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Theme issue contribution

Making Mining Good: Tracing the semiotics of justification in mineral exploration and mining

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Abstract
What does it mean for a business or industry to be and do good? And who can count themselves within the good economy? This article investigates the justification of goodness in mineral exploration and mining and uses the entwinement between value creation and destruction characteristic of mining to trouble notions of goodness in impactful industries. Based on analyses of in-depth interviews, ethnographic fieldnotes, and archival materials, the article follows the ways in which mining industry actors seek to negotiate contradictions between creation and destruction; and does so while using an innovative conceptual framework based in Peircean semiotics to open up justification for analysis of the underlying semiotic machinery that actors rely on to signify goodness. Mobilizing this conceptual toolkit, the article investigates how miners and explorers emphasize certain values, or signs, over others and how values are used to assert that some mines and miners do more good than others.

Keywords: justification; semiotics; mineral exploration and mining; valuation; extractivism; green technology

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Can mines be good?

> Everybody has a kettle at home, everybody drives a car, everybody has a mobile phone. Even the worst of the objectors show up with something that came from a mine, y'know. (Interview 9).

When it comes to doing good, mining holds a uniquely contradictory position rivalled only perhaps by the oil industry (see Lautrup Sørensen 2022). While its products are of fundamental importance to modern society, mining has costs that, at times, can be severe and irreparable (Jacka 2018; Miranda et al. 2003). The rapidly growing demand for metals and minerals in contemporary societies and industries has ushered in an era of extractivism unparalleled in human history (Arsel et al. 2016); the booming demand has made metals and minerals such a concern that the European Union has begun replacing natural protection and tourism with extractivism as its main framework for rural development (del Mármol and Vaccaro 2020). Meanwhile, the socio-environmental effects following in the wake of a booming minerals industry linger in the complex long-term social and environmental impact that arises both in the communities living around a mine and from the vast amounts of waste materials produced at mines (see e.g., Ureta and Flores 2022). It is therefore not surprising that while mineral extraction plays an important part in contemporary economies and industry, it is also often subject to significant contestation from local communities, stakeholders, and NGOs (Martinez-Alier et al. 2010; Acuña 2015; Conde 2017).

Because of these tensions, mining is rife with paradoxical valuations at the same time as it is subject to multiple lines of critique. The mineral exploration company CEO quoted above was eager to stress the good that mines bring to the world and pointed to the ubiquity of metals and minerals in contemporary society as an example of this. Having said this, he also expressed frustration with mining critics. Complaining that critics' accounts of mining and its impact are one-sided, he reversed the criticism and said, "don't benefit from something and then complain about it. That's really bad y'know." Mining critics, it follows, should not expect to have the cake and eat it.

This article investigates the ways in which mining industry actors, including miners and mineral explorers, justify the goodness of their work and industry. Asking who may claim to belong to the "good economy," the article draws on recent scholarship on emergent post-petroleum- and bio-economies that has outlined how industry actors point to extra-economical values to claim a form of goodness for their businesses or industry (Chiapello and Godefroy 2017; Asdal et al. 2023). Grounded in the observation that impactful industries, like mining and oil extraction, also claim to produce beneficial spillovers and extra-economic goods, including jobs, economic growth, and the kettles, cars, and other products mentioned above (Weszkalnys 2008;

Olofsson 2020; Lautrup Sørensen 2022; Ureta and Flores 2022), the article troubles notions of what it means for economic actors to be, or to do, good. In doing this, the article explores the ways in which mining and mineral exploration negotiate the kind of dual position that the exploration company CEO quoted above refused mining critics.

Previous research has described how the mining industry has launched initiatives that seek to balance out the negative aspects of metal and mineral commodities. Examples of such initiatives include attempts to differentiate good mineral products from bad by creating a certification system for ethically produced minerals, including for conflict-free gold (Reinecke 2015). Other examples include the introduction of corporate social responsibility programs that target mineral extraction and its relation to the surrounding human and non-human world (Jenkins and Yakovleva 2006; Kirsch 2014) and discursive inventions such as the oxymorons "clean coal" and "sustainable mining" (Kirsch 2010). But is certification or discursive innovation enough to make an industry good? And how do individual companies and projects navigate the many contradictory and conflicting values inherent in mining?

Focusing on how explorers and miners[1] negotiate the destructive potentiality of mineral exploration and extraction, this article follows the invitation to trouble "the good" (Asdal et al. 2023) by opening up the justificatory claims they make for an investigation of the values used to signify goodness and the ways these values are used to negate the costs of mining. In doing so, the article maps the semiotic content of claims of goodness and examines how the values actualized therein help miners and explorers negotiate contradictions and criticisms in order to represent mining as something that is and does good. To facilitate this investigation, this article employs a conceptual framework based in Peircean semiotics (Peirce 1992; see also Tavory and Timmermans 2014) and uses it to explore the practical and creative work mining industry actors engage in when justifying the goodness of their industry.

The continuation of this article is divided into four sections. The first outlines the conceptual toolkit used to open up justification for analysis. The second presents the methodology and outlines its three-pronged dataset consisting of ethnographic field notes, in-depth interviews, and archival materials, including applications for mining

[1] This difference between explorers and miners is an emic distinction made in the mining and exploration industry. While some companies bridge the distinction and do both, many mining and exploration companies belong to either one of three categories: companies that carry out exploration in previously unexplored areas, so called green-field exploration; companies who carry out exploration in regions known to hold mineral deposits, so called brownfield exploration; and companies solely focused on purchasing and exploiting already discovered deposits (Olofsson 2020).

leases. The third section accounts for research findings and demonstrates how miners and explorers justify mines and exploration projects by relating them to values claimed to signify goodness. The section also discusses moments of critique and critical disagreements between the mining industry and other actors. These moments illustrate how assertions of goodness depend on contextual factors and a receptive public for their legitimacy. The article's concluding section discusses the different strategies miners and explorers deploy in their justification and reflects on the benefits of using a semiotic bottom-up approach for studying justification in contested fields and industries.

Justification of goodness: A semiotic approach to claims of goodness

Valuation, or the processes of appraisal through which values are ascribed to objects and persons through different means of comparison such as ratings and rankings (Dewey 1939: 5), lies at the heart of justification. Based on the assignment and comparison of values, someone or something can be said to be of a particular character or possess more of a quality than someone or something else. In much research on justification, the source of these values has been located in certain regimes of worth (Blokker 2011; Silber 2016) or in discourse (see, e.g., Vaara and Tienari 2002; Erjavec and Erjavec 2015); and the work of Boltanski and Thévenot has played a foundational role in the emergence and growth of this branch of research. In their original work, Boltanski and Thévenot (1999, 2006) outlined six institutionalized economies of value in relation to which justification is claimed. These "worlds of worth," as they called them, include the worlds of the civic, domestic, fame, industry, inspired, and market,[2] and subsequent studies have drawn on this distinction between different worlds of worth to investigate the ways in which actors justify the merits of acts, decisions, goods, and services. Nevertheless, while this approach to the study of justification has been extremely successful, it is not without challenges.

The first challenge is that the worlds of worth framework struggles to accommodate paradoxes, especially paradoxes that do not confine themselves to tensions between two or more worlds of worth (Lee and Helgesson 2020). The second challenge is that there is a tendency in the literature to overdetermine empirical trends in a way that reduces justification to examples of particular worlds of worth, and this makes it hard to understand and untangle contradictory and competing

[2] Note that the worlds of worth framework was not intended as an exhaustive list limiting the number of possible worlds of worth to the six listed here (Lamont and Thévenot 2000) and has later been expanded upon by Boltanski together with Chiapello through a discussion on how new worlds of worth may emerge (Boltanski and Chiapello 2007).

values in justification. Addressing these challenges, scholars have proposed different ways to amend the orders of worth framework to make it better suited for analyzing conflicting valuations. One suggestion made by Gond and colleagues (2016; see also Krauss and Barrientos 2021) is that power should be added as a further analytic besides the worlds of worth to support inquiries into how the use of power is justified in conflict situations. A second solution has been proposed by Centemeri (2015), who writes that researchers need to look beyond the worlds of worth toward the ways in which the actors making justificatory claims engage with that which is being justified. In this amended version of Boltanski and Thévenot's framework, justification is tied in with other kinds of regimes of valuing, including values such as utility or personal attachment, and these regimes add further dimensions to the worth attributed to something; dimensions that lie beyond the economies of worth described by Boltanski and Thévenot (Centemeri 2015: 11; see also Langa 2020).

However, while approaches such as these help broaden the scope of investigation in studies of justification, they leave the tendency to reify the worlds of worth described by Boltanski and Thévenot unresolved. Moreover, by emphasizing power and engagement they move the focus away from conflicting values toward conflicts between actors in ways that, in turn, shift the focus away from the justification itself on to the actors claiming justification. Because of this, these amended approaches also end up leaving the key challenges associated with the worlds of worth framework partially unresolved.

While the solutions proposed by Gond and colleagues (2016) and Centemeri (2015) have been to complement the worlds of worth framework with other concepts or theories, this article suggests an alternative strategy. Leaning into and staying with the messiness of the paradoxes and controversies discussed above, this article reimagines the problem from the bottom up and focuses on justification itself. In doing so, it develops an approach that homes in on the contents of justification and on the creative work involved in crafting justificatory claims. To accomplish this, the article adopts a broadened approach to justification that draws on the semiotic theory developed by American pragmatist philosopher Charles Sanders Peirce.

By focusing on the semiotic components of justification the focus of the inquiry is shifted away from the worlds of worth toward opening up and interrogating the ways in which actors use actual or perceived relations between an object and one or several values claimed to mark its worth. In the context of this article, this means mapping the representations actors make of the relation between the object, e.g., their industry, a mine, or an exploration project, the values mobilized in the justification, and the results they seek when choosing to represent the relations between objects and values in a particular way. In Peirce's terminology this line of investigation constitutes an

exploration of how relations between objects and *signs* are represented in efforts to produce a particular *interpretant* (Peirce 1992; Tavory and Timmermans 2014). The sign is the value(s) used in justification to signify worth and the interpretant, e.g., goodness, becomes the result sought when representing the relationship between a sign and the industry, mine, or exploration project in a particular way. That is, it is through the representation of mining as being related to one or more signifiers of goodness that mining becomes good.

Using a semiotic framework to study justification allows inquiries to bypass the worlds of worth and to focus, instead, on how values are used to ascribe worth to things and persons from a bottom-up perspective. This approach prioritizes the representations actors make of the relations between objects and signs and the ways in which actors use these representations to negotiate contradictions and paradoxes in their claims. Consequently, this Peircean approach to the study of justification finds its analytical torque in unpacking the semiotic structure of justificatory claims rather than in mapping which worlds of worth actors draw upon when claiming justification (for a similar approach to valuation – rather than justification see Muniesa and Ossandón 2023, and Duterme 2023). Mobilizing this conceptual toolkit, the article investigates how miners and explorers emphasize certain values, or signs, over others and how values are used to claim that some mines do more good than others; and it does so without assuming that the actors and objects involved belong to or are restricted to a particular normative polity and that justification can creatively be adopted to fit different contexts, audiences, and lines of critique.

Research site and methods

Sweden as a mineral exploration and mining destination

In a global context, Sweden is a small player among the world's top mining destinations in terms of the volume of metals and minerals mined annually. Nevertheless, the country is one of the largest producers of metals and minerals in the EU – contributing 91.5% of the EU's annual iron ore production – and in terms of exploration expenditure relative to country size, Sweden sees more investment than exploration and mining giant Canada (Geological Survey of Sweden 2019). Additionally, Sweden has a reputation of being a low-risk jurisdiction – albeit with cumbersome natural resource and environmental regulation[3] – and Swedish mining and exploration

[3] For examples of such ratings see, e.g., the Mining Journal's Annual World Risk Report in which mining jurisdictions are rated according to their performance on legal, governance, social, fiscal, and infrastructure variables, e.g., https://www.mining-journal.com/category/research/world-risk-report-2023

policies describe mining as an important industry for the country (Ministry of Enterprise and Innovation 2013).

Nevertheless, while the country has a reputation of low-risk and political goodwill, mineral exploration and extraction in Sweden is a contested industry and subject to several salient conflicts. Examples of such conflicts include civil society contestation of exploration and mining projects (see, e.g., Anshelm et al. 2018) and conflict between competing interests, including competing uses of land and water areas on and around mining sites. One important example of the latter is how exploration and mining in the northern half of the country are carried out in conflict with the interests of indigenous Sámi communities. At the heart of this conflict is the mining industry's part in the expansion of industrial and government interests on traditional Sámi lands that threaten indigenous traditions such as reindeer herding, which is practiced by members of the Sámi community (Sörlin and Wormbs 2010). Mines disturb reindeer in their migration and force reindeer-herding Sámi to develop strategies to adapt their customs to fit within a mining impacted landscape (Gallardo et al. 2017). At the same time, explorers and miners often fail to recognize, or outright reject the Sámi's indigenous status and their right to the land (Persson et al. 2017; Lawrence and Moritz 2019).

These conflicts between contradictory values and interests are managed through legal processes overseen by governmental agencies and the regional land and environmental courts. For example, before a mine can be opened, a mining company will first have to demonstrate, in a court hearing, that a mine is the most suitable use of the area "in respect of the nature and situation, and the present needs" and that the mine "entails, from a general point of view, good resource administration" (Swedish Riksdag 1998: ch. 2, §1). Consequently, it is up to the parties in these conflicts to demonstrate why one set of values or interests should be granted precedence over others.

Taken together, Sweden's exploration- and mining-friendly policies, the long-term conflict between mining and other interests, and the environmental legislation's emphasis on resource husbandry and best use, means that Sweden as a mining destination offers a window through which to investigate how mining is made "good" through justification.

Dataset

The dataset consists of three complementary bodies of empirical materials: (i) 18 in-depth interviews with miners, explorers, Sámi representatives, and government officers; (ii) field notes from ethnographic fieldwork at exploration and mining sites, industry events, conferences, and courses; and (iii) a corpus of mining lease applications filed with the Mining Inspectorate of Sweden (MIS)

between 2010 and 2016.[4] Out of the 18 interviews, 16 were carried out face-to-face while two interviews were carried out using Skype. Sixteen interviews were audio recorded with the permission of the informants. Two informants declined audio recording. For these two interviews, extensive notetaking was carried out during the interviews. Ethnographic observation amounting to approximately 90 hours was documented in fieldnotes, either during the events, during breaks, or immediately after leaving the field for the day. In addition to the interviews and observations, documentation from 43 applications for mining leases filed with the MIS were collected through freedom of information requests made directly to the inspectorate. The corpus of applications includes supplementary materials such as financial and geological studies as well as the preliminary environmental impact assessments (PEIAs) produced for each application. Because of their role in mining lease and environmental permit processes, PEIAs complement informants' statements and field notes in that they offer a window into the practical work of justifying new mines. Taken together, the three types of data offer opportunities to explore in detail and from different perspectives how mining industry actors use signs when justifying their industry and what signs they use to signify worth in a mine.

Analysis: Unpacking justification

Interviews and field notes were coded using a constant comparative approach based on descriptive line-by-line coding and subsequent thematization by means of axial coding (Strauss and Corbin 1998). Care was taken to identify statements and events involving the justification of mines, mining, or mineral exploration for further analysis of which signs were used, how they were represented and what interpretants were suggested by the actor making the justification (see Peirce 1992; Tavory and Timmermans 2014). Because of the heft of the corpus of mining lease applications (the corpus consists of 577 documents and a total of 7,855 pages), line-by-line coding was determined unfeasible. Therefore, a less fine-grained thematic approach was used in which each document was read through and summarized

[4] Interviews, transcriptions, and data storage have been carried out in accordance with the guidelines provided by the Swedish Research Council (2017). All informants were apprised about the purpose of the study, the measures taken to anonymize their contributions, and gave their informed consent to participate. Observations were made with the full disclosure of the researcher's name and place of work and the author made sure to inform anyone with whom they interacted of the purpose of their presence at the event in question. To ensure confidentiality and to protect the identities of informants, all transcripts as well as the index of mining lease applications were anonymized by removing identifying information such as names of individuals, places, companies, and corporations as well as identifying information such as places of employment and geographic location.

in an index cataloguing the type of document and its origin as well as a summary of its contents.

Reproduction of the empirical materials in this article has been made with the aim of providing a detailed account in the form of a "collection of composed set-pieces" (Fine 2003) organized around the types of justificatory claims put forth in the materials. Examples from the interviews, observations, and documents presented here were selected based on their ability to illustrate the thematically organized findings.[5]

Becoming good: The justification of mining and exploration in Sweden

Because miners and explorers frequently must justify mining and exploration projects to government agencies, the land and environmental courts, investors, and stakeholders, the question of how mines are made good in justification is more than a mere philosophical curiosity. Instead, it is a question with far-reaching implications. Moreover, it is a question that is actualized every time a mine or exploration project's costs and benefits are outlined and weighed, including in the permit applications and court hearings discussed above. For explorers and miners working in Sweden, the process of opening a new mine or expanding the operations of an existing mine involves several steps in which justification takes center stage. For example, to receive the right to exploit a mineral deposit, they must first apply for a mining lease, a process which requires applicants to demonstrate: (i) that it is likely that the mineral deposit in question can be mined at a profit within a 25 year period; and (ii) that the location or quality of the deposit does not mean that mining it will cause such an impact on public or private interests that its exploitation is rendered unsustainable (Swedish Riksdag 1991). Applications for mining leases therefore include several types of documents that describe the geological qualities of the deposit, the economic viability of the new or expanded mine, and the consequences the operation will have for other interests and for the environment.

One of these documents is the PEIA, and this is one place in which the reconciliation of a mine's socio-environmental impact and economic benefits comes to the fore. In the PEIA, applicants are to account for and weigh a mine's impact on environmental, social, and cultural values in and around the projected mining area. This multidimensional assessment includes reviews of the expected impact on landscape; land and aquatic life; surface waters; and ground waters.

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[5] Quotes from interviews conducted in any language other than English have been translated to make them more accessible to readers. All quotes have been edited for readability meaning that stutters, repetitions, and similar features have been removed.

PEIAs also include estimates of the mine's contribution to noise pollution and vibration levels in and around an area, as well as an account of the values that may be impacted by the mine, including impact on to environmentally valuable species, biotopes, or artefacts and historical or archeological remains.

The environment, economic benefits, and rural livelihoods: Job creation as a sign of goodness

While the balancing of socio-environmental costs and economic benefits runs like a thread throughout the PEIAs analyzed for this article, the tension between different values takes center stage in the sections of PEIAs that discuss the so-called "zero alternative." A zero alternative is a statement on what the applicant proposes would happen if the planned mine were to go unrealized. In discussions of zero alternatives, miners and explorers contrast the costs and benefits of a projected mining operation and justify the benefits of mining a deposit. In the quote below, the applicant is outlining what would happen if a mining project in northern Sweden were not to open:

> The zero alternative means that the deposits at [the location] are left unexploited. This in turn would mean that there will be no conflict between other interests and mining in the area and that the planned investment will not materialize. This in turn means that the near 100 jobs that [the mine] is estimated to generate directly during its operation, as well as the equal number of jobs created at the construction stage, will not be realized. (PEIA 21a).

In the applicant's discussion, the number of jobs expected to be created at the mine is brought forth as a central, characterizing value of the mine. Later in the same section, the applicant goes on to state that in addition to the 200 jobs expected to be created in constructing and operating the mine, an additional 100 jobs are expected to be created indirectly in the surrounding community supplying the mine with materials and servicing its workers and their families. In other words, refusing the applicant a mining lease would mean pulling 300 jobs off the table – a decision that would amount to a significant loss to many of the sparsely populated rural communities in the mineral rich parts of Sweden.

The justification made in the PEIA cited above is characteristic of all PEIAs in the corpus and it offers an example of how mining industry actors justify what they do by stressing the benefits they bring while also pointing out the costs involved in refusing them a mining lease or environmental permit. By centering a particular sign, in this case job creation, miners and explorers emphasize the relation between the mine and the sign in a way that downplays the relevance of other

signs related to the mine such as the environmental impact it would cause, including permanently altered landscapes, increased pollution, reduced groundwater levels, or other forms of socio-environmental disruption.

While mining industry actors successfully highlight the relation between mines and jobs, this does not mean that jobs are in and of themselves an inherent mark of goodness. Instead, to understand how mining's contribution to regional economies becomes a viable sign of goodness, one must look to the context, discourse, and debates that give weight to the signs used. One important contextual factor is that many mines and exploration projects in Sweden are located in sparsely populated rural areas where the establishment of a large industrial operation, such as a mine, would mean a significant boost not only to the local economy but to all municipal operations, as new jobs and new residents would be reflected in the municipality's tax base. An exploration geologist based in a small northern town discussed how dependent communities like hers feel about mines operating in the region. In the discussion, she contrasted the situation of her community to that of communities in other parts of Sweden:

> Up here, in northern Sweden, any village or town located near a mine is very dependent on it. And here in [Town] we have [Mining company's] mine. And many here are employed, yeah if not directly, then as consultants or in associated businesses like at the vulcanizing shop that does a lot of business with [the mines in the region] and if just one of those mines were to close it would really affect a lot of people out here. The thought is actually quite frightening! So having these mines is important for us who live up here, that we have mines and mining, definitely! Southern Sweden is different, absolutely; they have many other industries and job opportunities. That's a fact! (Interview 17).

The differences in economic opportunities between the northern periphery and the central south described by the geologist is a prominent feature in contemporary Swedish debate (see Olofsson 2019). It is this tension between urban economic centers and rural communities that mining industry actors rely on when using a mine's ability to create jobs and economic growth as a justification for their goodness. That is, in statements such as those quoted above, where goodness becomes an interpretant because of the ways in which the signs used are embedded in a larger universe of tension and debate around the varying economic opportunities in Sweden's centers and peripheries, mines become a vehicle of critique against real or perceived injustices in Swedish domestic politics. An example of this line of critique is how a senior mining officer complained that the policies that regulate mining and mineral exploration in Sweden

reduce rural landscapes to something to be visited and looked at, rather than places that people can live in:

> The regulation was written by those who, if you allow for some simplifications, visit nature and look at it, not by those who live and work in it. You know, the Swedish Environmental Protection Agency, which is a powerful actor in these matters, have their main office on Valhallavägen [in central Stockholm]. I believe it would be better if they'd move out closer to nature. Then perhaps they'd gain a better understanding of the need to build opportunity structures so that people who want to live and work in the countryside can do so. (Interview 13).

Nevertheless, while the miners and explorers quoted above use signs such as job creation and economic growth as near universal marks of good, the justificatory claims they put forward neglect the fact that there are others living and working in rural regions who disagree with the contents of these claims or see their businesses and ways of life threatened by the mining industry. In their responses to arguments that stress the importance of mining to rural economies and livelihoods, critics often use the interpretant suggested in this justification as a sign in their own second-order justification. One example of this is how a senior member of a Sámi district, on whose traditional lands an exploration company was looking to establish a new mine, criticized the shortsightedness of the justification made for the project. While he admitted that the mine would bring some economic benefits, he did not agree that the benefits would outweigh the costs:

> [The mine] was only planned for seven years, and they said that "it could grow to become much bigger and last longer." But to cause so much destruction for just seven years! (Interview 14).

That is, while the economic benefits may offer some degree of good, the short lifespan of the mine meant that its benefits, in the eyes of the Sámi district member, did not outweigh its long-term costs. And the Sámi are not alone in arguing this. The Swedish Tourism Association, for example, has voiced a similar critique and argued that Swedish policymakers erroneously place the benefits of mining before the long-term costs the industry causes other rural industries, including tourism and reindeer herding (Svenska Turistföreningen 2022).

Critiques of the shortsightedness of using economic benefits to justify long-term environmental impact demonstrates how the capacity of a sign to outweigh others, and thereby negate paradoxes and contradictions, depends on the willingness of others to recognize the validity of the claims made. Conflicts between the mining industry and other actors in rural areas are illustrative examples of this as both sides are critical of the ways that the other represents and justifies what is

good and right; the Sámi and tourism sector by criticizing the shortsightedness of mineral extraction and emphasizing their long-term engagement with the affected landscapes, and the mining industry by rejecting the validity of the criticism, because it comes from people who merely look at nature, or by refusing the Sámi their indigenous status and associated rights.

Green means good: Environmental benefit as a sign of goodness

A second context that gives weight to the justification made by mining industry actors are the debates on climate change and the role of electrification in combating global warming. Pointing to how wind turbines, solar panels, electric cars, and other hallmarks of contemporary imaginaries of a fossil free energy system all depend on metals and minerals, miners and explorers argue that mining is an acceptable and necessary price to pay for a greener future. And this justification has a receptive audience. For example, when the state-owned Swedish mining company LKAB in January 2023 announced that they had discovered a deposit of rare earth minerals – a group of minerals for which applications include batteries and wind turbines – the Minister for Energy, Business, and Industry, Ebba Busch, participated in the press briefing, where she told journalists that the discovered deposit, although it had yet to receive a mining lease or environmental permit, would be of critical importance for green energy transition and for the Swedish government's ability to meet its climate targets (see Lutto 2023).

As with job creation and economic growth, justification relying on the relation between mining, green technologies, and electrification as signs of goodness depends on the discursive context surrounding green technologies and climate change for their justificatory torque. Moreover, as current levels of metal and mineral recycling are far too low to meet even present demand (Ciacci et al. 2017), miners and explorers have plenty of opportunities to argue that mineral extraction, however impactful it might be, is good because of how important it is for a green future. For example, one mineral exploration company's CEO emphasized how important present and future mines will be if contemporary ambitions on electrification are to be realized:

> If we want to have enough copper for all these views about electrification, y'know, electrification of cars, getting away from fossil fuels and what have you. Shit, there is a lot of work to be done! So every person that is out there right now with an idea about trying to find something somewhere needs to be taken seriously. (Interview 9).

The way that mining industry actors draw on the need for metals and minerals in electric vehicles and renewable energy infrastructure exemplifies the way in which the paradoxical tensions between value creation and destruction in impactful industries can be rebalanced by references to external tensions. Just as the Norwegian oil sector was made good by regulators' efforts to use its revenues for expanding the welfare sector (Asdal et al. 2023; see also Lautrup Sørensen 2022), the mining industry is made good through its potential to contribute the raw materials needed for a green technology and energy future. Then again, compared to the Norwegian oil industry, the mechanism through which mining is to make this contribution is reversed as the modern mining industry is not expected to share its surplus, but expand its operations so that it can put more metals and minerals in the hands of car manufacturers and wind turbine producers.

By their relations to signs associated with greenness, mines, despite their environmental impact, are made good through the part they play in current plans to mitigate the climate crisis – a semiotic relation that paradoxically recasts an environmentally impactful industry as a green enterprise. However, the use of the mining industry's relations to green technology and infrastructure in justifications is not uncontroversial. In a statement published by Amnesty Sápmi (a branch of Amnesty International Sweden), activists seeking to stop a nickel mining project on traditional Sámi lands (a project that boosters claim will make an important contribution to the emerging Scandinavian battery industry) decry the use of environmental values in justification of mineral exploration and mining, labeling it a "green colonialism" and a violation of the Sámi's indigenous rights (Amnesty Sápmi 2023). As with justification using economic benefits to signify goodness, greenness is not an absolute sign of good, but a contextual one that depends on the recognition of others to hold merit. Gaining acceptance for one's claims of good is therefore a matter of who is able to make their version of what is good the dominant one – and when a government minister praises a mine's importance for the country and its transition to a green future, the voices of local stakeholders, indigenous groups and other objectors may find it hard to be heard.

Relativized costs and benefits

In the above examples, justification works by singling out certain signs as more important or more relevant than others. However, justification can also be based on comparisons between two or more objects' relation to a sign. One example of this form of justification is how mining industry actors discuss the failures of past mines to prevent long-term social and environmental damage. In a keynote address at an international mining and mineral exploration conference, the CEO of an international mining corporation spoke about the

boom-and-bust rhythm characteristic of mining and of how the industry, as mines waxed and waned, used to leave ghost towns in its wake. He then turned to the present and stressed that modern mines must do better than their predecessors and ensure that local communities do not dwindle and die when a mineral deposit has been depleted and the mining company has moved on to other projects.

Like the keynote speaker, mining industry actors in Sweden also draw on narratives about history to justify why the mines of today are better and do more good than the mines of the past. For example, an officer with the Geological Survey of Sweden, a state agency responsible for producing, archiving, and making available national geological data, said that he could understand that mines of the past were built and operated in ways that caused irreparable environmental damage. After all, he continued, "the word 'environment' hardly existed back then," implying that miners of today possess a type of environmental awareness that miners of the past did not (Interview 16).

By comparing present-day mining to mines of the past, miners and explorers effectively sever relations between past and present in a way that frees contemporary mines from potential associations to signs attributable to historical mines. And they do so by suggesting that mines today will not cause the same social or environmental costs that historical mines did. This distinction between past and present environmental consideration (or lack thereof) is one example of how comparisons are used in justification of contemporary mineral exploration and mining. Another example is the distinctions made using geography and real or perceived differences in environmental policies and practices between the global north and the global south as signs of goodness. This distinction represents the relations between mining and signs such as a willingness to take social or environmental responsibility, as significantly different in different regions. This distinction is perhaps best exemplified – or at least, most nakedly visible – in the following quote from an exploration consultant working in Sweden: "Swedish gold is relatively good. It is better than Latin American gold where they destroy the rainforests and shoot Indians." (Interview 7).

Here the line of comparison is not between past and future, but between different locations and the real or imagined differences in what mineral exploration and mining entails in different contexts. This is a common form of justification among mining industry actors in Sweden and the global north, who point to their adherence to environmental regulation and oversight as something that sets them apart from other mines. Using signs such as rainforest destruction or the murder of indigenous people, miners and explorers working in the north lean into common stories about villain companies and evil states in the global south (see Appel 2012) in ways that allow them to cast

their mines and exploration projects as comparatively less impactful and therefore more good. Some informants even went as far as describing the proposed relation between mining in the global south and the risk for social and environmental harm as a moral dilemma facing the industry. Talking about the ability or willingness of different national governments to limit or restrict mining out of environmental concerns, the CEO of an exploration company working in Sweden compared the way that governments in the global north might be prepared to restrict mining in environmentally sensitive areas to how governments in less privileged parts of the world might act:

> [Y]ou can imagine other poorer countries on the planet that don't have any choice. So then here comes the, sort of like, the moral dilemma. So it's easier to go to a country like Mali, okay, that has historically been mined for gold, or Ghana, another one, and set up a new mine. And y'know, there is a lot more potential for corruption in the system. And that's not just today, that's developed. So now it's an industry, if you like, which is largely benefitting the people that work on these mines and also the officials in power of these countries. But they probably wouldn't want to stop such a project because it might affect some environmental thing, some bush or some frog or some tree or something like that. (Interview 9).

As noted above, this use of real or imagined differences in the willingness or capability of governments and state actors to enforce policies that safeguard social or environmental values as a sign of relative goodness is common among actors in the Swedish mining industry. By using narratives about the relative strictness of Swedish environmental legislation as signs of goodness, miners and explorers working in the country claim that because Swedish legislation is stricter than that of many other jurisdictions, mines and exploration projects in the country do more good – or less bad – than mines elsewhere. According to this line of reasoning, allowing more exploration and mining in Sweden becomes a way of ensuring that the mining industry on the whole does more good. Or as the exploration company CEO concluded in his discussion of this proposed, moral dilemma:

> So, the thing to do is to actually explore in countries that have got good regulation, like the United States, or Canada, Sweden, Scandinavia. Whatever you find must be the real thing and it must actually meet the requirements of becoming a human activity that is in favor of all of us that live here. Not just this party or that party. (Interview 9).

This justificatory strategy works in the opposite way from the strategies observed among oil companies operating in southern jurisdictions, who have been shown to seek to disassociate themselves

from negative signs such as corruption by walling themselves off from their surroundings (Appel 2012). In contrast, justification offered in accounts like the ones made by the exploration company CEO above depend on representations that highlight the mining industry's embeddedness in the social, political, and regulatory environment of countries such as the United States, Canada, or Sweden. And in doing so, miners and explorers make a mine's relative relation to signs such as regulatory strength and a perceived willingness to enforce environmental legislation a mark of goodness.

The structure of this justification differs from the forms of justification discussed in previous sections. While justification that stresses a mine's relation to positive signs, such as job creation or the contribution of raw materials to green energy and technology, or claim goodness by placing certain signs before others in ways that favorably balance a mine's costs and benefits so it becomes good, comparison-based justification follows a different structure. By relying on comparisons between mines operating in more or less strict regulatory environments, this justification expands the notion of goodness from being a question of whether a mine is capable of producing sufficient benefit to outweigh its costs into a question of whether a mine's costs or benefits can be expected to be comparatively more or less good than those of another mine. A second example of this mode of justification can be found in how several informants criticized Swedish policies that allow municipalities to veto uranium mining projects. Several informants said that they believe that Sweden should open its bedrock for uranium mining, and a mining engineer argued passionately for why this should be done:

> We have nuclear power in Sweden and we import our uranium from Russia and Namibia, and Canada. And we probably have the strictest environmental regulation in the world here in Sweden. Is it then morally correct that we purchase our uranium from Namibia, which has poorer environmental regulation than we do, and use it, unless we are also prepared to mine our own uranium, under stricter environmental regulation? That's something to think about, whether that's hypocritical or not. I believe it is. (Interview 3).

As in previous examples, the perceived strength of Swedish environmental regulation is used here as a sign of goodness, which is used to claim that a Swedish uranium mine – had there been any – would be more 'good' than the Namibian mines from which Swedish reactors source their fuel. Here the justification relies on positioning a potential uranium mine in Sweden as possessing more of a sign (such as environmentally friendliness) than a Namibian uranium mine. And it does so in a way that not only claims that Swedish mines do more good, but which also casts a Namibian mine as an immoral and

hypocritical alternative. Because it relies on comparison, justification such as this necessitates a normative valuation that favors the object of justification. It does not matter whether Swedish environmental legislation is as strict as those using it to justify Swedish mining make it out to be, or whether Namibian uranium mining really is an immoral alternative. Instead, what matters is what the idea that Sweden has strong environmental legislation and that Swedish authorities, unlike those in other jurisdiction, do not hesitate to use it, allows mining industry actors to claim in justification. Narratives such as these afford comparisons that in turn allow miners and explorers to cast questions about where to mine as moral dilemmas that are best resolved by opening "good" jurisdictions for more mining.

Implicit in the comparison-based justification discussed here is a refusal of the premises of some critiques. By drawing boundaries between past and present mines or between Swedish and Namibian mines, industry members claim goodness by arguing that while other mines were or are bad, their mines are not. A manager at a local mine, for example, had the following response when a participant in a workshop on sustainability in mining challenged his assertion that mines are not inherently harmful: "Just because Hitler was German does not mean that all Germans are bad!" That is, although some mines may be bad, a few bad mines do not undo the goodness of other mines.

Conclusion

The paradoxical tension inherent in mineral exploration and mining makes the mining industry a uniquely well-positioned case for exploring the semiotics of justification and to trouble notions of good in the economy. Being simultaneously necessary for contemporary socio-technological arrangements, including for green technologies, and inherently non-renewable and impactful, mining upends distinctions between value creation, preservation, and destruction as the goods and benefits it produces come at significant cost. This paradoxical position is visible in the ways mineral exploration and extraction, while environmentally damaging, are prerequisites for many of the environmental initiatives that typically fall under the banner of the good post-petroleum economy, including renewable energy and electric vehicles. As influential actors, such as the European Commission (EC), embrace electrification as a means of cleaning up their energy system (see EC 2020), the importance of metals and minerals for energy production and storage as well as for transportation has seen the mining and exploration industry grow increasingly entangled with positive environmental values. But is this enough to make mining part of the good economy? The short answer is probably no. But the long answer is that it is complicated. After all,

when miners and explorers claim to do good their appeals to goodness are different from those made by actors in the burgeoning alternative economies, such as impact investment or the proto-renewable bioeconomy, who rely on a distinction between past and future economic entanglements to justify their goodness (see Karhunmaa (this issue) and Stilling (forthcoming)). While the miners and explorers quoted above stress their contributions to rural communities and environmental technologies, they are only able to do so by downplaying the drawbacks of their industry, or by pinning problems on a temporally distant or underprivileged Other. As with the oil industry (Appel 2012; Lautrup Sørensen 2022), the mining industry's claims of goodness depend on their context and its willingness to give some values more weight than others.

Using mining's paradoxical relation to value creation and destruction as an analytical lens, this article has investigated how mining industry actors justify the goodness of mineral exploration and mining. Focusing on the semiotic content of justification made by industry members as well as by their critics, this article presents two strategies, or modes, of justification through which claims of goodness in mines and mining are made. In the first mode, a sign is treated as more relevant or important than other signs attributable to the same object. A mine's ability to create jobs or its contribution of necessary materials to the green energy and technology sectors, for example, may be used to argue that, based on the merits of the first sign, other aspects of the mine, such as its environmental or social impact, can be forgiven or ignored. In the second mode, justification works by representing two or more objects as being either more or less related to a sign. In this strategy, a mine is made good by being more beneficial or less impactful than another mine. Miners and explorers in Sweden, for example, claim that because they operate in a jurisdiction characterized by strict environmental legislation and oversight, they are forced to do more good than mines operating in more lax regulatory spaces. Being forced to limit their negative impact, the argument goes, Swedish mines are by necessity better than mines in other jurisdictions.

Like other industries and phenomena, mining holds multiple relations to many different signs. Because of this, the way in which justification weighs signs against each other or stresses the relative strength of the connection different mines have to a sign is the root of the paradox of good mining. In practical terms, this paradox emerges from the plurality of signs attributable to a mine and the way that different justificatory claims, often made to different audiences in different arenas, emphasize some signs while neglecting or downplaying others – after all, when your access to water is unstable and uncertain, even the runoff from a mine's tailings dam can be a lifeline (Ureta and Flores 2022). Nevertheless, while the specificities of

the examples of justification discussed above differ, they are alike in how they connect a mine or exploration project to institutions such as environmental legislation and discursive notions of economic fairness, greenness, or legislative strictness. This inquiry has highlighted the ways in which justification combines objects and signs to achieve a particular result, an interpretant, and how justification becomes meaningful through the broader universe of meaning that the signs inhabit, including debates and narratives on issues such as rural impoverishment or green technology and electrification. It is this broader universe of meaning that allows miners and explorers to bracket out costs and emphasize the good in a present or future mine.

While the signs discussed here could potentially be sorted into the worlds of worth outlined by Boltanski and Thévenot (2006), the bottom-up approach developed in this article pushes the analysis beyond the limits of their framework. By centering the way justification relates signs and objects to produce interpretants such as goodness, the framework opens up justificatory claims to a detailed investigation of the ways in which actors relate what they do to signs that in different ways allow them to claim goodness and negotiate paradoxes and contradictions. Moreover, while this article has primarily troubled notions of goodness in mining and mineral exploration, it has also outlined several instances of critique in which miners and objectors seek to refute each other's claims by questioning the relevance of the signs used or by pointing to alternative signs. These moments of critique contain disagreements over the weight given to different signs, for example, whether short-term economic benefits can be said to outweigh long-term environmental costs, as well as attempts to disqualify the premises of critique. Examples of the latter include miners' refusal to be lumped together with other, bad, mines as well as their strategic use of comparison, through which they claim that what they do is different, and therefore better, because their relation to a certain sign, such as corruption or a regulative environment, is unlike that of the Other.

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