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# Disassembling Poland's high-carbon imaginaries from within: The case of local activism in Upper Silesia

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## ABSTRACT

This paper seeks to understand how dominant high-carbon imaginaries, such as those associated with coal, can be disassembled from within. Although resistance can have a disruptive potential to threaten the prevailing energy narrative, in certain contexts, the complete replacement of the dominant imaginary with an alternative one may not always be feasible or preferable. The paper shows how thinking about disassembly from within can be achieved by bringing the interpretative envelope of sociotechnical imaginaries (STI) into productive conversation with the concepts of hyperobject and hyposubjects. While the analytical framework of STI accounts for the material-normative co-production of future-making, the hyperobject emphasises the effects of human-natural interconnectedness, and hyposubjects elucidate how this mesh can be used generatively through attunement and subsistence. The paper illustrates this way of thinking about disassembling from within by focusing on Upper Silesia, a region in Poland uniquely bound to coal. Through the case of a local activist group *Queer Silesia*, the paper provides a perspective on disassembly from within where elements of the old but prevailing imaginary can be repurposed to create visions of the post-coal future without erasing the resource's legacy or compromising social cohesion.

## 1. Introduction

There is a growing realisation within social science energy research that the incumbency and endurance of fossil fuels cannot be addressed solely by assembling and upscaling novel low-carbon energy systems and institutions that support them [1]. Equal attention must be placed on disassembling old but powerful and seemingly durable fossil fuel incumbencies [2]. Turnheim and Geels [3] stress the importance of understanding the processes that destabilise incumbent energy regimes, showing in the case of the UK how these processes are multi-dimensional and enacted through diverse actors and institutions. Brown and Spiegel [4] have shown how protests around sites of coal extraction can disrupt the logics of incumbent firms in ways that enable processes of rupture and transformation from within the high-carbon energy regime. Perspectives like this confirm the value of Stirling's call for a "worm-eye view" on the incumbency of fossil fuel 'regimes,' and its capacity for moving "beyond narrow policy interventions, to embrace broader and deeper kinds of political collective action, culture change and democratic struggle" [5, p. 1].

Seizing upon these insights, we begin by acknowledging how the

seemingly durable incumbencies of fossil fuels like coal cast a long shadow over society's capability to *imagine* alternative energy futures. As Kuchler [6, p. 433] observes, future energy visions are often "trapped within the imaginative potentials and resources available in the contemporary socioeconomic system". Hence, high-carbon imaginaries continue to hold a powerful grip on societies, making it difficult for (radically) different energy visions to gain a foothold and become future drivers of low-carbon transformations [7,8]. For us, coal in Poland provides an illustrative case of both the potency and obduracy of high-carbon imaginaries, a country that "stands on coal" and is fuelled by "specific materialities of black gold and its related infrastructure" [8, p. 1].

In this paper, we seek to explore how dominant high-carbon socio-technical imaginaries, such as those associated with coal, can be *disassembled* from within. We agree with Kuchler and Bridge [8, p. 3], who argue that imagined futures often fail to radically depart from the past. At the same time, we propose that disassembling from within is unlikely to be achieved by envisioning a radical or resistant imaginary and wholesale replacement of the dominant narrative. We focus instead on identifying examples of disassembly where it is the members of affected

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communities themselves who respond to the ongoing changes by repurposing parts of the old imaginary to construct a new vision of the region without discarding the elements of cultural significance and further eroding social bonds in the process. We refer to this process as disassembly *from within*, or a generative disassembly, arguing that it entails identifying shared aspects among diverse actors, both human and nonhuman, and utilising them constructively to develop something new while simultaneously esteeming significant elements of the old. We concentrate particularly on the co-productive role of entrenched *material* properties within energy-producing spaces exerting long-term socio-political and cultural influences on the capability to imagine energy futures.

The primary aim of the paper is to put the concepts of sociotechnical imaginaries (STI) in a productive conversation with hyperobjects [9,10] and hyposubjects [11] with the goal of tailoring an analytical-interpretative lens for teasing out local-scale instances of creative engagement with high-carbon imaginaries. By combining STIs with hyperobject and hyposubjects, we aim to illuminate movements that consider the role of materials in shaping the social and facilitating transformation while building solidarity across different social groups. Our ambition is, therefore, not to replace larger-scale analyses of STIs but to complement them by magnifying the processes of productive disassembly through engagement with the materialities of the regions in transition. This alternative offshoot of STI analysis, which we propose, introduces more complexity into the research on energy transitions by disclosing what local grassroots movements can teach us about more context-sensitive disassembly through repurposing and retooling of fossil fuels' legacy.

We begin by turning to the extensive scholarly work on socio-technical imaginaries that has, since the concept's inception [12], offered ample analytical insights into the emergence, embedding and extension of collectively upheld energy visions [6,7,13–17]. We observe that a growing number of STI scholars have recently turned their attention to the contested and unfixed character of dominant, institutionally stabilised energy visions. Studies on the niche, bounded, excluded, rival and radical imaginaries show how different social actors perform alternative or resistant imaginaries that often challenge the prevailing vision [e.g., [7,16,18–20]]. These insightful contributions offer a valuable enrichment to the STI scholarship, which until recently has mostly concentrated on identifying and interrogating processes of embedding collectively held imaginaries, particularly on the national level [e.g., [19,21]]. In parallel, there is also a growing interest among STI scholars to critically explore the role of materialities in co-producing and (re)shaping imaginaries. These researchers discern that material properties of energy sources and infrastructures influence the formation and transformation of energy visions [e.g., [8,22–24]].

Acknowledging the importance of these two contributions to the literature on STIs, we also agree with Jasanoff and Simmet [19] that replacing one energy vision with another neglects the question of how fossil fuel materialities co-produce social life and uphold high-carbon imaginaries. These authors caution that such a substitution can only temporarily remove selected symptoms of global climate change without addressing its root causes [19]. We concur with Jasanoff and Simmet [19, p. 9] that the interpretative envelope of STIs “helps reveal the ways in which the material and normative dimensions of future-making are bound up together”. However, in this paper, we seek to depart from their understanding of materialities as closely intertwined with social power dynamics through values natural resources bring to society. Instead, we acknowledge the role of natural resources in society and the values they bring while also emphasising the agency of nonhuman objects. This expanded perspective allows us to move beyond a purely human-centric view and consider the complex entanglements between human and nonhuman actors in future-making processes.

We do so by bringing the concept of STIs into productive conversation with the key element from Object Oriented Ontology (OOO), *hyperobject* [9,10,25] and its recent offshoot – *hyposubjects* [11]. We find

these two concepts beneficial in two crucial ways. First, they help us contribute to a better “analytic symmetry” between the material and the normative [19, p. 2] by considering the agency of the nonhuman. Second, these notions bring to the fore bottom-up processes of envisioning futures across different social groups, which are important to the question of disassembling dominant imaginaries from within. Coined by Timothy Morton [9,10], the concept of hyperobjects shifts the focus away from the centrality of human agency and acknowledges the iterative relationship between nonhuman objects, such as coal, and the social orders they co-produce. Morton and Boyer's hyposubjects [11] bring into focus processes of disassembly taking place via alliances between heterogeneous social groups who perform imaginaries centred on recognition of the material objects' impact on society, culture, and environment.

The insights from OOO make it possible to foreground how dominant imaginaries can be disassembled by engaging with their materialities and effecting change from within [11]. By proposing this conceptual juxtaposition, we respond to a broader call in social science research for perspectives that can capture the messy, heterogeneous and localised character of energy [e.g., [26,27,28]]. In this sense, we depart from a mindset of strongly rejecting high-carbon imaginaries that may lead to the substitution of one energy source with another without considering the broader implications. Instead, we contend that by highlighting the interconnectedness of both human and nonhuman objects, the ontological shift in social science can serve as a guiding force in the formulation of more context-sensitive energy transformation pathways.

We illustrate the proposed conceptual conversation between STIs and OOO on the case of coal in Poland. Poland's heavy reliance on coal, or “black gold”, is seemingly unshaken by various material ambiguities and constraints, including resource depletion and the urgency of climate change [8]. In 2021, 96% of hard coal within the European Union (EU) was extracted from the Polish mines in the Upper Silesia region, and the country remains the second largest producer of brown coal in the EU after Germany [29]. In the same year, almost 80% of electricity in Poland came from hard and brown coal [30]. Poland's coalmining regions exemplify how powerful sociotechnical imaginaries hinder people's ability to envision a future beyond coal. While many mining communities are closely-knit and have culturally-specific values and traditions, a closer look at these “coalscapes” [31] reveals they comprise multiple and diverse parts which do not necessarily conform to the logic constructed around their greater wholes. Foregrounding alternative visions which consider materiality's role in social life sheds light on how dominant imaginaries can be disassembled from within. We illustrate this with the empirical example of Queer Silesia, a local activist group operating within the hard coal heartland of Poland. The empirical material used to facilitate this illustrative instance was compiled through a combination of desk research primarily conducted between 2021 and 2022 and ethnographic fieldwork carried out in Upper Silesia during the period of March to June 2023.

The paper is structured as follows: in Section 2, we outline the analytical approach of STIs and illustrate how it can be brought into productive conversation with the concepts of hyperobject and hyposubjects to advance research on disassembling high-carbon imaginaries. In Section 3, we provide a brief overview of dominant STIs concerned with Polish coal. In Section 4, we introduce an empirical example of local activism in Upper Silesia to show how the proposed juxtaposition of STIs with the hyperobject and hyposubjects can be deployed. Finally, we present our conclusions in Section 5.

## 2. Conceptual framework

We begin this section by providing a brief overview of the STI scholarship concerned with energy futures by focusing on two strands in this research that we consider relevant to our paper. We then explain how hyperobject and hyposubjects offer a perspective on disassembling dominant high-carbon imaginaries from within. First, we problematise

coal as a hyperobject to demonstrate the intricate interplay between humans and this natural resource. Specifically, we emphasise its agency by underscoring the extensive interdependencies it shares with society. Second, we outline a recently emerged notion of hyposubjects, focusing on their ability to illuminate disassembling from within through engagement with hyperobject's inescapable enmeshment and the forming of heterogeneous alliances on the basis of common attachments.

### 2.1. Sociotechnical imaginaries: disassembling from within

In recent years, the analytical framework of sociotechnical imaginaries has gained significant traction in social science research on desirable energy futures. In the article which lays the foundation of STIs, Jasanoff and Kim [12, p. 109] observe that “technoscientific imaginaries are simultaneously also ‘social imaginaries’, encoding collective visions of the good society”. Drawing upon social science work concerned with the notion of the imaginary and its (powerful) role in (re)shaping nationhood [32–34], these scholars recognise that by “activating collective consciousness, imaginaries help create the political will or public resolve to attain them” [12, p. 123]. Jasanoff and Kim [12, p. 120] define sociotechnical imaginaries as “collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects”. In this sense, the authors associate STIs with “active exercises of state power” [12, p. 123]. Since its introduction, however, the concept has been somewhat broadened to include other collective forms of life situated outside the nation-state. For Jasanoff and Simmet [19, p. 3], for example, “the point is to show how an STI produces a sense of belonging to a particular kind of collective that may be as large as a nation-state or as small as a breakaway utopian community”.

The analytical value of STIs has been particularly demonstrated in studies on how collectively upheld energy visions emerge, become socially embedded and extended, and are influenced by past choices and trajectories [e.g. [6,8,13,14,15,21,35]]. However, an increasing cohort of STI researchers has shifted their attention to examine the contested and unfixed character of powerful, institutionally stabilised energy imaginaries, revealing how they are often challenged by visions that emerge from or take shape in spaces beyond the confines of the nation-state [e.g., [7,16,17,18,20,22,36–42]]. Although some scholars point out that alternative STIs often encounter numerous constraints, including lack of access to political power and financial resources, marginalisation and absorption [e.g., [17,38,41]], other researchers highlight the potency of rival or resistant imaginaries to contest, oppose and even obstruct prevailing visions [e.g., [7,16,20,22]]. For example, Marquardt and Delina [20] aptly demonstrate how radical energy imaginaries, performed through the “prefigurative activism” of rural communities in Thailand and the Philippines, can have the potential to disrupt and threaten the dominant fossil fuel-based narrative.

Simultaneously, there is a burgeoning interest among STI scholars in acknowledging the significance of materialities in (co)producing and (re)shaping imaginaries. This research aims to explore and gain a better understanding of the role material factors, such as physical properties of resources and infrastructures, play in the emergence, embedding and extension of energy visions [e.g., [8,19,22,23,24]]. For example, by examining the development of negative emissions technologies (NETs) in Sweden, Christiansen and Carton [22, p. 7] show that material conditions can enable or constrain “the opportunities for emerging imaginaries to take hold and become institutionalised”. Jasanoff and Simmet argue that STIs help consider the role of both material and normative aspects of future-making by, for example, showing how physical properties of natural resources are mobilised to fuel desires about certain social order, thus reflecting the values implied in these imaginaries [19, p. 9]. In this sense, the interpretative envelope of the STI aims to inhabit a space between normativity and materiality, and the analysis thereof can spotlight how certain norms, representations and practices are co-produced with elements of the material world.

Recognising the significance of both these streams of contributions in the STI literature, we concur with Jasanoff and Simmet's observation that energy transition “is not simply a matter of substituting one means of generating energy for another” and it “entails commitments to radical reconfigurations of human-nature relationships” [19, p. 2]. We seek to advance our understanding of how dominant high-carbon STIs can be disassembled from within, thereby facilitating these transformative reconfigurations. By dominant, we do not only refer to visions supported and enhanced by political power, financial resources or technological inventions: we refer especially to the prevailing “collective consciousness” [12] that is often profoundly interlaced with the material-sociocultural dynamics weaving the fabric of a specific community for years and generations. Acknowledging that a radical departure from the fossil fuel past may not always be entirely possible or fully achieved [8], we aim to understand disassembling from within as a process that recognises commonalities among various actors and harnesses them in a constructive manner to forge something new while simultaneously preserving and repurposing certain elements of the old. By focusing on the co-productive role of entrenched material properties within energy-producing spaces, we also seek to depart from rendering materialities solely through the human-centric lens. This departure entails emphasising the “ontological multiplicity” of energy resource in order to remedy “a tendency to focus on the commodity status of resources rather than asking ethnographically what else they might be at any given point in time” [43]. Adopting this less anthropocentric perspective helps us acknowledge the formative role of energy resources in shaping socio-cultural structures and practices and thus think of the disassembly of prevailing STIs more carefully – not as discarding or rejection but more as a creative rearrangement. Such a process would entail more than acknowledging the historical, cultural and symbolic importance of a given resource (by, for example, creating a museum). Importantly, it would emphasise the multifaceted effects on local identity and mobilise this resource-human interconnectedness to build alliances between different social groups, preventing the erosion of social bonds.

This is why we propose that the concept of STIs can benefit from bringing it into productive dialogue with hyperobjects [9,10,25] and hyposubjects [11]. While the two strains of STI scholarship described at the beginning of this section re-emphasise the co-production of society and nature, a deeper consideration of the ontological complexity of natural resources and associated technologies can refine the analysis of disassembly processes and, most importantly, tune the interpretative tool to tease out processes of creative repurposing taking place within energy-producing spaces.

We find the concept of hyperobject helpful for two particular reasons. First, it helps us to go beyond describing vast collectives grouped under a dominant STI: hyperobject's focus on the agency of nonhuman objects affords identifying human actors who do not always “consciously” and/or willingly uphold and perform high-carbon imaginaries but who cannot escape the effects of coal and are inadvertently seen (at least from the outside) as proponents of such imaginaries. Second, it allows us to show how coal's material manifestations (from massive infrastructures underpinning the energy system to marks left on the miner's body) are cross-sections of a larger transdimensional entity with effects on other objects and the social order. Recognising coal as one of the Anthropocene's hyperobjects “force[s] us into an intimacy [...] with others (because everyone is affected by them)” [10, p. 139]. This implies that hyperobject's individual parts can connect with each other, form alliances and develop more ecological modes of coexistence not by rejecting or abandoning the hyperobject but by “[a]ttuning ourselves to the intimacy that hyperobjects demand [...]” [10, p. 139].

The notion of hyposubjects lets us recognise the existence of multiple collectives performing imaginaries of interconnectedness with materialities. In other words, hyposubjects may practice alternative visions and simultaneously attune to the qualities of the hyperobject. Attuning to the hyperobject – recognising all its interconnected effects, both good and bad – can lead to disassembly from within, where parts of the old are

repurposed instead of being radically rejected or completely abandoned. As Morton and Boyer [11,p. 44] contend, hyposubjects recycle the “infrastructure bequeathed to us by capitalist modernity, [...] disabling them, link by link from the inside, while repurposing their materials”.

Fusing these two concepts with the interpretative envelope of STIs can, in our view, enrich the analysis of the processes of disassembling high-carbon imaginaries from within, as it opens up pathways for thinking about disassembly that do not rely on resistance to – or confrontation with – dominant visions. Resistance implies that an alternative imaginary defeats a dominant one that is deemed “no longer sufficient” [44,p. 329]. We find this view limiting in two ways. On the one hand, it does not consider the broader implications of replacing a dominant high-carbon imaginary, which could potentially result in, e.g., abandoning physical infrastructures and, above all, local collectives. On the other hand, it suggests a grand solution to a massive problem, thereby overlooking a range of small-scale avenues and processes. We concur with Morton and Boyer, then, that “[o]ne of the limits we are facing is that our inherited critical practice often wishes to offer a hyperobjective solution to a hyperobjective problem” [11,p. 76]. Similarly, our intention is not to replace the conventional analysis of STIs but rather to introduce a supplementary component that may enrich the burgeoning field of STI scholarship. This addition provides a more refined perspective for highlighting the role of local activism and its engagement with materiality in disassembling dominant STIs.

## 2.2. Coal as a hyperobject

In recent years, attempts at comprehending fossil fuels’ intricate web of effects on society and the environment have resulted in the emergence of terms such as “carbonscapes” [45], “energyscapes” [46], “petroleumscape” [47], or “coalscapes” [31]. These concepts effectively capture the co-productive nature of spaces involved in energy production by encompassing the infrastructures, labour organisations, social institutions, and cultural practices. In our view, however, they fail to incorporate the essential anti-anthropocentric aspect required to surpass social constructivism and acknowledge the importance of materiality. For this reason, we prefer to conceive of coal as a *hyperobject* [9,10] – an object in its own right, with material expressions and tangible influence on environments and communities deeply entwined in a “mesh of interconnection” [10,p. 130]. Hyperobjects such as coal are not fixed and coherent but fluctuating and multifaceted, affecting countless individuals who can form alliances to mitigate its effects and develop ecological coexistence suitable for life in the Anthropocene [10].

Understanding coal as a hyperobject helps thus maintain the gravity with which it should be treated while at the same time recognising its fluidity and the agency of the entities enmeshed with it. Just like other objects in OOO, hyperobjects are “withdrawn” – they can never be fully grasped by humans, and the effects they exert on other objects are just a limited set of characteristics to which we happen to have partial access via mediation [25,p. 7]. In this sense, we are reminded that objects may impact other entities in a multitude of ways, regardless of whether humans can observe and measure these impacts – objects, thus, “maintain a degree of autonomy despite their interrelations” [25,p. 41]. Seen through the lens of a hyperobject, coal’s effects on other entities are not just those we can measure, such as CO<sub>2</sub> emissions or the number of mining jobs, but also the unquantifiable impact on social order, regional identity, culture, and people’s capacity to imagine the future. Considering the vast array of tangible and intangible effects and attachments to coal, we can avoid fixating on the removal of symptoms and instead address the overexploitation and rampant extractivism at the core of our relationship with natural resources.

Morton [10,p. 1] coined the term hyperobject to refer to “a bundle of entities massively distributed in time and space that forms an entity in its own right, one that is impossible for humans to see or touch directly”. This category of objects refers to “the largest, longest-lasting objects we know”, which “penetrate the physical body at every available

opportunity” and exude a certain degree of subjugation (although at times only in appearances) over other entities [10,p. 87]. According to Morton [10], examples of hyperobjects include climate change, capitalism, or fossil fuels. The author explains that contemporary human societies lack conceptual tools to comprehend such complex phenomena, and by mathematising temporal and incomplete cross-sections of greater wholes, we are bound to misunderstand hyperobjects and come up with ineffective solutions to the risks they pose [10]. The concept thus emerges out of the need to better understand “objects this huge, this massively distributed, this counterintuitive, this transdimensional”, which are characteristic of the current moment in history where “our cognitive powers become self-defeating” [10,p. 182,160].

The more we learn about objects within our world, their complexity and interlinkages with other elements, the harder it becomes to maintain impenetrable boundaries between individual objects. Morton [48,p. 40] explains that even a human body could be deemed a hyperobject if we consider all its “nonhuman prostheses and symbionts, such as [...] bacterial microbiome and [...] technological gadgets”. It is through this inward movement that any hyperobject can be made to disappear by breaking it down and exposing it as a sort of “symbiotic community” rather than a finite and uniform entity [48,p. 125]. It seems, therefore, that with Morton’s theory, a great number of things can be considered hyperobjects as long as they meet several broad criteria outlined by Morton. It is in the concept’s broadness and capaciousness where we find the key anti-anthropocentric strategy behind Morton’s philosophy – with enough evidence, anything, including humankind, can be considered a fictitiously uniform construct, and by the inward movement of deconstruction, the rigid boundaries between individual objects can be dissolved. The utility of such deconstruction lies in exposing seemingly powerful entities as highly dependent on others, thus paving the way towards emancipation from their control.

Admittedly, the novelty and experimentalism of the concept make it challenging to develop clear guidelines for its application in STI analysis. We emphasise, therefore, that we consider the concept of a hyperobject an inspiring philosophical intervention aimed at developing a better grasp of the massively distributed unprecedented entities rather than a readily actionable analytical tool. For this reason, rather than provide a universal definition, we elucidate hyperobjects’ key qualities – viscosity, nonlocality, temporal undulation, phasing, and interobjectivity [10] – via the concrete example of coal.

By being viscous, hyperobjects surround and penetrate other entities without necessarily being readily observable. Putting a hyperobject out of sight does not eliminate its effects, but rather “the more you try to get rid of them, the more you realise you can’t get rid of them” [10,p. 36]. Coal can be understood as viscous because, despite attempts to put it out of sight, its effects are very much felt. This can be experienced via smog, which penetrates human bodies, contributing to an array of medical conditions. Smog can thus be seen as a material manifestation of the hyperobject, which brings to the fore the shared, inescapable, and embodied experience of living within a coal mining region where coal is used for heating – an experience of “being bound by toxicity”, increasingly common in other contexts of life in the Anthropocene [49,p. 96].

Hyperobjects are also nonlocal as they are present at multiple scales at once, in different places and at different times simultaneously – even if experienced only in their local manifestations or ephemeral expressions. They are impossible to experience holistically and are “cuttable into many parts without losing coherence” [10,p. 47]. Morton explains that hyperobjects “compel us to think ecologically” by foregrounding the interconnectedness of objects [10,p. 48]. Extracting coal in one place affects groundwater, crop yield, food availability and lives in another – as seen in the case of the Turów lignite mine in the South-East corner of Poland between the German and Czech borders [50]. More generally, burning coal at one site releases carbon dioxide into the atmosphere and affects all human and nonhuman objects.

Hyperobjects are temporally undulating – “time-stretched to such a vast extent that they’re almost impossible to hold in mind” [10,p. 58].

They are “massively distributed in time” and “exert downward causal pressure on shorter-lived entities”, thus putting plant and animal life events out of synch [10,p. 67]. Hard coal used today in Europe originated approximately 300 million years ago and underwent a lengthy process spanning nearly 100 million years to develop [51]. Interfering with coal reserves means interfering with time. Burning this high-energy-density resource accelerated the development of human societies and their industries to a rate far outrunning that of regenerative cycles of the planetary systems, threw the Earth’s carbon cycle off balance, and made it impossible for the natural carbon fluxes to keep the temperature stable [52]. Coal mining regions are spaces where these different temporal landscapes, or timescapes [53], clash, resulting in further asynchrony of human societies and planetary cycles. Indeed, previous research investigates how fossils and fossil fuels are “knots in the narrative arc of human becoming” [54,p. 780] and contain multiple temporalities within them [55].

Hyperobjects are phased – they are “transdimensional”, meaning that they occupy several dimensions simultaneously, making it impossible for humans to access anything other than just a cross-section thereof [10]. From a human standpoint, hyperobjects may appear transient, appearing and vanishing, but it is more accurate to conceive of them as always there but never fully accessible to humans – we can only access indexical signs of them, which we turn into human understanding [10]. Coal can be experienced as a warrant of stability and progress, which keeps society running. Consequently, miners may view their occupation as material provisioning [56]. Coal can also be experienced as a noxious contributor to global warming, a commodity to be exchanged on the capitalist market, or a fascinating mineral made of prehistoric plant organisms. Each of these perspectives is valid, yet they are all just cross-sections of a larger transdimensional entity.

Hyperobjects are interobjective – they are not free-floating but interconnected in a shared space, which Morton refers to as a “mesh” [10,p. 77]. It is the links and gaps created by this interconnectedness which enable causality. Interobjectivity means that objects within the mesh of interconnectedness never experience each other directly but always as “mediated through other entities in a shared sensual space” [10,p. 86]. By simply using electricity in Poland, one becomes part of an interobjective system stemming from coal. Coal is never fully accessible to us but only experienced through “anthropomorphic translation” – one of its multiple temporarily-manifested forms [10,p. 11]. We access it via electrical appliances, sockets and cables, which in turn are connected all the way back to a coal-fired power plant and ultimately to a coal mine. Coal mines, power plants, cables, sockets and our smartphones all share a sensual space “despite their vastly differing timescales” [10,p. 86].

Recently, the interpretative potential of hyperobject has been gaining increasing scholarly recognition [e.g., [57,58–60]]. The concept has been, among others, applied in the Polish context. Debińska [61] shows how different practices of climate activism in Poland exemplify a certain undoing of a linear-time by displaying an “attunement” to various temporalities of the hyperobject. The author argues that recognising hyperobjects exist in different temporal dimensions may help devise climate action more in tune with planetary cycles [61]. Indeed, it is not through waging war on hyperobjects or convincing ourselves that we can measure, comprehend and control them that we can develop ecological coexistence but through the “human attunement to the time of hyperobjects” [10,p. 197]. In the following section, we introduce the concept of hyposubjects – a term for those humans who attune to the characteristic qualities of hyperobjects and thus devise modes of existence better equipped for life in the Anthropocene.

### 2.3. Hyposubjects as agents of disassembly from within

Rather than providing a theory or definition of hyposubjects, Morton and Boyer [11] invite their readers to collective reflection and elaboration aimed at finding out what this antidote to hyperobjects might be. As a new and experimental term, hyposubjects have not been applied in

many scientific papers – in fact, a Scopus search yields only two results as of the time of writing this paper. In one of them, Medinkova [62,p. 341] explores the anthropological potential of Morton’s philosophy in devising “the new subjectivity characteristic of human in an environmentally friendly society”. We wish to contribute an empirical element to this exploration. Inspired by Boyer and Morton’s proposition, we set out to explore the potential of this fresh concept as an interpretative lens applicable to a specific kind of bottom-up movement aimed at disassembling the imaginaries of coal in Poland. To Boyer and Morton, hyposubjects are those who engage in the form of “creative squatting” by repurposing elements of their hyperobjective environments [11,p. 44]. We view this engagement with materiality and disassembly through repurposing as potentially more socially integrative than the indiscriminate rejection of coal’s legacy. Moreover, this repurposing concerns more than the material as it also extends to the socio-cultural elements co-produced with coal.

When combined with STIs, hyposubjects can be viewed as groups performing imaginaries which offer alternatives to the dominant visions circulating within energy-producing spaces while respecting the socially significant legacy of coal. They recognise the intricate and inescapable network of interrelations with coal and thus attune to this interdependence. This recognition is key in devising pathways out of hyperobjects’ negative effects, not by means of disconnecting from them, but by adapting to the condition of entanglement and finding a generative potential in the interconnectedness. This way, the disassembly of high-carbon imaginaries can take place from *within* the web of mutual influences and through the transformative potential of the interdependence of all objects. Indeed, hyposubjects are primarily defined by their mode of disassembling, where subsistence (highlighting similarities between different social groups and building alliances) and attunement (acknowledging the complexity of hyperobject’s effects on local identity, social order and cultural practices) are the key features. We consider these processes essential for achieving a disassembly from within and thus deem them the central criteria in the analysis of hyposubjects.

Rather than attempting to transcend hyperobjects – i.e. devise an equally “apocalyptic solution to an apocalyptic problem” [11,p. 76] – this disassembling takes place through a process of *subsistence*: moving within the hyperobjective environment and towards relations with other hyposubjects [11]. It can take the form of organising collectives in actions for justice or of implementing alternative ideas despite the dominant cynical narrative that small interventions do not work and one must wait for bigger ideas from those with more money. Hyposubjects promote bottom-up action, a transition away from fossil fuels based not necessarily on seizing the infrastructure but a nonetheless revolutionary “retrofitting, [...] disassembling these apparatuses, but maybe still getting to use some of the parts” [11,p. 45]. For Morton and Boyer [11,p. 70], the key strategy is about “subsistence and unplugging from the grid” because “whether or not it’s a Soviet or capitalist situation, if it’s powered by massive energy grids, in the form of carbon-powered electricity, it remains the essence of the problem”. While the authors emphasise that hyposubjects are emerging and only “beginning to discover what they might be and become”, they provide some ideas as to how we can think about them [11,p. 14]. Morton and Boyer offer a tentative list of five key characteristics of hyposubjects: they are (1) “native species of the Anthropocene”, (2) “multiphasic and plural”, (3) “feminist, colourful, queer, ecological, transhuman, and intrahuman”, (4) “squatters and bricoleuses”, and (5) they “make revolutions where technomodern radars can’t glimpse them” [11,p. 14–15]. Rather than a rigid set of criteria, we treat these characteristics as elements of an ideal type, which helps us grasp what hyposubjects might look like.

Hyposubjects are native to the Anthropocene in the sense that they exist in a “hyperobjective condition” – a main feature of life in the Anthropocene where the viscosity and omnipresence of vastly distributed objects make it impossible to escape their effects or unsubscribe from being a part thereof [11,p. 19]. This deep interconnectedness

means that hyposubjects emerge from within hyperobjects and could not have come into existence without the hyperobjective environment they are disassembling. This co-constitution presents a paradox where humankind is both the reason for and part of the solution to anthropogenic climate change [11].

The plurality and multiphasity of hyposubjects mean that they do not make claims to individualism or pretend to form cohesive wholes but instead live by the recognition of their interconnectedness with other entities, including nonhumans and hyperobjects. They move towards relations (subscend) rather than rise above them (transcend) [11]. This also means that hyposubjects are not interested in achieving some sort of “absolute knowledge or language, let alone power” but instead continuously revise their approach, adapt and invent – “they play, they care [...]” [11, p. 14].

Another feature of hyposubjects is that they often belong to groups which have been systemically marginalised. Hyposubjects are diverse and do not conform to the dominant mode of existence, which Morton and Boyer refer to as “androleukoheteropetromodernity”.<sup>1</sup> Hyposubjects form relations based on care and solidarity and enter into alliances with other minorities fighting against the exploitative system. Their awareness of how the dominant energy-intensive and profit-oriented mode of existence drives planetary crises does not, however, plunge them into cynical climate doomism. Rather than urging a largely undefined immediate action and advocating for quick fixes, hyposubjects already live a life of comradeship and respect for planetary boundaries without indulging in the assumption that bottom-up changes of social organisation would take too long and are thus irrelevant [11].

Hyposubjects find ways to perform alternative imaginaries with the tools they have at hand and in spaces that the dominant visions would paint as hostile to alternatives. They form cooperatives, come up with solutions together, and repurpose elements of the hyperobjective environment – “[t]hey turn things inside out and work miracles with scraps and remains”, “[t]hey unplug from carbon gridlife; they hack and redistribute its stored energies for their own purposes” [11, p. 15].

Finally, hyposubjects are hard to spot on a large scale and identifying them requires a closer observation from within a particular hyperobjective environment such as a coal mining heartland. They might already be doing a lot to reconfigure the exploitative relations between humans and the nonhuman environment and disseminate forms of coexistence which mitigate the harmful effects of human activity and yet remain unseen in the larger picture. They persist on their course and continue to develop new ways of living amidst the climatic collapse despite the opposition telling them their actions do not make sense, do not have enough impact, or go against certain rules. In other words, “[t]hey patiently ignore expert advice that they do not or cannot exist” [11, p. 15].

The concept of hyposubjects can guide ethnographic research into disassembling the totalizing high-carbon imaginaries from within. Dominant discourses often present coal mining regions as more or less uniform spaces populated solely by people engaging in extractive or energy-producing work, having mostly conservative values and focused on prolonging the legacy of coal [63] – a mentality which in Poland gets compared to concrete (pol. *Beton*) [64]. These prejudices begin to be confronted in sociological studies [65] and public hearings [66], which show alternative imaginaries. Closely examining these spaces and delving into their inner workings helps foreground how they comprise multiple hyposubjects (e.g., self-organised community-oriented initiatives, activists’ movements, environmental NGOs, and even miners’ unions who form alliances with climate activists [67]) that are preoccupied with testing and envisioning alternative paths to future development, struggling for justice and equality, or caring for the integration

<sup>1</sup> With this single word the authors aptly encapsulate the four most problematic characteristics of modernity – male domination, antiblackness and racism, discrimination of sexual minorities, and addiction to fossil fuels.

of the community. Through their practices of disassembly from within, hyposubjects repurpose elements of the dominant sociotechnical imaginaries of coal, exposing them as less fixed and uniform than they appear from the outside. Such a context-sensitive way of performing disassembly implies that not all efforts aimed at advancing the green transition can be considered hyposubjects. While the concept is still in its early stages of evolving, it seems reasonable to suggest that those advocating for quick techno-fixes or grand solutions that may exacerbate the neoliberalisation of the energy market and displace workers do not align with the hyposubject framework.

In the subsequent sections of this paper, we direct our focus towards Poland’s high-carbon imaginaries associated with coal mining regions. We begin by providing a brief overview of dominant STIs in the country identified in social science energy research. Subsequently, we narrow our scope to Upper Silesia, the heartland of hard coal industry in Poland, to illustrate how a productive conversation between STIs and the concepts of hyperobject and hyposubject can elucidate the processes of disassembling the dominant high-carbon imaginaries from within by means of attunement and subscendence.

### 3. Dominant high-carbon imaginaries in Poland

The lasting prominence of “black gold” in the country is rooted in the historical accessibility of abundant coal resources and the fuel’s pivotal role in (re)building modern Poland during the communist regime [8]. Despite committing to a coal phase-down by 2030 at COP26, the country has pledged to depart from hard coal by 2049, arguing that it needed more time to make a transition, thus derailing the EU’s climate policy ambitions [68,69].

Unsurprisingly, the Polish coal-dominated energy system and the country’s contemporary struggles to depart from it have received scholarly attention, particularly in light of the EU’s coal phase-out plans [70]. We focus our attention on research that illuminates how the seemingly durable incumbency of coal in Poland casts a long shadow over society’s capability to imagine alternative energy futures.

In their paper advancing a conceptual merger of imaginaries and materialities, Kuchler and Bridge [8] deconstruct Poland’s national STI of coal as a guarantor of energy security and national independence, tracing it back to the post-war communist times. Following the collapse of communism, coal’s reputation has been in sharp demise due to several challenges arising from the material qualities of Poland’s coal reserves, including resource depletion and the “dirty” nature of combustion (particularly in terms of CO<sub>2</sub> emissions and climate impacts) [8]. But as Kuchler and Bridge [8, p. 1] observe, Poland’s contemporary policymakers continue to “mobilise a national imaginary inherited from communist times – encapsulated in the slogan ‘Poland stands on coal’ – that fuses infrastructures of coal extraction and combustion with the fate of the nation”. Various attempts at rebranding coal as “clean” serve to prolong the legacy of “black gold” as the vital building fundament on which the nation stands [8]. Kuchler and Bridge [8] demonstrate that, despite serious material deficiencies, coal continues to hold a powerful grip on Poland’s political imagination surrounding national energy policy and energy system [8].

Concurring with the findings of Kuchler and Bridge [8], Rabiej-Sienicka et al. [71] illustrate that Poland’s energy security and independence continue to be perceived as values derived from the coal-based energy system. Among the three energy visions in Poland identified by these authors, the “Let it Flow” imaginary sustains the status quo of coal as the country’s main source of energy [71]. In this imaginary, electricity generation remains governed centrally with a small addition of prosumers who support the grid, whereas renewable energy sources (RES) constitute only a small addition to the mix, with nuclear energy serving as a security buffer. The implementation of carbon capture and storage (CCS) and clean-coal technologies are imagined to maintain the extraction of coal. The authors conclude that the main objective of this imaginary is to preserve the security and stability of the Polish energy

system [71].

Outside the scholarship concerned with STIs, Lis [72] identifies similar motivations for continued commitment to coal, where a desire for independence and prosperity upholds the imaginary of the Polish “coal empire” [72,p. 109]. The author focuses on carbon dioxide as an “energy object”, which emerged through climate policies and made it expensive to produce energy from CO<sub>2</sub>-heavy coal [72]. Lis [72,p. 109] illustrates how state and private actors continue to perform discourses of fossil fuel resources as synonyms of “energy security, sovereignty, but also development” despite the growing costs of their extraction and burning under the EU regulations. The stubborn persistence of the imaginary of coal as a guarantor of security and prosperity is a result of the solidification of “[t]he coal empire, which had grown around a myriad of inter-related organisations and in close relation to state structures, involved trade unions, service companies and various political bodies” [72,p. 109].

Following these scientific insights concerned with STIs in Poland, we observe how the “powerful grip” and “stubborn persistence” of the imaginary sutured around the “coal empire” in the country is performed and maintained by state actors, experts, and the industry. Although we acknowledge the value of this work in illuminating the prevailing character of Poland’s coal imaginary, we seek to understand its dominance as arising from the profound entanglement of the “collective consciousness” [12,p. 123] with the material-sociocultural dynamics that shape a specific community across generations. Indeed, the long-lasting imaginary of coal as the guarantor of stability and prosperity has co-produced specific social orders, culturally significant practices and closely-knit communities [63,73,74]. Adopting this perspective, we also recognise that a radical departure from the fossil fuel past may not always be entirely feasible or fully realised [8]. In this sense, we move away from the mindset of resisting and rejecting high-carbon imaginaries, as this approach may inadvertently result in the substitution of one energy source with another without fully considering the wider implications for the collective. Instead, we investigate how the disassembly from within entails retooling and repurposing the material-sociocultural elements co-produced with coal, which can avoid the sense of abandonment and loss after coal is phased out. The repurposing we advocate, however, is not akin to the discursive rebranding of coal, which only prolongs coal phase-out and contributes to tensions between different social groups as shown in several studies concerned with STIs of coal in Poland [8,71,72].

#### 4. Hyposubjects and disassembling the coal imaginary from within

In this section, we aim to demonstrate how the productive conversation between STIs and the concepts of hyperobject and hyposubjects can help us elucidate the disassembly of the dominant coal imaginary from within. The analytical framework of STIs allows us to observe how the potent imaginary of coal persists not only in the domain of political order but especially in the social structures, traditions, and culture, or the “collective consciousness”. Simultaneously, understanding coal as a hyperobject helps us illuminate the deep interconnectedness between this resource and the collective. The concept of hyposubjects shows how disassembly can occur through creative engagement with coal and the building of stronger communities on common attachments to the culture co-produced with mining. In line with Morton and Boyer’s [11] emphasis on the emergent nature of hyposubjects, we do not claim that the groups described below fully encompass each and all of the proposed qualities of hyposubjects. In this paper, our primary criteria include attunement and subsistence. We prioritise these two characteristics as they refer to the specific mode of disassembling performed by hyposubjects, where elements of the old are retooled and used generatively. It is these forms of collective action that we consider essential in generating context-specific reframing of coal rather than a particular class or type of actors. As such, attunement and subsistence are the most

operationalizable features of hyposubjects while encapsulating the core of the concept. Hyposubjects attune to the qualities of hyperobjects by recognising their multifaceted effects on society and repurposing the elements of old imaginaries to shape new ones. They subsist by moving towards relations with other hyposubjects to find connections and build stronger alternative practices based on common entanglement with the hyperobject rather than adopting a single narrative with the aim of replacing the dominant one.

##### 4.1. The hyperobjective environment of Upper Silesia

In Upper Silesia, the long history of hard coal extraction has contributed to a unique cultural identity strongly bound up with this resource [74]. The resistance to coal mining is far less prominent than in other parts of the country as miners fear a repeat of post-communist history manifesting as the severe closure of unprofitable extraction sites that previously resulted in high unemployment rates and the erosion of social bonds [74,75]. Moreover, Silesian mines are frequently likened to beating hearts that possess the ability to sustain and invigorate not only their immediate surroundings but also extend their vital influence far beyond [76]. For example, a recent study finds that “80% of the coal mining tender value goes to companies less than 20 km from the nearest mine”, and as much as “41% (21,000) of total indirect jobs (51,000) in Upper Silesia are highly exposed to coal mine closures” [77, p. 41]. The interobjectivity of coal, a hyperobject, means that its sudden removal is bound to send ripple waves across the mesh of interconnected objects.

The deep interconnectedness of coal and the residents of Upper Silesia is observable well beyond the labour market. The character of dangerous subterranean labour and miners’ strong work ethos contributed to the emergence of closely-knit communities, powerful workers’ unions, specific traditions, and shared values, often entwined with Catholicism [63,74]. The legacy of the mining industry is well-worth commemorating, and certain unique characteristics of the region co-produced with coal are what residents wish to preserve. However, alongside these cherished aspects, there are also elements of coal’s legacy from which certain residents desire to disassociate themselves.

Researchers observe that being place-based, geographically bound and solid, coal contributes to the development of nationalistic attitudes prone to right-wing populism [63,78]. Relatedly, miners’ “ethics of material provisioning”, i.e. viewing their job as performing the ‘dirty’ work to provide society with essential utilities [56], often evolves into a form of defensive friction where their bodily labour and familiarity with coal’s materiality contrasts with “parasitic” members of society – “elite actors (‘brains’) and ‘inferior’ Others, such as immigrants, ethnic and sexual minorities, the poor or underclass, who do not ‘labour’ while seemingly are ‘favoured’ with recognition by those same elites” [Ivaldi and Mazzoleni 2019, cited in [63]].

##### 4.2. Local queer activism – hyposubjects in action

These tensions are particularly observable in attempts to show how the stereotype of a brutish and intolerant Silesia is an unjust essentialisation of a much more diverse population. One group that aims to undo such simplifications is *Queer Silesia* (Śląsk Przeglęty). This interdisciplinary art and research project is committed to queering Silesian traditions by inclusively celebrating Silesian culture, telling stories of non-heteronormative Silesians, and creating a queer archive of Silesia [79]. In their manifesto, the group states that they oppose the generalisation of the experience of being Silesian, and they intend to demonstrate that queerness and local identity do not have to be separated [79]. The collective’s first project was a performance entitled *Of Coal and Rainbow* (Wungiel i donga), which premiered in Berlin in September 2018 [80]. The performance draws inspiration from a collective childhood memory shared by many Silesians: the sight of miners returning from work with eyes covered in soot. The protagonist recalls mistaking the soot for

mascara, a misinterpretation which inspires questions as to why a man would wear make-up when what is commonly taught is that this is reserved for women [80]. This is a starting point for the performance's reflections on traditional gender roles in Silesia. The material properties of coal, particularly its staining soot, are stripped of their traditional connotations as symbolic of hard masculine work and are instead presented as a symbol of queerness. The performance invites a discussion of tensions and similarities between the queer and Silesian traditions and the resulting inner conflict experienced by non-heteronormative Silesians, ultimately showing, however, that one does not have to choose between being Silesian or queer [80].

*Of Coal and Rainbow* is an example of hyposubjects in action, as it attunes to the hyperobject of coal by recognising its complex influence on local identity and thus attempts to reconcile supposedly conflicting elements into a multifaceted queer-Silesian identity. Instead of searching for a radically new collective imaginary to replace the old one, the example of Queer Silesia shows that in the unique context of Upper Silesia, disassembling from within is seen as more productive than resisting or rejecting the prevailing imaginary. This potent avenue of disassembling the dominant imaginary from within through the lens of gender roles and sexual identity has only recently begun to receive scholarly attention [e.g., [81,82–84]]. Disassembling from within allows for the generative preservation of important cultural elements without marginalising anyone. This inward movement, which focuses on cultivating commonalities among heterogeneous groups, exemplifies the hyposubject's strategy of subsistence.

Moreover, the value of *Queer Silesia* in challenging the fossilised prejudices about coal regions is beginning to be recognised by cultural institutions, grassroots movements and NGOs in the regional capital of Katowice. For example, *Katowice – the City of Gardens* (Katowice Miasto Ogrodów) funded one of *Queer Silesia*'s events which could signal a wider motivation to remedy negative stereotypes by showcasing Silesia's diversity and inclusiveness. In 2023, *Queer Silesia* organised *Queer Song's Review* (Przegląd Piosenki Przegiętej) in partnership with several local organisations, including *Silesian Opinion* (Śląska Opinia), a news outlet with a strong focus on issues surrounding energy transformation, and the *Silesian Climate Movement* (Śląski Ruch Klimatyczny). The festival incorporated the elements of coal's legacy in ways that did not clash with ecology or queerness. By subsisting and reaching out to different social groups, *Queer Silesia* contributed not only to dismantling the stereotypes of coal regions but also to building alliances with other sections of society in order to disassemble high-carbon imaginaries from within.

Subsistence goes hand in hand with the attunement to the interconnectedness with coal observed in the collective's usage of symbols, language, and the embodied sense of belonging to the place. The event's promotional posters used a rainbow-coloured version of the region's traditional crossed-hammer-and-pick symbol, which historically represented mining. One of the organisers wore a traditional miner's habit, while the presenters on the stage spoke the Silesian ethnolect, using traditional mining vernacular to refer to members of the collective – e.g., *hajer*, which refers to a miner responsible for using explosives (shot firer). During and after the festival, members of the organising collective expressed their gratitude on social media, sharing, for example, that they have not felt so at home (*u siebie*) for a long time, and they wish to continue to feel like that in their native Upper Silesia.

The miners themselves also seek a similar sense of belonging, since due to being associated with the dirty and toxic material qualities of coal, they experience what Allen [63,p. 12] describes as “ecological dispossession”. Based on extended ethnographic fieldwork among miners in Upper Silesia, Allen [63,p. 12] observes that due to resultant marginalisation and social disconnectedness, miners seek the “embodied feeling of congruence, of being at-home-in-the-world or, ‘u siebie’ (‘at home with yourself’).” The interconnectedness of these different social groups lies in seeking the same embodied feeling of being connected to a place. By engaging with the material and discursive elements of the

socio-cultural reality in Upper Silesia inherited from coal (miner's habit, mining symbols, the vernacular), the queer community provides a potent venue for disassembling the dominant coal imaginary from within. The attunement to coal and the concomitant recognition of its significance for both miners and queers creates a generative space for solidary future-making.

#### 4.3. Conceptual conversation about disassembly from within

The presented example closely aligns with the ideal type characterised by Morton and Boyer [11]. However, for us, it is the process of disassembly, rather than the specific types of actors involved, that defines hyposubjects. This is why, instead of seeking to identify all the characteristics suggested by Morton and Boyer, we advocate focusing on the concepts of subsistence and attunement to guide the analysis of hyposubjects. It is in this specific mode of disassembly, where the interconnectedness of community and natural resources is considered seriously, that we find the essential contribution of OOO to STIs. The idiom of co-production at the core of STIs accounts for the role of natural resources in shaping social order, making STIs a theoretical framework well-suited to understanding how human perception of materialities is always necessarily influenced by a specific sociocultural and historical context and can thus lead to creating collectives and organising society in specific ways [44,p. 14]. Co-production, however, implies a rather different human-nonhuman relationship than interconnectedness. The idiom of co-production includes the material as a contributing factor in shaping human society, science and technology. As such, the concept of STIs offers interpretative tools for exposing the socially constructed and partial view of natural resources' role in society. For the purpose of teasing out processes which productively disassemble dominant STIs while recognising the complex interlinkages between materiality and the collective, we complemented the framework with concepts of hyperobjects and hyposubjects. The concept of hyperobject permits capturing a more equally-distributed relationship with natural resources, where it is not only humans projecting their understanding onto nonhuman objects to utilise them in shaping society, but also nonhumans who continuously reveal their multiple characteristics and intricate influences, exposing thus their agency. The concept of hyposubjects, on the other hand, allows theorizing a response to this hyperobjective condition, where attunement and subsistence constitute leading strategies for building resilience rather than resistance and control.

In this productive conversation, OOO complements the STI framework by tailoring it to the analysis of processes of disassembly, which engage with materiality by recognising human-nonhuman interconnectedness. Not unlike a magnifying lens, hyperobject and hyposubjects equip the interpretative framework with the ability to better tease out movements that engage with the interconnectedness of community and natural resources and experiment with new visions of local identity where culturally significant elements co-produced with coal are not discarded after the phase-out.

## 5. Conclusions

In this paper, we sought to understand how dominant high-carbon imaginaries, such as those associated with coal, can be disassembled from within. Although we recognise that resistance can have a disruptive potential, threatening the prevailing energy narrative [20], we contend that in some specific contexts, replacing the dominant vision with a radically-different imaginary may not always be attainable and desirable. Concurring with Kuchler and Bridge [8,p. 3] that the “imaginary future is rarely a radical departure from the past”, we discern the powerful grip high-carbon imaginaries hold on some collectives, particularly in coal mining regions. By shifting away from thinking about disassembly as a rejection of dominant energy imaginaries and their wholesale replacement by another, we seek to avoid broader

implications of transformational pathways that may lead to exclusion, neglect and abandonment of infrastructures and communities. Our approach shows how this way of thinking about generative disassembly from within can be achieved by bringing the interpretative envelope of STIs into dialogue with the concepts of hyperobject and hyposubjects.

We argue that this conceptual perspective provides a more comprehensive and nuanced understanding of energy transitions by allowing us to interrogate the socio-material interplay underpinning energy visions. While the analytical framework of STIs allows us to “reveal the ways in which the material and normative dimensions of future-making are bound up together” [19,p. 9], the allied concept of a hyperobject helps us deepen this perspective by emphasising the effects of human-natural interconnectedness, and thus consider not only the way natural resources are mobilised by humans in shaping social order but also how agency of the nonhuman manifests itself in diverse effects of coal on communities, region and local identity. Hyposubjects, on the other hand, introduce novel ways of reckoning with hyperobjects such as coal, where attuning to their interconnectedness and subsending to form alliances across different social groups can facilitate a more context-sensitive and socially-sustainable way of transitioning away from fossil fuels than an indiscriminate rejection of their legacy.

The analytical power of the STI framework lies in the potential to expose how a dominant understanding of materialities and the role they play for humans can create collectives as vast as nation-states, shape their policies and significantly impact the identity of their members. In a productive conversation with hyperobject and hyposubjects, the framework gains an added sensitivity to nonhuman agency, in our example, the agency of coal, becoming thus well-tailored to teasing out specific small-scale processes of disassembly which engage with the materiality of coal and its impact on local identity.

We exemplified this conceptual conversation in the case of Upper Silesia, the region in Poland that has experienced a deep-rooted entanglement between coal mining and “the collective consciousness” for generations. The interobjectivity of coal, understood as a hyperobject, means that it cannot be simply removed from the mesh of interconnectedness but should instead be carefully repurposed. Its viscosity, or inescapability of its effects, is hard to ignore or erase and, instead, it can be used productively. In this sense, coal in Upper Silesia plays an important role in stitching the social fabric as society transitions towards a post-extractivist future. Coal not only affects the landscape, human health, and culture but also embodies a sense of belonging, fostering a collective bond within the community. We demonstrate how *Queer Silesia*, understood as a hyposubject, recognises the complexity of coal’s impact on the society of Upper Silesia and engages with its socio-material effects in the practices of future-making. We argue that this attunement can help unite different social groups by emphasising their common attachments to coal. By moving within the hyperobjective environment and cultivating relations, *Queer Silesia* lays the foundations for heterogeneous alliances. We argue that in the specific context of Upper Silesia, where links to coal are multiple and complex, the strategies of attunement and subsending stand a greater chance to unite diverse actors in shaping visions of a post-coal future.

As our focus was on disassembling high-carbon imaginaries, the instances of repurposing and retooling we presented involved socio-cultural elements co-produced with coal. However, we can easily envision an application of the concept where the retooling takes on a more literal form – for example, an instance where a close-knit community and work ethos inherited from the mining past are mobilised to create an energy cooperative based on renewable energy sources. Hyposubjects can thus differ in orientations, but the principles of subsending and attunement remain the same – to make sure that the social tissue is not eroded in the process of transformation, while the elements holding the community together are emphasised to create something new across differences.

In this regard, our paper seeks to contribute to the growing demand in social science for approaches that can help capture the intricacies,

nuances, and messiness inherent in the study of energy [27] and provide more contextualised insights into the perspectives, experiences and visions of the people living in a particular place [28]. Although the strategies of disassembly from within employed by hyposubjects may not appear revolutionary at first glance, according to Morton and Boyer [85, p. 45], the “idea of revolution is much more about what happens in the base [...]”. With this paper’s contribution, we seek to illuminate bottom-up processes, which might aid us in “find[ing] some wiggle room down there so we can wriggle our way out of the hyperobjects” [48,p. 188]. This metaphor emphasises the importance of countering the immobilising pressure exerted by dominant high-carbon imaginaries that are prone to essentialising coal mining regions and thus simplifying transition pathways as a substitution of one energy source for another. Hyposubjects help defy simplification by attuning to the complexity of hyperobjects and subsending to form alliances of diverse social groups united by the resolve to respect this interconnectedness. We argue that the productive conversation between STIs, hyperobject and hyposubjects illuminates specific processes of disassembly that otherwise might go unnoticed. In this disassembly from within, local activism acknowledges complex attachments and interdependencies of people and natural resources and mobilises them to pave the way for inclusive energy transition pathways. We suggest, therefore, that to facilitate a just transition, small-scale context-dependent processes of reformulating the relationship of the local community with coal must not be side-lined. Perhaps paradoxically, it is by recognising the agency of nonhuman objects and their capacity to shape social orders, culture and regional identity that we can avoid the neglect and dispossession of humans.

#### CRediT authorship contribution statement

**Kosma Lechowicz:** Conceptualization, Writing – original draft, Writing – review & editing, Investigation, Formal analysis. **Magdalena Kuchler:** Funding acquisition, Supervision, Writing – original draft, Writing – review & editing, Project administration.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

No data was used for the research described in the article.

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