



# “Can we envision Decarbonisation beyond extraction? Challenging claims of a ‘just’ energy transition from the seabed”<sup>☆</sup>

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## HIGHLIGHTS

- The critique of current neoliberal modes of ocean and natural resources governance.
- Extractive practices sustain and underpin these neoliberal modes of governance.
- To achieve a “just” energy transition, we must move beyond extractivism.
- DSM corporate proponents’ rhetoric on social media builds on gold rush discourse.
- Can degrowth, circular economy and battery recycling be more sustainable pathways?

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## ABSTRACT

This paper provides a critique of contemporary neoliberal modes of ocean and natural resources governance in the context of a just energy transition, by asking how a “just” energy transition can take place beyond extractive practices. It does so by first setting up what is meant by “extractivism” and providing a brief colonial genealogy and history of the term. Then, building on this, the paper considers how current proposals to mine the deep seabed in international waters are being considered and regulated by the International Seabed Authority (ISA). The paper focuses on this UN-mandated body whose aim to create a regulatory framework (also called the mining code) for deep-sea mining (DSM). The paper introduces the ISA and the current negotiations of the mining code, providing a brief overview of how the ISA and the code as well as of the UN Convention of the Law of the Sea (UNCLOS). This article claims that the ISA and UNCLOS are underpinned by the same colonial practices that pervade extractivism as a practice. It then focuses on unpacking one corporate stakeholder’s discourse on DSM and how the language used by this company’s social media is underpinned by a specific type of discourse recalling colonial practices and *El Dorado* narratives. The company was chosen given their legal involvement with the mining code negotiations. As these sections are set, the paper then asks whether it is possible to undertake a “just” energy transition if sourcing minerals for decarbonisation requires damaging forms of extraction. The paper concludes considering the circular economy, metal recycling and degrowth as possible pathways towards energy justice.

## 1. Introduction

Crude oil is viscous, thick, sticky, dirty. Images of oil-drenched seas and beaches, constellated with dead creatures, of oil-workers and fields, often translate into a certain disgust for the energy source that has fuelled our world for decades. These striking images have often helped anti-petroleum and pro-energy transition activism to make oil visible in

our everyday lives,<sup>1</sup> particularly for those of us for whom it is often erased as it is transported, transformed, refined, and consumed through digital and physical infrastructures that hide its materiality and toxicity. Drivers and commuters experience some of its presence through the smells and practices that accompany automotive travel and maintenance; workers whose mental and physical labour is connected to petroleum, and hydrocarbons more broadly, are not faced with this erasure

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<sup>1</sup> [75,12,27].

either, oil is on their mind as they work and interact with it daily. Particularly at sites of extraction and refinement, these peripheral spaces, on land or offshore, often put people, non-human life<sup>2</sup> and oil, in direct contact in damaging ways. At such sites, oil's toxicity seeps and penetrates through life, sometimes slowly, and sometimes catastrophically, poisoning it.<sup>3</sup> Dramatic imagery of oil spills, though terrifying to many, form part, through spectacle<sup>4</sup> and the already entangled relationship most of us have with this resource, of an aesthetic of "petro-fetishism".<sup>5</sup> Petro-fetishism has been developed in hydrocarbon company's communications, along with advertisements and other mediatic representations that attempt to sell oil and its product derivatives, including plastic, as well as products using it, particularly the automotive industry.<sup>6</sup> However, in a time when economically- and racially-privileged groups experience the consequences of our current anthropogenic climate crisis, exacerbated by our excessive extraction and consumption of fossil fuels, repulsion is becoming a more common reaction to petroleum.<sup>7</sup> Marginalised communities across the globe have been living through our crisis for much longer, particularly in formerly colonised spaces which continue to be exploited as sites of extraction and where imperial capitalism has accelerated our anthropogenic climate crisis in order to produce wealth for western countries.<sup>8</sup>

Renewable energies, on the other hand, are often described as "clean" or "green" – and, in some ways, they are: their production of energy pollutes much less than hydrocarbons. But parts of the energy production process from minerals extraction to infrastructure settlement are much less "clean", and often even less "just", than some of their proponents claim. Indeed, the entire sustainable energy chain of

production requires the construction of infrastructures that necessitate specific materials, and, the re-arrangement of space – at the site of infrastructure construction and mineral extraction. Both energy system storage and batteries for our green automotive industry necessitate extraction, just like fossil fuel energy,<sup>9</sup> some of them also necessitate a re-extraction of materials when batteries are recycled.<sup>10</sup> However, Green Transitions discourse, mostly from companies, often ignores, or purposely erases, the impact of extracting and transforming these materials. Indeed, like petro-extractivism, the extraction of these materials is often happening in the same spaces previously exploited during colonial periods.<sup>11</sup> As Christos Zografos reminds us, Green Transitions discourse often obscures the colonial underpinning of extractive histories and practices:

promises of justice and universal salvation from climate chaos by means of GNDs [Green New Deals] in the global North may obscure their embeddedness in contemporary colonial relations of injustice, which remain premised on assumptions of race and social difference. [...] The resources that are seen as vital for northern Green New Deals are very often located in the global South, and this has serious consequences for environmental justice. The concern here is that the communities and ecosystems from which these resources are extracted risk becoming Green Sacrifice Zones.<sup>12</sup>

The terminology of Green Sacrifice Zones points to the fact that the transition to so-called "more sustainable" energy does not inherently shift the manner in which we produce and consume energy, which is at the core of our socio-ecological crisis. As Diego Andreucci and Christos Zografos argue, "[r]ecognising that there is an ingrained 'coloniality' to the way climate change is governed has important implications for how we think of alternatives. Simply promoting 'transitions' away from fossil fuels, even if accompanied by progressive reforms, is insufficient to overcome the current predicament."<sup>13</sup> Many scholars have explored some of these ideas through the conceptualisation of "green extractivism"<sup>14</sup> and the exploration of how renewable energy regimes and infrastructure perpetuate global inequalities. As Carlos Tornel notes "[p]olitical economists have (until recently) paid relatively little attention to the colonial-imperialist origins of energy transitions".<sup>15</sup> Diego Andreucci et al. also consider "decarbonisation by dispossession" to

<sup>2</sup> Throughout this article, I use the terminology "non-human" to designate non-human animals and nature to challenge their objectification in neoliberal modes of classification and governance. However, I do not use this terminology by ascribing to any specific theoretical practice. This terminology is not grounded in Posthumanism as a theoretical movement. Indeed, this terminology is framed by bearing in mind that not all people have been – or continue – to be considered as "human". Given the long history of racism and racial capitalism that is explored throughout this paper, I ground this formulation in the works of thinkers at the intersection of decolonial and environmental studies. Particularly, important texts that have explored black and decolonial ecologies and challenging the understanding of "humanity" as a concept on which this paper builds are the following: [136], the many brilliant chapters in [87,49,11,102].

<sup>3</sup> For more on the representation of oil versus the representation of renewable infrastructure see [16,33,133,29,134,72,95]. [https://www.youtube.com/watch?v=9OFVU\\_Nhig&ab\\_channel=Nordlandsforskning](https://www.youtube.com/watch?v=9OFVU_Nhig&ab_channel=Nordlandsforskning).

<sup>4</sup> See [69].

<sup>5</sup> I intend this term as being grounded in Karl Marx's conceptualisation of "commodity fetishism" in [82]. It also builds on David Harvey's discussion of technology fetishism in [58]. It also echoes Matthew Huber's "oil-fetishism" in [65], and it encompasses ideas discussed in what Michael J. Watt calls "*Petro-Fetishism/Petro-Magic [the el Dorado effect]*" in [132]. 7 and in which is further explored in Watts, Michael. 'Petro-Violence: Community, Extraction, and Political Ecology of a Mythic Commodity'. In *Violent Environments: Essays on the Metaphysics of Human Persons*, edited by Lee Peluso Nancy and Michael Watts. Cornell University Press, 2001. Though in my case the focus is on how petroleum, gold, polymetallic nodules and other commodity are fetishised in Marx's term and identify certain colonial genealogies rather than simply on what Watt identifies as the magical effects of petroleum that allows people to become rich fast and without efforts, though that is also an element.

<sup>6</sup> See the second chapter of LeMenager, Stephanie [74]. Oxford University Press, 2013 and Petrocultures Research Group. *After Oil*. 2016.

<sup>7</sup> McGreal, Chris. [86] <https://www.theguardian.com/environment/2021/jun/30/climate-crimes-oil-and-gas-environment#:~:text=Coastal%20cities%20struggling%20to%20keep,harm%20from%20burning%20fossil%20fuels> and 'Making Sense of Public Opinion on Oil and Gas'. *Climate Barometer*, 22 November 2023. <https://climatebarometer.org/making-sense-of-public-opinion-on-oil-and-gas/>.

<sup>8</sup> See Vergès, Françoise [128]; Sultana, Farhana [117] and the brilliant essays in Sultana, Farhana [116].

<sup>9</sup> Many different minerals and metals are needed for Energy Storage Systems. In the case of the green automotive industry, key ones are lithium, nickel, cobalt, graphite, manganese and vanadium. In the case of renewable energy storage batteries, the same are included and the list is longer depending on the energy infrastructure, see more in Roberts, David [103].

<sup>10</sup> See Tang, Yi-Chin, Jian-Zhi Wang, and Shen Yun-Hwei [119].

<sup>11</sup> See [32,31,40,5,43,42,93,3,41,123,125,127,40,122,4,81].

<sup>12</sup> [137], p. 38.

<sup>13</sup> [3], p. 9.

<sup>14</sup> Natacha Bruna defines "green extractivism" as "a new variation of extractivism [...], which serves as a handy analytical tool in today's focus on reducing emissions or compensating for emissions (the era of 'emissions imperative')". Green extractivism arises as an innovative way in which capitalist production, reproduction, consumption and accumulation unfolds" in "[13], p. 842. See also Isla, Ana [67]. This concept has been explored by a number of authors and particularly in a special section of the *Journal of Political Ecology* on "The Political Ecology of Green Extractivism". In the introduction to this section, Alexander Dunlap, Judith Verweijen and Carlos Tornel discuss "the serious socioecological issues and violence related to projects labeled 'green,' 'environmental,' 'clean,' 'decarbonized' and 'sustainable.' Moreover, it demonstrates how 'green' discourses work to expand capitalist relations, land control and extractivism to intensify modernist development and wealth accumulation (Banerjee, 2003; Kirsch, 2009; Sullivan, 2009; Fairhead et al., 2012; Corson et al., 2013). Research on green extractivism continues these lines of inquiry, critically examining the evolutions in contemporary capitalism and the related political-economic landscape that propel a rapid expansion of capitalism branded 'green'" in Dunlap, Alexander, Judith Verweijen, and Carlos Tornel [44]. See also Hesketh, Chris [63].

<sup>15</sup> [122], p. 1075.

explore how “the ongoing energy transition is premised upon an extractivist logic, linked to neo-colonial patterns of uneven development and the creation of sacrifice zones of mineral extraction in the global South. [They] adopt the concept of ‘decarbonisation by dispossession’ to underscore the centrality of these patterns to current energy transition plans.”<sup>16</sup> In order to build on this research that focuses on how historical inequalities continue in the present across global divides, this paper proposes to focus on how these questions appear to become more blurred in the context of “green extractivism” on the seabed. Indeed, many of the above conceptualisations apply to the context of deep-sea mining (DSM). This practice would involve several deep-sea ecosystems beyond national jurisdiction, including seamounts containing cobalt-rich ferromanganese crusts and hydrothermal vents containing polymetallic sulphides,<sup>17</sup> but the DSM negotiations at the International Seabed Authority (ISA) and public-facing discourse focuses particularly on polymetallic nodules to be mined in the Clarion-Clipperton Zone (CCZ), a large area in the deep seabed, situated between Hawai’i and the Pacific coast of Mexico. Polymetallic nodules are often described as “approximately the shape and size of potatoes [and] hold precious minerals, including copper, manganese, nickel and cobalt”.<sup>18</sup> DSM, which its proponents suggest would reduce land-mining and its interconnected human and environmental devastations, is being negotiated at the ISA. This body is tasked to oversee the exploration and exploitation of minerals outside any country’s jurisdiction by the United Nations Convention of the Law of the Sea (UNCLOS), through the creation of a regulatory framework, also called the mining code.<sup>19</sup>

The ISA currently meets multiple times a year<sup>20</sup> to negotiate the terms of the mining code that governs exploration and would regulate the exploitation of minerals in the deep seabed. These international negotiations are complex and technical; bringing to the fore many complex issues relating to the science, economy and the political ecology, and even feasibility, of DSM and they have caused great debates between nation-state representatives, policymakers, scientists, companies, activists and civil society more broadly. Many countries have requested that the finalisation of the mining code be delayed, despite it having been accelerated in 2021 when the Pacific Island Nation of Nauru triggered the so-called “Two-years rule” setting a deadline for the ISA to finalise the mining code.<sup>21</sup> This deadline was due to expire in July 2023, when this rule would have come to an end. However, as Pradeep A. Singh has argued, this section of UNCLOS (Section 1(15)(c)) is not straightforward and scenarios exist in which the finalisation of the code may be delayed.<sup>22</sup> This was effectively the case as the deadline was extended to July 2025 when the ISA council members were unable to reach a consensus on the mining code on 21 July 2023, the end of the scheduled council meetings for the second part of the 28th session.<sup>23</sup>

The ISA is unlikely to reach this deadline given the current delay in

the first part of the of the council meetings that took place in March 2025, particularly given that at the time of writing, 31 countries have called for different forms of moratoria on DSM, for a precautionary pause or even a ban.<sup>24</sup> This is because DSM has many underdetermined risks and possible impacts: the likelihood of destroying marine biodiversity – and even endangering our ecosystem – is major given the role of the deep-sea in sustaining life on our planet. Moreover, mining could release sedimented carbon into the ocean and atmosphere, intensifying ocean acidification and increasing greenhouse gases, thus exacerbating global warming and further threatening low-lying islands and coasts being submerged by rising waters. Additionally, some of the risks and impacts are also unknown given that the sciences exploring abyssal and benthic environments need more funding and time to consolidate their findings,<sup>25</sup> and because the plural knowledges of the ocean held by global coastal, local and Indigenous communities is not always taken into account in legal, technical and scientific spheres as a “valid” knowledge.<sup>26</sup> The lack of integrating knowledge – a formulation itself problematic as it others certain knowledges – more widely in ocean science and governance has a long history, but has become even more central in the context of the ISA negotiations of the mining code where Pacific activists have been vocal about the need to consider their cultural attachment to and important knowledges of the ocean and seabed.<sup>27</sup> This adds a layer to the many tensions and frictions emerging in the ISA negotiation room and the practicalities and materialities of undertaking DSM as a path towards an energy transition. Though the ISA negotiations predate our urgency to decarbonise as discussions have been ongoing since the early 2000s, mining companies are framing their aim within the context of energy transition, both within the ISA discussions and in their messaging to the wider public and their shareholders. Some of them, particularly The Metals Company (TMC), leverage their relationship with sponsoring countries to sit on the negotiations at the ISA and intervene on how the regulatory framework is written. Moreover, TMC’s Nauru-based subsidiary NORI was involved in the triggering of the two-years deadline. TMC has been chosen in this article as a corporate stakeholder to explore given their problematic embedding within a policy-making context governing what UNCLOS Article 136 designates as the “the heritage of all mankind”, which means, legally, all our (humanity’s) heritage.<sup>28</sup> According to Article 140, this means that all mankind should benefit economically and financially from DSM and the ISA is tasked to create an appropriate mechanism for this benefit-sharing process; but the ISA itself is also due to self-sustain itself from future royalties to be received from DSM.

Two main issues arise here: first, the ISA’s mandate to mine highlight concerns pertaining to whether a regulatory body can be objective when they stand to benefit from the activity they regulate. This becomes further problematic if mining companies are also involved in the production of this framework, as TMC has been when sitting on Nauru’s delegations during negotiations. Second, as Sue Reid notes the “ISA’s explicit mandate to advance seabed mining legitimates the industry’s expansion and subjugates obligations to protect and conserve natural resources in the Area.”<sup>29</sup> Whether on land or on the seabed, mining the metals needed for our energy transition causes many tensions; tensions between communities, stakeholders and actors, and raises issues that put

<sup>16</sup> [3], 2.

<sup>17</sup> See the International Seabed Authority’s website listing of the minerals and ecosystems in [97].

<sup>18</sup> [48]. A picture of a nodule is shown later in this article.

<sup>19</sup> See Article 1 of the United Nations Convention on the Law of the Sea, United Nations (1982). [https://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf); [109,48].

<sup>20</sup> Generally, the ISA council meets twice a year, though following the triggering of the “Two-years deadline” in 2019 the council met thrice between 2020 and 2023, partially online due to the pandemic, and since 2024 has returned to twice a year.

<sup>21</sup> See [130,21,88].

<sup>22</sup> “Now that Section 1(15) has been invoked, the ISA will find itself in a race against time to address all outstanding matters on the following: (i) issues directly relating to the exploitation regulations; and (ii) issues that gravitate toward the exploitation regulations and intrinsically related to the design of a functional system for exploitation activities in the Area” in [112], 3. See also [111].

<sup>23</sup> See the 28th Session of the ISA schedule in [1].

<sup>24</sup> See most up-to-date list on the DSM Observer website for June 2024 in [53]

<sup>25</sup> See [57].

<sup>26</sup> This is an ongoing debate, and one might rightly ask why we should not rather seek to integrate legal frameworks with Indigenous knowledges rather than the other way around, which automatically other and undermine these knowledges and practices. See more in [26,90].

<sup>27</sup> See [115,21].

<sup>28</sup> Today people use the term “humankind” for a broader inclusion, though the legal term remains “mankind” and the problematic nature of both terms in briefly addressed later in this article.

<sup>29</sup> [100].

into question how *sustainable* and how *just* this transition can be given the power dynamics at play. These issues and tensions are now compounded by the fact that, on 24th April 2025, United States President Donald Trump signed an executive order directing his administration to undertake DSM in both national and international waters.<sup>30</sup> Technically only the ISA has power over international waters, or waters beyond national jurisdiction, but incited by TMC and their frustration with the slowness of international negotiations, Trump is proposing to flout international law, ignoring UNCLOS, of which the USA is not a signatory.

This paper asks how a “just” transition can be envisioned, and put into practice, if the infrastructures needed to enact them are premised on extractive practices that would perpetuate the exploitation and damage in which hydrocarbon extraction has been grounded. In order to answer this question, this paper explores the energy transition discourse within the ISA negotiations to create a mining code because, as mentioned above, though DSM has been in negotiators’ minds since before decarbonisation debates; it has now become deeply embedded with them. Thus this paper uses the DSM case study to identify important tensions in energy transition developments and plans: tensions between geopolitical divides at the ISA negotiation table, between the so-called Global South and Global North – or the more aptly articulated Global Minority and Majority.<sup>31</sup> As the colonial underpinnings of UNCLOS, ISA and extractivism explored in this paper evidence these divides are deeply entangled with regulation-making. These tensions are compounded by tensions between the human and non-human; the latter being raised only through scientific discourse or Pacific Indigenous cosmologies and knowledges. Often, whilst scientific discourse of non-human life continues the ISA and UNCLOS and other negotiators’ commodification of the ocean, Pacific and other activists raise the complex natures of what some of us call “Nature”.

In order to address these tensions in this paper, I first endeavour to define what is meant by the term “extractivism” and the socio-ecological impacts of this practice, by unpacking and identifying the different colonial legacies that underpin it. In this section, I explore the connections other authors have made between extractivism, colonialism and decarbonisation and I build on their work and supplement it by focusing on DSM. The second section of this paper will connect the first to DSM by considering through examples in TMC’s social media how petro-fetishism is being displaced onto the materials needed for energy transition by the discourse created by companies leading the charge on mining. Drawing briefly on their pro-DSM social media campaigns, this paper proposes to specifically identify how this type of discourse predates hydrocarbon extraction as it began with gold mining and the pursuit of *El Dorado*<sup>32</sup> when the Spaniards colonised the Americas after Columbus stumbled onto the Caribbean in 1492. This is extremely relevant here given that the negotiations around DSM are taking place at the ISA headquarters in Kingston, Jamaica, one of the Caribbean countries that has been deeply impacted by colonialism, extractive monocrop plantation agriculture and bauxite mining. My aim here is to draw a genealogy across these histories to emphasise how DSM as an extractive practice, UNCLOS as a legal text governing how the seabed beyond national jurisdiction can be utilised, and the ISA dynamics are deeply underpinned by colonial extractive logics.

In doing so, the paper connects the history of extractivism that it briefly discusses to DSM, the ISA, UNCLOS and the rhetoric deployed by TMC. By highlighting this colonial extractive genealogy, I aim to emphasise crucial tensions in an energy transition that would be predicated on DSM. Indeed, scholarship is beginning to explore how the ocean is being considered a space supposedly offering many solutions to our climate crisis through several so-called “blue economy” projects, from seagrass planting for carbon sequestering and aquaculture to

storing carbon deep under the seabed, and including DSM, often perpetuate the exploitation of the ocean as a technofix and silver bullet solution to our climate crisis.<sup>33</sup> It is thus necessary to bring the ocean and the seabed back in these conversations and taking DSM as a case study permits to do so whilst also addressing the many complex issues that pertain to tensions in energy justice and challenge the simple idea that to decarbonise without shifting current neoliberal practices is ever just and sustainable. For this reason, the third section of this paper explores the DSM negotiations, UNCLOS and the ISA and the ways in which global majority viewpoints and knowledge systems are implicitly – and sometimes physically – excluded in the negotiation process unearthing important tensions in the international governance of the seabed and its management for supposed energy justice. I close the paper with a fourth section suggesting that addressing the tensions that exist within the ISA room and outside is essential in order to begin undertaking a *just* energy transition. Indeed, energy justice does not simply require technological and scientific developments but socio-cultural and economic shifts in the way we produce and consume energy at governmental and corporate levels and not just at individual consumer level. Simply attempting to respond to increasing energy demands by changing what is being extracted does not attend to our socio-ecological crisis. This involves thinking about environmental and energy justice differently to mainstream global minority discourse. This is done to avoid simply displacing extractivism in the depth as part of “blue economy” projects that seductively lead us to believe that there are silver bullets to solve our energy and climate crisis. This paper thus proposes an overview of these questions and to unpack the colonial extractive dynamics behind our global energy production and consumption and it suggests that identifying these dynamics in socio-political and financial mainstream discourse of decarbonisation proponents can help think through energy transition from the bottom-up, as a just and sustainable practice rather than a repetition of the colonial and extractive regimes that underpin our hydrocarbon economy.

## 2. Extraction, Extractivism and the Coloniality of energy transition

According to Francesco Durante, Markus Kröger, and William LaFleur the “term extractivism derives from the Latin American concept of ‘*extractivismo*,’ which originally emerged in the 1970s to describe developments in the mining and oil export sectors”.<sup>34</sup> The authors note how the term originates from the Latin verb *extrahere*, which is made visible in Eduardo Gudynas’ proposal of the concept of “*extrahección*” in the Latin American context. This term refers to activities relating to the appropriation of natural resources undertaken with brutality and which violate any rights, whether human or non-human.<sup>35</sup> Gudynas’ aim is to identify neoliberal practices of extractivism as a specific type of action in order to oppose the multiple uses of the term “extraction” as an umbrella term across different contexts, including in a metaphorical manner. This argument is crucial as it permits us to separate extractive practices that are key to subsistence living, such as small-scale agriculture or traditional fisheries, from those core to large-scale exploitation, such as monocropping cultures or deep-sea trawling aimed at export.<sup>36</sup> Moreover, the term does not simply refer to a material and physical practice of taking minerals and metals from underground (whether on land or

<sup>30</sup> See [121] and [100].

<sup>31</sup> See [92].

<sup>32</sup> Formulation also used by Hannigan in [57].

<sup>33</sup> See, for instance, [78,36–39] and the work done by the Equinor company Northern Lights in [91]. For important critiques of Blue Economy projects and the commodification of nature, see [135,129]; and [19].

<sup>34</sup> [45], 21, emphasis in original.

<sup>35</sup> In the original Gudynas writes: “el nuevo concepto de ‘extrahección’ para referirse a actividades de apropiación de recursos naturales que se realizan con violencia y violan derechos, sean humanos como de la Naturaleza” in [54], 1, and see also 11–12, 14–15.

<sup>36</sup> [54], 5.



offshore), but one that is deeply entangled with specific political ecologies and financial aims, as Siobhan Angus notes:

Extraction is both a material process and a worldview. Materially, extraction provides the raw materials that give our world form. Fundamentally, mining is a problem of *material* production: the raw materials, machinery, facilities, and labor used to produce goods. Extraction describes the physical processes of taking raw natural materials from the earth, which, under extractive capitalism, often results in the violent dispossession of Indigenous peoples and the destruction of lands, waters, and nonhuman species. Extraction is the first step in an accumulative process through which materials are transformed into wealth.<sup>37</sup> And here it might also be worth asking *whose* wealth since any wealth generated is generally kept within global minority spaces and companies, replicating colonial dynamics and flows of goods and money.

Many scholars have explored these topics, the terminology of extraction and extractivism, and the different socio-ecological dynamics and impacts entangled with it.<sup>38</sup> The scope of this paper does not permit a detailed literary review of their work, but all inform the overview being presented here, as well as the argument that the coloniality of extractivism has led to an objectification and commodification of life (human and non-human) through forms of datafication; reducing life to numbers to sell as a commodity. Thus, here I only briefly explore this genealogy by identifying how, as a practice, extractivism is grounded in colonial and mercantile endeavours that developed centuries ago, and which continue to underpin the pursuit of materials for renewable energy production, most of which necessitate extraction. Indeed, the geographical locations of these new extractive frontiers often overlap with historically colonised spaces, reinforcing colonial legacies in the context of an energy transition.<sup>39</sup> One can identify the beginning of colonial and capitalistic extractivism with any form of unsustainable plantation extraction, particularly intensified by sugar cane and other “cash-crop” monocrop agriculture in the Americas as Europeans colonised and re-organised the space they took by violence, perpetuating a genocide of Indigenous peoples and a mass abduction and enslavement of people from the African continent to be put to work on these plantations.<sup>40</sup> This type of unsustainable monocrop agriculture was first tested on Madeira before it was brought over to the American continent by the Spaniards, and, as Jason Moore notes, it was a particularly deadly practice:

As Central Europe’s metallurgical boom took flight, a different kind of commodity revolution was unfolding in the Atlantic. This was the rise of King Sugar, modernity’s original cash crop. Combining the ecology of cane and capital, a special lethality defined the sugar plantation system. Sugar not only devoured forests and exhausted soils – it was an apparatus of mass killing in the form of African slavery. On Madeira, located off the western coast of north Africa, the first sugar boom – and the first signs of the modern sugar-slave nexus – took shape. Madeira’s sugar boom began in the 1470s, ousting Mediterranean producers from their privileged position. In the two decades after 1489, sugar production soared – and labor productivity with it. So did deforestation. For sugar

was a cash crop that famously devoured nearby forests. As an economic activity it resembled smelter more than farm.<sup>41</sup>

This necrotic agricultural practice not only destroyed people and environments as well as re-organised spaces, physically and conceptually; additionally, it also re-shaped people’s relations with their environment, whether their native one or the new one they had been forcibly migrated to, through different forms of alienation. These forms of alienation continue today as resource extraction and its consequences continue to plague the countries whose colonization had included such practices.<sup>42</sup> Kristina M. Lyons identifies this as a form of “soil-alienation” which points to a multi-layered separation enacted between people and land in Latin America and which stands in conflict with many groups and Indigenous communities’ conceptions of their environment.<sup>43</sup>

To align different types of oppression and dispossession born out of extraction, consider Achille Mbembe’s description of the Atlantic trade extraction: “first and foremost the tearing or separation of human beings from their origins and birthplaces”, as paralleling Macarena Gómez-Barris’s understanding that “[e]xtractive capitalism .... violently re-organizes territories as well as continually perpetuates dramatic social and economic inequalities that delimit Indigenous sovereignty and national autonomy”.<sup>44</sup> The forced removal and migration of groups of people that identify themselves with specific places through ancestry and custodianship violates their autonomy and sovereignty. Moreover, one may ask what happens when populations Indigenous to an environment are moved across oceans and lands. Along these lines, Jessica Hernández notes that.

Black people are Indigenous; their Indigeneity was fractured over generations of the slavery, segregation, and discrimination they have endured when they were displaced from their ancestral homelands. Like Indigenous peoples, Black people have also been caretaking and stewarding our lands since slavery.<sup>45</sup>

Though this paper does not aim to romanticise Indigenous peoples’ relations with environments and their practices as “better” and necessarily more sustainable – which would create a simplistic binary between Indigenous and non-Indigenous groups and make Indigeneity a monolithic and homogenous category – it does suggest that the practices of certain communities have been more sustainable and that their lifestyles are synonymous with less consumption and pollution. Although such communities hunt, fish and engage in agricultural practices, a lot of these are undertaken at smaller and more sustainable scales embedded within cultural, and sometimes spiritual, relationalities, and this means that non-human life is not commodified to be sold on the capitalist marketplace.<sup>46</sup>

Thus, extractivism transforms the environment into what Gómez-Barris’s calls “extractive zones”: “by using the term *extractive zone* I refer to the colonial paradigm, worldview, and technologies that mark out regions of ‘high biodiversity’ in order to reduce life to capitalist resource conversation”.<sup>47</sup> These modes of extraction perpetuate in the case of energy transition regime what, “[i]nspired by Gómez-Barris’s work” Astrid Ulloa calls “*renewable extractive zone* (REZ)”: “I define an REZ as a site combining several conventional extractive processes (mining-energy), which are necessary for energy transitions such as copper mining, and low-carbon infrastructures or ‘green extractivism’ projects.”<sup>48</sup> And whilst many scholars have explored, as I do here, capitalist extractivism

<sup>37</sup> [8], 10–11.

<sup>38</sup> See, for instance, [94,9,118,20,18,98].

<sup>39</sup> See [2]; Tornel’s discussion of “the Coloniality of Power (COP) embedded in energy systems” in [122]; de Onís’ concept of “energy coloniality” in [31]; in Dunlap and Correa Acre’s coinage of “infrastructural colonialism” in [42] and Preston’s concept of “racial extractivism” in [99].

<sup>40</sup> As Tristan Partridge notes “the history of energy emerges within the logics of exploitation and extraction that drove systems of chattel slavery and imperialism from the fifteenth century onwards and which continue to fuel anti-Blackness and (neo)colonialism today (Yusoff 2018; Bledsoe and Wright 2019; Fiori 2020). Tracing the role of energy extraction and transfer within histories of exploitation shows how dominant ideas about energy (and the material organization of energy systems) are inseparable from—and are used to justify—inequality, exclusion, and the devaluing of others” in [93], p. 6.

<sup>41</sup> [89], 615.

<sup>42</sup> This, of course, is true beyond the Americas though this region is explored here given that the scholarship on extractivism studied here emerged there.

<sup>43</sup> [79], 4.

<sup>44</sup> [83], xviii. Also, for more details on a comparative study of the violence of extraction see [131].

<sup>45</sup> [62], 3.

<sup>46</sup> See for instance [59,71,62,34].

<sup>47</sup> [52], xvi, emphasis in original.

<sup>48</sup> [125].

as an environmentally racist practice that perpetuates colonial dynamics globally, less scholarship has been undertaken on how this unfolds on the seabed.<sup>49</sup> Moreover, the commodification of different extracted natural resources is also underpinned by the extraction, objectification and commodification of Indigenous, Brown and Black peoples. Mbembe perfectly captures the process of objectification, both metaphorical and economic, undergone by enslaved peoples in *Critique of Black Reason*.<sup>50</sup> The literal extraction and commodification of abducted and enslaved Black peoples is seen through their objectification as products to be sold and recorded in traders' and plantation owners' ledgers as anonymous numbers and figures. This is a first instance of making humans into data, which was coupled with the transformation of non-human life into financial and scientific data within records of crop yields and plantation agriculture science.

This discourse weighs heavily on our present given that contemporary racist and racialising discourse embedded within systemic and structural inequalities stemming from these material and intellectual developments. Hence, as Mbembe notes: to "produce Blackness is to produce a social link of subjection and a *body of extraction*, that is, a body entirely exposed to the will of the master, a body from which great effort is made to extract maximum profit".<sup>51</sup> By engaging with this history of brutal material, ontological and epistemological extraction, I suggest that extractive practices at industrial scale are entangled with this type of objectification, commodification and datafication of people and non-human life and this plays a crucial role in our current climate crisis. This objectification of our ecosystem as a "natural resource" can be observed in several ways. In the next section of the paper, I am interested to establish how, inside and outside of the ISA negotiation room, corporate messaging portrays polymetallic nodules in a fetishistic manner, which I align to what petrocultural scholars have called petrofetishism, as noted above. This has a longer history if connected to gold mining and the *Eldorado* narrative in the Americas. This genealogy, which this paper cannot unpack in detail due to its scope,<sup>52</sup> is nonetheless relevant given the ISA location in Jamaica and the fact that the ISA and UNCLOS themselves, as I suggest then in the third section of this paper, are underpinned by colonial dynamics; these manifest in a number of ways in the DSM negotiations.

### 3. The colonial legacies of the ISA

As the ISA is drafting the framework that would regulate industrial-scale DSM, it must bear in mind many issues pertaining to benefit-sharing, that is, who may benefit from the extraction of these resources? But also, who will undertake the extraction and how? And broader socio-ecological issues: What will be the consequences to deep-sea marine life? What is to happen to countries closest to the extraction sites? How likely is the risk of releasing sedimented carbon? Aline Jaeckel et al. also note that.

Despite this rush, the social legitimacy of DSM is compromised. Not only have major brands rejected deep-sea minerals, but there are also growing calls for a moratorium on DSM, including from the Alliance of Countries for a Deep-Sea Mining Moratorium, which was launched at the 2022 UN Ocean Conference. [...] Social legitimacy of DSM relates not only to *what* decision is ultimately taken but also to *how* decisions are taken and by *whom*. While the ISA has legal competence to permit DSM

under the UN Convention on the Law of the Sea (UNCLOS), there are concerns about whether the ISA's current decision-making procedures do justice to its mandate to act on behalf of humankind as a whole (UNCLOS, Article 136(2)). This unique and legally binding mandate requires the ISA to consider not only profit and environmental impacts but also social and potential negative economic effects of DSM, particularly for developing states. Yet the social aspects remain understudied.<sup>53</sup>

But can we divorce the environmental and societal impacts from these practices? I ask this question here not only in considering how physical reliance on the ocean – how it nourishes many communities through fishing and aquaculture and in terms of the oxygen it produces – but also through the economic and health benefits it procures for us.<sup>54</sup> Communities have been built around the sea for centuries and continue to be sustained by the ocean, socio-ecologically, economically, as well as culturally. Coastal and insular spaces are especially connected to the ocean, not only the surface on which they paddle, navigate, surf and swim, but also the depths in which they dive, and where divinities and ancestors live and/or return.<sup>55</sup> How can one measure the threat that DSM poses to these practices that are deeply entangled with socio-ecological and economic realities?

Outside of the yearly meetings in Kingston, the ISA negotiations are also informed by intersessional working groups, and one, led by Clement Yow Mulalap (adviser to the Permanent Mission to the United Nations for the Federated States of Micronesia),<sup>56</sup> focuses on the integration of what UNESCO calls "in/tangible" underwater cultural heritage (UCH) within the mining code. Since the group first met in 2023, the discussions have debated about what "in/tangible" UCH might mean and whether it is indeed the burden of the mining code and the obligation of the ISA to protect it in the first place, given that the ISA mandate, after all, is to mine, as the first article of UNCLOS reminds us (UNCLOS 1.(1)). This has resulted in multiple re-phrasings of "in/tangible" UCH into, for instance, "human remains and objects and sites of an archaeological or historical nature" (Consolidated Text Regulation 35), though regulation 35.1 and 2 have kept a mention of UCH as per UNESCO 2001 Article 1 (a). Thus, we can already see how, over a few meetings the legal text and some of its negotiators have pushed out non-western-legal understandings of the ocean, clearly erasing Indigenous and local communities' epistemologies.<sup>57</sup> And while this paper does not focus on this discussion, here it asks how can a just energy transition take place if the legal space that regulates a type of mining to undertake them does not allow for a fair and inclusive governance?

Indeed, it is central to consider tensions in the negotiation process that find their origin in the manner in which UNCLOS and the ISA are constituted, and this is why, as I will show in the next section, discussions concerning DSM also importantly unfold in the social and digital space<sup>58</sup>; the ISA is a legally and technically restricted space, not only in terms of the complex legal, technical and scientific discussion, but also because being able to be physically present in the ISA room is only allowed if a nation-state delegation or an observer-status-holder organization invites you in. The ISA boasts its inclusivity and transparency given their live-streaming of the council and assembly meetings via the ISA-TV, but the stream is in the Jamaican time-zone, meaning not all can access, only certain languages are available for translation, and it is

<sup>49</sup> See amongst others [120,24,25,60,56].

<sup>50</sup> Achille Mbembe argues that the "noun 'Black' is in this way the name given to the product of a process that transforms people of African origin into living *ore* from which *metal* is extracted", in *Critique de la raison nègre*. Découverte, 2013, 40, emphasis in original.

<sup>51</sup> [83], 18, emphasis in original.

<sup>52</sup> Though I am exploring these questions in a research and monograph project entitled *(Un)Mediating the Ocean: Making the Seabed in Policy, Finance, Activism and Infrastructure*.

<sup>53</sup> [68], 1, italics in original.

<sup>54</sup> See [114,36,37,38,39,55,70,46,64].

<sup>55</sup> See for instance, though this is not an exhaustive list, on DSM: Childs, John [23] and [124]. More broadly see [59,66,30,76,77,104,85].

<sup>56</sup> Since March 2025, Clement Yow Mulalap has been joined by Dr. Anastasia Strati of Greece and Ambassador Antonio Otávio Sá Ricarte of Brazil as co-facilitators of this intersessional working group.

<sup>57</sup> See a longer discussion on this development in Champion, Giulia, and Mia Strand [22].

<sup>58</sup> Some of which is unregulated and biased.

often unstable and glitches.<sup>59</sup> I raise this because, as noted above, the part of the seabed outside any country's jurisdiction being discussed is "the heritage of all mankind", and so it appears problematic that civil society cannot directly or fully participate in these negotiations or even observe them. This is putting aside the problematic formulation of "mankind", today often replaced in discussion by "humankind", which does not still include marine ecosystems *who* are the first to be impacted by underwater mining.<sup>60</sup> Or, the fact that formerly colonised countries from the Pacific and the Caribbean have now been subsumed within their former coloniser, such as the United States or France, meaning that though some of them, particularly Hawai'i in the Pacific, who are closest to the sites to mine, do not have any say in the actual policy-making and can only intervene as observers. This status allows them to speak and make interventions in the room, but their suggestions need not be accounted for as the mining code is being drafted, unlike UNCLOS-signatory countries. This raises, as I have mentioned above, important tensions concerning the question of *who* gets to write the mining code, and, if mining companies can sit on signatory countries' delegations like TMC does with Nauru, then their participation in the negotiations is more impactful than observers'.

This irresolvable question is a product of the colonial legacies underpinning the creation of the ISA and UNCLOS but international law more broadly as Anghie notes: "colonialism was central to the constitution of international law in that many of the basic doctrines of international law ... were forged out of the attempt to create a legal system that could account for relations between the European and the non-European worlds in the colonial confrontation".<sup>61</sup> If the structures on which the law-making process of the ISA is built stems from colonial histories and is compounded by continued present colonial practices, then can an energy transition based on DSM, negotiated at the ISA, be just? This question connects also to the tensions of using an industrial-scale extractive method such as DSM for decarbonisation, showing that the multilayered and complex tensions and issues attached to DSM, the ISA and the seabed, make these an important case study to consider what a just energy transition may look like. These issues are compounded by the language used by mining companies such as TMC who wish to convince civil society, who is sometimes uninformed on DSM, that it is a safer than land-mining.<sup>62</sup> And, though they are correct in pointing out the socio-ecological devastation of mining in places such as the Democratic Republic of Congo, this type of rhetoric simplifies a complex entanglement of dynamics that forecloses alternative ways to decarbonise, particularly those beyond extractivism. In the next section, I will consider how TMC's rhetoric perpetuate colonial underpinnings, also present at the ISA.

#### 4. The polymetallic nodule rush to the seabed

Social media and the digital world have become spaces where activists can inform civil society of what happens in the ISA – the plenary room *and* informal events and conversations that surround it. It is also a space where mining companies provide a specific narrative of what DSM is for civil society and their shareholders. The language used by TMC –

the company that supported Nauru as the country triggered the aforementioned two-years deadline – is a good example of decarbonisation discourse that erases the extractive reality of DSM and in which we can identify the colonial genealogy discussed above. First, this can be seen in its relationship with Nauru. As I argued elsewhere "[t]his collaboration underscores Nauru's long history of colonial extractivism. The Pacific Island needs the wealth that [DSM] could generate because it struggles to survive after strip-mining of phosphate pushed it to an environmental crisis" and after it rented itself as refugee detention camp to Australia.<sup>63</sup> It is thus difficult not to see DSM as part of a broader history of extractive colonialism and repeating, though underwater, what Christina Sharpe calls "a past that is not past".<sup>64</sup>

In three tweets selected below, which, as mentioned in the introduction, represent the wider discourse used by TMC and its CEO Gerard Barron, one can see the erasure of colonial and imperial histories in pro-DSM discourse, a discourse fuelled by corporate interest. TMC and Barron's Tweets follow a specific pattern and repetition of claims and arguments. They tend to appear instructive, as they often share scientific facts and figures about polymetallic nodules, land-based and deep-sea extractive practices and geopolitical and economic realities pertaining to the climate crisis and decarbonisation. Given that civil society does not have access to all the discussions at the ISA, it is important to consider how DSM is discussed on accessible platforms. As I will show, the extractive and mining discourse used evokes gold rush and *El Dorado* rhetoric by fetishising polymetallic nodules.<sup>65</sup>

In the TMC Tweet below (Fig. 1 below) the nodule on display is made to appear similar to a gold nugget (see Fig. 1 below under it Fig. 2), and Barron's fetishistic showcasing of a nodules, which he brings to official meetings (see Fig. 3 below), brings DSM back into the long colonial history of gold mining and *El Dorado* narratives in the Americas and Gold Rush narratives. Some of these have been deeply embedded in petroleum extraction too given that "black gold" has often been a metaphor



Fig. 1. See this digitally modified image of a nodule that seems to seep gold from within.

<sup>59</sup> I use the term boast here as in July 2024 at the opening of the council meetings I was observing in the room the ISA secretariat began the negotiations doing exactly that and providing numbers of people who have connected on the live stream. Though having used the live stream myself in the past, I have experienced it crashing repeatedly, making it challenging to follow the negotiations.

<sup>60</sup> A consideration of the definition of humankind is beyond the scope of this article, but as established in the second footnote of this article and my use of the term non-human, these types of articulations have a tendency to undertake epistemic and material harm as they have not included many communities for centuries.

<sup>61</sup> [6], 3.

<sup>62</sup> See in [28].

<sup>63</sup> [21], 284 and [84] and [50].

<sup>64</sup> [109], 13.

<sup>65</sup> See [131,51], 133; [57], 20 and 43 and [2].





Fig. 2. . Source: [https://commons.wikimedia.org/wiki/File:Gold\\_nugget.jpg](https://commons.wikimedia.org/wiki/File:Gold_nugget.jpg)



I recently had the pleasure of meeting the Tongan Ambassador in New York to renew our sponsorship agreement. As a reminder, we acquired Tonga Offshore Mining Limited (TOML) last year which gave us an additional inferred resource of 756 million wet tonnes of polymetallic nodules



8:05 PM · Oct 12, 2021 · Twitter for iPhone

Fig. 3. . See a polymetallic nodule on the left-hand corner of the picture on a piece of paper on the table and one in-cased at the centre of the table.

for crude oil. Hence, one can identify a genealogy of commodity fetishism at the heart of extractive practices dating back from gold extraction, which pervaded petro-extractivism rhetoric, and which is now moving to the materials we desperately need for decarbonisation.

The positioning of the nodule weighing papers on the left corner of the table and as a preserved and precious piece in the plastic case at the centre of the table emphasises how this type of fetishism makes the nodule both hyper-valuable on the financial market, from which TMC and Barron profit greatly, as well as devaluing it from being a natural formation that plays central roles in deep-sea ecosystems. It becomes a “resource” that can be used for green car batteries or as a paperweight. And no information is provided to the viewer about the radioactivity of the nodules, which is probably why it is encased in Fig. 3. TMC provides a very specific narrative through imagery and text.<sup>66</sup> TMC and Barron’s engagement with this type of discourse is crucial to their production of wealth via financial speculation; indeed, the fact that Barron has been the CEO of another DSM company gone bankrupt (Nautilus Minerals

attempting to mine hydrothermal vents), which also bankrupted Papua New Guinea, and renamed another failing one to TMC (DeepGreen Metals), might lead one to wonder whether they are indeed able to undertake DSM. Because DSM is overseen by the ISA and only exploration licenses are being distributed whilst the mining code is being finalised, corporations’ collaboration with sponsoring countries is supposed to have regulatory protection, but as was the case of Nautilus Minerals and Papua New Guinea, “international frameworks like those at the ISA also have the side effect of cultivating predatory relationships between Western nations, mining corporations, and island nations like Tonga or Papua New Guinea”.<sup>67</sup> As Lisa Yin Han explains.

Oftentimes, less powerful nations are pressured to legally sponsor and thereby provide legitimacy to foreign mining contractors from wealthier nations like Canada, even amid sustained opposition by members of coastal communities themselves. The Nautilus Minerals case is one of the few instances in which local opposition ultimately succeeded in halting mining. But the greater outcomes of Papua New Guinea’s partnership with Nautilus are much more bleak. Although Nautilus eventually went bankrupt in 2019, in 2011 its founders created another company called DeepGreen Metals (renamed The Metals Company in 2021) which now holds three exploration licenses in the CCZ. And while many early Nautilus investors became millionaires over the course of this debacle, Papua New Guinea’s partnership with Nautilus left the country \$125 million in debt.<sup>68</sup>

National sponsorship of mining company makes the countries sponsoring them liable if any of the company’s does not abide by the ISA’s work-in-progress regulations, including environmental damage. It also puts them in financial difficulties as was the case of Papua New Guinea. The power dynamic embedded in the example above echo those discussed at the beginning of this section. TMC and Nauru and wider colonial dynamics that have created uneven relations globally. Overall, it reinforces the colonial dynamics of the ISA discussed in section 2. And, though the gradual process of international negotiations has slowed down the start of industrial-scale DSM, TMC’s decision to bypass the ISA and go to the Trump administration to expedite mining is a sign of the company’s bad faith. Indeed, if they did care for the environment as much as they claim in their communications and use this care as an excuse for DSM, would they really mine without knowing with certainty whether it might have devastating risks for the seabed?<sup>69</sup>

## 5. Can we envision Decarbonisation beyond extraction?

In the last section of this article, I want to suggest that, not only are there solutions being explored by scientists about recycling materials already in circulation, but also that what is needed is a paradigm shift; at two levels: one in terms of energy consumption, particularly in global minority countries who have been the major emitters of CO<sub>2</sub>, as well as a second one, at governmental and corporate level and particularly one away from corporations being put at the heart of the energy transition. Indeed, when companies who have been leading extractive projects announce themselves as providing options for decarbonisation, they not only erase the impact they have been having in undertaking large-scale destructive mining and petroleum extraction, but also their responsibility in our current anthropogenic climate crisis, and the fact that they have been earning large sum of money from these deadly practices. Indeed, they put themselves at the centre of renewable energy businesses to ensure that they continue to generate wealth for themselves. This can be seen in Shell’s recent 2024 advertisement entitled “Helping power the UK now, and into the future”.<sup>70</sup> This advertisement is being

<sup>67</sup> [56], 112.

<sup>68</sup> [56].

<sup>69</sup> See two instances in <https://x.com/themetalsco/status/1185969100280852480> and <https://x.com/themetalsco/status/1301892923970269186>.

<sup>70</sup> See [61] and [108].

<sup>66</sup> [73].



shown on UK televisions widely, without any critical engagement from broadcasting companies in addressing the problematic language it contains and its promise “to help” the UK being driven by an ingenious “engineering”. But why would social media posts or advertisements be addressed critically by the platforms that broadcast them? This raises crucial issues in how the digital space, which is one of both propaganda and resistance, can be empowering and dangerous, as we have seen in its use by TMC. It also demonstrates why a paradigm shift is necessary as we envision a “just” energy transition beyond extractivism: Asking for whom and by whom energy justice is created is central; it requires, as Ed Atkins importantly notes, “to put people’s voices, stories, and experiences at the forefront of future decarbonisation policies”.<sup>71</sup> And, while it may seem easier for a localised or national context, like those explored in Atkins’ *A Just Energy Transition*, all “sites of a global energy transition highlight how, in short, there can be no transition *here* without justice *everywhere*”.<sup>72</sup> This emphasises how tensions across geopolitical and socio-ecological divides are central to envision and undertake a just energy transition and, as this article has discussed, the seabed, and the ISA negotiation room discussing it, is a central site where we can unpack these tensions.

As Ian Angus argues “[e]arth has entered a new epoch, one that is likely to continue changing in unpredictable and dangerous ways. That’s not an exaggeration or a guess: it’s the central conclusion of one of the largest scientific projects ever undertaken, *one that requires us to think about our planet in an entirely new way*”.<sup>73</sup> Similarly, as we envision a just energy transition, we must think differently and ask: Who are they *just* for? Scholars and scientists have been exploring how degrowth and material recycling could be a way to undertake a just energy transition beyond extractivism.<sup>74</sup> Matthias Shmelzer, Andrea Vetter and Aaron Vansintjan describe degrowth as follows:

‘Degrowth’ is a term that is increasingly mobilized by scholars and activists to criticize the hegemony of growth – and a proposal for a radical reorganization of society that leads to a drastic reduction in the use of energy and resources and that is deemed necessary, desirable and possible. Degrowth starts from the fact – demonstrates by an increasing number of studies – that further economic growth in industrialized countries is unsustainable.<sup>75</sup>

In their work, they explore how this vision of the world is necessarily post-capitalist since capitalism promotes constant and short-term growth to promote the enrichment of some at the expense of a healthy livelihood for others. This is also noted by Lisa Yin Han who notes that with “the present-day normalization of finance capitalism, even imaginaries of a sustainable future are built on the premise of environmental destruction”.<sup>76</sup> For this reason, any practice of recycling materials must be accompanied by paradigm and policy shifts. Indeed, as Elsa Dominish, Nick Floring and Rachael Wakefield-Rann note there “are a range of strategies to minimise the need for new mining for [lithium-ion batteries (LIBs)] for [electric vehicles (EVs)], including extending product life through improved design and refurbishment for reuse, and recovering metals through recycling at end-of-life (EOL), as well as shifts away from private car ownership towards shared vehicles or active and public transport”.<sup>77</sup> In this study, the authors have found that “recycling has the potential to reduce primary demand compared to total demand in 2040, by approximately 25% for lithium, 35% for cobalt and nickel and 55% for copper. This creates an opportunity to significantly reduce the demand for new mining”.<sup>78</sup> Another study by the Blue Climate Initiative

explores how the need for DSM can be eliminated if we focus on the next generation of EVs being built and a report by Moana Simas, Fabian Aponte and Kirsten Wiebe on how a circular economy of critical minerals and recycling can provide the needed materials for decarbonisation without further extractive practices being undertaken.<sup>79</sup> Recycling will take a long time to become the main way in which we secure materials and in the meantime extraction is the main way used to source them, but further funding transdisciplinary projects on recycling mean accelerating this practice.

Nonetheless, as Alexander Dunlap, Judith Verweijen and Carlos Tornel argue, “Green New Deals are rapidly colonizing collective imaginations with ‘lower-carbon’ lifestyles, thereby advancing faulty climate change mitigation/adaptation strategies and preventing alternative postcapitalist and postdevelopment futures”,<sup>80</sup> importantly noting the need to imagining the future in new ways, not just in the context of energy, but also beyond capitalism. Along these lines, the Seas at Risk have also produced a report entitled *Breaking Free From Mining*, which provides future visions of pathways to undertake a just energy transition beyond extractivism, reminding us that “technology and innovation fixes” come at a price.<sup>81</sup> Indeed, these are techno-utopian silver bullets that only displace capitalist extractive practices if not undertaken alongside paradigm shifts at large scale, which also focus on sustainable and healthy livelihoods. This can only be done by shifting away also from what Holly Jean Buck calls “the language of numbers, the same language engineers and builders and technocrats speak”<sup>82</sup>; by shifting beyond the datafication of life discussed above. This is not to say that numbers and sciences cannot provide answers for decarbonisation, but rather that some of the ways in which we currently address our socio-ecological crisis through number and technological solutions have pitfalls and limitations,<sup>83</sup> and that more sustainable ways of life require more transdisciplinary approaches that listen to all the people involved and do not limit life to a number. It also becomes crucial for Indigenous and local communities’ knowledge holders to be listened to, first, and invited to these discussions at the incipit of any further plans for a just energy transition.

## 6. Conclusion

This paper has argued that seeing DSM as a techno-utopian silver bullet solution for our climate and energy crisis is problematic and that there are many pitfalls to the ways extractive practices more broadly are being seen as solutions when their perpetuation has exacerbated and accelerated this crisis in the first place. By exploring the regulatory processes and corporate discourse surrounding DSM, this paper has identified how DSM – and extractivism more broadly – is underpinned by colonial legacies and endeavours that have shaped our current economic system. The paper thus suggests that envisioning a *just* energy transition can only be done by moving beyond extractivism at industrial scale. Moreover, this should also be accompanied by wider paradigm shifts promoting lower energy consumption, particularly in global minority contexts which are directly responsible for our current anthropogenic climate crisis because of our unsustainable lifestyle. This paper suggests that we politically, socially and economically reconsider our focus to non-extractive practices because continuing to use extractivism as way to source minerals will only perpetuate structural inequalities and the climate crisis rather than solve them.

<sup>71</sup> [10], 15.

<sup>72</sup> [10], 17, emphasis in original.

<sup>73</sup> [7], 29, my emphasis.

<sup>74</sup> See the papers quoted below and [113].

<sup>75</sup> [105], 3.

<sup>76</sup> [56].

<sup>77</sup> [35], 3.

<sup>78</sup> [35], iv.

<sup>79</sup> [47,110].

<sup>80</sup> [40].

<sup>81</sup> [106], 5.

<sup>82</sup> [15], 7.

<sup>83</sup> See details in [17].

## CRediT authorship contribution statement

**Giulia Champion:** Methodology, Investigation, Funding acquisition, Resources, Project administration, Conceptualization, Writing – original draft, Formal analysis.

## 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.

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## Data availability

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

## References

- [1] 28 th Session 2023 - International Seabed Authority. <https://isa.org.jm/sessions/28th-session-2023/>; 2022.
- [2] Abad Leticia Arroyo, Palma Nuno. The Fruits of El Dorado: The Global Impact of American Precious Metals. In: *The Fruits of the Early Globalization: An Iberian Perspective*, edited by Rafael Dobado-González and Alfredo García-Hiermaux. Palgrave Studies in Comparative Global History. Springer International Publishing; 2021. [https://doi.org/10.1007/978-3-030-69666-5\\_4](https://doi.org/10.1007/978-3-030-69666-5_4).
- [3] Andreucci Diego, López Gustavo García, Radhuber Isabella M, et al. The Coloniality of green Extractivism: unearthing Decarbonisation by dispossession through the case of nickel. *Polit Geogr* 2023;107:102997.
- [5] Andreucci Diego, Zografos Christos. Between improvement and sacrifice: othering and the (bio)political ecology of climate change. *Polit Geogr* 2022;92:102512.
- [6] Anghele Antony. Imperialism. Sovereignty and the Making of International Law: Cambridge University Press; 2004.
- [7] Angus Ian. Facing the Anthropocene: Fossil capitalism and the crisis of the earth system. *Monthly Review Press*; 2016.
- [8] Angus Siobhan. Camera Geologica: An elemental history of photography. Duke University Press; 2024.
- [9] Arboleda Martín. Planetary mine: Territories of extraction under late capitalism. Verso; 2020.
- [10] Atkins, editor. A just energy transition: Getting Decarbonisation right in a time of crisis. Bristol University Press; 2023.
- [11] Bennett Joshua. Being property once myself: Blackness and the end of man. The Belknap Press of Harvard University Press; 2020.
- [12] Bergstrand Kelly, Mayer Brian. Transformative environmental threats: behavioral and attitudinal change five years after the Deepwater horizon oil spill. *Environmental Sociology* 2017;3(4):348–58.
- [13] Bruna Natacha. A climate-smart world and the rise of green Extractivism. *J Peasant Stud* 2022;49(4):839–64.
- [15] Buck Holly. Jean. After Geoeengineering: *Climate Tragedy, Repair, and Restoration*. Verso; 2019.
- [16] Buell Frederick. A short history of oil cultures: or, the marriage of catastrophe and exuberance. *Journal of American Studies* 2012;46(2):273–93.
- [17] Buller Adrienne. The value of a whale: On the illusions of green capitalism. Manchester University Press; 2022.
- [18] Calvão Felipe, Archer Matthew, Benya Asanda, editors. The afterlives of extraction: Alternatives and sustainable futures. Brill Nijhoff; 2020.
- [19] Carlson Andrew Kalani. AlterNatives to blue carbon Coloniality: An 'Ōiwi perspective on redirecting funding to indigenous stewardship. In: Sultana Farhana, editor. *Confronting climate Coloniality: Decolonizing pathways for climate justice*. Routledge; 2025.
- [20] Chagnon Christopher, Durante Francesco, Gills Barry K, et al. From Extractivism to global Extractivism: the evolution of an organizing concept. *J Peasant Stud* 2022;49(4):760–92.
- [21] Champion Giulia. Decolonising Deep-Sea gothic: perspectives from the Americas. *Gothic Studies* 2022;24(3):275–94. <https://doi.org/10.3366/gothic.2022.0142>.
- [22] Champion Giulia, Strand Mia. “Other(Ed)” Ocean Knowledges: Unlearning Integration in Ocean Governance for Recognitional Justice’. *Ocean and Society* 2: Knowledge Integration in Ocean Governance. 2025. p. 8875. <https://doi.org/10.17645/oas.8875>.
- [23] Childs, John. ‘Deep Sea mining threatens indigenous culture in Papua New Guinea’. *The Conversation*, 19 February 2019. <https://theconversation.com/deep-sea-mining-threatens-indigenous-culture-in-papua-new-guinea-112012>.
- [24] Childs John. Greening the blue? Corporate strategies for Legitimising Deep Sea mining. *Polit Geogr* 2019;74:102060.
- [25] Childs John. Performing “blue degrowth”: critiquing seabed Mining in Papua new Guinea through creative practice. *Sustainability Science* 2020;15(1):117–29.
- [26] Chilisa Bagele. Decolonising transdisciplinary research approaches: an African perspective for enhancing knowledge integration in sustainability science. *Sustainability Science* 2017;12:813–27.
- [27] Chun Jungyeon, Jeong-Hwan Oh, Kim Choong-Ki. Oil spill response policies to bridge the perception gap between the government and the public: a social big data analysis. *The Journal of Marine Science and Engineering* 2020;8(5):335.
- [28] Company, The Metals. ‘The metals Company releases study comparing impacts of land ores to polymetallic nodules’. The Metals Company, 27 April 2020. <https://metals.co/deepgreen-releases-study-comparing-land-ores-to-nodules/>.
- [29] Daggett Cara. Petro-masculinity: fossil fuels and authoritarian desire. *Millennium: Journal of International Studies* 2018;47(1):25–44.
- [30] Dawson Kevin. Undercurrents of power: Aquatic culture in the African diaspora. University of Pennsylvania Press; 2018.
- [31] Onís De, Catalina M. Energy Islands: Metaphors of power, Extractivism, and justice in Puerto Rico. University of California Press; 2021.
- [32] DeBoom Meredith J. Climate Necropolitics: ecological civilization and the distributive geographies of extractive violence in the Anthropocene. *Ann Am Assoc Geogr* 2021;111(3):900–12.
- [33] Demos TJ, editor. *Decolonizing nature: Contemporary art and the politics of ecology*. Sternberg Press; 2016.
- [34] Demuth Bathsheba. Floating coast: An environmental history of the Bering Strait. W. W. Norton & Company; 2019.
- [35] Dominish Elsa, Florin Nick, Wakefield-Rann Rachael. *Reducing new Mining for Electric Vehicle Battery Metals: Responsible sourcing through demand reduction strategies and recycling*. Report prepared for earthworks by the Institute for Sustainable Futures. University of Technology Sydney; 2021.
- [36] DOSI. Hydrothermal vent ecosystems. Information Sheet Deep-Ocean Stewardship Initiative 2023. <https://www.dosi-project.org/wpcontent/uploads/vents-ecosystems-infosheet.pdf>.
- [37] DOSI. Polymetallic nodule-rich Abyssal Plains. Information Sheet. Deep-Ocean Stewardship Initiative. 2023 <https://www.dosi-project.org/wpcontent/uploads/abyssal-plain-info-sheet.pdf>.
- [38] DOSI. The seamount ecosystem. Information Sheet. Deep-Ocean Stewardship Initiative. 2023 <https://www.dosi-project.org/wp-content/uploads/seamount-info-sheet.pdf>.
- [39] DOSI. What does the DeepOcean do for you? Deep Ocean Stewardship Initiative Policy Brief 2022. <https://www.dosi-project.org/wp-content/uploads/deep-ocean-ecosystem-services-brief.pdf>.
- [40] Dunlap Alexander. In: Batel Susana, Rudolph David, editors. ‘Does renewable energy exist? Fossil fuel+ technologies and the search for renewable energy’. In *a critical approach to the social acceptance of renewable energy infrastructures going beyond green growth and sustainability*. London and New York: Palgrave Macmillan; 2021.
- [41] Dunlap Alexander. Spreading “green” infrastructural harm: mapping conflicts and socio-ecological disruptions within the European Union’s transnational energy grid. *Globalizations* 2023;20(6):907–31.
- [42] Dunlap Alexander, Acre Martín Correa. “Murderous energy” in Oaxaca, Mexico: wind factories, territorial struggle and social warfare. *J Peasant Stud* 2022;49(2):455–80.
- [43] Dunlap Alexander, Laratte Louis. European green Deal Necropolitics: exploring ‘green’ energy transition, Degrowth & Infrastructural Colonization. *Political Geography* 2022;97:102640.
- [44] Dunlap Alexander, Verweijen Judith, Tornel Carlos. The political ecologies of “green” Extractivism(s): an introduction. *Journal of Political Ecology* 2024;31:436–585.
- [45] Durante Francesco, Kröger Markus, LaFleur William. Extraction and Extractivisms: Definitions and concepts. In: Shapiro Judith, McNeish John-Andrew, editors. *Our extractive age: Expressions of violence and resistance*. Routledge; 2021.
- [46] Ecott Tim. *Neutral buoyancy: Adventures in a liquid world*. Grove Paperback; 2002.
- [47] Everett Jeanne, Kammen Daniel, Lau James, Lau Katherine. Rowland Stan Next generation EV batteries eliminate the need for Deep Sea mining. *Blue Climate Initiative* 2023:1–12.
- [48] Farran Sue. Deep-Sea mining and the potential environmental cost of “going green” in the Pacific. *Environmental Law Review* 2022;24(3):173–90.
- [49] Ferdinand Malcom. Une Écologie Décoloniale: Penser l’écologie Depuis Le Monde Caraïben. Seuil; 2019.
- [50] Gale SJ. Lies and Misdemeanours: Nauru, phosphate and global geopolitics. *The Extractive Industries and Society* 2019;6(3):737–46.

- [51] Gavouneli Maria. Functional jurisdiction in the law of the sea. Brill; 2007.
- [52] Gómez-Barris Macarena. The extractive zone: Social ecologies and Decolonial perspectives. Duke University Press; 2017.
- [53] 'Governments and Parliamentarians'. *Deep Sea Conservation Coalition*. <https://deep-sea-conservation.org/solutions/no-deep-sea-mining/momentum-for-a-moratorium/governments-and-parliamentarians/>. [Accessed 21 October 2025].
- [54] Gudynas Eduardo. Extracciones, Extractivismos y Extrahecciones. Un Marco Conceptual Sobre La Apropiación de Recursos Naturales. Observatorio Del Desarrollo 2013;18:1–18.
- [55] Hamley Graham J. 'The implications of seabed Mining in the Area for the human right to health'. *Review of European, Comparative & International Environmental Law* 2022;31:389–98.
- [56] Han Lisa Yin. Deepwater alchemy: Extractive mediation and the taming of the seafloor. University of Minnesota Press; 2024.
- [57] Hannigan John. The geopolitics of deep oceans. Polity 2015.
- [58] Harvey David. The fetish of technology: causes and consequences. *Macalester International* 2003;13:3–30.
- [59] Hau'ofa, Epeli. We are the ocean: Selected works. University of Hawaii Press; 2008.
- [60] Hein James R, Koschinsky, and Thomas Kuhn. Deep-Ocean polymetallic nodules as a resource for critical materials. *Nature Reviews Earth & Environment* 2020;1(3):158–69.
- [61] Helping Power the UK Now, and into the Future | About Shell UK. <https://www.shell.co.uk/about-us/what-we-do/helping-power-the-uk.html>. [Accessed 22 May 2024].
- [62] Hernández Jessica. Fresh Banana leaves: Healing indigenous landscapes through indigenous science. North Atlantic Books; 2022.
- [63] Hesketh Chris. Clean development or the development of dispossession? The political economy of wind parks in southern Mexico. *Environment and Planning E: Nature and Space* 2022;5(2):543–65.
- [64] Hough-Snee Dexter Zavala, Eastman Alexander Sotelo. The critical surf studies reader. Duke University Press; 2017.
- [65] Huber Matthew. Refined politics: petroleum products, neoliberalism, and the ecology of entrepreneurial life. *Journal of American Studies* 2012;46(2):295–312.
- [66] Ingersoll Karin. Amimoto. Waves of Knowing: A Seascapes Epistemology. Duke University Press; 2016.
- [67] Isla Ana. "Greening," the Highest Stage of Extractivism in Latin America. In: Brownhill Leigh, Mauro Salvatore Engel-Di, Giacomini Terran, Isla Ana, Löwy Michael, Turner Terisa E, editors. *The Routledge handbook on Ecosocialism*. Routledge; 2021.
- [68] Jaeckel Aline, Harden-Davies Harriet, Amon Diva J, et al. Deep seabed mining lacks social legitimacy. *Npj Ocean Sustainability* 2023;2, no. 1. <https://doi.org/10.1038/s44183-023-00009-7>.
- [69] Jim Igoe. The nature of spectacle: On images, money, and conserving capitalism. The University of Arizona Press; 2017.
- [70] Kelly Catherine. "I need the sea and the sea needs me": symbiotic coastal policy narratives for human wellbeing and sustainability in the UK. *Mar Policy* 2018;97: 223–31.
- [71] Kimmerer Robin. Wall. Braiding Sweetgrass: *Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants*. Milkweed Editions; 2013.
- [72] Kinder, Jordan B., and Lucie Stepanik. 'Editorial Introduction: Oil and Media, Oil as Media—Mediating Petrocultures Then and Now'. *MediaTropes* 12, no. 2 (2020): i–xvi.
- [73] Kuhn Thomas, Wegorzewski Anna V, Rühlemann Carsten, Vink Annemiek. Composition, formation, and occurrence of polymetallic nodules. In *Deep-Sea Mining Resource: Potential, Technical and Environmental Considerations*, edited by Rahul Sharma. Springer; 2017.
- [74] LeMenager Stephanie. Living oil: Petroleum culture in the American century. Oxford University Press; 2013.
- [75] León Carmelo J, Araña Jorge E, Michael Hanemann W, Reira Pere. Heterogeneity and emotions in the valuation of non-use damages caused by oil spills. *Ecol Econ* 2014;97:129–39.
- [76] King Lethabo, Tiffany. The black shoals: Offshore formations of black and native studies. Duke University Press; 2019.
- [77] Loichot Valérie. Water graves: The art of the Unritual in the greater Caribbean. University of Virginia Press; 2020.
- [78] Yong Lym, Thau Wilson, Thien Yun Yee, Rupert Rennielyn, Rodrigues Kenneth Francis. Seaweed: a potential climate change solution. *Renew Sustain Energy Rev* 2022;159:112222.
- [79] Lyons Kristina M. Vital Decomposition: Soil Practitioners & Life Politics. Duke University Press; 2020.
- [80] Mao Yiming. Unveiling the shadows: reassessing energy security through the lens of petro-violence and green colonialism. *Energy Res Soc Sci* 2025;121:103951.
- [81] Marx Karl. In: Mark G, editor. Capital: A critical analysis of capitalist production. vol. 1 and 2. *Wordsworth Classics of World Literature*; 2013. Spencer. Translated by Samuel Moore, Edward Aveling, and Ernest Untermann.
- [82] Mbembe Achille. Critique de La Raison Nègre. Découverte; 2013.
- [83] McDaniel Carl N, Gowdy John M. Paradise for Sale: A parable of nature. University of California Press; 2000.
- [84] McGarry Dylan. When ancestors are included in ocean decision- and meaning-making. In *Hydrofeminist Thinking With Oceans*. Routledge; 2023.
- [85] McGreal, Chris. 'Big oil and gas kept a dirty secret for decades. Now they may pay the Price'. *The Guardian*, 30 June 2021. <https://www.theguardian.com/environment/2021/jun/30/climate-crimes-oil-and-gas-environment#:~:text=Coastal%20cities%20struggling%20to%20keep%20from%20burning%20fossil%20fuels>.
- [86] McKittrick Katherine, Woods Clyde. eds. Black Geographies and the Politics of Place: Between the Lines/South End Press; 2007.
- [87] Miller Kathryn A, Thompson Kirsten F, Johnston Paul, Santillo David. An overview of seabed mining including the current state of development, environmental impacts, and knowledge gaps. *Front Mar Sci* 2017;4:418.
- [88] Moore Jason W. The Capitalocene, part I: on the nature and origins of our ecological crisis. *J Peasant Stud* 2017;44(3):594–630.
- [89] Morgera Elisa. Participation of indigenous peoples in decision making over deep-seabed mining. *AJIL Unbound* 2024;118:93–7.
- [90] Northern Lights – What We Do. <https://norlights.com/what-we-do/>. [Accessed 21 October 2025].
- [91] Oppong Nelson, Dombroski Kelly. Majority and minority worlds. In: Dombroski Kelly, Goodwin Mark, Qian Junxi, Williams Andrew, editors. *Introducing human geographies*. 4th ed. and Paul Cloke. Routledge; 2024.
- [92] Partridge Tristan. Energy and environmental justice: Movements, solidarities, and critical connections. Palgrave Macmillan; 2022.
- [93] Petras James, Veltmeyer Henry, editors. Extractive imperialism in the Americas: Capitalism's new frontier. Haymarket Books; 2014.
- [94] Petrocultures Keynote by Cara Daggett. Petrocultures Conference. Norway: Stavanger; 2022. [https://www.youtube.com/watch?v=9OFVU\\_Nhig&a\\_b\\_channel=Nordlandsforskning](https://www.youtube.com/watch?v=9OFVU_Nhig&a_b_channel=Nordlandsforskning).
- [95] Polymetallic Sulphides - International Seabed Authority. <https://isa.org/jm/exploration-contracts/polymetallic-sulphides/>; 2022.
- [96] Postar Stephanie, Behzadi Negar Elodie, Doering Nina Nikola. Extraction/exclusion beyond binaries of exclusion and inclusion in natural resource extraction. Rowman & Littlefield; 2024.
- [97] Preston Jen. Racial Extractivism and White Settler Colonialism: An Examination of the Canadian Tar Sands Mega-Projects. *Cultural Studies* 2017;31(2–3):353–75.
- [98] Reid, Sue. 'Current legal frameworks can't protect the oceans from Deep-Sea mining and the negative impacts on humankind'. *The Conversation*, 1 May 2025. <https://theconversation.com/current-legal-frameworks-cant-protect-the-oceans-from-deep-sea-mining-and-the-negative-impacts-on-humankind-254967>.
- [99] Roane JT. Black ecologies, subaquatic life, and the Jim crow enclosure of the Tidewater. *Journal of Rural Studies* 2022;94:227–38.
- [100] Roberts David. Here are the minerals we need for batteries, solar and other clean energy tech. *Canary Media*; 2 July 2022. <https://www.canarymedia.com/articles/clean-energy/the-minerals-used-by-clean-energy-technologies>.
- [101] Sammler Katherine G. Kauri and the whale: Oceanic matter and meaning in New Zealand. In *Blue Legalities: The Life & Laws of the Sea*, edited by Iru Braverman and Elizabeth R. Johnson. Duk; 2020.
- [102] Schmelzer Matthias, Vansintjan Aaron, and Andrea Vetter. *The Future Is Degrowth: A Guide to a World Beyond Capitalism*. Verso; 2022.
- [103] Seas at Risk. Breaking free from mining: A 2050 blueprint for a world without mining – on land and in the Deep Sea. Brussels. <https://seas-at-risk.org/wp-content/uploads/2021/06/Breaking-Free-From-Mining.pdf>; 2021.
- [104] Dir Shell. Helping power the UK now, and into the Future01; 2024. p. 00. <https://www.youtube.com/watch?v=P3hUObH3HUK>.
- [105] Silva Mariana. Mining the Deep Sea. *E-Flux Journal* 2020;109:1–9.
- [106] Simas Moana, Aponte Fabian, and Kirsten Wiebe. The Future Is Circular: *Circular Economy and Critical Minerals*. Research Report; 2022. <https://sintef.brage.unit.no/sintef-xmlui/handle/11250/3032049>.
- [107] Singh Pradeep. The invocation of the "two-year rule" at the international seabed authority: legal consequences and implications. *The International Journal of Marine and Coastal Law* 2022;37:375–412.
- [108] Singh Pradeep. The two-year deadline to complete the international seabed authority's mining code: key outstanding matters that still need to be resolved. *Mar Policy* 2021;134:1–10.
- [109] Snieckus Darius. Ontario EV battery recyclers get \$10M for critical minerals recovery. *Canada's National Observer* 2024. [https://www.nationalobserver.com/2024/06/11/news/Ontario-EV-battery-recyclers-federal-funding?nih=249e668af438f5d1be55f71e67bfd14&utm\\_source=National+Observer&utm\\_campaign=da97a5ae35-EMAIL\\_CAMPAIGN\\_2024\\_06\\_11\\_01\\_05&utm\\_medium=email&utm\\_term=0\\_cacd0f141f-da97a5ae35-5BLIST\\_EMAIL\\_ID#5D](https://www.nationalobserver.com/2024/06/11/news/Ontario-EV-battery-recyclers-federal-funding?nih=249e668af438f5d1be55f71e67bfd14&utm_source=National+Observer&utm_campaign=da97a5ae35-EMAIL_CAMPAIGN_2024_06_11_01_05&utm_medium=email&utm_term=0_cacd0f141f-da97a5ae35-5BLIST_EMAIL_ID#5D).
- [110] Stow Dorrik. Oceans: A very short introduction. Oxford University Press; 2017.
- [111] Strand Mia, Rivers Nina, Snow Bernadette. Reimagining Ocean stewardship: arts-based methods to "hear" and "see" indigenous and local knowledge in ocean management. *Front Mar Sci* 2022;9:886632.
- [112] Sultana Farhana. Confronting climate Coloniality: Decolonizing pathways for climate justice. Routledge; 2025.
- [113] Sultana Farhana. The unbearable heaviness of climate Coloniality. *Polit Geogr* 2022;99:102638.
- [114] Szeman Imre, Wenzel Jennifer. Afterword: what do we talk about when we talk about Extractivism? *Textual Practice* 2021:1–19.
- [115] Tang Yi-Chin, Wang Jian-Zhi, Yun-Hwei Shen. Separation of valuable metals in the recycling of Lithium batteries via solvent extraction. *Minerals* 2023;13:285. <https://doi.org/10.3390/min13020285>.
- [116] Teske Sven, Florin Nick, Dominish Elsa, Giurco Damien. *Renewable Energy and Deep Sea Mining: Supply, Demand and Scenarios*. Report prepared by ISF for J.M. Kaplan Fund, Oceans 5 and Synchronicity Earth. 2016.
- [117] The White House. Unleashing America's Offshore Critical Minerals and Resources. <https://www.whitehouse.gov/presidential-actions/2025/04/unleashing-americas-offshore-critical-minerals-and-resources/>; 2025.
- [118] Tórnell Carlos. Decolonizing the political economy of energy transitions: new energy spaces and Pluriversal politics in Mexico. *Review of International Political Economy* 2024;31(3):1074–98.



- [123] Tornel Carlos. Energy justice in the context of green Extractivism: perpetuating ontological and epistemological violence in the Yucatan peninsula. *Journal of Political Ecology* 2023;30(1):1–28.
- [124] Turner Philip J, Cannon Sophie, DeLand Sarah, et al. Memorializing the middle passage on the Atlantic seabed in areas beyond National Jurisdiction. *Mar Policy* 2020;122:104254.
- [125] Ulloa Astrid. Aesthetics of green dispossession: from coal to wind extraction in La Guajira, Colombia. *Journal of Political Ecology* 2023;30(1):743–64.
- [127] Almeida Vela, Diana Vijay Kolinjivadic, Ferrando Tomaso, et al. The “greening” of empire: the European green Deal as the EU first agenda. *Polit Geogr* 2023;105: 102925.
- [128] Vergès Françoise. Racial Capitalocene. In: Johnson Gaye Theresa, Lubin Alex, editors. *Futures of black radicalism*. Verso; 2017.
- [129] Voyer Michelle, Quirk Genevieve, McIlgorm Alistair, Azmi Kamal. Shades of blue: what do competing interpretations of the blue economy mean for oceans governance? *Journal of Environmental Policy & Planning* 2018;20(5):595–616.
- [130] Watts Jonathan. Race to the bottom: the disastrous, blindfolded rush to mine the Deep Sea. *The Guardian* 2021. <https://www.theguardian.com/environment/2021/sep/27/race-to-the-bottom-the-disastrous-blindfolded-rush-to-mine-the-deep-sea>.
- [131] Watts Michael. Petro-violence: Community, extraction, and political ecology of a mythic commodity. In: Nancy Lee Peluso, Watts Michael, editors. *Violent environments: Essays on the metaphysics of human persons*. Cornell University Press; 2001.
- [132] Watts Michael J. Petro-Violence: Some Thoughts on Community, Extraction, and Political Ecology. <https://escholarship.org/uc/item/7zh116zd>; 1999.
- [133] Wenzel Jennifer. ‘How to read for oil’. *Resilience: a journal of the environmental Humanities* 2014;1(3):156–61.
- [134] Wenzel Jennifer. *The disposition of nature: Environmental crisis and world literature*. Fordham University Press; 2020.
- [135] Whyte Kyle Powis. Settler colonialism, ecology, and environmental injustice. *Environment and Society* 2018;9(1):125–44.
- [136] Wynter Sylvia. Unsettling the Coloniality of being/power/truth/freedom towards the human, after man. Its overrepresentation - an argument. *The New Centennial Review* 2003;3(3):257–337.
- [137] Zografos Christos. The contradictions of green new deals: green sacrifice and colonialism. *Soundings* 2022;2022(80):37–50. <https://doi.org/10.3898/SOUN.80.03.2022>.

### Further reading

- [4] Andreucci Diego, García-López Gustavo, Zografos Christos, Conde Marta. Political ecologies of the green new Deal: critiques, contentions and radical appropriations. *Polit Geogr* 2025;117:103256.
- [14] Buchan Pamela. A transdisciplinary co-conceptualisation of marine identity. *People and Nature* 2024;6(6):2300–24. <https://doi.org/10.1002/pan3.10715>.
- [80] Making sense of public opinion on oil and gas. *Climate Barometer* 2023. <https://climatebarometer.org/making-sense-of-public-opinion-on-oil-and-gas/>.
- [96] Petrocultures research group. *After Oil* 2016.
- [101] Reid Sue. Imagining justice with the Abyssal Ocean. In *Laws of the Sea: Interdisciplinary Currents*, edited by Iru Braverman. Routledge; 2022.
- [107] Sharpe Christina. *In the wake: On blackness and being*. Duke University Press; 2016.
- [126] United Nations Convention on the Law of the Sea, United Nations. [https://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf); 1982.