DEEP SEA MINING, DEEP TROUBLE

Introduction

DEME centres wind energy at the core of its reputation, with a windmill at the heart of its logo. Yet today we see that image crumbling. DEME stands at a crossroads for its future financial and reputational health, as a result of the incomplete information and faulty assumptions underpinning its continuing investment into deep sea mining, under its subsidiary Global Sea Mineral Resources (GSR).

What began as an exploratory venture has become a high-stakes gamble—one that threatens DEME's standing as a leader in sustainable solutions. Deep sea mining is not just an untested industry; it is increasingly seen as a pariah by scientists, governments, and major corporations alike. The environmental risks are profound, the financial costs staggering, and the reputational damage already unfolding.

This brochure lays bare the contradictions between DEME's green legacy and its ties to an industry that jeopardises ocean health, climate stability, and the very values DEME aspires to uphold. The choice is clear: double down on a failing bet, or reaffirm DEME's commitment to a sustainable future by divesting from deep sea mining.

What is deep sea mining?

Deep sea mining is the practice of removing metals and minerals from the ocean's seabed, thousands of metres below the surface. Over millions of years, elements such as manganese, nickel, and cobalt have accumulated on the seabed in the form of nodules.

To mine these metals, machines would scoop deposits from the deep ocean floor. Scientists have, however, raised concerns about the large-scale and irreversible impact of such activity on deep-sea ecosystems, which are still largely understudied.

Deep sea mining is a very new industry, with only a handful of companies active in the field. Apart from a few small tests, no commercial mining has happened yet.

Financial risk

DEME's subsidiary GSR has spent millions these last 10 years on testing and the development of the Patania mining machines. The capital expenditure (CapEx) for DEME and its shareholders - however considerable - is nothing compared to the bill waiting for DEME when GSR decides to go through with further test mining during its exploration phase (projected at 200 million USD)[1], and validation monitoring during the early stages of the exploitation phase (projected at 500 million USD). **GSR would thereby double or triple the CapEx of the entire DEME group for 2024** for only testing their operations.[2] These are just a fraction of the costs, as GSR still lacks key infrastructure such as the Patania 3 mining robot and transport ships.

The **Ocean Rig Olympia**, for instance, was acquired through a 2023 investment by fossil fuel company Transocean, in return for a 15.7% share of GSR.[3] This was heralded in GSR presentations as a "€1 billion asset," but official filings and capital increase documents value the vessel closer to €79 million, a fraction of the claimed worth.[4] The cold-stacked oil and gas vessel still needs to be revived - an additional investment estimated at $100million - and retrofitted for deep sea mining.[5] In addition, **no operational refinery currently exists** for processing deep sea polymetallic nodules. Even The Metals Company's planned facility would only handle 1.3 million tonnes annually[6] — less than half of GSR's estimated needs for profitability.[7] GSR has no publicly confirmed refining partner, and building a dedicated facility would take years.

These are huge investments to make at a time of **unstable mineral markets, rapidly changing technology and regulatory uncertainty**, undermining the financial viability of deep sea mining. **Core metals**

targeted by GSR - cobalt, nickel, and copper - have all experienced dramatic price swings over the past five years. Cobalt, for example, dropped from over $80,000/tonne in 2022 to just $21,550 in early 2025, currently hovering around $33,700.[8] Nickel has fallen from highs of $48,226 to around $15,564 per tonne,[9] and copper has seen similar swings.[10] Meanwhile, established producers in Indonesia and the Global South face lower extraction costs and so continue to dictate global prices. This makes **revenue projections highly speculative**.

Demand projections are also highly uncertain. **Battery technologies are rapidly pivoting away from deep sea metals**. Lithium iron phosphate (LFP) batteries, which require no deep sea minerals, now dominate cheaper electric vehicles and are gaining traction with European car manufacturers like Volkswagen and Renault. This at a time when over 900 scientists,[11] 32 countries[12] - including France - and 64 tech and automotive firms[13] are calling for a deep sea mining moratorium. This is reflected in the international regulatory processes, where there is growing agreement that scientific consensus on the environmental and climate impact is a prerequisite for deep sea mining. Given the many knowledge gaps[14] remaining to date, the international green light may take many years to materialise.

All this has amounted to one of the industry leaders - **Loke Marine Minerals - filing for bankruptcy** in March 2025,[15] and Impossible Metals delaying its 2026 test mining.[16] At the same time, The Metals Company has gone rogue with the Trump administration,[17] thereby circumventing international law and blemishing the already tarnished reputation of deep sea mining globally. The risks of investing in unproven technology such as deep sea mining - which DEME acknowledges in the 2024 Annual Report[18] - are not theoretical. They are materializing across the industry at this very moment.

The question remains whether GSR will be able to break even in this unproven market. Polymetallic nodules have no established market value yet — no commercial transactions or pricing benchmarks exist. GSR projects 36ktpa nickel, 6ktpa cobalt, and 32ktpa copper per vessel. At April 2025 refined commodity prices, this yields $543 million per year for one vessel, or $1.08 billion for two — barely covering the annual operating costs of over $ 1 billion and projected investment costs of nearly $ 4 billion.[19] These figures do not yet include taxes, royalties, downtime, and benefit from the current cobalt price spike due to the war in East-Congo. They ignore the fact that GSR has only one cold-stacked vessel to date, which requires significant refitting. The projection is also based on the assumption of 24/7 operations, while the Patania II incident in 2021 exemplifies the plethora of accidents possible when operating at 4000 meter depth. Profitability thus hinges on speculative optimism, unrealistic assumptions and inexistent infrastructure.

Reputational risk

DEME's involvement in deep sea mining also puts its solid reputation of enabling Belgium's offshore wind farms on the line. As exemplified by the 64 businesses pledging not to use minerals mined from the deep sea,[20] deep sea mining is controversial and has a tarnished reputation. Major players like Volvo, BMW and Google do not wish to be associated with deep sea mining. The recent advances of the Trump administration exemplify the rogue public character of the industry and its proponents. Polling shows the Belgian public is not in favour either, with a large majority supporting a moratorium on deep sea mining.[21]

This is in large part because the **impact of deep sea mining on the climate and biodiversity crises** cannot be understated. Aside from the high energy-needs for processing polymetallic nodules, deep sea mining disrupts the ocean floor - the world's largest carbon sink - which can lead to reduced carbon sequestration.[22] It can also harm marine organisms that are crucial for carbon degradation - such as microbes[23] - and oxygen production in the deep ocean.[24] Removing the sedimentary layer of the ocean floor risks reducing the absorption capacity and the reincorporation of CO_2 into the marine environment. Such a contribution to further climate change undermines DEME's core values of caring for our planet and vision of delivering sustainable solutions.

Even test mining has proven to generate severe, irreversible environmental damage - with a recent expedition showing that the impacts of test mining remain evident over four decades later.[25] In the GSR operating zone, independent studies reveal that even small-scale testing removes critical sediment layers,[26] smothers habitats,[27] and creates persistent sediment plumes that spread far

beyond mining sites,[28] disrupting ecosystems for decades.[29] The seafloor suffers permanent scarring,[30] habitats are eliminated or buried,[31] and species richness is severely reduced.[32] With these impacts established for mere test mining, full-scale mining is certain to amplify environmental damage exponentially. GSR consistently downplays these major environmental risks and disregards the significant remaining knowledge gaps.[33]

Correspondence between DEME and the Belgian regulatory authorities uncovers some concerning practices surrounding GSR's impact monitoring. During North Sea testing, for instance, the regulator stated that GSR's plume monitoring methodology was not fine-tuned. The results can hardly be qualified as rigorous, as measurements could only take place outside of the excessive 500 meter no-go-zone around the Patania. Even GSR admits that the environmental impact aspect of their mission couldn't be representative.[34] During a later testing expedition in the Pacific Ocean, emails revealed that GSR lacked proper software expertise, and considered untested methods for monitoring sediment plumes.[35] These ad-hoc approaches raise serious concerns about GSR's commitment to conducting rigorous and methodical environmental impact assessments—an issue that becomes even more critical under the heightened public scrutiny of a potential future exploitation phase.

Finally, there are major **worker safety risks associated with the radioactivity of polymetallic nodules**. GSR acknowledges nodule radioactivity requiring worker protections during this exploratory phase,[36] but fails to assess full-scale operational risks. Studies show surface radiation exceeding safety limits by a thousandfold,[37] with Ra-226 levels over 500 times that of Germany's legal threshold.[38] There are three main ways workers can be exposed to harmful radiation from these nodules: breathing in or accidentally swallowing radioactive dust during processing, inhaling radon gas that can build up when nodules are stored indoors, and being exposed to concentrated radioactive materials during metal extraction.[39] Research has shown that in situations where workers are in close and frequent contact with large amounts of nodules, they could be exposed to radiation levels that exceed international safety limits for workplace exposure.[40] These documented health hazards are yet another, under-researched liability.

Conclusions

In sum, the additional financial investments that deep sea mining requires are substantial, with **tremendous capital expenditure required** for test mining, the purchasing and development of a mining robot and vessels, and the development of non-existent refinery facilities. These are unjustifiable investments to make **at a time when the industry is collapsing under the weight of unproven technology and regulatory uncertainty**, as illustrated by the Loke Minerals bankruptcy. The mineral market is unpredictable and changing rapidly, both on the demand and supply side.

DEME took a courageous bet by exploring new business opportunities in a challenging environment. But today we must acknowledge that **GSR cannot be profitable** and is becoming a liability for DEME and its shareholders. Now is the time to divest from the high-liability venture of deep sea mining, before damage to the financial health and green energy reputation of DEME become unavoidable. As Greenpeace, we invite shareholders to ask the questions annexed in this brochure to the DEME board. We also invite shareholders as well as the DEME board to reach out to us for further dialogue on deep sea mining at info.be@greenpeace.org.

Questions to the board for the AGM

1. DEME estimates its 2025 CapEx at approximately €300 million (Annual Report 2024, p25). Can you clarify whether this figure includes capital expenditure related to GSR's mining vessel, the Patania III collector; any future refining facility; or the refitting of the Ocean Rig Olympia?

2. What is the expected capital expenditure for validation monitoring by GSR, and how will DEME fund these uncertain operations without compromising its other strategic investments like offshore wind?

3. In view of the legal obligation of insurance for environmental damage due to deep sea mining, will DEME stand as a warrant for the environmental damage of GSR's potential future exploitation activities, or will it invoke an external insurance company to do so?

4. Does DEME plan to take on the financial and technical risks associated with building and operating a refining facility for polymetallic nodules? If so, what is the estimated timeline for such a facility to become operational? If not, what are the guarantees GSR's potential exploitation contract would be profitable without any processing plant for nodules being in place anywhere in the world?

5. How realistic is the timeline for a system integration test in 2027 considering the repeated delays, the current cold-stacking of the Ocean Rig Olympia, the absence of the Patania III, and the absence of a Mining Code?

6. Considering the rapidly changing electric vehicle battery market and technologies, how does DEME mitigate the risk of investing in technology that will be obsolete by the time GSR can go commercial in 2030? If not the automotive industry, who will be GSR's customers? Can GSR pledge it won't feed the weapon's industry with its nodules?

7. Considering DEME's commitment to zero accidents and workforce safety (Annual Report, p100), how will DEME ensure that workers are protected during handling and processing of radioactive polymetallic nodules? Can DEME outline the planned mitigation measures and their expected costs?

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Deep sea mining, deep trouble
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