ICEBERG

Innovative Community Engagement for Building Effective Resilience and Arctic Ocean Pollution-control Governance in the Context of Climate Change

Pollution related to the extraction of minerals in the European Arctic

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A policy paper prepared by the ICEBERG project, presenting background information on various elements relevant to Arctic pollution governance.

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Regulating pollution related to the extraction of minerals in the Arctic

Mining can be a source of wealth, but it can also pose environmental and social challenges. Often-revised Arctic regulatory and policy frameworks aim to balance investment incentives with theprotection against adverse impacts, but limited administrative capacities make this difficult.

CURRENT GOVERNANCE - KEY ISSUES

• All ICEBERG study sites have a history of mining, but currently, Greenland experiences the highest level of interest in the industry's expansion.

• Greenland – which has full responsibility over mineral resources except for international trade in uranium – has a relatively robust legislation covering mining activities, with the most recent update in the form of the 2023 Mining Act.

• Greenlandic policy framework boasts several valuable innovations: a separate social impact assessment process required by law; dedicated funding for local stakeholders to facilitate their participation; and the framework of impact and benefit agreements.

• Constant changes in the Greenlandic legislative framework on extractive activities introduce uncertainty both for communities and for mining companies and their investors.

THE MAIN GOVERNANCE GAPS

• All Arctic jurisdictions struggle with the challenge of limited administrative capacities to properly supervise and carry out permitting, planning, assessment, implementation and closure processes in extractive industries.

• Planning for the closure and post-closure stages of a mine proves challenging, despite robust provisions present in Greenlandic legislation. In particular, companies' long-term liability remains problematic.

• While impacts on climate are mentioned in the Greenlandic 2024 Mining Act as part of environmental impact assessment (EIA), permitting and monitoring, there is a lack of a clear idea of how to account for these impacts properly.

EXAMPLES OF GOOD PRACTICE

• Nunavut Impact Review Board Canada is an autonomous entity tasked with assessing the biophysical and socio-economic impacts of proposals and making recommendations and decisions about projects, barring or allowing them to proceed. It uses both scientific methods and traditional knowledge as sources of information.

• Impact and Benefit Agreements in Canada are voluntary instruments; but in the Canadian Arctic, they are de facto close-to-obligatory across the territories and areas covered by land claim agreements (and de jure in Nunavut and Inuvialuit), resulting in over 400 IBAs active in Canada in 2020.

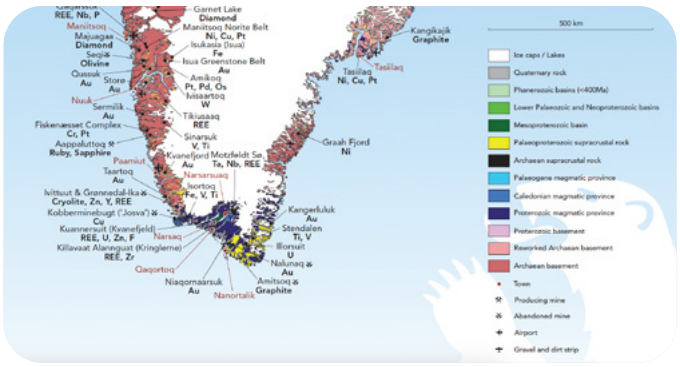

Photo: GEUS, Government of Greenland

FURTHER READING & CONTACT

Read the full policy paper at arctic-iceberg.eu/publications

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ICEBERG project

Climate change and pollution, including plastics, ship emissions and wastewater, pose threats to human health and the ecosystems of the Arctic region.

From 2024-2027, the ICEBERG project, funded by the EU under the Horizon Europe programme, studies pollution and its impacts on the ecosystems and communities in the European Arctic, focus on three regions: southern Kalaallit Nunaat (Greenland), Northern Iceland and Svalbard.

The ICEBERG project integrates natural and social sciences with Indigenous and local knowledge. Researchers employ an ethical, multi-actor and gender-sensitive approach to assess the impacts, risks and vulnerabilities of local communities. The project applies the One Health approach, which recognises the interconnectedness and interdependence of the health of humans, animals, plants and entire ecosystems.

The aim is to mitigate the impacts of pollutants in the Arctic. The project investigates the sources, types and distribution of pollutants, such as plastics, ship emissions, wastewater and heavy metals, by using simulations, remote sensing and observations. On a practical level, the project develops, for example, automatic marine litter detection tools using drones, AI and citizen science. The toxicological impact of microplastics, nanoplastics and persistent organic pollutants (POPs) on human digestive health is being evaluated. The impact of pollution emissions on the marine food web is assessed.

Researchers work together with the communities and stakeholders to co-develop pollution monitoring, mitigation and adaptation strategies, as well as policy recommendations for multilevel pollution-control governance.

Policy papers

The series of policy papers outlines the main elements of the governance framework relevant to pollution control in the Arctic areas of the North Atlantic, with a focus on the three ICEBERG study sites.

Each paper starts with an introduction on the specific policy area or economic sector relevant for Arctic pollution governance, then proceeds to discuss national regulations in the three ICEBERG study sites, as well as to provide an overview of international law, European Union policies and legislation, Arctic Council actions and corporate governance. Governance gaps and selected best practices are presented.

The policy papers produced and published on the ICEBERG website are:

- Cruise tourism
- Solid waste & wastewater management
- Microplastics and plastics pollution
- Frameworks for Arctic beach clean-ups
- POPS and heavy metals
- Pollution related to mining activities

The policy paper does not constitute a formal deliverable of the ICEBERG project.

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Key insights:

- Mining developments and potential pollution impacts are a key concern in Kalaallit Nunaat (Greenland), including Southern Greenland, where a number of mining projects have been under development in recent years. Svalbard has a strong history of mining, with mine closures and rehabilitation actions currently taking place. Iceland has minimal mining (quarrying) activities; however, potential carbon capture projects resemble governance challenges related to mining developments in other parts of the Arctic. This paper focuses on mining governance in Greenland, and especially issues relevant for the ICEBERG study sites in Southern Greenland.
- Active mineral extraction in Greenland remains limited, with one operating mine at the beginning of 2026. However, there have been multiple proposals for mine developments. Political pressure, global developments and expectations can create early social impacts (conflicts and tensions, effects on local and national politics, impact on individual land use decisions, educational choices, personal movement decisions etc.). Mining legislation has undergone several major overhauls. Relations with international partners, including the EU, encompass dialogues on critical minerals.
- Currently, Greenland – which has full responsibility over mineral resources except for international trade in uranium – has a relatively legislation covering mining activities, the most recent update taking place with the adoption of the 2023 Mining Act.
- Greenlandic policy framework boasts several valuable innovations. First, law requires a separate social impact assessment (SIA) process - a relatively rare policy solution among Arctic jurisdictions. Second, Greenlandic stakeholders can receive funding to facilitate their participation in impact assessment and permitting processes. Third, the framework of impact and benefit agreements in Greenland creates space for trilateral negotiations between the company, the government and the affected municipality.
- Many smaller Arctic jurisdictions struggle with the challenge of limited administrative capacities to properly supervise and carry out permitting, planning, assessment, implementation and closure processes in extractive industries. Greenland is a good example of this situation.
- Planning for the closure and post-closure stages of a mine timeline proves particularly challenging across the region. In Greenlandic legislation, robust provisions exist, but implementation is yet to be tested.
- Constant changes in Greenlandic legislation on extractive activities bring about uncertainty for communities, as well as for mining companies and their investors.
- Indigenous rights do not play a significant role in the Greenlandic mining legislation.
- Among good governance practices related to mining are: Nunavut Impact Review Board (Canada) and Canadian impact and benefit agreements provisions. In addition, the IGF's (the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development) Mining Policy Framework presents a clear set of guidelines for robust mining regulations. Greenlandic support for communities during project development can also be considered a good practice.

1. Introduction and background

This paper provides a general overview and ICEBERG-relevant insights on the governance of minerals extraction sectors in Kalaallit Nunaat (Greenland), Iceland, and Svalbard. Different levels of governance are considered, although the focus is on the national level (in Greenland, that means Greenlandic rather than Danish legislation), which is key for regulating exploration and extraction activities. The paper starts with an overview of the current situation with respect to mining activities in the three ICEBERG study sites and the insights from gained the fieldwork.

The primary focus of the paper is on Greenland, as it is the only study site where there is currently a possibility of the expansion of the mining industry.

Overall, the mining industry is characterised by a high level of diversity: particular resources, types of mines, location, regulatory framework, and social context all contribute to specific environmental risks and affect social impacts and benefits.

Pollution risks related to mining include emissions of dust (particulate matter) and heavy metals and releases of pollutants into soil and water (e.g. from tailing ponds). Some mining activities can result in radioactive by-products. Mining activities always require a large energy input; and thus, are related to greenhouse gas emissions. Globally, GHG emissions related to resource extraction (energy and non-energy mining activities) have been assessed at about 35% of total GHG emissions, with mining operations likely constituting 1% (with additional climate impacts from land use change and air pollution) (UNEP 2024, Global Resources Outlook; Delevingne et al. 2024).

Interest in mining in Arctic regions has increased over the last decade due to the present (and expected) demand for so-called critical raw materials and important metals, such as tungsten, molybdenum, copper, nickel, and rare earth elements (REE). These metals are currently indispensable for modern technologies, including those powering green and digital transitions, as they are key components of mobile phones, solar panels, wind turbines, electric car batteries, etc (Koivurova et al. 2021).

A new frontier for extracting minerals opens in the form of deep-sea mining (DSM). As there are no DSM projects, even with respect to exploration, in the vicinity of communities at the ICEBERG study sites, this emerging sector is not covered in this paper.

1.1. Greenland

The history of modern mining activities in Greenland goes back to the 1860s, and there have been a number of mines operating on the island since the 19th century. At the beginning of 2026, there is only one operating mine in Greenland – Lumina's White Mountain (Qaqortorsuaq) arthosite mine in west Greenland – while Amaroq Minerals' Nalunaq gold mine in south Greenland is possibly restarting production. However, many projects are under development (currently, eight additional companies hold valid exploitation licenses), and there has been noticeable mineral exploration activity. Most projects are in early stages of exploration or permitting and undergo environmental and social assessments. Most of the current mineral exploration licences are located on the West Coast of Greenland, including near Narsaq, Nanortalik and Qaqortoq (Mineral Resources Authority website, 2025).

There is an increasing global interest towards mining in Greenland, due to both global demand as well as the perception that the access to the minerals is improving due to the diminishing sea ice (in principle, improving access to minerals via maritime transport in the long term) and retreating Greenlandic inland ice (of minor importance in the short-to-mid-term), as well as owing to Greenlandic Government's interest in developing these resources (AMAP 2018). Commonly, the perception is that Greenland's economic independence from Denmark requires revenue from significantly expanded extractive industries, including mining for minerals and oil extraction (Jakobsen & Larsen 2024; Priebe et al. 2024). No economically feasible hydrocarbon deposits have been discovered so far (despite exploration since the 1970s), and a ban on oil exploitation is currently in place. Therefore, the onshore mining of critical minerals is the focus of both the government's industrial expansion efforts and commercial interest. It is essential to keep in mind, however, that the most important industry in Greenland remains fishing, together with related activities: wholesale and retail trade, as well as transportation and storage of fish products. In fact, since 2016, monetary turnover in the mining industry has been the smallest of the main industries subject to statistics (Statistics Greenland 2023).

In recent years, in addition to the two aforementioned anorthosite and gold mines, a ruby mine was operating until its ultimate closure in 2024, with no extraction taking place since 2022 (AMAP 2018, Priebe 2018). Earlier, coal mining took place on Disko Island in Northwest Greenland until 1972 (Priebe 2018). Rare earth elements have been explored since the 1950s near Narsaq in Southern Greenland, but the deposits have never moved towards an operational phase (AMAP 2018). The potential of uranium mining (as a side-stream to REE extraction) in Narsaq is a contentious issue. Uranium and nuclear activities have been a concern in Greenland for decades. Furthermore, there are competing narratives with respect to the potential of mining in general and uranium in particular to either "save" or "destroy" Greenland, views largely depending on prospects of socio-economic development and the pollution levels and risks (Bjørst 2016).

Survey programs promoted by Greenland's government have focused on iron ore, copper, zinc, REEs, anorthosite, gold and gemstones, as well as, a decade ago, uranium (AMAP, 2018).

Besides the mineral extraction for critical and important minerals, potential extractive activities (quarries) in Greenland include sand extraction (Bendixen et al, 2019, 2022), and lately, extraction of glacial rock flour to be used as fertiliser for the global markets (Gunnarsen et al. 2023).

With respect to oil extraction, AMAP (2018) estimated it unlikely that oil and gas exploration would result in production sites within the coming decades across the Baffin Bay – Davis Strait region, including West Greenland and its exclusive economic zone (EEZ). Moreover, in 2021, the Greenlandic government suspended its national petroleum strategy, which put an end to any oil exploration unless future governments introduce policy change (Priebe et al. 2024). However, there remains a possibility for exploration and extraction under licenses issued prior to the 2021 ban. At the end of 2025, a British company that purchased an exploration license with the right to commercialise discovered resources began preparations for exploration activities in Jameson Land in East Greenland, claiming the possibility of a 13-billion-barrel discovery (Thorsson, 7.11.2025).

In the ICEBERG case study sites in Southern Greenland, the situation reflects the developments across the territory. Exploration activities linked to REEs and uranium have been present, but there is no consensus locally on the desirability of mining (Hansen & Brown Burkins 2020; Bjørst 2016). Pollution from mining, particularly uranium mining, has been a point of concern for Greenlanders

(see e.g. Bjørst 2016). An especially visible issue is the contamination of inland and coastal waters, as fishing and hunting are both key livelihoods in the local context, part of the traditional indigenous way of life, but also important industries nationally. A good example in the studied area is a large deposit of REEs in Kuannersuit in Narsaq, where radioactive uranium would be extracted as a side product (Reuters, 10.11.2021).

In December 2021, the Greenlandic Government effectively banned uranium mining in the territory, following political changes and social tensions. The zero-tolerance policy towards uranium means that radioactive elements cannot be commercialised even as by-products, and prospecting, exploration and exploitation are forbidden if the content of radioactive elements would exceed natural background levels (Mineral Resource Authority, 2022). The decision prevented the further development of the Kuannersuit project (Reuters, 2021, ibid). Nonetheless, as there is no consensus on the issue among Greenlandic political parties, an overhaul of the uranium ban is possible.

The contribution of greenhouse gas emissions originating from mineral exploration and resource projects is calculated as a part of Greenlandic GHG emissions. If all current exploitation licenses were to result in active mines, Greenland's carbon footprint would increase by 40 % compared to 2020, if the industry continuous to rely on diesel generators. However, mining companies have been interested in renewable energy sources, especially hydropower, to provide energy for extractive activities and transport (Ea Energianalyse 2023). Arctic Council (AMAP, 2018: 201) considered hydropower, wind power and solar energy as resources "available for the 'green' development of mines and other industries" in Greenland. Nonetheless, as it stands at the moment, the island's energy system relies heavily on diesel, although hydropower production has been expanding, contributing to 12 % reduction in the territory's total annual CO2 emissions compared to the 1990 baseline (Ea Energianalyse 2023).

1.2. Iceland

Iceland does not have industrial level of mining activities. The country has no proven mineral fuel or metallic mineral reserves (Goclawska 2025). Geologically young age of the island – contrasting distinctly with the old age of rocks in Greenland – translates to the unavailability of primary metals, gemstones and oil in Iceland. A possible exception is a modest probability of oil deposits in the so-called Dreki area in the north-east section of the Icelandic EEZ between Greenland and Norwegian seas (Government of Iceland, Oil and Gas Exploration, n.d.).

In 2020, mining and quarrying accounted for only 0.1 % of Iceland's GDP, and the manufacture/smelting of metals constituted 1.1 %. Consequently, employment in mining and quarrying is also very small (Goclawska 2025). Historically, some small-scale mining was conducted at one mine, the Helgustaðir quarry in Eastern Iceland, where spar was mined until 1924. Currently, there is a small spectrum of extractive activities: the quarrying and exports of scoria (porous, glassy extrusive basaltic lava rock), natural glacial sand and pillow lava.

As Iceland is rich in geothermal and hydropower energy sources (in 2020, Iceland produced 99,98 % of its electricity by renewables), the country offers comparatively inexpensive and accessible renewable energy. This has attracted high-energy-consuming smelting of ferrosilicon, silicon metal and aluminium (Goclawska 2025). In terms of fossil energy resources, young wood-based coal and

peat have been dug for heating houses on a small scale and remain an additional energy source for several households.

The volcanic basalt stone in Iceland has been investigated for its potential as permanent storage for carbon dioxide captured from the air, relying on Iceland's geothermal and other renewable energy. The world's first carbon capture and storage plant was opened in Iceland in 2021 (climateworks, n.d.). Carbon dioxide removal (CDR) technologies are part of global climate policies as the Paris Agreement goals are deemed impossible to reach without utilizing CDR methods on residual emissions (Hoel, 2025). A possible carbon capture and storage facility is being considered in the Húsavik area – one of the ICEBERG study sites (Nordic Energy Research, 2022; ICEBERG fieldwork).

1.3. Svalbard

In Svalbard, coal mining began in the early 20th century. At the peak of extraction, there were nine operating mines in Svalbard. Until recently, the dominant company was the Norwegian Store Norske Spitsbergen Kulkumpani, established in 1916 with mining sites in Sveagruva and Longyearbyen, among others. Since the 1930s, the Soviet Union (enabled by the 1920 Spitzbergen/Svalbard Treaty) has operated mines in Barentsburg, Pyramiden (exploitation ended in 1998) and Grumant (until 1965). Barentsburg mine remain operational – and is run by Trust Arktikugol – and is the last site producing coal in the archipelago. The Barentsburg coal mine has unclear profitability and its continued existence is seen as partly politically motivated, aimed at ensuring continued Russian presence in Sptizbergen. Sveagruva mine was shut down in 2017 (final environmental restitution completed in 2023), while the production in Longyearbyen ended in 2023.

Coal used to be the primary source of energy in Svalbard. In 2021, the coal-powered heating power plant in Longyearbyen switched from coal to diesel, halving the settlement's CO_2 emissions (there are plans to introduce renewable energy in the largest Svalbard settlement) (Nielsen, 19.10.2023).

There is a growing interest in critical minerals in Svalbard. However, there has been limited exploration, and the industry would be limited by extensive environmental restrictions covering the archipelago. On the other hand, the Svalbard Treaty in principle enables all parties, their citizens and entities established therein, to conduct economic activities in areas not reserved for environmental purposes and under Norwegian administration.

2. National/local governance

2.1. Greenland

In line with the Self-government Act of 2009, the Government of Greenland (Naalakkersuisut) has acquired full control over its mineral resources. Greenland is therefore solely responsible for legislating, permitting and overseeing extraction activities on land and in the island's EEZ. The only exception is uranium, if it was ever extracted in the territory, as international trade in uranium is governed via international law, covering non-proliferation of nuclear weapons, and the relations with the International Atomic Energy Agency (IAEA), which remain the responsibility of the Danish government (Vestergaard, 2015). In 2016, Denmark and Greenland concluded an agreement that clarified related competencies (Vestergaard and Thomasen, 2016). The issue of uranium exports is currently irrelevant as Greenland decided not to allow uranium extraction, including as a byproduct of REE mining (Uranium Act No. 20 of 1 December 2021), prohibiting preliminary investigation, research and exploitation of uranium. In fact, Greenland had a ban on uranium mining earlier, before 2013, which was lifted primarily to allow REEs extraction. Exploration of oil resources was banned in 2021 (via an act of Parliament), although earlier exploration licenses remain valid. Following the 2025 elections, there is a renewed discussion on revisiting the possibility of exploration (although no economically feasible deposits had been found since the 1970s) (Arctic Today, 16.07.2021; Slothuus, 13.3.2025).

Greenland's uranium ban and legal government-company relations

Following the Naalakkersuisut's 2021 Uranium Act, Greenland Minerals (a subsidiary of Energy Transition Minerals, an Australian company), which had since 2008 held an exploration license and applied for an exploitation licence at Kuannersuit, started arbitration proceedings against the governments of Denmark and Greenland, claiming USD 11.5 billion in damages for the unissued license and breaching the contract, i.e. the terms of exploration license issued in 2008. In October 2025, the arbitration tribunal rejected most of the Greenland Minerals claims (including making the Government of Denmark a party in the case) and refrained from deciding on some of the case's aspects. The case, however, shows the difficulties in legislating raw materials extraction when various exploration and exploitation processes are already in place, and companies and investors have committed resources assuming the stability of state policy and legal framework (Hartmann et al., 2024; Fruerlund et al., 2025).

With the exception of uranium and hydrocarbons, mining in Greenland is encouraged by the government's policy. It is seen as a source of income, allowing Greenland to achieve economic independence from Denmark. In 2025, Greenland adopted the Raw Materials Strategy 2025-2029 (Government of Greenland, 2025). The strategy focuses on critical minerals, emphasises sustainability, responsible extraction, and the need to attract investment. The government aims to reduce investment and operating risk through tax agreements, streamlined administrative processes, digitalisation and improved infrastructure. There is also a commitment to assess in an ongoing manner Greenland's tax and royalty framework to boost the competitiveness of Greenlandic mining compared to other parts of the world. The need to invest in mapping and

geological data is highlighted. There is a strong emphasis on public engagement, education and gender equality in industry.

An important structural feature of Greenlandic system is that all land in Greenland is publicly owned (no private ownership of land exists by law), and thus, all uses of land are administered by the government not only as a public authority but also entity in control of lands and waters. The Government therefore grants rights to different activities, including mining. Generally, municipalities manage and allocate land to users (e.g. for housing).

The 2023 Mining Act sets Greenland's legislative framework for resource extraction,[1] although some measures under the old Mineral Resources Act (2009, substantially updated several times during the 2010s) remain applicable (Mineral Resource Authority website). The act covers exploration, permitting, exploitation, oversight, closure and remediation of mining activities. The licensing procedures for prospecting, exploration and exploitation are outlined. The exploitation licence contains general terms for the licence period, royalty, exploitation and plan and closure plan, reporting, confidentiality, as well as the use of local workers and contractors. The Act also requires mining companies to submit both an environmental impact assessment and a social impact assessment (SIA) for mining operations.[2] The mining law does not cover the extraction of hydrocarbon resources.

The 2023 Mining Act has introduced a number of changes to the legislative framework for mining in Greenland. The licensing process is to be accelerated by allowing companies to submit an exploitation license before EIA and SIA reports are approved, in principle allowing authorities to pre-assess the application, thereby improving companies' chances of obtaining financing. It is now mandatory for mining companies to be established in Greenland. Additional requirements for local employment, service-provision and supply chains can be imposed by the government. The protection of areas of special environmental and cultural significance has been introduced into mining legislation, although this does not apply to the existing mining licenses (where, however, environmental protection legislation applies). In addition, the 2023 act establishes judicial resolution of disputes as preferable to arbitration, and disqualifies from licensing procedures any individuals and companies charged with recent convictions, e.g. for fraud or corruption (Dalgaard-Knudsen, et al.22.08.2023).

The obligation to prepare SIA as a separate document is unique to Greenland in the Arctic and global context (although assessment of social impacts takes place in most jurisdictions in some form, most often as a part of an environmental impact assessment, EIA).

In order to implement a development project, an impact and benefit agreement (IBA) has to be concluded between the company, the Government of Greenland and the municipality or municipalities where impacts of the project are expected to occur according to the SIA report.[3] The IBA, thus, emerges from the findings of an SIA, with the negotiations starting at the end of SIA consultations. Greenlandic IBAs include: (a) measures on the interactions between the parties as the

[1] Greenland Parliament Act of 13 June 2023 on mineral activities.
[2] Additional legislation relevant for mining permitting and pollution: The Greenland Parliament Act No. 9 of 13 June 1994 on public access to documents in administrative files (the "Public Access Act"); Greenlandic Act No. 8 of June 13, 1994 on case administration in the public administration.
[3] Note that this constitutes a major difference compared to the IBAs concluded in neighbouring Canada, which are private agreements/contracts between the company and the community affected by the mining project.

project is implemented, (b) a monitoring and evaluation framework, as well as (c) concrete impacts and benefits comprising the facilitation of resource processing in Greenland, contracting local enterprises, training and employment of Greenlandic workers, among others (Government of Greenland website, n.d.). The IBA can be updated annually based on the results of monitoring.

Social Impact Assessment framework in Greenland: selected elements

A SIA report separate from an EIA is required for all major projects and all extractive activities in Greenland. The responsibility lies with the Ministry of Industry, Labour and Trade, with involvement of the Ministry of Nature, Environment and Justice and the Ministry of Mineral Resources (the division of responsibilities between ministries changes with each government).

The SIA – and later the Impacts and Benefits Agreement - has to involve affected municipalities and village councils (although the latter are not parties to the IBA). Project proponents are encouraged to engage the public as early as possible in the process.

The company proposing a project covers all the costs of the SIA report as well as associated studies or surveys.

The Greenlandic SIA process in a nutshell:

1. Announcement of the project intent.
2. Carrying out a scoping study, developing a project description (including implementation alternatives and options) and preparing draft terms of reference for the SIA.
3. Conducting stakeholder analysis (including the strategy for how stakeholders will be involved).
4. Collecting initial baseline data, which, alongside general social parameters, have to include also "values, heritage, knowledge and social/cultural well-being as well as language aspects".
5. Pre-consultation phase (35 days): meetings and allowing submissions of inputs.
6. Finalizing terms of reference reflecting pre-consultations and an advanced stage of project planning.
7. Carrying out assessment (with inclusion of local knowledge); proposing mitigation/compensation measures.
8. Producing draft SIA report.
9. Public consultations (8 weeks).
10. Producing final SIA together with the White Paper (which sums up pre-consultations and consultations input and indicates how these inputs are reflected in SIA and project planning – the White Paper needs to be translated to Danish and Greenlandic and constitutes a formal document in the government's decision-making process).
11. Based on the SIA, Impact and Benefit Agreement is negotiated.
12. Technical licensing and political approval of the project with SIA as one of the key inputs in the decision-making process.

The Mineral Resource Act (2009) and the Mining Act (2024) established a **consultation fund** for communities, organizations and individuals affected by or interested in (e.g. NGOs) proposed projects. The funding can be applied for organizing meetings, carrying out studies, hiring consultants and experts. The fund is a unique Greenlandic policy innovation, although support for communities during EIA and permitting processes is present also in Canadian territorial jurisdictions.

Government of Greenland (2016), *Social Impact Assessment (SIA): Guidelines on the process and preparation of the SIA report for mineral projects*. Ministry of Industry, Labour and Trade.

In addition to the Mining Act, the applicable legislation includes environmental law, and especially the Greenland Parliament Act on environmental protection (No. 9 of 2011).

Within the Government of Greenland (Naalakkersuisut), the agency responsible for governing mining activities, including licensing and oversight, is the Mineral Resources Authority.

With respect to pollution, the companies applying for exploration, construction and exploitation licenses are required to prevent and minimise pollution caused by their activities. The Environmental Impact Assessment process is the key instrument to assess the impacts, make them public, propose mitigation measures and provide authorities with information allowing the issuing of a license. Public consultations are a key element that the EIA. Greenland's Environmental Agency for Mineral Resources Activities (EAMRA) approves the EIA and negotiates/agrees specific mitigation and compensation measures with the company. As a result, the pollution control measures are included in environmental permits (also for exploration activities), covering, among others, maximum pollution thresholds, waste management plan, as well as monitoring and reporting obligations (regarding air emissions, water quality and soil pollution).

Monitoring is a responsibility of the project proponent or exploratory activities operator, while EAMRA and the Ministry of Mineral Resources and Justice may conduct inspections and audits to ensure compliance. In extreme cases, termination of activities is possible, but fines and agreed-upon new preventive measures are more likely outcomes of non-compliance. However, it is important to keep in mind that the system under the current legislation has not been tested, as of the end of 2025.

At the time of permit application and EIA process, project proponents are also required to prepare closure and rehabilitation plans, which need to detail how pollution is to be prevented or mitigated upon the closure of the mine and following the end of activities. Companies are required to provide adequate financial guarantees to ensure that clean-up costs are covered (including in the case of bankruptcy, which is not an uncommon case in the mining sector).[4]

Specific measures cover the compensation of environmental damage (Mining Act, Art. 134 and supra) and include impact on climate as well as noise, light, heat and other environmental

[4] No minimal amount is prescribed in the Greenlandic legislation (established in June 2019) for large-scale mining projects. Guarantee, escrow (a bond kept by a third party) and pledge are instead tailored to each project, and the guarantee amount is to reflect the costs associated with environmental remediation and closure. The specific terms are part of the Impact and Benefit Agreement and the mining permit. The minimum amount for small-scale mining activities is DKK 100,000. See Mineral Resources Authority "Standard Terms" (n.d.).

disruptions, thus going beyond direct pollution to soil, waters and air. Damage and compensation may be agreed prior to the (accepted) impact taking place (when the impact is a necessary and acceptable part of mining operations[5]). Parties that are impacted (individuals, their associations, or representatives of other industries, such as mining) may also use civil procedure to claim damages.

In principle, the industry can be impacted by the Paris Agreement, which Greenland joined in 2023.[6] Currently, extractive activities are responsible for less than 1 % of Greenland's GHG emissions. However, future growth in the sector may increase energy demand and potentially also carbon emissions. The fear that the Paris Agreement might restrict the development of new mining projects has initially been among the arguments against joining the agreement, due to political and economic hopes linked to the mining and hydrocarbon industries (Ea Energianalyse 2023). Importantly, the environmental/pollution provisions of the 2024 Mining Act also extend to the protection of the climate (Mining Act, Art 20), and are part of the environmental impact assessment. However, there is a lack of clarity on how climate impacts are to be measured in methodological terms, likely to be seen in company/consultants' practices.

2.2. Iceland

Mining activities in Iceland are relatively minor (one quarry for Iceland spar[7]). It is not surprising, therefore, that the legislative framework regulating mining is far from an advanced state of development compared to mining jurisdictions such as Canadian territories, Finland or, indeed, Greenland. However, activities related, for instance, to possible carbon capture and storage (CCS) might be regulated using partly the instruments established for mining developments, including the existing legal framework covering the environment and industrial processes.

The Law on Survey and Utilisation of Ground Resources (57/1998) establishes the overall framework for the exploration and exploitation of mineral resources. The Environment and Energy Agency is responsible for future licensing, permitting and oversight. The Ministry of the Environment, Energy and Climate is the main policymaking body.

Legislation governing land use and environmental protection is broadly relevant to mining pursuits. This includes: The Law on the Nature Conservation Act (60/2013), the Law on Environmental Impact Assessment (111/2021), and the Planning and Building Act (123/2010). This area of legislation is partly influenced by the EU regulatory framework applicable to the European Economic Area (EEA), of which Iceland is a part.

Concerning carbon capture projects, several policy and regulatory frameworks are relevant. Iceland Climate Act (nr 70 of 29 June 2012, amended in 2021) currently includes 2040 climate neutrality target, which in itself encourages the pursuit of CCS projects. Iceland is also committed to becoming a fossil-free country by 2050. EU frameworks such as the Emissions Trading System (ETS), as well as land-use, land-use change and forestry (LULUCF) rules apply to Iceland, and they are part of the

[5] It is important to note that every industrial activity has some environmental impacts and the environmental permit is partly a *de facto* permission given to companies to pollute.
[6] Greenland was not covered by earlier frameworks – two periods of the Kyoto Protocol under the UNFCCC.
[7] Iceland spar, formerly called Iceland crystal (*silfurberg* in Icelandic - 'silver-rock') and also called optical calcite, is a transparent variety of calcite, or crystallised calcium carbonate, originally brought from Iceland.

country's 2020 Climate Action Plan (Government of Iceland, 2020). The 2020 Action Plan does not include specific provisions on carbon capture, except for mentioning the possibility of capture from heavy industry in connection with the EU ETS. However, Iceland has transposed the EU CCS Directive (2009/31/EC)[8] into national legislation (Sanitation and Pollution Prevention Act[9]). The law allows industrial-scale CO_2 storage and clarifies liability issues. Projects that store under 100 kilotons of CO_2 are exempt from the requirements of the Act. In 2019, the government made a declaration of intent with six private firms to explore the feasibility of the CO_2 storage technique created by the company CarbFix as a viable option for reducing national emissions (Carbon Tracker website). Iceland has not ratified the 2006/2009 amendments to the 1996 London Protocol[10] art. 6 (covering storage of CO_2 in subsea geological formations and transboundary transport of CO_2 for storage), which would allow it to pursue offshore carbon storage. (Iceland is a party to the Protocol, which does not include an exception for CO_2 storage). Iceland officially prioritises onshore storage, and there appears to be no push for ratification of these amendments (notably, other Nordic countries have ratified these amendments).[11] Currently, the Swiss company Climeworks operates the world's largest active air capture plant in Iceland. In addition, a research project DemoUpCarma tested the feasibility of transporting CO2 from the wastewater treatment plant in Switzerland to Iceland for storage (results unknown).

2.3. Svalbard

The basis for economic activities in the Svalbard Archipelago, including mining, is the Svalbard Treaty (1920), which provides for equal access to all parties to engage in commercial activities. Mining activities were, in fact, the main type of economic activity on land at the time the treaty was adopted. However, as Norway is responsible for environmental conservation and for regulating activities in Svalbard, Norwegian regulations apply to all those who wish to engage in mining. Importantly, around 60-65% of Svalbard is covered by a network of protected areas, and thus, is *de facto* not accessible for mining companies.

Mining operations, specifically, are covered by the Norwegian century-old Svalbard Act (1925) and the Mining Code of Svalbard (1925, currently under revision). The code, revised multiple times, regulates rights to explore for and extract minerals, imposes operational requirements on project operators, safety obligations and outlines closure planning procedures. All entities from Svalbard Treaty parties can apply for mining permits, which are issued by the Norwegian Directorate of Mining. Importantly, the Norwegian 2010 Minerals Act does not apply to Svalbard.

[8] Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (Text with EEA relevance).
[9] Sanitation and Pollution Prevention Act no. 7 of 12 March 1998, amended multiple times, with last amendment in 2025.
[10] Protocol to the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972. Under the London Protocol, all dumping of waste at sea is prohibited, with the exception of "acceptable waste", with the overall goal to prevent pollution from human activities. Following amendments in 2006 and 2009, the London Protocol includes limited provisions on carbon storage.
[11] Nordic Council of Ministers (2023). Regulatory framework for CCS in the Nordic countries. TemaNord 2023:521. URL: https://pub.norden.org/temanord2023-521/

The Svalbard Environmental Protection Act (currently, Act of 15 June 2001 No. 79)[12] is a key piece of legislation when it comes to the environmental performance of industrial activities. The Act introduces measures on waste, emissions and landscape change. As there are, at the moment, no active mining project proposals, closure and cleanup provisions are the key areas of regulation (e.g., recently applied to the former Svea coal mine site). Section 64 of the Act stipulates that the person or entity leading an enterprise is responsible for preventing damage to the environment from residual operations, removing all surface installations, waste and other remains that are not protected as a part of the archipelago's cultural heritage, as well as restoring the area to its original appearance before the start of the activity in question. A plan for utilising the waste generated from the demolition and rehabilitation (when the minimal threshold is exceeded) needs to be submitted to the authorities, and hazardous waste disposal is regulated separately based on a permit.

3. Supranational regulations and standards

3.1. International frameworks

There are no international regulatory frameworks explicitly dedicated to mining; however, there are a number of instruments that are indirectly relevant for extractive activities.

International environmental law sets global – and influences national - goals for biodiversity protection and global climate action, as mining activities have both a significant environmental impact and result in GHG emissions across the minerals value chain. Instruments such as the 1992 Convention on Biological Diversity (CBD),[13] the 1992 UN Framework Convention on Climate Change,[14] and the 1971 Ramsar Convention on Wetlands of International Importance[15] are relevant examples.

Secondly, the international Indigenous rights framework is highly relevant for mining activities. The 2007 UN Declaration on the Rights of Indigenous Peoples provides for Indigenous rights to land, waters and resources they occupied and used, as well as introduces the principle of the Free, Prior and Informed Consent (FPIC) for developments that significantly impact Indigenous livelihoods and cultures. The Kingdom of Denmark is a party to the 1989 ILO Convention 169 on the Rights of Indigenous and Tribal Peoples[16], which outlines land rights and a range of human rights protections. ILO169 applies to the Danish sovereignty over Greenland.

International frameworks for the EIA provide rules for dealing with transboundary impacts. While there are numerous provisions in international law, including the International Court of Justice

[12] Act of 15 June 2001 No.79 relating to the protection of the environment in Svalbard (Svalbard Environmental Protection Act) T-1418.
[13] Convention on Biological Diversity, Rio de Janeiro, 5 June 1992, United Nations Treaty Series UNTS, vol. 1760, p. 79, Entry into force: 29 December 1993.
[14] United Nations Framework Convention on Climate Change, Rio de Janeiro, 9 May 1992, 1771 UNTS 107, 31 ILM 849 (1992), Entry into force: 21 March 1994.
[15] Convention on Wetlands of International Importance Especially as Waterfowl Habitat, 1971, UNTS 996, p. 245.
[16] International Labour Organization (ILO) Convention 169 of 27 June 1989: Convention Concerning Indigenous and Tribal Peoples in Independent Countries, 28 I.L.M. 1382 (1989), Entry into force: 5 September 1991.

jurisprudence, in the Arctic context, the main agreement dealing with the impact assessments is the UN Economic Commission for Europe's Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991).[17] The Espoo Convention applies to Svalbard and Greenland. The Convention establishes procedures for involving other states in EIA procedures where impacts are expected to affect territories or EEZs of other states. This could be the case if a mining project included, e.g., deposition of mining waste into the ocean or generated significant air pollutants (e.g. dust). In principle, it is possible that a mining project in Greenland could affect the Icelandic environment, although the Espoo procedure would be voluntary as Iceland is not a party. Projects in Svalbard could affect Russia (which has not ratified the convention), and Finland or Sweden, but only in exceptional and highly unlikely cases due to the geographical remoteness of the archipelago.

There are also a number of international public standards and guidelines relevant to the mining sector, although they primarily apply to the Global South. A good example are the Organisation for Economic Co-operation and Development (OECD)'s Due Diligence Guidance for Responsible Business Conduct (OECD, 2018) and Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (OECD, 2016).

3.2. European Union

EU law does not directly affect mining in the ICEBERG study sites, with the exception of Iceland, as the country is covered by a significant part of EU legislation under the EEA Agreement. However, EU legislation is also an important reference for Arctic countries and territories. This is also because the EU regulatory framework applies to Denmark as a Member State and Norway as an EEA state - even if Svalbard and Greenland are themselves outside of the EU/EEA, legislation and policy in these territories are affected by Danish and Norwegian frameworks. Furthermore, EU demand for raw materials is likely to be an important driver for global and Arctic resource extraction, especially as the EU sees Arctic regions as relatively reliable and well-governed, compared to the challenges characterising mining in the Global South.

In 2008, the EU adopted its first overarching minerals policy, the Raw Materials Initiative (EC 2008; EC 2011). A recent iteration of this policy is the Critical Raw Materials Resilience communication and action plan (EC 2020), accompanied by the first legally-binding regulation outlining EU policy, including MSs' obligations (see below). From early on, the EU has had a three-tier approach to raw materials: 1) diversifying and securing sustainable and responsible imports; 2) increasing domestic, European production, especially of critical minerals; and 3) improving recycling of minerals. Importantly for the ICEBERG study sites, the first objective is especially relevant for the EU's relations with states such as Canada or Greenland. The 2020 communication specified the need for developing resilient value chains for EU industrial ecosystems, introducing a more holistic approach (thinking of the whole sector and all sources of minerals as an integrated whole), facilitating sustainable products and innovation, as well as rule-based open trade in raw materials, and removing distortions to international trade. The minerals policy is in line with the objective of the

[17] Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), Espoo, Finland, 25 February 1991, UNTS 1989, p. 309, Entry into force: 10 September 1997.

EU to achieve a degree of strategic autonomy, as the Union would become less dependent on a limited number of external sources for raw materials critical for its industries.

The most recent and most important development concerning the EU's policy on minerals and raw materials is the Critical Raw Materials Act (CRMA),[18] proposed by the EC in 2023 and adopted in 2024. The decision to set the earlier policy into a legally binding instrument underlines the high political importance given to raw materials supply. The CRMA adopts a set of objectives generally following the 2008 goals, focusing on safety of supply and relations with source countries, coupled with standards for extraction and value chains, the increase in domestic production of raw materials and boosting recycling capacities and rates. The regulation increases the responsibilities and powers of the European Commission (EC) with respect to the critical raw materials, as well as introduces responsibilities of European companies and EU Member States (MSs). Targets for European domestic extraction (10% of production from local extraction and 15% from recycling in 2030), refining and overall recycling rates have been enshrined into law. The resilience of raw materials value chains is to be enhanced via establishing mechanisms to monitor and manage supply risks (incl. via the private sector reporting). A list of strategic raw materials is to be regularly revised, and strategic projects (boosting domestic/secure production and refining) within the EU will be supported. The EU is also to increase funding for technologies that reduce reliance on critical raw materials, enhance recycling efficiency, and improve the environmental performance of mining operations. This is already visible in the annual work programmes within the EU's Horizon Europe framework programme for research and innovation and may be expected to become even more prominent in the post-2027 framework programme.

Among specific actions envisaged in the CRMA is the creation of a European Critical Raw Materials Board, which will oversee the implementation of the new law, coordinate MSs' actions and engage with the private sector. Financial and technical support for strategic projects will be increased – EU funding was also available before the CRMA. Already before the CRMA, the EU's Raw Materials Information System (RMIS) had been established to facilitate the availability of more comprehensive, up-to-date data. Another EU instrument is the European Innovation Partnership (EIP) on Raw Materials, which brings together industry, public services, academia and NGOs, pursuing adaptations in the sector that could lead to environmentally and socially responsible extraction, better recycling, more efficient value chains, and technological changes enhancing resilience. A similar role is played by the EIT RawMaterials (European Institute of Innovation and Technology), an independent networking organisation committed to "supporting the EU's transition to green, circular and digital economy". The focus is on closing material loops (circularity), securing raw materials supply, and designing materials solutions (see EIT Raw Materials website).

The EU faces numerous challenges in its pursuit of ambitious policy and CRMA objectives. First, the targets for domestic extraction and processing are seen as unrealistic, at least within the 2030 timeframe. Consequently, it is unlikely that the EU will achieve a degree of strategic autonomy with respect to minerals supply in the foreseeable future. Second, other nations, including the US (e.g. via the Inflation Reduction Act), are also trying to secure access to the same pool of minerals. There are concerns over environmental degradation and social impacts, which result in opposition to mining both in the EU and in the source countries (as the recent opposition to a lithium mine in

[18] Regulation 2024/1252 of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials

Serbia shows). Balancing the demand for critical materials with environmental and social standards can prove particularly challenging, especially in trade partner countries with limited regulatory frameworks or ineffective enforcement capabilities. This makes relationships with countries sharing EU concerns about standards, such as Greenland, particularly valuable. Third, the selection of strategic projects (with facilitated permitting process) under the CRMA has been criticised for the lack of transparency, and there appears to be limited trust in the decision-making process. This also refers to the projects designated as strategic in Nordic countries.

Beyond raw materials policy, a number of other EU policies and legislation are relevant for minerals extraction. With respect to CRM supply chains, the Corporate Sustainability Due Diligence Directive[19] (CSDDD) and the Corporate Sustainability Reporting Directive[20] (CSRD), part of the European Green Deal package, are among the key examples. Both directives are likely to be revised in the coming years (as of early 2026), as part of the so-called Omnibus package for simplifying investment and sustainability rules.[21] Furthermore, the EU Taxonomy Regulation[22] (providing the framework for the definition of which investments and developments can be considered sustainable) is of relevance, although the sustainability standards for mining activities have not been adopted yet.

As mentioned, the most relevant aspect of the CRMA for ICEBERG is probably its goal to diversify the sources of supply. The EU is to reduce its overreliance on a few countries, such as China, for critical raw materials like lithium, cobalt, and rare earth elements. Since 2008, the EU's objective has been to establish partnerships with third countries to secure stable supply chains – this objective has received an additional boost with the adoption of CRMA. At the same time, as security of supply is being strengthened, CRMA has an objective of making the sourcing and processing within the EU and in the source countries to follow minimal environmental and social standards.

In addition to more general policies and relations with Arctic actors, various pieces of EU legislation, in particular those related to the environment, have a bearing on how mineral extraction is carried out in the EU (and partly in Norway and Iceland via the EEA Agreement). Waste originating from mining is one of the largest sources of waste in the EU,[23] and the Directive 2006/21/EC on the management of waste from the extractive industry, supplemented by the Best Available Techniques Reference (BAT) document, was adopted to prevent or minimise water and soil pollution. The law requires mines located in the EU to have a permit based on the best available techniques approach, including a waste management plan and a financial guarantee, while dangerous waste facilities in

[19] Directive (EU) 2024/1760 of the European Parliament and of the Council of 13 June 2024 on corporate sustainability due diligence and amending Directive (EU) 2019/1937 and Regulation (EU) 2023/2859 (Text with EEA relevance)
[20] Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting (Text with EEA relevance)
[21] European Commission, COM(2025) 80 final, Proposal for the Directive at https://commission.europa.eu/document/download/0affa9a8-2ac5-46a9-98f8-19205bf61eb5_en?filename=COM_2025_80_EN.pdf
[22] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance).
[23] In 2022, mining waste represented 22.7% of total waste produced in the EU, surpassed only by construction waste. See European Parliament, Sustainable waste management: what the EU is doing, URL: https://www.europarl.europa.eu/topics/en/article/20180328STO00751/sustainable-waste-management-what-the-eu-is-doing

mines need to have an accident prevention policy. Already a decade ago, the Commission (COM(2013)442) encouraged Member States to develop national minerals policies, set up comprehensive land-use planning policies for minerals, and streamline permitting processes. REACH Regulation 1907/2006/EC (Registration, Evaluation, Authorisation and Restriction of Chemicals) applies to the mining industry both as a user of chemicals (mines have to report the use of chemicals to the supplier) as well as to mining products (as it covers ores and concentrates in the case of chemical alteration).

EU relations with raw materials source countries

As a consequence of limited opportunities for European raw materials production, CRMA's and other EU policies aim at ensuring the EU's access to critical raw materials through partnerships with third countries. The CRMA emphasises the establishment of partnerships with resource-rich third countries to secure stable, diversified, and resilient supply chains. Sourcing from multiple regions to reduce EU vulnerability to supply chain disruptions. Partnerships with stable, rule-of-law countries are to be particularly favoured. The EU also promotes transparency and stability in international raw material markets through trade agreements, multilateral engagement and adopting relevant international rules and standards.

Moreover, the EU's raw materials diplomacy promotes environmental, social, and governance (ESG) standards within raw material extraction and trade. The EU's ambition is to set global benchmarks for ethical sourcing, envisioning the EU as a leader in environmentally and socially responsible raw material supply chains. This includes promoting sustainable mining practices, reducing the environmental footprint, upholding labour rights, and preventing the exploitation of workers and communities across supply chains. ESG standards also include a commitment that local communities benefit from extractive activities, including through equitable distribution of profits, infrastructure development, and creating economic opportunities.

Overall, the EU policies outline that strategic partnerships with respect to CRMs should include:

- clear, specific measures to tackle illegal and irresponsible mining;
- support producer countries' own green transition;
- measures to reduce the use of CRMs to achieve resource efficiency;
- integrity and transparency in the mining sector and in cooperation on CRMs and ESG standards;
- inclusive, transparent, robust and effective monitoring.

The EC has been pursuing agreements with source countries on cooperation in the mining, processing, and trade of critical raw materials, including provisions for sustainable mining practices, technology transfer, and capacity-building in source countries. So far, the EU has signed formal partnerships with Canada, Kazakhstan, Ukraine, Argentina, Chile, Namibia, the DRC and Zambia, while agreements with Norway, the East African countries and Australia are in the pipeline. Cooperation with the US and Japan under frameworks such as the Trade and Technology Council (TTC) is also part of such a broader partnership-building strategy. The EC has also been investing in building international coalitions, such as the Minerals Security Partnership (MSP),[24] hoping for a

[24] Partnerships, such as the MSP, may be currently less active, following the changes in the US approach under the Trump administration.

greater alignment of policies among like-minded nations, ensuring secure and fair access to critical resources.

Relations with Greenland

With respect to the EU-Greenland relations linked to mining, Greenland is seen as a territory with a high potential of providing EU industries with critical raw materials, as deposits of 25 of 34 minerals defined by the EU as critical are present in the territory.[25] The first letter of intent between the Government of Greenland and the European Commission on cooperation on critical minerals was signed already in 2012.[26] Under the EU-Greenland Partnership Agreement, renewed in 2021, both parties emphasise responsible mining practices, environmental protection, and fostering economic opportunities for Greenlandic communities. Education and vocational training – a cornerstone of EU support for Greenland in the framework of the Partnership Agreement – includes building human capital towards greater involvement of Greenlanders (i.e. workers, experts and companies) in future mining projects. There is a clear EU commitment to enable Greenland to benefit from EU-funded innovation and research (Greenland does not contribute to the budget, while Greenlandic institutions can participate in projects).

In 2023, the EU and the Greenlandic government signed a Memorandum of Understanding on a strategic partnership to develop sustainable raw materials value chains.[27] In 2024, a roadmap for implementing the partnership was adopted. Five areas of cooperation have been identified:

- Economic and industrial integration of value chains for Critical Raw Materials and other raw materials. (networking, joint projects, economic diversification support);
- Cooperation to leverage high international environmental, social and governance (ESG) standards;
- Deployment of infrastructure required for the development of raw material value chains. (e.g. EIB financing for infrastructure tailored to Greenlandic needs and conditions);
- Strengthening of capacities and skills development along raw materials value chains.
- Cooperation on research and innovation.

EU funding for Greenland as part of the Overseas Countries and Territories (OCT) network is among the key instruments to implement many of these objectives, alongside other EU programmes such as Horizon Europe, or territorial cooperation programmes (Interreg Northern Periphery and Arctic Programme).

3.3. Arctic Council initiatives

The Arctic Council has not dealt with mining activities in the Arctic in a comprehensive manner (e.g. through a project focused specifically on mining). However, various reports, assessments and

[25] European Commission (2023, November 30). EU and Greenland sign strategic partnership on sustainable raw materials value chains. URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6166
[26] European Commission (2012, June 13). Greenland's raw materials potential and the EU strategic needs, URL: https://ec.europa.eu/commission/presscorner/detail/en/memo_12_428
[27] European Commission (2023, November 30).

guidelines remain relevant, as mining activities are an important element of the region's economic landscape, while having significant environmental and social impacts.

The work within the Arctic Council (AC) on the environmental impact assessments (EIAs) is particularly relevant to mining activities, especially considering that many, if not most, of the industrial projects covered by EIA processes in the region are mining activities. EIA Guidelines[28] have been prepared under the AC's predecessor (the Arctic Environmental Protection Strategy), while the EIA good practice compendium was developed during the Finnish Arctic Council chairship and published in 2019 (Arctic Council, 2019). The focus has been on taking account of the vulnerable Arctic environment, long-range impacts and community engagement.

Moreover, the AC has conducted assessments of different pollutants in the Arctic, including those linked to local sources such as extractive activities (especially heavy metals like mercury and lead). The AC has also produced assessments of the socio-economic developments, including mining. A good example is the series of reports under the Adaptation Actions in the Changing Arctic project, where mining projects are presented as an important element of Arctic change.[29] The work under the AC's Emergency Preparedness, Prevention and Response (EPPR) working group has also covered mining-related accidents, although that has never been a focus of any assessment or project.

In 2011, the AC's Sustainable Development Working Group, adopted the Circumpolar Information Guide on Mining for Indigenous Peoples and Northern Communities.[30] The guidelines aimed to provide communities with information on how to understand, participate in, and influence decision-making processes related to mining, including benefit-sharing and assessment of effects on the environment, cultures and livelihoods.

The AC has been more active with respect to the extraction of hydrocarbons in the Arctic. In 2009, the Arctic Offshore Oil and Gas Guidelines (PAME, 2009) were issued, and have been updated several times through the 2010s. The 2013 Oil Spills Agreement and the creation of the Arctic Offshore Regulators Forum were also aimed at facilitating more responsible and safe extraction of hydrocarbons.

The key limitation of the recommendations and guidelines coming from AC assessments and reports is their soft law character and relatively low status of the AC outputs within national administrations. There are only a few cases where the implementation of AC recommendations is followed up and reported, and many of the produced guidelines are not well-known even among policy-makers and responsible civil servants (Koivurova, 2009). This does not mean that the AC's recommendations and guidelines are not relevant, as they contribute to (and often reflect) the overall policy trends and pressures affecting national and international decision-making. This was visible in particular with respect to Arctic shipping governance (Folkestad Soltvedt, 2017). However,

[28] Arctic Environmental Protection Strategy (1997). Guidelines for Environmental Impact Assessment in the Arctic. URL: https://oaarchive.arctic-council.org/items/74ad62a9-732f-4c4d-bde9-65fc6946a2d2

[29] Of particular relevance for the ICEBERG study sites is the report on the Baffin-Davis Strait region, which covers Greenland. URL: https://oaarchive.arctic-council.org/items/d91aebed-9a7f-4357-9749-bc5f66fe52aa

[30] Sustainable Development Working Group (2011). Circumpolar Information Guide on Mining for Indigenous Peoples & Northern Communities. Arctic Council. URL: https://oaarchive.arctic-council.org/items/602e7a19-bb78-4d76-b40f-91c45a187526 /. SDWG also produced an earlier Circumpolar Information Tool Kit on Minerals, and Oil and Gas for Indigenous People and Northern Communities, in 2007. URL: https://oaarchive.arctic-council.org/server/api/core/bitstreams/9a34ad9f-1cfa-4c68-a2b0-62d0eae50105/content

the political changes in the Arctic states and geopolitical tensions mean that even this limited effectiveness of the AC (and its organisational survival) is under threat.

3.4. Inuit Circumpolar Council and Indigenous rights regarding mining and pollution

As most Greenlanders are Indigenous Inuit, the activities and guidelines developed by the Inuit Circumpolar Council (ICC) - an organisation bringing together the Inuit from Greenland, Canada, Alaska and Chukotka (Russia) – are of some relevance for the soft law governance of Greenlandic extractive developments, as Inuit communities are often important partners in mining projects and ICC work can be seen as a point of reference for Inuit decision-makers. In 2016, the ICC prepared guidelines for resource extraction for the entire Inuit Nunaat (Inuit homelands) in the form of the Declaration on Responsible Resource Development in the Arctic Region (ICC, 2016). The declaration calls for:

- ensuring Inuit are primary beneficiaries of resource development;
- respecting the UN Declaration on the Rights of Indigenous Peoples and Inuit legal rights;
- balancing of risks and benefits of development, and ensuring development is sustainable;
- respecting the Arctic Council's "Arctic Offshore Oil and Gas Guidelines" as minimum standards;
- supporting an international mechanism for funds targeted towards liability and compensation for oil pollution damage resulting from offshore oil exploration and exploitation;
- continued joint work of Inuit leaders and their respective governments to address and pursue responsible resource development;
- assessing diligently environmental and social impacts from resource development.

4. Mining sector's Corporate Social Responsibility standards regarding pollution

Mining companies operating in the Arctic are generally expected to meet high CSR standards. The Arctic's fragile ecosystems, reliance of Indigenous peoples on the land and waters, and the region's visibility in the climate debate mean that companies must go beyond basic legal compliance. There is intense international pressure for mining companies to prioritise pollution prevention and environmental protection. Moreover, Arctic jurisdictions generally have robust legal frameworks, an active civil society and a high level of public awareness with respect to risks related to extractive activities and the problems occurring in the past. Policymakers, including the EU, are also willing to rely on audit and certification schemes as a part of promoting the enforcement of standards in the mining industry, which further increases the profile of voluntary standards initiatives.

Several international frameworks are relevant for the Arctic mining industry. The ICMM's (International Council on Mining and Metals) regularly updated Mining Principles (ICMM, 2024) include guidance and commitments on pollution prevention and responsible waste management. ICMM issued a plethora of specific guidance documents covering the environmental performance and biodiversity conservation, Indigenous Peoples and mining, inclusion, water management, tailing governance, mercury risk management, and climate change in the mining operations context. The companies are also required to establish effective and trustworthy grievance mechanisms and regularly monitor their operation. (e.g. under IRMA). The Initiative for Responsible Mining Assurance (IRMA's) Standards for Responsible Mining are highly relevant (IRMA, 2018) – at the end of 2025, IRMA was working on the new version of its standards, including via public consultations. The 2018 standards are accompanied by a number of guidance documents, including on Indigenous Peoples and the Free, Prior and Informed Consent (FPIC) (IRMA, 2025), reclamation, closure and financial assurance (IRMA, 2022), gender equality and gender-based protections (factsheet, IRMA, 2022).

There are also commodity-specific standards such as Responsible Steel, Coppermark, World Gold Council, etc. National industry associations' guidance is also present, such as the Mining Association of Canada's Toward Sustainable Mining (TSM) protocols, which are relevant globally due to the global presence of Canadian mining companies, including in Greenland and other Nordic countries. Documents issued by these initiatives include calls for strict pollution controls. Mining companies are expected to implement zero-discharge policies, air pollution control, or emergency spill response plans. Best practices include using dry-stack tailings instead of traditional water-based dams, reducing the risk of contamination.

Currently, the standards frameworks are at a crucial turning point as four big standards (ICMM, TSM, Coppermark and World Gold Council) are merging into the Consolidated Mining Standard Initiative (Mining Standards Initiative website).

A major instrument for ensuring companies' compliance with standards is certification, which in principle increases the companies' trustworthiness in the eyes of the public authorities, the public and project stakeholders. IRMA carries out audits for the purpose of issuing certification to companies, and these are conducted in line with the aforementioned 'Standards for Responsible Mining' and the relevant guidance documents.

Some CSR frameworks include complaint facilities, allowing stakeholders to raise issues regarding companies that are members of a given association or organisation or the standards in general. A good example here is IRMA (the Initiative for Responsible Mining Assurance), which has set up a feedback and complaints form on its website and provides information to those submitting a complaint on the steps that can be taken. Some complaints are published on the IRMA website. However, there are very few analytical or academic analyses of the effectiveness of CSR complaint mechanisms, such as that under IRMA (e.g., see, Heinz et al., 2022; Lead the Charge, 2024).

Other key global standards that could be referred to during Arctic project developments and negotiations include the UN Guiding Principles on Business and Human Rights (OHCHR, 2011), ISO 14001 for environmental management, and the Equator Principles for project finance.

As part of CSR, the social licence to operate (SLO) concept continues to be important as a tool for empowering local communities. Because mining companies' operations benefit from community acceptance for their projects, a community's ability to withhold that acceptance and either disrupt

or halt a given project gives them a great deal of leverage. There are, however, difficulties with the SLO concept, including its definition, identification of the point when companies have obtained community acceptance and SLO's role in an ever-evolving complex regulatory landscape. Nonetheless, the usefulness of SLO lies in its ability to encourage companies to prioritise community interests. thereby changing company behaviour.

5. Existing regulatory and policy gaps and challenges

Below, we highlight issues that can be seen as problematic or challenging, which could be considered in future policy developments and discussed with different stakeholders; however, these are not necessarily points of criticism of the current regulatory frameworks.

General:

- **Administrative capacities** in Arctic jurisdictions, including Iceland, concerning monitoring and inspections, reviewing environmental impact assessments, etc., are limited by human resources in national and local agencies and administrations responsible for reviewing EIAs, permitting, monitoring and enforcement. For instance, Greenland's EAMRA has both staffing and funding constraints to deal with complex projects. As a result, the environmental monitoring, data collection and reporting are *de facto* largely dependent on the companies and their proper behaviour. Much of the related work is outsourced (by both public bodies and companies) to consulting companies, often based outside of Arctic regions and sometimes seen by some stakeholders as lacking understanding of local characteristics (e.g. issues linked to traditional livelihoods and Indigenous rights). Limited administrative capacities also affect the public trust in the public bodies to interact with the private sector and protect public goods (here, especially the environment and human health) (ICEBERG fieldwork – personal communication). Various capacity-building initiatives, e.g. funded by the EU or national governments, may make a difference, but within small administrations in terms of personnel, there are structural limitations for increasing their capacities.
- **The industry CSR standards are voluntary and not well known** to affected communities and stakeholders, and it is unclear how they can be genuinely operationalised by stakeholders and rights-holders. Only the Initiative for Responsible Mining Assurance (IRMA) includes local communities in the standard compliance evaluation process, which allows them to raise issues related to the operation of companies that obtained IRMA certification. There are very few analyses on the impact of grievance mechanisms on the performance of companies, and there are no relevant cases in the Arctic context.
- **Deep-sea mining** (DSM) is not specifically covered by regulatory frameworks, although mining (especially regarding offshore oil and gas exploitation) and environmental laws are generally applicable. As deep-sea mining developments remain unlikely to happen in the Arctic in the mid-term perspective, there is little pressure to develop relevant legislation (currently, with the prominent exception of mainland Norway). For instance, the Greenlandic Mineral Resources Strategy until 2029 does not even mention deep-sea mining. Norway is

the most advanced Arctic country with respect to the development of a tailored legislative framework, and the country had initially opened parts of its EEZ to exploration activities (including in the Norwegian Sea). The latter decision has been recently reversed, with the process suspended until 2029 (Gilliver, 2025, December 4). Around Svalbard specifically, there is a lack of agreement between Svalbard Treaty parties on the applicability of the Svalbard Treaty to maritime zones (in particular, the exclusive economic zone and the extended continental shelf) that emerged in international ocean governance in the second half of the 20th century. Any deep-sea mining activities in that area could prove problematic, notwithstanding the extensive environmental protection measures and protected areas imposed by Norway across Svalbard. There are currently no projects or proposals at the Icelandic EEZ and continental shelf, nor are there any regulatory developments to direct future DSM activities. However, there are developments with respect to creating frameworks for impact assessment and licensing in the areas beyond national jurisdiction ("the Area") managed by the International Seabed Authority (ISA), which are likely to have an impact on future national regulatory developments.

Greenland:

- The **current Mining Act** entered into force in 2024, and the Mineral Resources Strategy was adopted in early 2025. We are yet to observe the Act's implications and the Strategy's impact on actual resource extraction, the exploration and permitting processes and the operation of mines. The current US administration's interest in Greenland may result in US companies' activities to develop Greenlandic resources and a level of pressure from the US government to facilitate such developments, with possible effects on the implementation of current legislation. On the other hand, the notion of uncertainty created by the Trump administration around Greenland may play a role in discouraging private sector investment. Specific issues include:
    - While the 2023 Mining Act provides for **closure and post-closure** planning, the questions related to the long-term liability of companies remain problematic. Historically, the closure and post-closure costs have often proven much higher than envisaged in the original permitting process. Reporting of closure activities have been shown to lack financial and technical transparency (Bainton and Holcombe, 2018). These problems will probably also be present in Greenland, and the current legislation is unlikely to prevent such challenges.
    - The **impacts on climate** are specifically mentioned in the 2024 Mining Act as the dimension of environmental/pollution impact that needs to be addressed in an EIA, permitting and monitoring for extractive projects. However, there is a lack of clear guidance on how to account for these impacts properly. The companies' practice will show how the new provisions are reflected in project documentation. The 2025-2029 Strategy does not fully integrate Greenland's climate targets or climate adaptation objectives, focusing exclusively on the contribution of critical minerals to the technologies mitigating climate change and the impacts of the changing climate in terms of disaster risk.
    - Provisions covering **mining waste and wastewater** management under the 2023 Mineral Act and other legislation are general and lack technical details, leaving the

elaboration of specific measures to companies, which also includes establishing thresholds and monitoring.

  - **There is a very limited framework covering and supporting local and small-scale mining**. Current legislation is targeting primarily large-scale projects. In principle, small-scale mining activities could be taken up by local actors, who have special rights to carry out small-scale minerals extraction, while their activities are covered by the overall Mining Act. A legislative process to develop a special framework is, however, underway (Fognani and Reagen, 2024).
  - There are no provisions for safeguarding resources and mining revenues for the **benefit of future generations** (e.g., no sovereign wealth fund has been established in Greenland).

- Mechanisms for **community benefit sharing** in Greenland can be seen as not fully developed – e.g. when compared with neighbouring Canadian jurisdictions – despite the existence of a unique, separate Social Impact Assessment requirement and an impacts and benefit agreements framework. The distribution of revenue between different actors within Greenland is not clearly defined and depends partly on the specific impact and benefit agreement. Moreover, IBAs in Greenland are concluded between the company, the government and the municipality. While municipalities and the government in principle represent Greenlandic stakeholders that are impacted by a mining project, it is not always certain that benefits are transferred to those impacted the most, at least based on the IBAs. There has been criticism of Greenland IBA negotiations as not delivering concrete social benefits or changes in a project (Tiainen, 2016; Bowles and MacPhail, 2021; Ackrén, 2016).
- It is unclear if the Greenlandic framework for separate **social impact assessments** is more beneficial than an integrated assessment, considering the importance of environmental changes on social developments. However, the need to carry out a separate SIA puts attention to social impacts and developments and could, in principle, lead to more targeted management of social questions, not merely as an afterthought to environmental concerns and changes.
- **Uncertainty for investors, operators and communities**: the changing policy and legislative frameworks (e.g. shifts in policy on uranium and oil) and continuously revised tax and royalty regulations (Mineral Resources Strategy in fact ensures constant review of this framework) make it difficult to plan, while adversely affecting the predictability of investments. Prolonged decision-making processes keep communities and stakeholders in a state of long-term uncertainty regarding the future of particular projects (in terms of environmental and social impacts, possible benefits and interactions with other industries, e.g. tourism or fisheries).
- While Greenland endorses the principle of **Free, Prior and Informed Consent** (FPIC) in general, and while the Kingdom of Denmark is a party to ILO Convention no. 169 and has fully endorsed UNDRIP, no provisions require consent of specific communities or rights-holders to mining projects when they are significantly affected. However, such consent is provided at the level of municipalities. Mining legislation in Greenland does not refer to FPIC, UNDRIP and Indigenous rights specifically. This is due to the Government of Greenland considering Greenlanders (all persons born in Greenland, notwithstanding their ethnicity)

to be one people under international law, and not an Indigenous people for the purposes of the domestic self-government of Greenland.

- Greenland is not a member of the **Extractive Industries Transparency Initiative (EITI),** which targets corruption linked to the mining sector by promoting open data and accountability, carrying out evaluations of member countries' performance, and suspending member countries that do not meet their commitments. Norway is a member of this initiative.
- **The right to regulate problematic mineral extraction** vs. existing commitments to private companies. The ongoing arbitration proceedings started by Greenland Minerals raise an issue of the regulatory power of the state in the case of changing policy preferences (banning uranium extraction). The issue is a major sticking point in terms of government-investor relations globally.

6. Examples of best practices on regulating mining pollution

1. Nunavut Impact Review Board: Nunavut Territory, together with Canada's federal government, based on the Nunavut Agreement, have established an autonomous entity tasked with assessing the biophysical and socio-economic impact of proposals and making recommendations and decisions about projects, barring or allowing them to proceed. It uses both scientific methods and traditional knowledge as sources of information. The board can also establish monitoring programmes for operating mines. The main objectives are to protect and promote the current and future well-being of inhabitants and communities of Nunavut and safeguard the integrity of Nunavut ecosystems. The Board can also review a project proposal located outside of the Nunavut Settlement Area if there is a possibility that it has impacts in Nunavut.

2. Norwegian rules on mining closure: Companies/Operators must provide upfront bonds – as financial securities – for mine closure. Post-closure monitoring of the long-term impacts by the company is made mandatory. Similar rules are included in the legislation applicable to Svalbard and have been implemented in the case of two recently closed coal mines.

3. Impact and Benefit Agreements in Canada: While generally IBAs are voluntary instruments, in the Canadian Arctic, they are *de facto* close-to-obligatory across the territories and areas covered by land claim agreements (and *de jure* in Nunavut and Inuvialuit), resulting in over 400 IBAs active in Canada in 2020 (Gunton et al., 2020; Gilmour and Mellett, 2013). For instance, under the 1993 Nunavut Land Claims Agreement, a major economic development project cannot commence on Inuit lands without a finalised IBA. Nunavut requirements also include provisions for an arbitration process. Within the 1984 Inuvialuit Comprehensive Land Claim Agreement and the 1992 Gwich'in Comprehensive Land Claim Agreement, similarly, a "participation agreement" (i.e. an IBA) is required. Over the last decades, there has been a transition from IBAs being negotiated by the federal government on behalf of a community to becoming private agreements/contracts between

the company and the community (or an Indigenous government). This means that they are also usually confidential. Lack of clear regulatory prescriptions on one hand makes it not compulsory for a project proponent to agree on an IBA - at least outside of the areas listed above, but also makes this instrument very flexible, easily adjusted to a given project, location and community preferences and priorities (Gilmour and Mellett, 2013). If the IBA is not required in a given location, and negotiations fail or the affected community opposes the project, it remains possible for a project proponent to still advance the development. However, consultation requirements enshrined in decision-making procedures remain in place, and the lack of an IBA increases the chance of litigation, protests and conflicts.

4. A recent compilation of governance good practice and guidance includes the **Mining Policy Framework** by the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF)[31], which include general aspects of good governance, among others:

- need for clear lines of responsibility and accountability, defining the roles and responsibilities of government institutions;
- robust monitoring and enforcement mechanisms equipped in appropriate sanctions and properly resourced;
- access to comprehensive geological, geophysical and environmental information by all stakeholders;
- transparency in decision-making;
- regularly revising and updating mining codes and regulations;
- coverage of all levels (sizes) of mining activities, all minerals and all stages, from prospecting to closure;
- public access to mineral extraction agreements;
- consider international developments and ensure respect to human rights, gender equality, cultural heritage and Indigenous rights;
- robust consultation processes;
- integrated environmental and social impact assessments;
- local benefits should be sustainable, equitable and inclusive;
- mitigation of adverse social impacts;
- robust plans for mine closure and monitoring as a prerequisite for licensing;
- permitting process that is timely (not extended over unreasonably long time periods), transparent and non-arbitrary;
- air quality and noise standards thresholds and monitoring;
- planning at the watershed level and protecting groundwater;
- continuous biodiversity monitoring;
- robust waste management mechanisms.

The Mining Policy Framework has been developed with the endorsement of the Government of Canada.

[31] See IGF website at https://www.igfmining.org/resource/igf-mining-policy-framework/ Most recent document: IGF (2023). Mining Policy Framework: Mining and sustainable development.

Relevant literature / references:

Ackrén, M. (2016). Public Consultation Processes in Greenland Regarding the Mining Industry. Arctic Review on Law and Politics, 7(1), 3–19.

AMAP (Arctic Monitoring and Assessment Programme) (2018). Adaptation Actions for a Changing Arctic: Perspectives from the Baffin Bay/Davis Strait Region. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.

Arctic Council (2019). Good Practices For Environmental Impact Assessment and Meaningful Engagement in the Arctic. Sustainable Development Working Group. URL: https://oaarchive.arctic-council.org/items/16e80a06-f002-452b-bfb0-6a24b4e5d93b

Arctic Environmental Protection Strategy (1997). Guidelines for Environmental Impact Assessment in the Arctic. URL: https://oaarchive.arctic-council.org/items/74ad62a9-732f-4c4d-bde9-65fc6946a2d2

Arctic Council (2019). Good Practices For Environmental Impact Assessment and Meaningful Engagement in the Arctic. Sustainable Development Working Group. URL: https://oaarchive.arctic-council.org/items/16e80a06-f002-452b-bfb0-6a24b4e5d93b

Arctic Today (2021, July 16). Greenland Halts New Oil Exploration. URL: https://www.arctictoday.com/greenland-halts-new-oil-exploration/

Bainton, N. and S. Holcombe (2018). A critical review of the social aspects of mine closure, *Resources Policy* 59: 468-478.

Bendixen, M., Nielsen, R.L., Plesner, J.L., Minor, K. (2022). Opportunistic climate adaptation and public support for sand extraction in Greenland. Nat Sustain 5, 991–999. https://doi.org/10.1038/s41893-022-00922-8

Bendixen, M., Overeem, I., Rosing, M.T., Bjørk, A.A., Kjær, K.H., Kroon, A., Zeitz, G., and Iversen, L.L. (2019). Promises and perils of sand exploitation in Greenland. Nat Sustain 2, 98–104. https://doi.org/10.1038/s41893-018-0218-6

Bjørst, L.R. (2016). Saving or destroying the local community? Conflicting spatial storylines in the Greenlandic debate on uranium. The Extractive Industries and Society 3, 34–40. https://doi.org/10.1016/j.exis.2015.11.006

Bjørst, L.R., (2020). Stories, emotions, partnerships and the quest for stable relationships in the Greenlandic mining sector. Polar Record 56, e23. https://doi.org/10.1017/S0032247420000261

Bowles, P and F. MacPhail (2021). Social License Comes to Greenland's Mining Sector: Will Communities be Empowered?. Arctic 74(4): 296-508. Insights are additionally based on personal communications.

Carbon Tracker website (Iceland) at https://tracker.carbongap.org/regional-analysis/national/iceland/

Climeworks, n.d. Orca Pland, at https://climeworks.com/plant-orca

Dalgaard-Knudsen, Frants, Esben Kjær,andJimmy Skjold Hansen (2023, August 22). New Mining Legislation in Greenland. Mondaq. URL: https://www.mondaq.com/energy-and-natural-resources/1357318/new-mining-legislation-in-greenland

Delevingne, L. W. Glazener, L. Grégoir, and K. Henderson (2020). Climate risk and decarbonization: What every mining CEO needs to know Building a climate strategy won't be quick or easy—but waiting is not an option. McKinsey and Company. www.mckinsey.com/~/media/McKinsey/Business%20Functions/Sustainability/Our%20Insights/Climate%20ri

sk%20and%20decarbonization%20What%20every%20mining%20CEO%20needs%20to%20know/Climate-risk-and-decarbonization-What-every-mining-CEO-needs-to-know.ashx

Luanna Di Guimarães, L., U. Pessoa Araújo, H. Mota de Lima (2025). Mine closure transparency and disclosure: An open-source evaluation of financial, technical, and social reporting, *Resources Policy* 107: 105644.

Ea Energianalyse (2023). Impact analysis of the Paris Agreement on Greenlandic society. Ministry of Agriculture, Self-Sufficiency, Energy and Environment.

European Commission (2023, November 30). EU and Greenland sign strategic partnership on sustainable raw materials value chains. URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6166

European Commission (2012, June 13). Greenland's raw materials potential and the EU strategic needs, URL: https://ec.europa.eu/commission/presscorner/detail/en/memo_12_428

European Institute of Innovation and Technology EIT RawMaterials website at https://eitrawmaterials.eu/about-us

Fuerlund, P., S. Fugleholm, S. Due Ilsoe (2025, November 17). Arbitration Tribunal Rules in Favour of the Government of Greenland in Billion-dollar claim. Poul Schmith Kammeadvokaten (legal firm representing the Government of Greenland in the case). Blog/news entry. URL: https://poulschmith.com/stay-updated/arbitration-tribunal-rules-in-favour-of-the-government-of-greenland-in-billion-dollar-claim

GEUS (Geological Survey of Denmark and Greenland) (2003). The Black Angel lead-zinc mine at Maarmorilik in West Greenland. https://eng.geus.dk/media/13331/go02_2ed.pdf

Gilliver, L. (EuroNews) (2025, December 4). Deep-sea mining: Norway halts controversial practice until 2029, URL: https://www.euronews.com/green/2025/12/04/deep-sea-mining-norway-halts-controversial-practice-until-2029.

Gilmour, B. and B. Mellett, (2013). "The Role of Impact and Benefits Agreements in the Resolution of Project Issues with First Nations", Alberta Law Review 51(2): 385-400.

Goclawska, Joanna Asha (2025, January). The Mineral Industry in Iceland. US Geological Survey. URL: https://pubs.usgs.gov/myb/vol3/2020-21/myb3-2020-21-iceland.pdf

Government of Greenland (2016), *Social Impact Assessment (SIA): Guidelines on the process and preparation of the SIA report for mineral projects*. Ministry of Industry, Labour and Trade.

Government of Greenland (2025). Greenland Mineral Resources Strategy 2025-2029,13.03.2025, URL: https://naalakkersuisut.gl/-/media/nyheder/2025/01/3101_ny_raastofstrategi/eng_greenland-mineral-resources-strategy-2025-2029.pdf

Government of Iceland (n.d.). Oil and Gas Exploration. Government website at https://www.government.is/topics/business-and-industry/energy/oil-and-gas-exploration/

Government of Iceland (2020, October). Iceland's 2020 Climate Action Plan. URL: https://www.government.is/library/01-Ministries/Ministry-for-The-Environment/201004%20Umhverfisraduneytid%20Adgerdaaaetlun%20EN%20V2.pdf

Fognani, J.D. and Ch. J. Reagen (2024). Mining – Greenland. Panoramic. Lexology. URL: https://nunalaw.gl/wp-content/uploads/2024/12/Greenland_Mining_2024.pdf.

Folkestad Soltvedt, Ida (2017). "Soft Law, Solid Implementation? The Influence of Precision, Monitoring and Stakeholder Involvement on Norwegian Implementation of Arctic Council Recommendations." Arctic Review on Law and Politics, Vol. 8, pp. 73–94.

Gunnarsen, K.C., Jensen, L.S., Rosing, M.T., Dietzen, C., 2023. Greenlandic glacial rock flour improves crop yield in organic agricultural production. Nutr Cycl Agroecosyst 126, 51–66. https://doi.org/10.1007/s10705-023-10274-0

Gunton, Cameron, Joshua Batson, Thomas Gunton, Sean Markey, and Daniel Dale (2020). Impact Benefit Agreement Guidebook. Canadian International Resources and Development Institute, Simon Fraser University.

Hansen, A.M., Brown Burkins, M. (2020). Melting and Mining in Greenland: Understanding Arctic Climate Change Through Dialogue with Locals. Georgetown Journal of International Affairs. URL https://gjia.georgetown.edu/2020/05/29/greenland-understanding-climatechange-through-localdialogue/ (accessed 4.22.24).

Hartmann, J., A. E. Bastida, and A. M. Daza-Clark (2024, January 29). Transition Minerals: A Cautionary Tale from Greenland. EJIL:Talk! Blog of the European Journal of International Law. URL: https://www.ejiltalk.org/transition-minerals-a-cautionary-tale-from-greenland

Heinz, R., J. Sydov, and F. Ulrich (2022). An examination of industry standards in the raw materials sector. Germanwatch 03/2022 Order no: 22-4-01e. URL: https://www.germanwatch.org/sites/default/files/gw_bericht_en_final_221004.pdf

Hoel, Michael (2025). The path to net zero emissions. Journal of Environmental Economics and Management online 7 May 2025.

IGF (2023). Mining Policy Framework: Mining and sustainable development.

ICC Inuit Circumpolar Council (2016). A Circumpolar Inuit Declaration on Resource Development Principles in Inuit Nunaat. URL: https://iccalaska.org/wp-icc/wp-content/uploads/2016/01/Declaration-on-Resource-Development-A4-folder-FINAL.pdf

ICMM (International Council on Mining and Metals). (2024). Mining Principles: Performance Expectations, URL: https://www.icmm.com/en-gb/our-principles/mining-principles/mining-principles

IRMA (Initiative for Responsible Mining Assurance). (2018, June). IRMA Standard for Responsible Mining v1.0 EN. URL: https://responsiblemining.net/resources/#full-documentation-and-guidance

IRMA (Initiative for Responsible Mining Assurance). (2025, March). IRMA Standard for Responsible Mining 1.0Supplementary Guidance on Indigenous Peoples and Free, Prior, and Informed Consent (FPIC)

Jakobsen, U. and Larsen, H. (2024). The development of Greenland's self-government and independence in the shadow of the unitary state. The Polar Journal 14, 9–27. https://doi.org/10.1080/2154896X.2024.2342117

Koivurova, Timo (2009), Limits and Possibilities of the Arctic Council in a Rapidly Changing Scene of Arctic Governance. Polar Record, Vol. 46, No. 2, pp. 146-156.

Koivurova, Timo, Alf Håkon Hoel, Malte Humpert, Stefan Kirchner, Andreas Raspotnik, Małgorzata Śmieszek, Adam Stępień (2021, June). Overview of EU actions in the Arctic and their impact. EPRD for the European Commission (FPI).

Lead the Charge (2024, February 6). An Assessment of Third-Party Assurance and Accreditation Schemes in the Minerals, Steel and Aluminum Sectors: A tool for automakers and other supply chain stakeholders. URL: https://leadthecharge.org/wp-content/uploads/2024/02/LeadTheCharge-Assessment-06022024.pdf

Mineral Resources Authority – Greenland, n.d. Mineral Resources Act of 2009. URL: https://govmin.gl/exploitation/get-an-exploitation-licence/mineral-resources-act/

Mineral Resources Authority – Greenland, website: https://govmin.gl/exploration-prospecting/get-an-exploration-licence/mining-act/

Mineral Resources Authority. n.d. "Standard Terms", URL: https://govmin.gl/exploration-prospecting/get-an-exploration-licence/standard-terms

Mineral Resources Authority - Greenland (2022). The Ban on Uranium. URL: https://govmin.gl/2022/04/the-ban-on-uranium

Mining Standard Initiative website at https://miningstandardinitiative.org

Nielsen, Thomas (2023, October 19) World's northernmost coal power plan shuts down. The Barents Observer. URL: https://www.thebarentsobserver.com/arctic/worlds-northernmost-coal-power-plant-shuts-down/119449

Nordic Energy Research (2022). Hydrogen, electrofuels, CCU and CCS in a Nordic context (edited by Jakob Louis Pedersen at COWI, Svend Søyland and Nicki Carnbrand Håkansson at the Nordic Energy Research, Nordic Council of Ministers).

OECD (Organisation for Economic Cooperation and Development) (2016), OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas: Third Edition, OECD Publishing, Paris, https://doi.org/10.1787/9789264252479-en.

OECD (Organisation for Economic Cooperation and Development) (2018), OECD Due Diligence Guidance for Responsible Business Conduct, OECD Publishing, Paris, https://doi.org/10.1787/15f5f4b3-en.

OHCHR (Office of the High Commissioner on Human Rights) (2011). Guiding Principles on Business and Human Rights: Implementing the UN "Protect, Respect and Remedy" Framework. United Nations, New York and Geneva 2011.

Priebe, J. (2018). A modern mine? Greenlandic media coverage on the mining community of Qullissat, western Greenland, 1942–1968. The Polar Journal, 8(1), 141–162. https://doi.org/10.1080/2154896X.2018.1468620

Priebe, J., Mårald, E., & Vikström, H. (2024). Holes of hope and uncertainty – test wells as a site of potential, exploration and the verdict on Greenland's oil development in the 1970s and 1990s. *The Polar Journal*, *14*(2), 535–559. https://doi.org/10.1080/2154896X.2024.2414644

PAME Protection of Arctic Marine Environment (2009). Arctic Offshore Oil and Gas Guidelines, Arctic Council, PAME working group. URL: https://oaarchive.arctic-council.org/items/eefd5b89-6164-4e3e-ac63-3b1d1fa06e94

Reuters (2021, November 10). Greenland bans uranium mining, halting rare earths project, URL: https://www.reuters.com/world/americas/greenland-bans-uranium-mining-halting-rare-earths-project-2021-11-10/

Slothuus, L. (2025, March 13). Greenland's fossil fuel ban is up in the air after recent election. The Conversation. URL: https://theconversation.com/greenlands-fossil-fuel-ban-is-up-in-the-air-after-recent-election-252071

Sustainable Development Working Group (2011). Circumpolar Information Guide on Mining for Indigenous Peoples & Northern Communities. Arctic Council. URL: https://oaarchive.arctic-council.org/items/602e7a19-bb78-4d76-b40f-91c45a187526

Statistics Greenland, 2023. Greenland in Figures 2023. https://stat.gl/publ/en/GF/2023/pdf/Greenland%20in%20Figures%202023.pdf

Thaarup, S. M., M. D. Poulsen, K. Thorsøe, and J. K. Keiding (2020). Study on Arctic Mining in Greenland. Publications of the Ministry of Economic Affairs and Employment 2020:57 (Finland), URL: http://urn.fi/URN:ISBN:978-952-327-567-6

Thorson, E. (2025, November 7). British firm eyes major Greenlandic oil project despite government opposition. URL: https://www.arctictoday.com/british-firm-eyes-major-greenlandic-oil-project-despite-government-opposition/

Tiainen, H. (2016). Contemplating governance for social sustainability in mining in Greenland. Resource Policy 49: 282-289.

Vestergaard, Cindy (2015). Greenland, Denmark and the pathway to uranium supplier status, The Extractive Industries and Society 2(1): 153-161.

Vestergaard, Cindy and Gry Thomasen (2016). New uranium deal between Denmark and Greenland clarifies competences. DIIS Comment. Danish Institute for International Studies. URL: https://www.diis.dk/en/research/new-uranium-deal-between-denmark-and-greenland-clarifies-competences