R&D-Report

Transport-Intensive Industries and the Maritime Cargo Base in Northern Norway

Report 1 of the BEAR Project
RCN/320266

Björn Gunnarsson
Ning Lin
Johanne Aadde
Øyvind Friskilä
Kjell Stokvik
Erlend Bullvåg
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Transport-Intensive Industries and the Maritime Cargo Base in Northern Norway

Report 1 of the BEAR Project RCN/320266
Business School, Nord University, Bodø
March 2026

Björn Gunnarsson (1), Ning Lin (1), Johanne Aadde (2), Øyvind Friskilä (1), Kjell Stokvik (1), Erlend Bullvåg (2), Felix Tschudi (3), and Nina Greiner Iversen (4)

(1) Centre for High North Logistics, Business School, Nord University
(2) Kunnskapsparken Bodø AS
(3) Tschudi Kirkenes AS
(4) Sør-Varanger Utvikling AS

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Preface

This is the first of six reports to be generated by the BEAR Project. These reports analyse maritime transportation in Northern Norway, a region of profound economic and strategic importance to Norway as a whole. Together, all six reports will contribute to increasing our understanding of maritime activities in the region. Report 1 provides a comprehensive analysis of transport-intensive industries and the maritime cargo base in Northern Norway.

The BEAR Project was made possible through generous funding from the Research Council of Norway (RCN/No. 320266) under the Collaborative and Knowledge-Building Project to Meet Societal and Industry-Related Challenges" grant, with financial support from the Norwegian Ministry of Foreign Affairs.

This collaborative endeavour is led by the Centre for High North Logistics (CHNL) at the Business School of Nord University in Bodø. Project partners include the Kunnskapsparken Bodø AS, Akvaplan-niva AS, Tschudi Kirkenes AS, and Sør-Varanger Utvikling AS.

The BEAR Project experienced delays due to the travel and meeting restrictions imposed by the Covid-19 pandemic. The initial scope of the project also had to be modified as a result of new geopolitical conditions. The project was initially designed to study maritime transport infrastructure across the Barents Euro-Arctic Region (BEAR) and included two university partners in Russia. However, the start of the war in Ukraine in February of 2022 necessitated a fundamental restructuring of the project's objectives and workplan. This restructuring excluded the initial Russian partners.

In response, the project's focus was strategically shifted to a more in-depth study of the maritime transportation and logistics system in Northern Norway. This new scope also includes an assessment of cross-border transport connections with Northern Sweden and Northern Finland, reflecting the new geopolitical and logistical realities in the High North.

We trust that this report, and the additional reports to that will follow, will provide a robust and essential knowledge base for policymakers, industry stakeholders, and researchers. It is our hope that this work will contribute to the development of a more resilient, efficient and sustainable transportation system for Northern Norway.

The BEAR Project Team,

March 2026

Executive Summary

This first report of the BEAR Project examines Northern Norway's prevailing economic reliance on commodity exports and underscores the strategic imperative for diversification, focusing particularly on the unique challenges and opportunities within Northern Norway's transport-intensive industries. It offers a comprehensive analysis of cargo generation, maritime trade patterns, existing infrastructure, and future industrial potential, aiming to inform strategic decisions regarding maritime transport infrastructure investments and regional economic development.

a. Norway's commodity-dominated export economy and the need for diversification

Norway's export economy reached a record value of USD 285 billion in 2022, primarily driven by soaring European demand for natural gas and liquid natural gas (LNG) following the Russia-Ukraine war. Petroleum products accounted for a staggering 77.3% of this total export value, with metals and fish products contributing 5.5% and 5.4% respectively. When including other raw commodities such as electricity, fertilizers, industrial minerals, and wood products, commodities collectively represented 91.55% of Norway's total export value in 2022. This heavy reliance on commodities positions Norway with a relatively low Economic Complexity Index (ECI) of 41 out of 124 countries, significantly lower than its Nordic neighbours; this indicates high dependence on unprocessed natural resources and susceptibility to volatile global commodity price cycles.

While Norway ranks highly in terms of technological development and research, this commodity dependence, often termed a "commodity trap" in developing countries, could limit future economic growth potential if diversification is not actively pursued. This report stresses the need for Norway to innovate and diversify its exports towards more specialized, high-value products that align with future global demands. This could involve a shift towards advanced manufacturing, high-tech products, and further processing of existing primary resources to increase their market value. Diversification away from fossil fuels is also a cornerstone of the EU’s Green Deal and of Norway’s targets of achieving energy transition by 2030 and carbon neutrality by 2050. Such a transition would not only enhance economic resilience but also create new, less competitive market niches globally.

The Norwegian oil and gas sector, a pivotal component of the national economy generating 70% of export revenues and substantial employment, has reached a critical juncture. With North Sea reserves rapidly declining and existing fields in the Norwegian and Barents Seas expected to last only another 10-15 years without new developments, the sector is at a crossroads. Two potential paths can be discerned: a) continued expansion, which would require significant and costly investments in new fields with uncertain long-term profitability due to the global energy transition; or b) finding a strategy to maximize near-term cash flow from existing fields by cutting new investments, leading to a more rapid decline in production and associated loss of employment and competence. To mitigate these impacts, the Norwegian government is aggressively promoting offshore wind power development, with an ambitious goal of 30 GW capacity by 2040 and a strategic focus on building a comprehensive supply chain and electrifying offshore oil and gas installations.

b. Transport-intensive industries in Northern Norway: challenges and opportunities

Northern Norway's export industries face inherent disadvantages because their distance from key markets makes industrial products more expensive. To remain competitive, industries must produce high-demand or rare goods of superior quality with lower environmental footprints and rely on predictable transport services and supportive maritime infrastructure. This necessitates extensive structural upgrades to the existing transport system (maritime, road, and rail) and new infrastructure. The seafood industry in particular is in urgent need of such upgrades.

Industrial products from Northern Norway are predominantly exported by sea from specialized terminals which are often owned by the companies or industrial parks concerned. Similarly, imports of raw materials for processing are mainly conducted by sea. In contrast, fresh seafood is primarily transported by road and, to a lesser extent, by rail, although frozen seafood is generally shipped by sea. The high volume of fresh fish exported by road results in significant amounts of heavy freight on Northern Norway’s narrow roads, posing a major logistical challenge. The cancellation of a key container shipping service in 2013 led to an estimated 6,000 additional trucks annually on Northern Norway’s roads, highlighting the need for more robust maritime freight alternatives.

Local utilization of renewable energy can prevent it being exported. Future industrial operations will rely on the allocation of grid capacity for green fuels and the management of high electricity demand to avoid price increases. The report identifies nine key prerequisites that Northern Norway must fulfil to become an attractive location for future businesses: high market demand, stable renewable energy at affordable prices, reliable transport systems (especially sea, with good road/rail connections), the development of industrial sites near seaports and urban centres, strong political leadership, competence, access to advanced technology, and a skilled workforce.

c. Sector-specific cargo generation and maritime demand

Power-intensive industry: Leveraging abundant hydropower, industries producing aluminium, ferrosilicon, cement, and fertilizers largely export by sea from self-operated terminals. While traditional production has been stable, plans for new green industrial concerns, such as hydrogen and ammonia production, present significant future export potential—though some projects (like the Freyr battery factory and hydrogen production in Narvik) have been cancelled due to unforeseen international incentives. The current electricity surplus in Northern Norway keeps prices low, attracting new industries, but this surplus could be quickly consumed.

Mining industry: Norway's 2023 Mineral Strategy, aligned with the EU's Critical Raw Materials Act (CRMA), aims to develop a sustainable mineral industry. Northern Norway holds significant potential for critical raw materials, including rare earth elements (REEs, essential for the green energy transition), graphite, and high-purity quartz. Currently, mining activity is very limited, with Rana Gruber (iron ore) and industrial mineral mines in operation, and projects like the restart of the Sydvaranger iron ore and Nussir copper mines in the

planning stages. The industry relies heavily on seaports for export, with Narvik handling significant volumes of iron ore arriving from Sweden.

Petroleum industry: This is Norway's largest industry. Crude oil and natural gas are usually exported by pipelines from offshore installations on the Norwegian Continental Shelf to Europe, but also by sea. Key installations in Northern Norway like Melkøya LNG and Goliat oil utilize LNG tankers and crude oil tankers for export. While direct employment in Northern Norway's petroleum sector is relatively small (700 man-years), the indirect economic ripple effects through supply bases in Hammerfest, Harstad, Sandnessjøen, and Brønnøysund are substantial.

Offshore wind power: Norway aims for 30 GW of offshore wind capacity by 2040, primarily to electrify offshore oil and gas installations. This is because offshore oil and gas operations are major CO_2 emitters as a result of being powered by natural gas turbines. Projects like Hywind Tampen represent initial steps to electrify platforms, but currently only partial electrification is planned.

Seafood industry: With ambitious goals to double production by 2030 and quintuple it by 2050, the seafood industry is a major economic driver, especially in coastal communities. While fresh fish is predominantly exported by road due to the speed and flexibility of road freight, frozen seafood is transported by sea. Future innovations in refrigeration technology and floating slaughterhouses could favour a shift to sea transport. There are significant road infrastructure challenges due to poorly maintained and narrow county roads combined with a high volume of heavy transport.

Trade in consumer goods: Consumer goods (i.e., food, groceries, furniture) constitute the largest volume of goods inbound to Northern Norway. This is split between train or truck (50%) transport and general cargo ships which also transport containerized goods (50%). This trade is often balanced with backhauls of chilled fresh seafood. The cancellation of the regional container line in 2013 notably increased road transport, underscoring the importance of sea-based container services.

Building and construction industry: This sector generates large cargo volumes for major projects, primarily by ship to nearby ports and with final delivery by road. Demand for bulk materials like sand, gravel, and crushed stone aggregates is high. These materials are also highly sought after abroad. In 2022 Norway was the world's biggest exporter of gravel and crushed stone.

Maritime equipment and green technology: Norway's strong maritime industry, known for specialized vessel construction and advanced ship equipment, is increasingly focusing on green technology (zero/low-emission solutions). This sector, which is not commodity-based, is internationally competitive but requires continued access to skilled labour and faces competition from lower-cost regions. It benefits significantly from growth in other ocean industries like oil and gas, offshore renewables, and aquaculture.

d. Cargo flow at seaports in Northern Norway

An analysis of 21 seaports in Northern Norway from 2012-2024 reveals that maritime export volumes significantly surpassed import volumes. Dry bulk cargo was the most abundant type with trade volumes remaining relatively stable, even showing resilience during the Covid-19

pandemic; this is largely due to the essential nature of exported commodities. Key international trading ports included Narvik (iron ore from Sweden), Kirkenes (historically iron ore and Russian crude oil), Hammerfest (LNG), Helgeland (aluminium), and Mo i Rana (iron ore, reinforced steel, ferrosilicon). Many companies, particularly in mining and seafood, utilized specialized terminals close to their production sites to minimize road transport. Domestic cargo was mainly handled by Brønnøy (limestone), Bergneset (stone aggregates and fish feed), Myre-Øksnes (fish feed) and Nesna (stone aggregates). The Netherlands and Germany were Northern Norway's leading international maritime trade partners by cargo volume, primarily driven by dry and liquid bulk exports. While bulk cargo dominated, smaller volumes of containerized cargo were traded, primarily with the Netherlands.

e. Norway's future strategic industry

The EU's Critical Raw Materials Act (CRMA) of 2023 places a clear requirement on EU/EEA member states to increase the exploitation of critical raw materials within their borders. Norway's 2023 Mineral Strategy recognizes mining as a future strategic industry and aims to unlock the country's significant potential for the extraction of critical raw materials (e.g., graphite, high-purity quartz, REE) essential for the green energy and digital transitions. The government is exploring policy measures, including speeding up permitting processes and potentially establishing state-owned mineral company or investment fund, to stimulate extraction and ensure sustainable development; this contrasts with the current dominance of foreign ownership in the sector. Expanding the mineral sector is seen as a key strategy to diversify Norway's economy away from oil and gas while providing jobs and revenue, particularly in rural and remote areas.

f. Conclusion

Norway's economy, heavily reliant on the export of commodities, particularly petroleum, is challenged by susceptibility to global price fluctuations and pressure to diversify. Northern Norway, with its resource-rich landscape and transport-intensive industries, presents significant opportunities to drive economic transformation. The current maritime transport system is crucial for heavy bulk exports (oil, LNG, ore, metals) but faces limitations—especially in terms of perishable goods like fresh seafood, which are heavily reliant on road transport despite long distances and infrastructure constraints.

By systematically addressing these aforementioned challenges and capitalizing on its unique strengths, Northern Norway can evolve into a robust, diversified, and sustainable economic region, with its maritime assets serving as a vital backbone for future trade and prosperity. This report provides the foundational data and analysis necessary to justify and guide such sea-land intermodal transport optimization through policy interventions.

1. Introduction

The BEAR Project will produce six reports dealing with maritime activities in Northern Norway (*Table 1*). The first three reports cover transport-intensive industries and maritime cargo-base (Report 1); the maritime transportation and logistics system (Report 2); and seaports (Report 3). All three reports were completed at the same time, relying on the same quantitative and qualitative datasets and applying mixed-methods analysis.

Table 1: The six reports of the BEAR Project.

Report No.	BEAR report
1	"Transport-Intensive Industries and the Maritime Cargo-Base in Northern Norway", published in March 2026.
2	"Maritime Transport and Logistics in Northern Norway: Current and Future Development", published in March 2026.
3	"Seaports in Northern Norway: Current Challenges and Future Development Strategies", published in March 2026.
4	Environmental risks of shipping and port activities in Northern Norway (working title)
5	Maritime intelligent transportation systems: Emerging technologies and applicability for Northern Norway (working title)
6	The significance of effective transport systems for regional socio-economic development in Northern Norway (working title)

1.1 Background

The global economic landscape is characterized by an intricate web of interdependencies, where international trade stands as an undeniable engine of national prosperity and regional advancement. At the core of this globalized commerce lies maritime transport, the mode that remarkably facilitates the movement of over 80% of the world's goods by volume and more than 70% by value.[1] This makes sea-based logistics an indispensable artery within the global

[1] UNCTAD, *Review of Maritime Transport 2024* (22.10 2024), https://unctad.org/publication/review-maritime-transport-2024.

supply chain, especially for Norway with its extensive coastlines, unique logistical complexities imposed by challenging geographical terrains, and economies heavily reliant on the extraction and export of natural resources. In this case, the efficiency, resilience, and accessibility of maritime logistics transcend mere convenience to become a fundamental prerequisite for economic survival and growth. Consequently, the continuous optimization of sea-based trade routes, the modernization of port infrastructure, and the seamless integration of intermodal connections (e.g., sea-rail, sea-road) remain focal points for both governmental policy formulation and strategic private sector investment.

Northern Norway often presents an amplified set of logistical challenges. The combination of vast distances between production sites and markets, extreme climatic conditions (such as prolonged winters and icebound roads), and typically sparse population densities can pose significant impediments to the movement of goods. Despite these inherent difficulties, the northern regions have abundant natural resources available for development. These resources—ranging from extensive mineral deposits and diverse energy reserves to rich marine ecosystems—constitute the economic foundation of their export-oriented economies. As a result, such regions invariably feature a high concentration of what can be called "transport-intensive industries". These industries' economic viability and competitive edge are linked to the efficient, reliable, and cost-effective transportation of substantial volumes of raw materials, intermediate goods, or finished products. Typical examples often include large-scale mining operations, extensive energy extraction and processing, and aquaculture operations that demand just-in-time logistical solutions for perishable goods. The success of these foundational industries in Northern Norway depends on the existence of robust and adaptive transport networks, especially maritime connections, that are capable of handling significant and often specialized cargo flows.

In the context of Northern Norway, current academic and industry discourse is focused on the importance of strategically located Arctic seaports and the far-reaching impacts of climate change on navigability at high latitudes. Furthermore, there is a strong focus on the innovative development of sustainable energy sources and associated green technologies that can underpin new industrial paradigms and support a transition away from traditional reliance on fossil fuels. In the meantime, a substantial body of scholarly and practical work focuses on the optimization of supply chains for specific commodities vital to Northern Norway's economy, such as mineral resources, oil and LNG exports, and highly perishable seafood products. This includes an emphasis on the multifaceted role of its port cities as vital economic gateways, acting not only as transshipment hubs but also as industrial clusters and centres for value-added services. Moreover, rapid technological advancements in the global shipping sector, such as the progression towards autonomous vessels, the development of cleaner maritime fuels (hydrogen, ammonia, and other low-emission solutions), and advanced digital logistics platforms, are increasingly prominent areas of ongoing research and practical implementation for Northern Norway.

However, a significant limitation of many of these existing studies is that they are isolated. Studies often concentrate on individual aspects of the wider subject—a specific industrial sector, a particular port's operations, or a singular transport challenge. This fragmented analytical perspective often results in sub-optimal infrastructure planning and policy formulation, as it fails to fully capitalize on the synergistic potential inherent in the region's diverse industrial base and its strategic maritime assets. This gap highlights the critical need

for an integrated framework that can holistically assess the complex interdependencies underlying the sustainable development of Northern Norway.

1.2 Significance of the current study and research gaps

The BEAR Project explores how to support Norway's commodity exports by strategically developing robust, efficient, and environmentally sustainable maritime trade infrastructure and related services. By identifying opportunities for strategic modal shifts (for example, transitioning cargo from road to sea) and optimizing existing transport modalities, the Project aims to identify pathways towards a more resilient, diversified, and sustainable transportation system for Northern Norway. This first report of the BEAR Project is particularly significant as it adopts an empirical and applied orientation to analyse transport-intensive industries and seaport cargo flows in Northern Norway. By collecting and visualizing different data sources (e.g., SSB, Eurostat and industry reports), it creates a holistic dataset that did not previously exist. This allows for a practical assessment of the region's cargo base that can be directly applied as a tool by industry stakeholders and policymakers.

The report is designed to systematically address several critical research gaps that have hitherto either been overlooked or insufficiently explored in prior investigations concerning the northern regions and their maritime logistics.

a. Comprehensive cargo characterization and quantification: The primary and foundational objective of this study is to undertake a detailed and systematic quantification of the type and volume of cargo currently being generated by export-import industries across Northern Norway. This analysis extends beyond direct export-import figures compiled by seaports to encompass all relevant data from transport-intensive sectors/cargo bases. This provides a robust, data-driven understanding of the region's current maritime trade footprint, which is essential for informed strategic planning and targeted infrastructure development.

b. Assessment of maritime trade significance: By analysing challenges facing export-import trade and the maritime transport needs of different sectors, this research offers a sector-specific assessment of the current significance of maritime trade for Northern Norway. This goes far beyond presenting broad aggregate statistics by providing intricate insights into how different industries within the region currently utilize maritime transport. Critically, this level of detail allows the subsequent reports of this research project to identify specific logistical bottlenecks and emerging opportunities for the design of sea-land intermodal logistics solutions for Northern Norway.

c. Identification of strategic modal shift opportunities: A key and innovative focus of this study is to systematically identify specific industrial activities that could significantly benefit from switching to, or substantially increasing their reliance on, maritime transport. The next step, optimizing sea-land intermodal logistics solutions, requires a comprehensive analysis of the multi-faceted preconditions necessary for such modal shifts. This includes an assessment of economic viability, logistical feasibility, potential environmental benefits, and the requisite infrastructure upgrades needed to seamlessly facilitate such transitions, thereby promoting more sustainable transport patterns.

d. Forecasting future production potential and cargo generation: The study discusses the future productive potential of Northern Norway's key export-import industries. By illustrating anticipated growth and structural changes in both established sectors and emerging green

industries, the report provides a crucial forward-looking perspective on the likely volume, characteristics, and value of future cargo generation. This predictive insight is crucial for prudent long-term infrastructure planning, policy foresight, and attracting new investments.

By systematically addressing these critical gaps, this study endeavours to generate a robust, actionable, and comprehensive knowledge base. This will provide a solid data foundation for the subsequent reports of the BEAR Project. This will also serve as an indispensable resource for strategic planning by governmental bodies at local, regional, and national levels, inform pivotal private sector investment decisions, and guide the development of sustainable regional policies specifically aimed at fostering sustained economic diversification, boosting maritime trade, and ensuring resilient supply chains across Northern Norway.

1.3 Research questions

To achieve the objectives outlined above and systematically address the identified research gaps, this report seeks to answer the following key research questions and sub-questions: (1) What type and volume of cargo is being generated by export-import industries in Northern Norway, and what is the future production potential of these industries? (2) What is the current significance of maritime trade in Northern Norway? Which industrial activities currently rely on maritime transport or could benefit from switching to maritime transport? Can the answers to these questions be used to justify new maritime transport infrastructure investments?

1.4 Report structure

Following the introduction of the study and discussion of its methods of analysis in the first two sections, Section 3 provides an overview of the broader national export economy, specifically emphasizing existing trade patterns and the strategic necessity of national and regional economic diversification away from traditional dependencies. Section 4 examines the various transport-intensive industries operating within Northern Norway. This section details their current operational characteristics, existing logistical challenges, and future growth prospects, thereby providing a foundational understanding of their potential cargo generation capabilities.

Section 5 and the Appendix is dedicated to an analysis of cargo flow at the principal seaports across Northern Norway. This includes a review of cargo types, historical and current cargo volumes, and the identification of key international trade partnerships, highlighting patterns and trends in maritime movements. Section 6 shifts the focus to industries of future strategic importance relevant to Northern Norway, with a particular emphasis on critical raw materials. This section explores the potential for enhanced regional cooperation and its implications for future cargo volumes. Finally, Section 7 synthesizes the findings of the preceding sections and presents the main conclusions of the report, while Section 8 offers actionable recommendations aimed at enhancing maritime trade efficiency, strengthening the cargo base, and supporting long-term economic diversification and sustainable development in Northern Norway.

2. Methods of Analysis

A pragmatic approach was adopted when conducting this research. The choice of methods was driven by the need to answer the specific research questions posed by the BEAR Project. Learning from history provides insight into the mechanisms underlying an existing societal situation or condition and is the best foundation for future planning. Studying individual events or figures, such as a single seaport or a specific cargo shipment, does not provide comprehensive knowledge. However, historical cargo flow data from seaports in the whole of Northern Norway, together with published articles and documents, internet resources on regional industrial activities and freight generation, collectively illustrate both the current state of maritime trade in the region and long-term trends, facilitating the prediction of future developments.

The core of this first report of the BEAR Project is a descriptive analysis of cargo flows. Descriptive research is designed to describe the characteristics of an existing phenomenon.[2] Unlike experimental research, which seeks to manipulate variables to test causal hypotheses, descriptive research observes the situation as it naturally occurs. In the context of Northern Norway's logistics, the "phenomenon" is the movement of goods. The variables (e.g., tonnage, value, origin, destination) are observed and recorded without intervention.

The rationale for adopting this descriptive approach stems from the current level of understanding of the "status quo" of Northern Norway. As noted in the project background, the geopolitical and economic landscape of the High North has shifted dramatically. To effectively plan for future infrastructure, stakeholders first require a precise, quantitative baseline of current activities. Leedy and Ormrod (2016)[3] argue that descriptive research is the appropriate tool for such "status quo" analysis, providing the foundational data upon which explanatory or predictive models can later be built. By systematically documenting "what is", this study lays the foundation for subsequent research on "what could be".

This section begins with a brief introduction of the data collection method used in this research, followed by a discussion of data analysis methods.

Data collection is the process of gathering information from sources relevant to the purpose of the research. Data can be classified into two types: primary data and secondary data. Based on the purpose of this study, secondary data were collected from published articles and documents (including government reports), online resources for information on industrial activities, and public records (databases). Information from published articles/documents and online resources was used to answer research questions such as "What is the future production potential of the export-import industries in Northern Norway?" To achieve this objective, comprehensive information was gathered on transport-intensive industries in Northern Norway, including their history, current status, challenges, and development plans.

Online databases were used to identify freight volumes and types handled by seaports in Northern Norway and their main trading partners. The main data sources were Statistics Norway (SSB) and Eurostat. The former has overall responsibility for providing statistics on

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[2] Leedy, Paul D., and Jeanne Ellis Ormrod. Practical research. Pearson Education UK, 2015.
[3] Same as note 2

Norwegian society, while the latter is the statistical office of the European Union, which aims to provide high-quality statistics and data on Europe. After determining the data sources, a sample had to be selected. The authors decided to analyse cargo flow from 2012 to 2024 (2013-2023 for smaller seaports).

Data analysis was performed on the online databases to find patterns and trends of cargo flow during the studied period using mathematical and statistical methods. Although the data collection process for secondary data from databases is often very similar across different research projects, the data analyses described here differ according to the purpose and characteristics of the research.

Cargo flow data for 21 selected seaports[4] (*Figure 1*) in Northern Norway and Svalbard were collected from SSB[5] and Eurostat[6]. Eurostat was crucial as it uniquely provided information on trading partners, which was unavailable from SSB. Each row in these online tables registers total cargo throughput (tonnes) for a specific cargo type, loading seaport, direction (import/export), time interval (quarter/year), and partner seaport. The final dataset, covering all cargo types and directions for the studied period across all 21 seaports, encompasses 525,111 data rows. The characteristics of each dataset are summarized in *Table 2*. Power BI Desktop[7] was used to handle big data in this research because of its advantages in scalability, data handling, ability to integrate diverse data sources, and visualization options. Power BI allows users to work with large datasets efficiently, making it easy to connect and integrate data from different tables and represent or interpret data in more insightful ways. In Section 5, a map and bar charts are used as visualization tools to illustrate key cargo flow information and trends.

[4] Ports were selected based on total cargo throughput and strategic significance.
[5] Liv Torunn Petersen, "08923: Maritime transport statistics. Goods, by ports, type of cargo, type of commodity, flag and domestic/foreign 2011K1 - 2025K2," ed. SSB (2025). https://www.ssb.no/en/statbank/table/08923/.; Liv Torunn Petersen, "10916: Cargo, by port, direction, partner port and type of cargo (tonnes) 2013 - 2024," ed. SSB (2025). https://www.ssb.no/en/statbank/table/10916/.
[6] Eurostat, "Gross weight of goods transported to/from main ports - Norway - quarterly data," ed. Eurostat (2025). https://ec.europa.eu/eurostat/web/products-datasets/-/mar_go_qm_no.
[7] Power BI Desktop Version 2.144.878.0 64-bit.

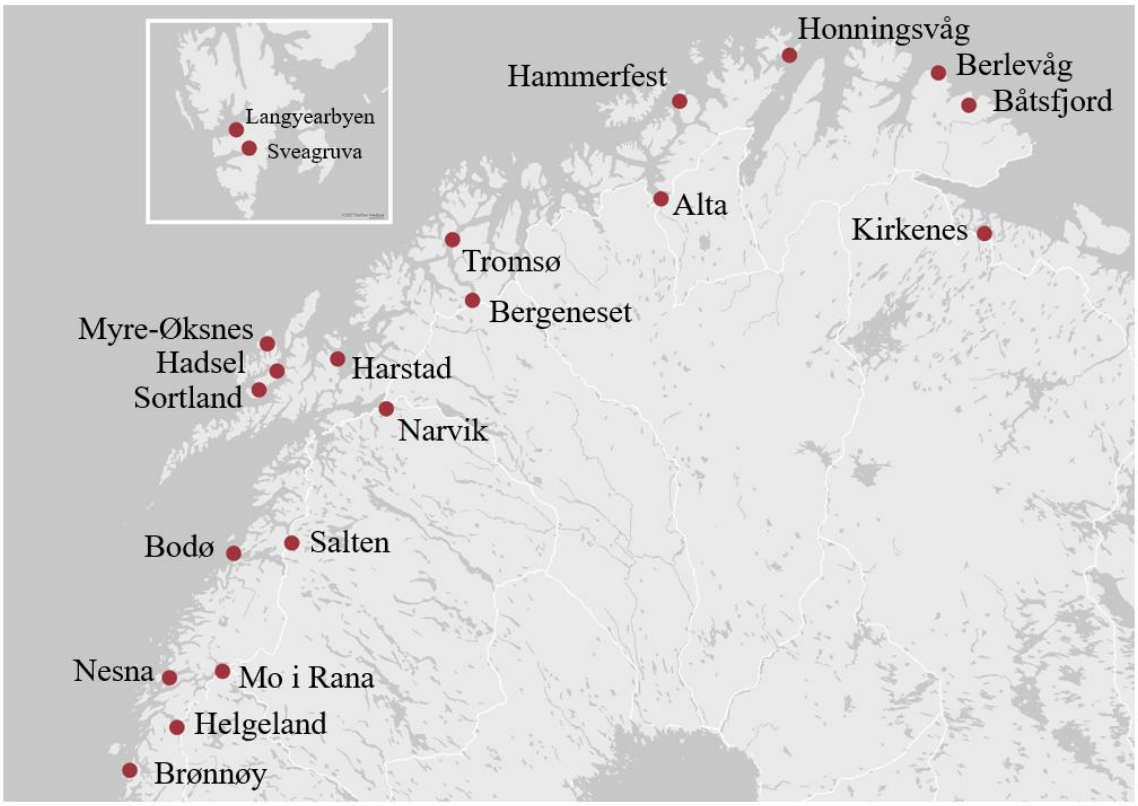

Figure 1: Location of the 21 selected seaports in Northern Norway and Svalbard.

Table 2: Information on each online data table.

Table	Number of rows	Information included in each row
10916	3488	Loading seaport, direction, international or domestic trade, cargo type (seven categories), time interval in year, cargo throughput.
08923	449343	Loading seaport, direction, international or domestic trade, cargo type (36 categories including sub-categories), time interval in quarter, cargo throughput.
MAR_GO_QM_NO	72280	Loading seaport, partner seaport, direction, international or domestic trade, cargo type (25 categories including sub-categories), time interval in quarter, cargo throughput.

3. Norwegian Exports Dominated by Commodities

The value of Norwegian exports reached a record high of USD 285 billion in 2022, about USD 100 billion higher than in 2021.[8] The reason for the increased export value was high demand in Europe for natural gas and LNG due to the Russia-Ukraine War. In that year petroleum products made up 77.3% of Norway's total export value, followed by metals and metal products at 5.5% and fish products at 5.4%. Other commodity exports included electricity at 1.7% of total export value; fertilizers at 0.8%; hydrogen at 0.36%; industrial minerals at 0.13%; gravel and crushed stone at 0.13%; rough and sawn wood at 0.20%; and wood pulp lyes at 0.05 %. Commodities therefore made up 91.55% of total Norwegian export value in in 2022. Norway also exported petroleum-based chemicals (carboxyamides and acyclic hydrocarbons), which represented 0.44% of total exports. Norway's largest non-commodity exports in 2022 were passenger and cargo ships and other types of vessel, representing 0.92% of total export value, in addition to related electrical machinery and nautical equipment.

The Norwegian maritime industry created an estimated value of NOK 219 billion in 2024. The Norwegian global merchant shipping fleet is the world's fourth largest by value, with 1,634 registered ocean-going ships in 2023.[9]

3.1 The danger of commodity overdependence

Norway is a highly developed country with a high standard of living and an effective social welfare system, and very high per capita export value ($52,300; ranking second of 219 countries[10] in 2022). But compared to many other industrialized Western countries, Norway's exports have a relatively low Economic Complexity Index[11]: its ECI ranking places it at 41st out of 124 countries for trade. For comparison, Sweden is in seventh place, Finland in 11th, and Denmark in 23rd.[12] This is because a large majority of Norway's exports are unprocessed natural resources – oil and gas, fresh fish, ore, and industrial minerals. Norway's export value is therefore very dependent on commodities and influenced by frequent price cycles in global commodities markets.

Such strong commodity dependence (often referred to as a commodity dependence trap) is very common among developing countries, where it is known to prevent or reduce the motivation to innovate and diversify the economy.[13] This is not the case in Norway, which

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[8] Arne Eidshagen, "07336: Exports of goods and services 1970 - 2024," ed. SSB (2025). https://www.ssb.no/en/statbank/table/07336/.; The total value of Norwegian exports in 2022 are listed on the Statistics Norway website as NOK 2659 billion, with the average exchange rate of 0.1044 in 2022 is about USD 278 billion.

[9] Norges-Rederiforbund, *Maritime Outlook 2025*, Norwegian Shipowners' Association (2025), https://www.rederi.no/en/reports/maritime-outlook-2025/.

[10] OEC, "Norway," ed. The Observatory of Economic Complexity (OEC) (2025). https://oec.world/en/profile/country/nor.

[11] OEC, "Norway."

[12] UNCTAD, *Review of Maritime Transport 2024*.

[13] JD Nkurunziza, "Escaping from the commodity dependence trap through technology and innovation," *United Nations* (2021).

ranks highly in technological development and research (sixth of 96 countries in technology and 17th of 135 countries for research in 2022).[14] But Norway could still do more to innovate and diversify its economy and exports by producing more specialized and high-value products which are in demand or are likely to be in demand in the future, and subsequently become less commodity-dependent. This could include a shift to more advanced manufacturing of high-tech products, and further processing of primary resources into more complex products of higher market value. Diversification away from fossil fuels is the cornerstone of the EU's Green Deal[15] and Norway's energy transition to low or zero-emission fuels by 2030.[16]

Unprocessed commodities are currently being produced and exported by several developing countries that do not necessarily have the technical and financial means to change course and become less commodity-dependent.[17] In addition, focus on low-value-added products can limit future economic growth potential compared to economies that produce more complex and innovative goods and services. Human resources play a pivotal role in driving economic growth and development within local communities. Workers' expertise and specialized knowledge contribute significantly to the overall productivity and competitiveness of a region.

3.2 The need for increased diversification of exports

The use of advanced and innovative technologies in production and manufacturing not only leads to higher productivity, but also to less competition and subsequently higher market share in global markets. Export diversification also minimizes over-reliance on one export product or type of commodity. Only a limited number of nations might have the capacity to manufacture and export highly complex products. Most commodity-dependent developing countries export products (raw materials) at the low end of the product complexity index, which require the least technological capacity. As a result, most commodity-dependent developing countries have diversification levels well below the global average and face competition from more than 80 countries that export similar products. This helps explain why commodity-dependent developing countries become stuck in the commodity sector and might need strong support to escape the commodity dependence trap.

Moreover, the process of economic diversification is impacted by commodity price cycles. When commodity prices are high, commodity-dependent developing countries have an incentive to produce more of the same, reducing their motivation to innovate and diversify their economies. On the other hand, when commodity prices are low the resulting decline in resources, particularly the scarcity of hard currency to import capital goods, becomes another barrier to diversification.

Diversification can follow different paths. One path could lead to the development of new industries and manufacture of high-value products that are not directly related to the

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[14] UNCTAD, *Review of Maritime Transport 2024*.
[15] European Commission, "The European Green Deal Striving to be the first climate-neutral continent," n.d., accessed 05.11, 2025, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal en.
[16] Regjeringen, Norway's Climate Action Plan for 2021–2030, Meld. St. 13 (2020–2021) Report to the Storting (white paper), (2021).
[17] Eurostat, "Gross weight of goods transported to/from main ports - Norway - quarterly data."

commodities currently being produced. For Norway, this could take place within the shipbuilding industry through the construction of highly specialized vessels and development of advanced maritime and zero-emission green technologies. Floatable offshore wind power and the development of innovative mineral mining and metal refining technologies could represent other opportunities for specialization. Alternatively, a shift could be achieved through further processing of the commodities already in production to increase their export value (for example, further processing of seafood; ore processing using natural gas), as well as the production of new alternative commodities that are likely to be in demand in the near future (such as hydrogen and ammonia).

3.3 The Norwegian oil and gas sector at a crossroads

The petroleum sector is critical for Norway's economy, providing 70% of export revenues and employment in oil and gas offshore operations and supply services. In the 1970s, the largest Norwegian shipyards transitioned to mainly servicing the offshore oil and gas sector. Today, "one-off" oil and gas projects continue to be the main focus of smaller and medium-sized yards.[18] But the global energy transition from fossil energy to low-carbon alternative energy is challenging the sector's long-term viability. Norway's main oil and gas reserves in the North Sea are now in rapid decline, with any additional resources that could possibly extend operations being very limited and expensive to develop. More recent petroleum developments in the Norwegian Sea and the Barents Sea have so far made up for the shortfall. Nevertheless, oil and gas fields that are currently in operation in these areas are expected to last only for an additional 10-15 years. To extend this lifetime further, new fields of high capacity need to be put into production. Based on past experience, bringing new petroleum fields from initial assessment into full production can take a decade or longer. So, the Norwegian oil and gas sector is faced with two choices.[19]

First, the petroleum sector could continue to expand as it has in the past, until expansion is halted by lower oil demand, reserves, or prices. During the last decade an average of NOK 186 billion was invested annually in Norwegian offshore capacity. This capacity generated large volumes of oil and gas, on average 185 Mtoe/yr. The sector has directly and indirectly employed an average of 150,000 persons per year since 2010, around 7% of total Norwegian employment. Investment reduction in the industry may lead to losses in jobs, exports, GDP, and in the value of the Oil Fund. Domestically, these potential losses are widely perceived as a threat to Norway's status as a well-functioning welfare state, and so citizens are generally supportive of continued petroleum exploration.[20] In this situation, a gradual decline in offshore investment and production is predictable, as new petroleum projects gradually become less profitable.

The second choice is to only harvest existing petroleum fields and cut new investments, thereby maximizing near-term cash flow. The near-term effect is rapidly declining

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[18] Tomine Sandal, "The "Green" Petrostate? Norway likes to portray itself as a "green" nation both domestically and abroad, but it's a myth," 2023, accessed 05.11, 2025, https://www.rosalux.de/en/news/id/51168/the-green-petrostate.
[19] Per Espen Stoknes et al., "Plausible futures for the Norwegian offshore energy sector: Business as usual, harvest or rebuild?," *Energy Policy* 184 (2024).
[20] Florian Egli et al., "The politics of phasing out fossil fuels: party positions and voter reactions in Norway," *Climate Policy* 25, no. 1 (2025).

investments into exploration and new greenfield development. Reductions in investment costs give an increase in the net tax revenues from the oil-producing companies into the Oil Fund during the late 2020s and early 2030s, as oil and gas fields will produce at low cost until their reserves are drained. The longer-term effect is a more rapid decline in oil and gas production with a more rapid fall in employment and a loss of offshore oil and gas competence.

To counteract the decline in offshore oil and gas production and employment, the Norwegian government is promoting increased investments in offshore wind power generation on the Norwegian Continental Shelf.[21] Norway has already set an ambitious goal to achieve 30 GW of offshore wind power by 2040.[22] This shift has a long-term focus on building up competence along the whole offshore wind power supply chain from manufacturing (mainly floatable foundations) to assembly, installation, operations, and maintenance. Expanding the mineral processing sector to concentrate on special and highly refined metal products can also help Norway further diversify its economy as oil and gas production declines.[23]

4. Transport-Intensive Industries in Northern Norway

4.1 Challenges for export-import trade

Export industries in Northern Norway disadvantaged by the relatively long distance to market compared to similar industries in more southerly locations. Exports of industrial products from Northern Norway to the European market are therefore likely to be expensive. To compensate for higher transport costs and to remain competitive, the industries need to produce goods which are in high demand (or are rare in other locations) and goods of high quality with a lower environmental footprint. To succeed, the industries also need to rely on predictable transport services and supportive maritime infrastructure. Shipping companies need to find ways to reduce the cost of transport while at the same time providing timely, efficient and reliable services. For this to happen, the current maritime transport system needs extensive structural upgrades and new transport infrastructure. This applies not only to maritime transport but also to road and rail transportation. It is the seafood industry that has the most urgent infrastructure needs, as the industry is projecting a significant increase in the production of farmed salmon over the next several years.[24] The potential monetary value of increased shelf-life for perishable goods is enormous.

Industrial products generated in Northern Norway are usually exported by sea from specialized terminals, which are commonly owned and operated by the producing companies themselves, or industrial parks. The industries also import materials for their own processing

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[21] See Section 3.5 in this report; Even Winje et al., *Market development of floating and bottom-fixed offshore wind - the long-term potential for the Norwegian offshore wind industry*, Menon Economics (2024), https://menon.no/en/projects/market-development-of-floating-and-bottom-fixed-offshore-wind.

[22] Regjeringen, "Offshore wind," n.d., accessed 05.11, 2025, https://www.regjeringen.no/en/topics/energy/renewable-energy/havvind/id2830329/.

[23] See Section 3.3 and Section 5 in this report.

[24] Ida Grong Aursand and Karl A. Almås, "Norway needs a 'salmon feed revolution," 2023, accessed 05.11, 2025, https://www.sintef.no/en/latest-news/2023/norway-needs-a-salmon-feed-revolution/.

and production, again mainly by sea. The seafood industry, on the other hand, exports fresh fish exclusively by road and to a lesser extent by railways, but frozen, dried, salted, and smoked seafood is primarily transported by sea. Airfreight of fresh fish from Northern Norway constitutes a very small volume,[25] but much larger volumes are flown from Southern Norway and Northern Europe to markets in Asia and North America. Excluding the petroleum industry and the ore mining industry, which sell essentially all their products overseas, other local industries in Northern Norway sell large parts of their production to costumers within Northern Norway (or to other parts of Norway). The seafood industry sells more than half of its production locally and about a sixth of the power-intensive industries' production goes to customers within Northern Norway.[26] This domestic trade is mainly dependent on road transport.

It is important for industrial development in Northern Norway that the renewable energy generated within the region benefits local industries, instead of being transported out of the region to the power grids of neighbouring countries. Local use will bring industry to the power source. Another issue is allocation of capacity on the power grid for conversion to green fuels, and whether renewable energy resources in Northern Norway will be used to achieve the national CO_2 emission reduction goals in the coming years. This use needs to be managed wisely so enough power is conserved for important industrial production. The central government has recently agreed to allow full electrification of all plant operations at the Melkøya LNG liquefaction plant in Hammerfest, Finnmark. Previously, all electrical power required by the plant was generated by burning natural gas in the plant's own gas turbines. High demand for electrical power will lead to increased electricity prices in Northern Norway, deterring future industrial operations.

Northern Norway is a resource-rich region of Norway with potential for a substantial increase in industrial activities. But the degree and speed of industrial development will be dependent on several factors that need to be in place before the region becomes an attractive location for future Norwegian businesses. Prerequisites include: (1) high demand for industrial products produced in the region and high prices on global markets; (2) sufficient grid infrastructure and access to a stable supply of renewable energy at affordable prices; (3) a reliable and effective transport system with seaborne export opportunities, and with good road and/or railway connections; (4) the development of industrial sites close to seaports and urban centres, with access to regional airports; (5) suitable land available for increased future industrial development close to seaports; (6) strong political leadership at both the local and state levels supporting and facilitating industrial development; (7) competence and expertise in the execution of industrial projects; (8) access to advanced technology and innovation; and (9) the availability of a skilled workforce.

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[25] Statens-Vegvesen et al., *Konseptvalgutredning Nord-Norge (KVU) for transportløsninger i Nord-Norge* (2023), https://www.vegvesen.no/en/road-projects/project/kvunordnorge/.; 14,000-18,000 tons in 2021

[26] Heidi Ulstein and Øyvind Vennerød, *Næringslivets behov for transportinfrastruktur i Nord-Norge*, kbnn Menon Economics (2023), https://www.kbnn.no/archive/kbspesial/2022-Rapport-N%C3%A6ringslivets-behov-for-transportinfrastrukturbehov.pdf.

4.2 Power-intensive industry

Northern Norway's abundant hydropower resources have made it an attractive location for various power-intensive industries. These industries require significant amounts of electricity for their production, and the region's (low cost) renewable energy resources provide a competitive advantage. Power-intensive industries in Northern Norway include industrial plants that produce aluminium, ferrosilicon, silicon metal, microsilica, ferromanganese, reinforced steel, cement, and fertilizers (*Table 3*). These plants are in the Helgeland, Mo i Rana, Salten, and Ofoten regions of Nordland, and in Finnfjord in Troms (*Figure 2*).

These plants have been operating for several years with a fairly constant yearly production rate and employ about 2,100 people, in addition to jobs in the equipment supply sector.[27] The value of their exports was NOK 29 billion in 2022.[28] The plants export essentially all their products by sea and consequently tend to be located at or close to seaports and operate their own specialized sea terminals. The industry also imports materials for its own production, including chemical products and metals, which are also transported almost exclusively by sea. Norway is also an important producer of nickel and cobalt extracted from imported raw materials.

Planned power-intensive industries include hydrogen and ammonia production, green steel, fuel cells, and data centres. Launching of small commercial satellites is also planned at Andøya Spaceport. Construction of a battery factory (Freyr) in Mo i Rana was started in 2023 with a pilot plant, but an upgrade to a larger semi-industrial scale plant was halted and the operation moved to the United States. This move was explained by the easier access to investment capital and more favourable taxation rate for green-tech projects granted by the Inflation Reduction Act (IRA) of 2022 in the United States. Another project cancelled in 2024 was hydrogen production in Narvik, in combination with the development of hydrogen fuel cells.

[27] BIN, *Business Index North – A periodic report with insight to business activity and opportunities in the Arctic* (2023).
[28] SSB Database.

Figure 2: The location of power-intensive industries in Northern Norway.

The production of (green) hydrogen and ammonia could become a new export market for Northern Norway. A total of 18 out of 50 suggested hydrogen projects in Norway were initially planned in Northern Norway.[29] The power-intensive industry is dependent on renewable energy (hydropower). Currently there is an electricity surplus in Northern Norway; this is keeping electricity prices lower than in other parts of the country, which is attracting new power-intensive industries to Northern Norway. But this electricity surplus could be quickly used up if several plants were constructed over the next several years.

Table 3: Most power-intensive industries in Northern Norway.

Company, Location	***Types of cargo, production volumes, and number of employees***
Celsa Armeringstål (bought by *7 Steel Nordic* in 2025) Mo i Rana (Nordland)	Smelter. Recycling of iron scrap. Producer of reinforced steel; the largest recycling company in Norway; about 770,000 tons of scrap recycled per year; 1,400 employees (including subcontracted).[30]

[29] Pwc, *Nord-Norge er med på å drive utviklingen innen hydrogen og ammoniakk*, kbnn (2022), https://www.kbnn.no/artikkel/nord-norge-er-med-pa-a-drive-utviklingen-innen-hydrogen-og-ammoniakk#:~:text=Det%20vil%20fortsatt%20ta%20en,prosjektene%20enn%C3%A5%20ikke%20er%20tatt.
[30] 7-steelnordic, "Homepage," updated 13.08.2025, 2025, accessed 04.11, 2025, https://7-steelnordic.com/.

Company, Location	***Types of cargo, production volumes, and number of employees***
Elkem Rana Mo i Rana (Nordland)	Smelter. Annually 90,000 tons of ferro-silicon (Fe-Si) used in the production of steel and 23,000 tons of microsilica[31] (Si). 130 employees.[32]
Elkem Salten Sørfold, Salten (Nordland)	Smelter. Annually 80,000 tons of silicon and 30,000 tons of microsilica (Si). 200 employees.
Ferroglobe Mangan Mo in Rana (Nordland)	Smelter. Annually 125,000 tons of silicon-manganese (Si-Mn) and ferro-manganese (Fe-Mn)[33]. 95 employees.
Alcoa Mosjøen, Helgeland (Nordland)	Smelter. Fully dependent on import of raw material. About 230,000 tons of primary aluminium alloys for export annually. About 650 full-time employees.[34]
Finnfjord Finnsnes, Senja (Troms)	Smelter. Annually 100,000 tons of ferro-silicon (Fe-Si) used in the production of steel; also produces silica (SiO2). One of Europe's largest producers of ferro-silicon. About 150 employees.[35]
Heidelberg Cement (before *Norcem*) Kjøpsvik in Tysfjord, Narvik (Nordland)	Cement. About 0.5 million tons annually. Norway's only cement producer. Operation of limestone quarry and production of cement for mainly the domestic market. About 150 employees.[36]
Yara Glomfjord (owned by *Yara International*) Glomfjord (Nordland)	Fertilizers. Production of nitrogen-phosphorus-potassium fertilizers and calcium nitrate fertilizers. Annually about 820,000 tons. Most of the ingredients are imported. About 30% of the production is for the domestic market. 185 employees.[37]

4.3 Mining industry

The Norwegian Mineral Strategy of 2023[38] laid out a plan to develop the world's most sustainable mineral industry in Norway. The industry will have a complete and compact value

[31] Microsilica is a spherical sub-micron amorphous silicon dioxide used in many applications.
[32] Elkem, "Elkem Silicon Products Rana," updated n.d., n.d., accessed 04.11, 2025, https://www.elkem.com/about-elkem/worldwide-presence/norway/elkem-rana/.
[33] Ferroglobe, "Mo i Rana," updated n.d., n.d., accessed 04.11, 2025, https://www.ferroglobe.com/about-ferroglobe/industrial-footprint/mo-i-rana.
[34] Alcoa, *Alcoa Annual Report 2023* (2024), https://s29.q4cdn.com/945634774/files/doc_financials/2023/ar/alcoa-corp-2023-annual-report-final-bookmarked.pdf.
[35] Finnfjord, "One of the World's most Energy-efficient Ferrosilicon Producer," updated n.d., n.d., accessed 04.11, 2025, https://finnfjord.no/en/.
[36] Heidelberg Materials, "Norcem Kjøpsvik," updated n.d., n.d., accessed 04.11, 2025, https://www.sement.heidelbergmaterials.no/en/NorcemKjopsvik en.
[37] Yara, "Yara Glomfjord," updated 10.10.2023, 2023, accessed 04.11, 2025, https://www.yara.no/om-yara/yara-i-norge/yara-glomfjord/.
[38] Regjeringen, Norway mineral strategy, (2023).

chain with a low climate and environmental footprint, from mineral extraction to production. Norway's new Mineral Strategy is aligned with the EU's Critical Raw Materials Act (CRMA), which entered into force in May 2024.[39] Norway could play an important role in the supply of some critical raw materials: minerals and metals of high economic importance that are essential for the energy transition and green technologies. There are several known deposits of non-ferrous ore and industrial minerals in Norway, and significant potential for production of critical raw materials.[40] However, mining is currently very limited in Norway (*Figure 3, Figure 4)*. To assess the concentration and quantity of critical raw materials, the Nordic countries are now working together on evaluating future mining opportunities in the Nordic region.[41]

Two of what may be the largest deposits of rare earth elements (REEs) in continental Europe have recently been discovered in Northern Sweden (at Kiruna) and in Southern Norway (the Fens deposit at Ulefoss in Telemark, south of Oslo).[42] REEs are used as permanent magnets in electric cars and wind turbines; security of REE supply is critical for European industry, and of crucial importance to Europe's green energy transition. Today, Europe is completely dependent on REEs imported through a market heavily dominated by China. Deposits of phosphate, titanium and vanadium-rich magnetite are being investigated in Southwest Norway, and in Western Norway (in Engebø), a new mine for titanium minerals (rutile) and garnet is scheduled to begin production soon. Norway has several ilmenite deposits rich in titanium ore, and the Tellnes deposit in Rogaland in Southern Norway is the largest in Europe.[43] In 2021, Norway was the second-largest producer of titanium (Ti) in Europe, with production amounting to 220,000 metric tons. Norway also has large and well-documented resources of olivine and dolomite, which could be used to produce magnesium (Mg).

Northern Norway has a rich mining history, but today there is only one ore mine in operation (*Table 4*): an iron ore mine in Mo i Rana (Rana Gruber) in Nordland, which has been in operation for over 60 years. In addition, the port of Narvik receives iron ore from Kiruna in Sweden via the Ofoten Railway. The iron ore mine near Kirkenes (the Sydvaranger mine) in Finnmark, which has been closed since 2015, is also expected to reopen. The largest known copper deposits in Norway are the Nussir and Ulveryggen deposits in Repparfjord in Troms; mining operations are expected to begin soon. Copper mining in Sulitjelma in Fauske, Nordland, is scheduled to recommence in 2026.

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[39] Directorate-General for Internal Market-Industry-Entrepreneurship and SMEs, *Study on the Critical Raw Materials for the EU 2023 - Final Report* (2023), https://single-market-economy.ec.europa.eu/publications/study-critical-raw-materials-eu-2023-final-report en.
[40] Innovation news network, "The potential for raw materials exploration in Norway ", 2022, https://www.innovationnewsnetwork.com/potential-raw-materials-exploration-norway/19013/.
[41] Nordic Innovation, *The Nordic Supply Potential of Critical Metals and Minerals for a Green Energy Transition* (2021), https://www.nordicinnovation.org/critical-metals-and-minerals.
[42] LKAB, "Europe's largest deposit of rare earth metals located in Kiruna area," updated 24.10.2025, 2023, accessed 05.11, 2025, https://lkab.com/en/press/europes-largest-deposit-of-rare-earth-metals-is-located-in-the-kiruna-area/.; Rare Earths Norway, "Europe's largest deposit of rare earth elements discovered at Fen, Norway," 2024, accessed 05.11, 2025, https://rareearthsnorway.com/europes-largest-deposit-of-rare-earth-elements-discovered-at-fen-norway.
[43] Are Korneliussen et al., "An overview of titanium deposits in Norway," *Norges Geologiske Undersokelse* 436 (2000).

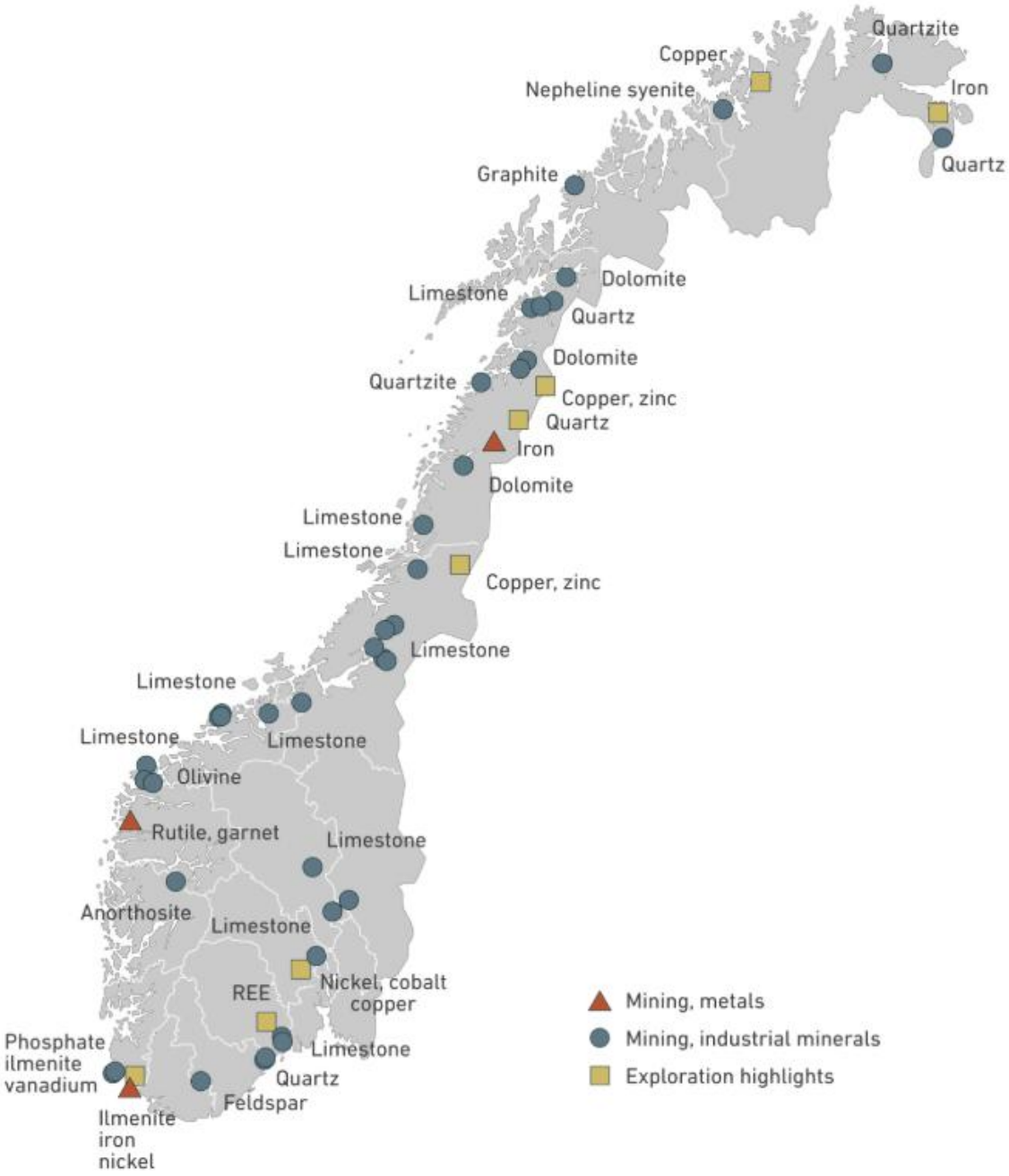

Figure 3: Location of active mining of metals and industrial minerals in Norway, including the locations of the most important future mining projects. Source: Norwegian Geological Survey (NGU), updated April 2025.

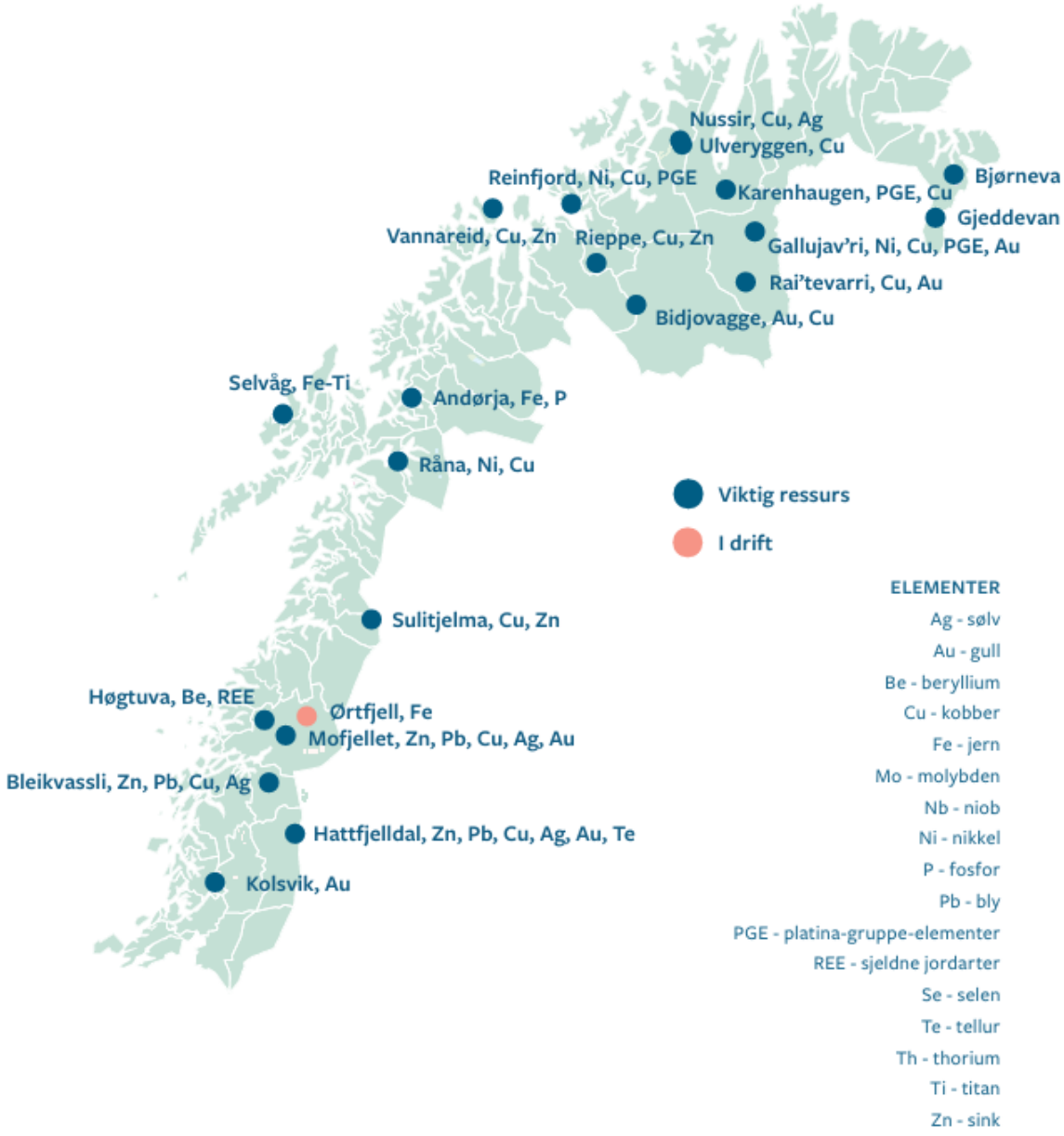

Figure 4: Important ore deposits and currently active mines in Northern Norway. Source: Norwegian Geological Survey (NGU), 2025.

Industrial minerals[44] are being mined in several locations in Northern Norway by a number of different mining companies[45] (*Table 5*). Northern Norway has developed a world-leading value chain based on ultra-pure quartz (SiO_2), which is used in the production of silicon metal, the production of solar cells, and in semiconductor technology. Norway is the main

[44] Industrial minerals are minerals and rocks that are used in industry because of their physical or chemical non-metallic properties. Industrial minerals are used, among other things, in the production of paper, computer chips, mobile batteries, ceramics and paint.

[45] Producers of industrial minerals in Northern Norway include: Brønnøy Kalk, SMA Mineral, Omya Hustad Marble, Franzefoss Minerals, Heidelberg Materials Cement, and Elkem, Quartz Corp, and Drag.

producer of high-purity quartz in Europe and produces about 35% of the silicon (Si) consumed by the EU. The Trælen graphite mine in Northern Norway is the most important producer of natural crystalline graphite in Europe and produces the highest grade of flake graphite in the world. Nepheline syenite (a feldspar mineral which was added to the EU's list of critical minerals in 2023) is mined on the island of Senja off the coast of Troms in Northern Norway. It is used in the production of glass, porcelain, ceramics and paint.

Coal mining on Svalbard has been ongoing for over 120 years, but the closure of the last mine (Mine 7) was announced during the summer of 2025.[46] Annual production from Mine 7 was about 100,000 tons, with 25% of the coal used for local energy generation in Longyearbyen and the rest exported. About 140 employees still work in the mine at the time of writing. Previously, the Svea Nord Mine produced up to 4 million tons of coal per year.

Exports of ore and mineral concentrates from Northern Norway totalled NOK 2.3 billion in 2021, with the majority of the products mined in Nordland.[47] Total production was valued at NOK 3.4 billion. In the same year 970 people were employed in the mining industry in Northern Norway, amounting to around 22% of all employees of the Norwegian mining industry in 2021. The Geological Survey of Norway (NGU) has estimated that the total value of ore and non-metallic mineral deposits in Norway could add up to NOK 2,500 billion, with a substantial part of these resources located in Northern Norway.[48]

The Norwegian government has recently approved an exploratory program for deep-sea mining of polymetallic volcanic crust in the Norwegian Sea between Norway and Greenland.[49] Samples of crust have been shown to contain manganese, zinc, copper, cobalt and REEs. But the metal concentrations in the collected samples are low and similar to concentrations in known ore deposits on land (e.g., the Nussir deposit).[50]

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[46] Kristine Bondo Pedersen and Anita Evenset, "Coal mine heritage on Svalbard – cleaning up after a century of coal mining activities," Akvaplan-niva, 2024, accessed 05.11, 2025, https://akvaplan.no/en/news/2024-08-30/coal-mine-heritage-on-svalbard-cleaning-up-after-a-century-of-coal-mining-activities-487466.
[47] Dirmin.
[48] *NGU Thematic Issue No. 1 - Minerals for the Green Economy*, Geological Survey of Norway (2019), https://www.ngu.no/publikasjon/minerals-green-economy-ngu-thematic-issue-1.
[49] Regjeringen - Ministry of Energy, "Opening of an area on the Norwegian continental shelf for mineral activities," 2024, accessed 05.11, 2025, https://www.regjeringen.no/en/whats-new/opening-of-an-area-on-the-norwegian-continental-shelf-for-mineral-activities/id3033970/.
[50] Tore Relling et al., *Status 2024*, Kystverket (2024), https://www.kystverket.no/globalassets/om-kystverket/sentrale-dokumenter/rapporter/status/kystverket_status_2024_enkeltsider.pdf.

Table 4: Main ore mining operations in Northern Norway.

Company, Location	***Types of cargo, production volumes, and number of employees***
Rana Gruber Ørtfjell, Mo i Rana (Nordland)	Ore mining. Open-pit and underground ore mining and processing of iron ore concentrates (62-65% Fe). Only underground mining operations from 2025. All production is exported; annual production 1.8 million tons of iron ore concentrate; estimated 444 million tons as a resource base. 370 employees.[51]
LKAB Mine in Kiruna, Sweden Narvik (Nordland)	Transport of iron ore by railway from Kiruna in Sweden to the Port of Narvik for export. About 21 million tons annually.
Sydvaranger (new owner Swedish company *Grangex Group*) Kirkenes (Finnmark)	Previously Norway's largest mine producing high-grade magnetite concentrate (68-72% Fe). Closed down in 2015. Annual production was around 2.5 million tons of iron ore concentrate with 420 employees.[52] The mine was the largest private employer in the Finnmark region at the time of its closure. Scheduled to start operations again in 2027.
Nussir (new owner Canadian company *Blue Moon Metals*) Repparfjord, Hammerfest (Troms)	Underground copper (Cu) mine with an average copper concentration of 1.14% (varying between 0.5-5%). The Nussir and neighbouring Ulveryggen deposits together contain an estimated 72 million tons of copper ore, which also includes economically significant trace elements of silver, gold and platinum group elements.[53] Mining operations are expected to start by 2027.[54]
New Sulitjelma (new owner Canadian company *Blue Moon Metals*) Fauske (Nordland)	Copper ore concentrate (includes also zinc, Zn) with an estimated resource base of 35 million tons of sulphide ore. Between 1887 and 1991, about 25 million tonnes of ore were extracted with an average grade of 1.84% Cu and 0.86% Zn. Scheduled to restart operations in 2026.

[51] Rana Gruber, *Annual Report and Sustainability Statement 2024* (2025), https://ranagruber.no/media/annual-report-and-sustainability-statement-2024/.
[52] Sydvaranger, "Sydvaranger," updated n.d., n.d., accessed 05.11, 2025, https://www.sydvaranger.com/.
[53] Jan Sverre Sandstad and Terje Bjerkgård, "Sediment hosted Cu-Deposits in Norway," Geological Survey of Norway (NGU), n.d., accessed 04.11, 2025, https://www.ngu.no/en/geological-resources/sediment-hosted-cu-deposits-norway.
[54] Blue Moon Metals, "Nussir," updated 05.09.2025, 2025, accessed 04.11, 2025, https://bluemoonmetals.com/project/nussir/

Table 5: Key mining of industrial minerals in Northern Norway.

Company, Location	***Types of cargo, production volumes, and number of employees***
SMA Mineral Norway Mo i Rana (Nordland)	Mining of limestone/dolomite for the production of cement. 20 locations in Sweden, Norway, Finland and Estonia; 7% domestic use. 22 employees. Annual production in Norway about 210,000 tons in 2023.
SMA Mineral Norway Seljeli in Elsfjord, Vefsn (Nordland)	Mining at the Seljeli dolomite quarry. Annual production between 70,000-150,000 tons.
Sibelco Nordic (current owners *North Cape Minerals*). Stjernøy Island, Alta (Finnmark)	Open-pit mining of nepheline syenite; one of the three largest deposits in the world. Europe's only producer. Used in production of glass, ceramics, and as soil conditioner. Annual production about 300,000 tons; 126 employees.
Elkem Tana Austertana (Finnmark)	Open-pit quartzite quarry. One of the largest in the world. Annual production about 850,000 tons. Supplies almost all silicon smelters in Norway. 50 employees (including 25 contractors).
Quartz Corp Drag, Hamarøy in Tysfjord (Nordland)	Open-pit high-purity quartz. Quartz from pegmatites in the Drag area of Nordland. Extraction and local processing of high-purity quartz together with imported high-purity quartz from Spruce Pine, North Carolina USA. Quartz for electronics and solar cell production. Annual production in Norway in 2023 was 45,703 tons; 233 employees.
Elkem Mårnes Mårnes, Gildeskål (Nordland)	Open-pit quartzite quarry; supplies quartz (SiO_2) to Elkem's smelter in Rana and customers in Sweden. Annual production (2021) was 140,000 tons.
Skaland Trælen Graphite (new owner *Norge Mineraler*) Skaland on Senja (Troms)	The Trælen deposit contains about 1.8 million tons of proven reserves of graphite with a grade of 31% carbon. The mine produces the highest-grade flake graphite in the world. 12,000 tons produced annually; 36 employees. High-grade graphite is both used in the steel industry and more recently in the production of anode material in batteries.
Elkem Nasafjell Nasafjell (Nordland)	Possible mining of hydrothermal quartz veins; estimated at 200,000 tons annually and employing about 50 people, but currently no production.

Company, Location	***Types of cargo, production volumes, and number of employees***
Franzefoss Minerals Ballangen, Narvik (Nordland)	Underground mining of dolomite ("Arctic Dolomite", Europe's whitest deposits of dolomite); used in glass and steel production and agriculture; exported abroad. Annual production 255,788 tons in 2024, with 29 employees.[55]
Brønnøy Kalk (owner *Norsk Mineral Group*) Brønnøy, Akselberg in Velfjord (Nordland)	Mineral mining of calcite-marble for use in the paper industry. Supplies *Omya Hustadmarmor* with raw materials for their production; 71 employees.
Omya Hustadmarmor (owned by *Omya AG*) Elnesvågen (Hustadvika) Løvgavlen (Fauske) Hammerfall (Sørfold)	Mining of dolomite-marble and production of carbonate-based pigment for use in the paper industry both as filler and as coating; imports additional chemicals. About 2 million tons annual production, mainly for the domestic market; about 190 employees.

4.4 Petroleum industry

The petroleum industry is Norway's largest industry and a key driver of the Norwegian economy. Norway is the fourth largest exporter of natural gas and seventh largest exporter of crude oil in the world.[56] Extraction is only conducted offshore on the Norwegian continental shelf in the North Sea, Norwegian Sea, and the Barents Sea. Norway is currently the most important supplier of natural gas to Europe; in 2023, it supplied more than 30% of total gas consumption in the EU and the United Kingdom.[57] Most of the gas from fields in the North Sea and Norwegian Sea is transported to Europe through a network of pipelines of about 8,800 km in length.[58] In addition, several pipelines connect offshore oil fields with onshore oil terminals. Equinor, which is 67% publicly owned, controls approximately 80% of oil and gas operations on the Norwegian continental shelf. Future extraction activities will mainly take place off the coast of Finnmark in the Barents Sea, where a large part of the country's remaining oil and gas resources are located.[59]

Currently, there are five petroleum installations in the Barents Sea. The Snøhvit gas field about 143 km offshore in Finnmark with a gas pipeline to the Melkøya liquefaction plant just outside Hammerfest. Export is mainly by LNG tankers to the European market. The Hammerfest LNG plant is Norway's only facility for liquefied natural gas, with about 500 employees working at the plant.[60] The plant has annual production capacity of 4.65 million

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[55] Norskeutslipp.no/miljødirektoratet

[56] NorskPetroleum, "Exports of oil and gas," updated 28.08.2025, 2015, accessed 05.11, 2025, https://www.norskpetroleum.no/en/production-and-exports/exports-of-oil-and-gas/#oil-and-gas-exports.

[57] NorskPetroleum, "Exports of oil and gas."

[58] NorskPetroleum, "The oil and gas pipeline system," updated 02.01.2024, 2016, accessed 05.11, 2025, www.norskpetroleum.no/en/production-and-exports/the-oil-and-gas-pipeline-system/.

[59] Norwegian Offshore Directorate, *The Shelf in 2024, Chapter 3. Oil and gas on the shelf moving forward* (2024), https://www.sodir.no/en/whats-new/publications/reports/the-shelf/the-shelf-in-2024/oil-and-gas-on-the-shelf-moving-forward/.

[60] NS Energy, "Hammerfest LNG," updated 05.02.2023, 2023, accessed 05.11, 2025, https://www.nsenergybusiness.com/projects/hammerfest-lng/.

tons of LNG, 0.34 million tons of liquefied petroleum gas (LPG), and 0.73 million tons of condensate.[61] The second petroleum installation is the Goliat oil platform (an FPSO facility[62]) 85 km offshore from Finnmark, where tankers are loaded with crude oil for direct shipping to international markets. Other fields recently entering production include Askeladd, Johan Castberg and Wisting, all with their own FPSO oil platforms and no shoreside infrastructure. There are three oil and gas installations in operation in the Norwegian Sea outside Helgeland in Nordland: Aasta Hansteen, Skarv, and Norne. These petroleum fields depend on FPSO (Norne) for oil transport, and gas pipelines (Aasta Hansteen and Skarv) for transfer to Europe.

Exports of oil and gas from Northern Norway reached a record high of NOK 1964.451 billion in 2022,[63] prompted by elevated oil and gas prices on global markets. In comparison the figures for 2021 were NOK 100 billion, and less than NOK 40 billion in 2020.[64] In terms of employment in Northern Norway, 700 man-years account for direct operations by the oil companies, 2,700 man-years for delivery of supplies and services at fields and installations, and 3,800 man-years are created through ripple effects further down the supply chain.[65] Direct and indirect employment in the petroleum sector creates around 200,000 jobs throughout Norway.[66] Employment in Northern Norway is therefore only about 2% of that figure.

The associated petroleum service and supply industry for the Barents Sea has supply bases for specialized equipment, emergency response and preparedness at offshore platforms, and housing for commuting employees in Hammerfest and Harstad (and also some activities in Tromsø and Kirkenes). Supply bases for petroleum activities off the coast of Nordland are located in Sandnessjøen and Brønnøysund. The supplier industry includes several small and medium-sized companies.

Refined petroleum products, including gasoline and diesel, are imported by tankers to Northern Norway and stored at all the larger seaports. Distribution on land is by oil trucks to petrol stations. Norway considers carbon capture and storage (CCS) a high priority and has played an important role in the development of the technology.[67]

4.5 Offshore wind power

Considerable hydropower resources have provided Norway with essentially all its electricity needs for several decades. Norway has not therefore had the same incentives to develop wind power as have neighbouring countries bordering the North Sea.

Electricity production from hydropower in Northern Norway in 2021 was 21.9 TWh, and from land-based wind 2 TWh. During the same year total renewable energy use in Northern

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[61] Equinor, "The Snøhvit field," n.d., accessed 05.11, 2025, https://www.equinor.com/no/energi/snohvit.
[62] FPSO stands for Floating Production Storage and Offloading.
[63] Nina Rolsdorph, "08792: External trade in goods, main figures (NOK million) 1980M01 - 2025M09," ed. SSB (2025).
[64] BIN, *Business Index North – A periodic report with insight to business activity and opportunities in the Arctic*
[65] BIN same as note 64
[66] International Trade Administration, "Norway Country Commercial Guide - Offshore Energy - Oil, Gas and Renewables," updated n.d., n.d., accessed 05.11, 2025, https://www.trade.gov/country-commercial-guides/norway-offshore-energy-oil-gas-and-renewables.
[67] Carbon Capture and Storage (CCS) is a set of technologies designed to prevent large amounts of carbon dioxide - a major greenhouse gas - from being released into the atmosphere from sources like industrial facilities and power plants; carbon storage reservoir under the seabed in the North Sea with storage capacity of up to 1.5 million tons of CO2 per year (“Longship”).

Norway was 17.3 TWh (11.0 TWh in Nordland, 4.0 TWh in Troms, and 2.3 TWh in Finnmark), leaving a surplus of 6.6 TWh.[68] The surplus allowed Norway to export USD 4.74 billion's worth of electricity through grid interconnectors to its EU neighbours in 2022. New hydropower plants already under development in Nordland should provide additional 16.9 TWh, and in Troms and Finnmark 4.7 TWh.[69]

The construction of several additional hydropower plants in Norway is considered unlikely, beyond those plants which are already under development. Although Northern Norway has good potential for significant land-based wind power, for the time being production is taking place in only a few places. Wind power developments on the mainland have faced opposition from local residents, including indigenous reindeer herders.[70] Norway's ambitious goal to drastically reduce CO_2 emissions from both its industries and the transportation sector, and to attain carbon neutrality by 2050, will require substantial amounts of renewable energy.

Emissions from offshore oil and gas installations make up a significant share of Norway's annual CO_2 emissions. The electricity needed to run system operations on the offshore platforms is provided by powerful gas turbines which emit large amounts of CO_2 and methane. To eliminate these emissions the gas turbines, need to be replaced with renewable energy. In the offshore environment the only option is to anchor floating wind-turbines close to the platforms with electricity cables running from the wind installations to the platforms. Placing floating wind-turbines in deeper waters further from the shore, where wind speed is greater, also leads to greater power generation. The Norwegian government has approved a plan to achieve 30 GW of offshore wind power capacity on the Norwegian continental shelf by 2040. In a high outcome scenario, the value-added potential for floating offshore windfarms in Norway has been estimated to be about NOK 117 billion, creating employment equal to 130,000 man-years over a period of 30 years.[71]

In 2019 the Norwegian government granted NOK 2.3 billion in financial support to the state-owned Equinor and its partners for the development of Norway's first floating offshore windfarm, Hywind Tampen, located 140 km off the Norwegian coast in the North Sea. The wind farm has a power capacity of 88 MW and became operational in August 2023.[72] All the renewable power produced by the windfarm goes to electrify operations on the oil and gas platforms at the Snorre and Gullfaks fields in the North Sea, but currently the windfarm generates only about 35% of these platforms' annual electricity demand. Natural gas from within the offshore fields had previously been used to run gas turbines for electricity generation. Gas turbines are still needed to satisfy the remaining demand and to produce electricity when the wind-turbines are not generating sufficient power. Together with the planned electrification of the Melkøya LNG plant in Hammerfest,[73] these are the first steps

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[68] BIN same as note 64
[69] BIN same as note 64
[70] Eva Maria Fjellheim, "Wind energy on trial in Saepmie: epistemic controversies and strategic ignorance in Norway's green energy transition," *Arctic Review on Law and Politics* 14 (2023).
[71] Av Even Winje et al., "Verdiskapingspotensialet knyttet til utviklingen av en norskbasert Industri innen flytende havvind," *Menon Economics* (2019).
[72] Equinor, "Hywind Tampen: the world's first renewable power for offshore oil and gas," updated n.d., n.d., accessed 06.11, 2025, https://www.equinor.com/energy/hywind-tampen.
[73] Equinor, "Governmental green light to the Snøhvit Future project," updated 08.08.2023, 2023, accessed 06.11, 2025, https://www.equinor.com/news/20230808-governmental-green-light-snohvit-future.

toward using offshore wind power for the electrification of oil and gas platforms on the Norwegian continental shelf. Current plans for additional renewable energy generation will therefore primarily benefit the oil and gas sector.

4.6 Seafood industry

The Norwegian aquaculture industry has a goal of doubling production by 2030 and quintupling it by 2050. Norway was the world's largest seafood exporter in 2022, with exports valued at NOK 47 billion. The EU is Norway's largest trading partner, but the Norwegian seafood industry has a global reach: it exported to 172 different countries during the 2016-2020 period.[74] The value of seafood (mainly cod) from the fishery sector in Northern Norway in 2023 was NOK 17.8 billion, and the pre-tax profit for salmon and trout farming industry was NOK 35.5 billion.[75] The value of Norwegian seafood has been increasing. Norway exported a total of 2.8 million tons of seafood worth NOK 181.5 billion in 2025; a 4% increase compared to 2024.[76]

The yearly fishing quota for wild-caught fish has been declining over the last several years,[77] but as stated above continued growth is expected in the production and export of farmed fish. More than half of the seafood produced in Northern Norway is sold and consumed in Northern Norway.[78] The largest fishing ports in Northern Norway by landing volume are Tromsø, Båtsfjord, Lødingen, Sortland, Øksnes and Hammerfest (*Figure 5 and Figure 6*). In 2022, a total of 12,900 workers were employed in the seafood industry in Nordland and 12,700 in Troms and Finnmark.[79] More than any other industry in Northern Norway, the seafood industry creates an economic ripple effect in local coastal communities and strongly contributes to maintaining settlement along the coast and in remote island communities.

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[74] Hans-Martin Straume et al., "The structure of Norwegian seafood trade," *Marine Policy* 159 (2024).
[75] Oliver McBride, "2023 record year for Norwegian wild-caught fish through Råfisklaget," thefishingdaily.com, updated 02.01.2024, 2024, accessed 06.11, 2025, https://thefishingdaily.com/latest-news/2023-record-year-for-norwegian-wild-caught-fish-through-rafisklaget/.; fishfarmingexpert.com, "Norwegian salmonid farmers more than doubled pre-tax profit in 2022," updated n.d., 2023, accessed 06.11, 2025, https://www.fishfarmingexpert.com/norway-salmonid-profits-2022/norwegian-salmonid-farmers-more-than-doubled-pre-tax-profit-in-2022/1593411.
[76] Norwegian Seafood Council, https://en.seafood.no/news-and-media/news-archive/price-growth-for-wild-fish-and-increased-salmon-volume-resulted-in-record-value-for-norwegian-seafood-exports-in-2025-/
[77] Hilde-Gunn Bye, "Major Norwegian Trawling Company's Fleet Impacted By Reduced Fishing Quotas," highnorthnews.com, updated 15.11.2024, 2024, accessed 06.11, 2025. https://www.highnorthnews.com/en/major-norwegian-trawling-companys-fleet-impacted-reduced-fishing-quotas.; Hilde-Gunn Bye, "Avdekker en svært alvorlig situasjon for kystsamfunnene i Finnmark," highnorthnews.com, updated 15.10.2024, 2024, accessed 06.11, 2025, https://www.highnorthnews.com/nb/avdekker-en-svaert-alvorlig-situasjon-kystsamfunnene-i-finnmark.; Øyvind Vennerød et al., *KYSTKOMMUNENE OG FISKERIKRISE I FINNMARK - En analyse av hva kvotekrisen kan bety for befolkningen i kystkommunene i Finnmark*, Menon Economics (2024), https://www.ffk.no/_f/p1/i5f2e7389-80c9-46a2-84f4-5370d98be075/kystsamfunn-og-fiskerikrise-i-finnmark.pdf.
[78] Menon Economics, 2022
[79] Morgan Lillegård, "Strong growth in the seafood industry," nofima.com, updated 05.12.2024, 2022, accessed 06.11, 2025, https://nofima.com/results/strong-growth-in-the-seafood-industry/.

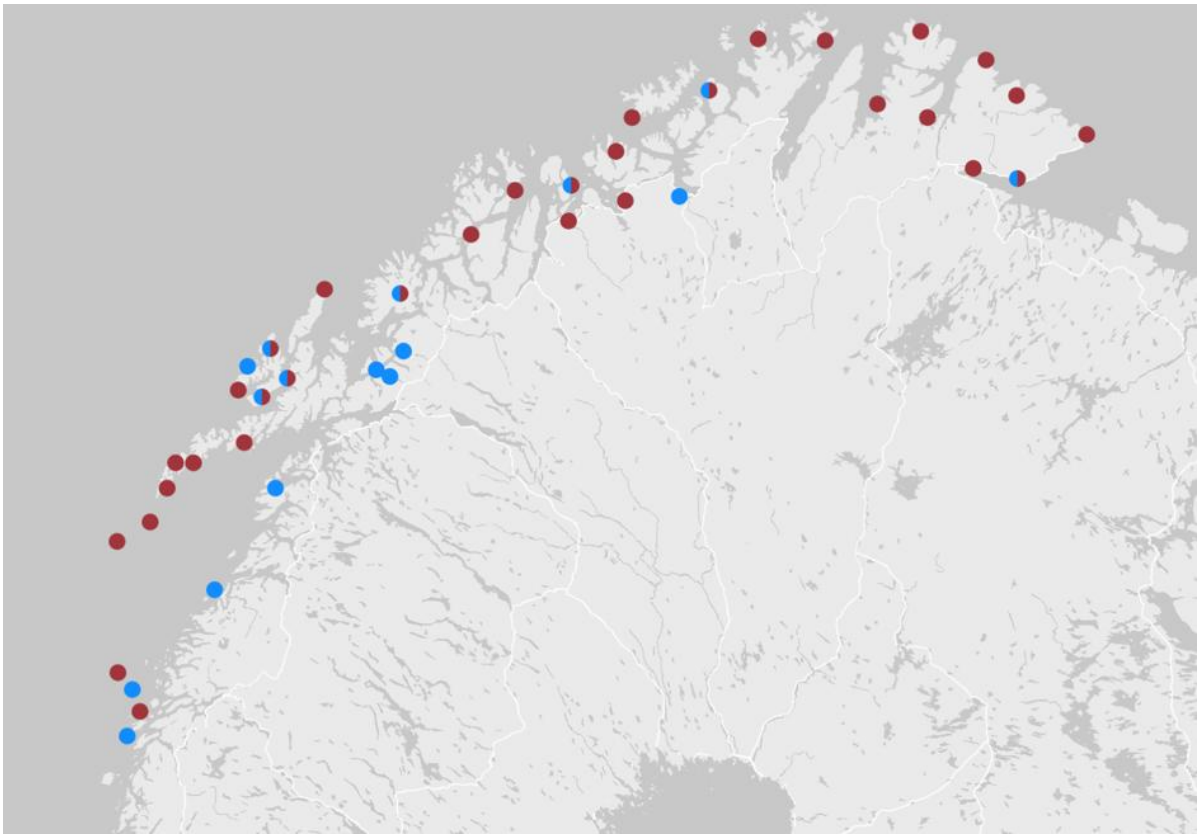

Figure 5: Main landing sites for wild-caught fish (cod: red dots) in Northern Norway and location of main slaughterhouses for farm-raised salmon (blue dots; source: norskeutslipp.no). There are more than 500 landing sites for cod in Northern Norway, so the figure only shows the sites with the greatest volumes (source: Fiskeridirektoratet).

Unlike other high-volume industrial products, which are mainly exported from Northern Norway by sea, seafood is mainly exported on large trailer trucks. This applies to fresh chilled fish and live king crabs. In 2021 about 80% of all fresh seafood was exported to the EU in temperature-controlled containers on trailer trucks and the remaining 20% on trains (via the Nordland and Ofoten Railways).[80] Consequently, trailer transport with fresh fish makes up a large proportion of heavy transport on Norwegian roads.

About 250,000 tons of seafood is transported annually on the Ofoten Railway from Narvik to Kiruna and onwards through Sweden to Oslo; this is equivalent to about 20,000 tons per month.[81] In comparison each trailer truck transports about 20 tons of seafood, so around 1000 trucks would be required to transport the same volume that trains do each month. Road transport has several advantages over trains when it comes to perishable goods, in particular frequency of departure, flexibility, punctuality, and enabling door-to-door transport from the supplier to customer. But the narrow county roads of Northern Norway are a major challenge

[80] Markus Metallinos Log, "Runoff from Road Freight of Fresh Salmon in Norway: A State-of-the Art," *Moderne mobilitet og infrastruktur* 2, no. 2 (2024).
[81] Hilde-Gunn Bye and Birgitte Annie Hansen, "Over 200 000 Tonnes of Sea food Sent Annually via the Ofoten Line: The Derailment Highlights Need for Double Track," Highnorthnews.com, updated 11.01.2024, 2024, accessed 06.11, 2025, https://www.highnorthnews.com/en/over-200-000-tonnes-seafood-sent-annually-ofoten-line-derailment-highlights-need-double-track.

for the seafood industry, which also has to deal with ferry connections and the need to drive through difficult mountain passes during the winter months.

Frozen farm-raised fish and frozen wild-caught fish are transported to international markets by ships (reefers/ refrigerators) with temperature-controlled containers.[82] Better refrigeration technology (supercooling) on board ships and direct loading of farm-raised fish from floating slaughterhouses could possibly favour sea transport over road transport in the future.[83] A small fraction of fresh fish is transported directly from Northern Norway by aeroplane. Onwards transport of fresh fish from Southern Norway includes transport on larger cargo planes to more distant destinations like the American and Asian markets.

Table 6: Key seafood industry locations in Northern Norway.

Company, ***Port location***	***Types of cargo, production volumes, and number of employees***
Several fishing companies Main landing ports: Båtsfjord, Honningsvåg, Hammerfest, Alta, Tromsø, Sortland, Hadsel, Myre-Øksnes, Bodø, Helgeland and Brønnøy.[84]	Annual production of all wild-caught saltwater fish, shellfish, cartilaginous fish, and macro algae was 675,371 tons in 2024; but production of just cod and "cod-like" fish was 351,502 tons.[85] Total of 2,275 people working in the fishing industry in Northern Norway in 2024.[86]
Nova Sea (bought by *Mowi Norway* in 2025). 26 production localities along the Helgeland coast (close to the ports of Mo i Rana, Nesna and Helgeland). Main port location: Lovund.	Aquaculture, farm-raised Atlantic salmon and rainbow trout. About 52,000 tons of farmed fish annually. 347 employees in 2023 (domestic and international).
Mowi Norway (before *Marine Harvest*). Headquartered in Bergen.	Aquaculture - world's largest producer of Atlantic salmon, slaughters over 600,000 tons annually, employing 11,500 people. Operating in several European, American and Asian countries (41 processing facilities in 19 countries). Feed factories in Norway and Scotland.[87]

[82] This includes salted cod and dried cod.

[83] Anne-May Johansen, "NOK 1.5 billion to be saved on salmon transport," nofima.com, updated 06.12.2022, 2022, accessed 06.11, 2025, https://nofima.com/results/nok-1-5-billion-to-be-saved-on-salmon-transport/.; Erkoseafood, "Norwegian Gannet. ," updated n.d., n.d., accessed 06.11, 2025, https://erkoseafood.no/norwegian-gannet/.

[84] Based on information from Norwegian Coastal Administration and SSB Table 08868.

[85] Sluttseddelregisteret, Fiskeridirektoratet

[86] SSB, "13470: Employed persons, by industry division (5-digit level, SIC2007). 4th quarter (M) 2008 - 2024," ed. SSB (2025). https://www.ssb.no/en/statbank/table/13470.

[87] Mowi, "Homepage," updated 05.06.2025, 2019, accessed 04.11, 2025, https://mowi.com/no/.

Company, ***Port location***	***Types of cargo, production volumes, and number of employees***
Nordlaks 39 production localities in Northern Nordland and Central and Southern Troms. Headquarter in Hadsel (Stokmarknes)	Aquaculture: farm-raised Atlantic salmon and rainbow trout. Annual production volume 65,855 tons in 2024.[88] Over 800 employees.
SalMar Several production facilities and ports in Troms and Finnmark, from Harstad in Troms to Sør-Varanger in Finnmark.	Aquaculture: farm-raised Atlantic salmon and rainbow trout. World's second largest salmon farmer. Annual production 80,500 tons in Northern Norway with 482 employees.[89]
Lerøy Norway Seafood Engaged in fishing and aquaculture along the entire coast of Norway.	Aquaculture: new upgraded fillet factory in Båtsfjord for wild-caught fish (cod, halibut), an investment of NOK 220 million and securing 120 jobs at the factory.
BioMar Norway Myre-Øksnes	Fish-feed factory for the aquaculture industry. About 0.4 million tons annually in Northern Norway with 269 employees in Øksnes (2 million tons in the whole of Norway in 2020).[90] One of Norway's foremost fish-feed producers; over 1,700 employees worldwide, headquartered in Aarhus, Denmark; and operates 17 feed production facilities worldwide.
Skretting Hadsel (Stokmarknes)	World leading producer of fish-feed for the aquaculture industry; annual production 206,000 tons in 2023, with 74 employees.
EWOS (*Gargill* since 2015) Bergneset (Troms)	Fish-feed factory for the aquaculture industry. The feed is sent to around 60 locations from Lofoten and Vesterålen in the south to Hammerfest in the north. Annual production not known; 171 employees.[91]

4.7 Trade in consumer goods

Food, groceries and other consumer goods transported in containers represent the single largest product group transported to Northern Norway. About half of all food and consumer goods are transported to Northern Norway by either trains (a little over 25%; Nordland and Ofoten Railways) or trailer trucks (a little less than 25%). The other 50% is transported by general cargo/container ships. Trains and trucks are used to transport time-sensitive chilled groceries in particular. This transport is part of a balanced trade as refrigerated food/groceries

[88] Nordlaks, *Nordlaks Bærekraftsrapport 2024* (2025), https://nordlaks.no/wp-content/uploads/2025/08/B_rekraftsrapport_2024_-_Web-1.pdf.
[89] Proff Forvalt
[90] Turid Synnøve Aas, Torbjørn Åsgård, and Trine Ytrestøyl, "Utilization of feed resources in the production of Atlantic salmon (Salmo salar) in Norway: an update for 2020," *Aquaculture Reports* 26 (2022).
[91] Proff Forvalt

and other consumer goods is transported north in containers and refrigerated (chilled) fresh seafood is transported back south in containers.[92]

Trailer trucks bring the goods to distribution centres in Trondheim, Bodø and Tromsø, where warehouses are owned by companies like ASKO, COOP, and REMA. Other transport companies operating large warehouses include PostNord and Bring. Increased direct transport by trailer trucks from the south to individual retailers in the north (without warehousing) has also increased. For the areas north of the Vestfjord, goods arrive largely via the Ofoten Railway or through the road networks in Sweden and Finland. In Nordland, the E6 and the Nordland Railway are mainly used.[93] Train transport of consumer goods will increase in the future if train capacity and frequency are improved. Due to higher transport costs and potential markups for retailers serving remote areas, consumer goods in Northern Norway can be more expensive than in other parts of Norway.

The largest seaports in terms of container cargo are Hadsel, Helgeland, Salten, Mo i Rana, and Sortland (from which processed industrial materials are exported).[94] Container transport of consumer goods by sea used to be more common in Northern Norway than it is today. Previously, Bodø was the largest container port in Northern Norway; the container ship MS Tege used to operate three round trips between the Ports of Bodø and Tromsø each week, with a once-a-week extension to Alta. This Northern Norway container line transported up to 20,000 twenty-foot equivalent units (TEUs) per year. The container cargo was offloaded from the Nordland Railway in Bodø onto the MS Tege for shipping to Tromsø and Alta. This service was cancelled in 2013, which shifted Tromsø's container traffic to the roads. Some of the volume was absorbed by the Ofotbanen Railway to Narvik, but the largest share is now transported via trailer trucks from the Nordland Railway station at Fauske to Tromsø. By some estimates this has resulted in 6,000 more trucks annually on Northern Norway's roads.[95]

4.8 Building and construction industry

The building and construction industry in Northern Norway manages several large construction projects each year, requiring large volumes of cargo to be transported. Transport is mainly by ships to nearby ports, with final transport conducted on often narrow county roads to specific construction sites. The cargo includes large equipment, machinery, bulk materials such as timber, plywood, cement, iron and steel components, and heavy-lift construction modules. Raw materials include sand and gravel, crushed stone aggregates, asphalt, large blocks of rock and natural building stone. About 200,000 tons of construction material was transported by sea to Tromsø in 2023.

Sand and gravel are in high demand locally for use in concrete, and crushed stone aggregates for use in the foundations of buildings and infrastructure projects (e.g., roads, railways, airports). The material is also highly sought after abroad (*Table 7*). In 2022 Norway was the world's biggest exporter of gravel and crushed stone, with exports valued at USD 371

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[92] Love Kristoffersson and Etienne Skowronski, "Towards Sustainable Transport: A case study on modal shift for temperature-controlled goods between northern Norway and central Europe," (2023).
[93] Statens-Vegvesen et al., *Konseptvalgutredning Nord-Norge (KVU) for transportløsninger i Nord-Norge*.
[94] BEAR Report 3. Seaports in Northern Norway: Current challenges and future development strategies.
[95] Øyvind Johansen, "Kutter ut MS "Tege"," Avisa Nordland, updated 28.05.2013, 2013, accessed 06.11, 2025, https://www.an.no/sport/kutter-ut-ms-tege/s/1-33-6679569.

million.[96] Stone aggregates are commonly produced by blasting in stone quarries and then crushed and mechanically sorted into different grades of aggregate. Industrial production of natural stone in Northern Norway has traditions that go back centuries (*Table 7*). Exploitation of large slate resources in Finnmark and Troms goes back to the early 19th century, as does quarrying of marble in Nordland. Large volumes of construction and demolition wastes also need to be transported from construction sites after the work has been completed.

Table 7: Crushed rock aggregates and natural stone production in Northern Norway.

Company, Location	***Types of cargo, production volumes, and number of employees***
Gabbro Nor Nesna, (Nordland)	Crushed stone aggregates and gravel for road and concrete projects including the new airport in Mo i Rana; extraction and further processing.[97] Close to 1 million tons annually; 80 employees.
Tschudi Aggregates Kirkenes (Finnmark)	Crust stone aggregates (gneiss) from waste rock generated by the Sydvaranger iron ore mine.
Bergneset pukk og grus (BPG) Brødrene Karlsen Anleggsdrift Bergneset (Troms)	Crushed stone aggregates, gravel and clay for road and other construction projects; about 0.4 million tons annually; 40 employees.
Several companies including *Norblock Group*. Fauske, Løvgavlen and Leivset (Nordland)	Natural stone: Fauske Marble. Largest marble quarries in Northern Europe. The marble is mainly exported as large blocks.[98] Most famous variety is “Norwegian Rose”.
Evjen Granitt Evjen, Beiarn (Nordland)	Natural stone: granite quarry and processing plant; producing floors and wall tiles, façade panels, kitchen countertops and other special products, including stones for pedestrian streets and sidewalks.[99]
Fuxite (owner *Norblock Group*) Kautokeino (Finnmark)	Natural stone: green quartzite (“Arctic Green”) sold as blocks and large decorative stones; stones also exported to the international market.
Pæskatun Alta Skiferprodukter Pæska Mountain, Alta (Troms)	Natural stone: quarzitic slate/flagstone; among Europe’s largest deposits of quartzite slate. Long history as a building stone of high quality in Norway and abroad. Used as durable roofing tiles and floor covering.[100] 15 employees.

[96] OEC, "Norway."
[97] Gabbro Nor, "Anleggene," updated n.d., 2024, accessed 05.11, 2025, https://www.gabbronor.com/anleggene/.
[98] Fauskemarble City, "Marble Industry," updated 11.04.2024, 2024, accessed 05.11, 2025, https://fauskemarblecity.com/marble-industry/.
[99] Evjen Granitt, "Prosjekter," updated n.d., n.d., accessed 05.11, 2025, http://www.egranitt.no/prosjekter.htm.
[100] Pæskatun, "about Pæskatun - Experience the Northern Lights and Alta Quartzite slate at Pæskatun," updated 19.06.2024, n.d., accessed 05.11, 2025, https://peskatun.no/about/.

4.9 Maritime equipment and the green technology sector

Norway is a great maritime nation with an extensive maritime industry. The industry includes several shipping companies, maritime transport and logistics services, shipbuilders, and suppliers of nautical equipment. The Norwegian shipbuilding sector focuses on advanced and specialized vessels, such as support and supply vessels for offshore oil and gas, ferries, fishing vessels, aquaculture service vessels and aquacultural equipment, passenger ships, and cruise ships. Manufacturing and sales of ship equipment generated revenues of NOK 82 billion in 2023.[101] Since then there has been notable upswing in revenues. In 2022 the export value of passenger and cargo ships and other types of vessel, such as tugboats and special purpose ships, was USD 2.68 billion. Shipbuilding and the manufacture of advanced nautical equipment for export[102] is one of Norway's few internationally competitive industries which are not based on commodities.

Within the nautical equipment sector, the focus on green technology is becoming an important business area for Norway. Sales of green technology are projected to increase, promoted by stricter environmental regulations and increasing demand. This has resulted in the development and testing of technologies for green shipping and zero and low-emission technologies. Large-scale wind energy projects on the Norwegian continental shelf could also provide significant opportunities for Norwegian nautical equipment manufacturers.[103] Continued access to competent workforce is of critical importance to maintain international competitiveness. Nautical equipment suppliers operate in a global market and face competition from countries with lower labour costs. To be competitive, the companies must either charge higher prices, mainly by delivering goods and services of higher quality, or produce them in a less labour-intensive fashion to keep prices down.

There is a considerable overlap between added value generated by the maritime industry and other ocean industries, particularly the oil and gas industry, offshore renewable power industry, and the seafood industry. The value created by the maritime industry in Norway is estimated at NOK 219 billion, with around 90,000 people employed.[104] The Norwegian global merchant fleet is the fourth largest in the world by value.

5. Cargo Flow at Seaports in Northern Norway

5.1 Total cargo throughput at seaports in Northern Norway

Cargo throughput at seaports, a fundamental indicator of maritime activity, measures the total volume of goods moving through a port, encompassing both incoming and outgoing shipments. This metric reflects a port's crucial role as a trade and transport hub, facilitating the

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[101] Kaja Haug, Sophie Emilie Sundt, and Erik Jakobsen, *Maritim verdiskapingsrapport 2025*, Menon Economics (2025).
[102] Shipping equipment does not include drilling equipment and offshore drilling rigs.
[103] Equinor, "The countdown has begun for Norway's new era of offshore energy: floating wind," updated n.d., 2023, accessed 06.11, 2025, https://www.equinor.com/magazine/offshore-wind-adventure.
[104] Norges-Rederiforbund, *Maritime Outlook 2025*.

movement of diverse types of goods such as dry bulk, liquid bulk, general cargo, and containerized goods.

In Northern Norway, maritime export volumes significantly surpass import volumes. Dry bulk is by far the most abundant type of cargo (*Figure 6 and 7*). Exports peaked in 2015, due to the export of iron ore from the Sydvaranger mine but were otherwise relatively stable during the study period. Notably, the international (outwards) maritime trade through Northern Norway's seaports appears to have remained relatively resilient to the global economic slowdown caused by the Covid-19 pandemic. This stability may be attributable to the essential nature of the commodities exported, which continued to be in demand despite global disruptions. Domestic and international cargo throughput by cargo type and per year at the 21 seaports in Northern Norway and Svalbard are Domestic and international cargo throughput per year at each of the 21 seaports in Northern Norway and Svalbard based on cargo types.

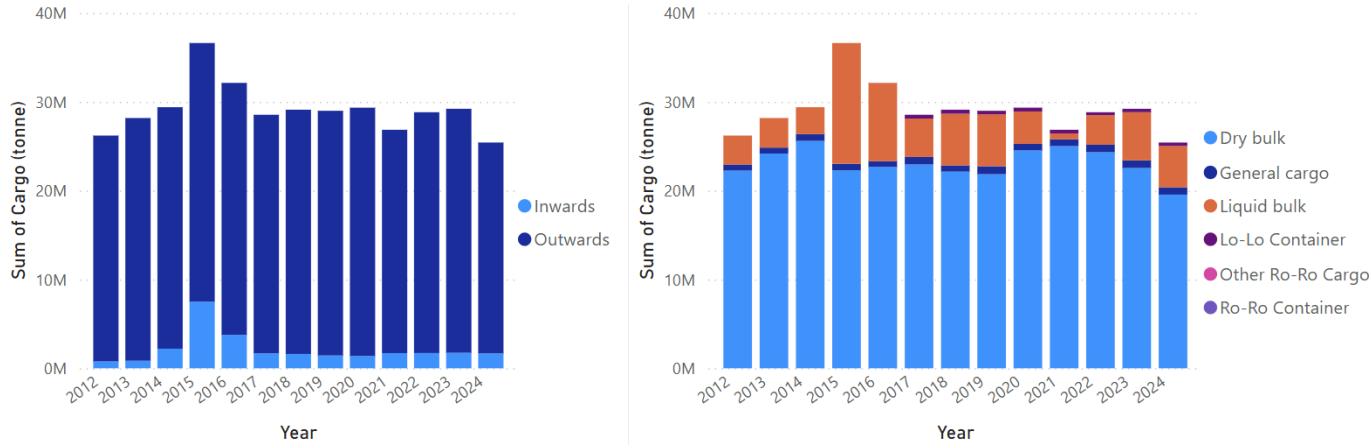

Figure 6: Cargo volume of international trade at the 10 main seaports in Northern Norway per year, 2012-2024. (a) Cargo volume by direction of transport for each year. (b) Cargo volume by type of cargo for each year.

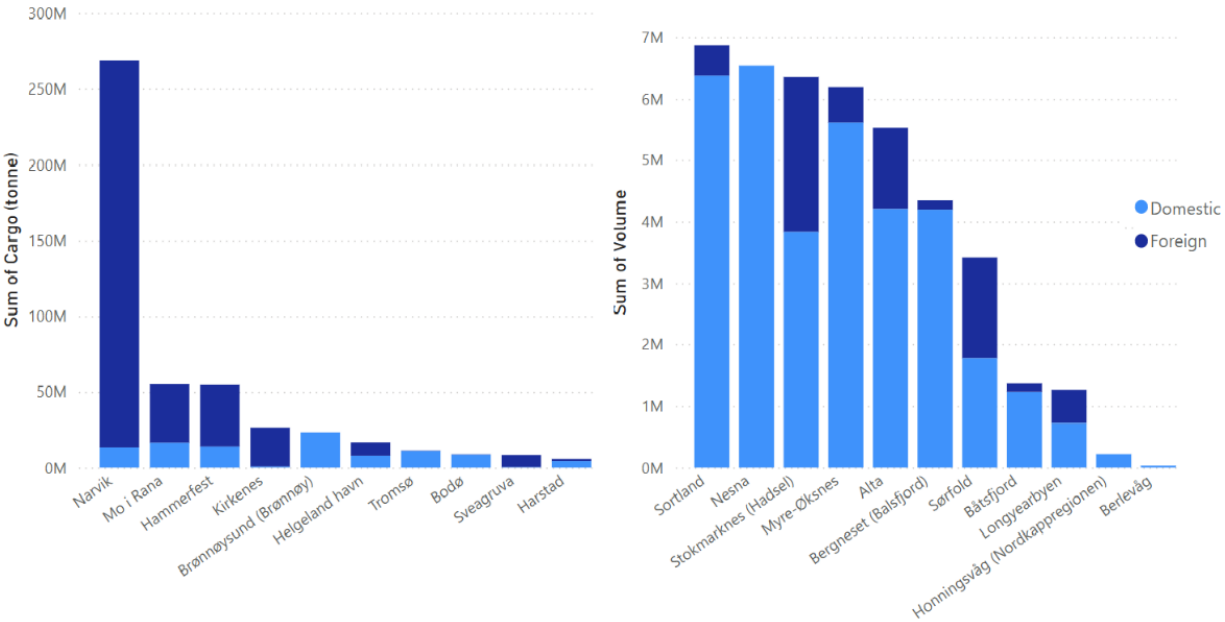

Figure 7: Total combined volume (in tonnes) of international and domestic trade at 21 seaports in Northern Norway over the period of 12 years, 2012-2024.

5.2 The cargo base in domestic and international maritime trade

This section provides a comprehensive cargo flow analysis at the selected 21 seaports in Northern Norway, examining their cargo handling capacities, trade volumes, economic contributions, and strategic significance. The *Appendix* provides detailed information on the types and volumes of cargo handled by the ports each year, for both domestic and international trade, during the 2012-2024 period. Seven of the seaports played active parts in international trade. These were the ports of Helgeland, Mo i Rana, Salten, Narvik, Hammerfest, Kirkenes, and Sveagruva. Other seaports primarily handled domestic cargo, but several of the ports registered small amounts of international trade in containers or general cargo. These were the ports of Bodø, Sortland, Hadsel, Myre-Øksnes, Harstad, Alta, Tromsø, and Båtsfjord. In addition to shipments from the selected seaports, several companies (in particular mining and seafood companies) shipped their goods from other smaller port locations closer to their production sites.

Dry bulk cargo

Most of the dry bulk cargo is for export and is transported to global markets by medium-size to very-large bulk carriers. In the study period, the Port of Narvik exported around 21 million tons annually of iron ore concentrate that had arrived on the Ofoten Railway from Kiruna in Sweden. The Port of Kirkenes exported a total about 5 million tons of iron ore concentrate from the Sydvaranger mine during the 2013-2015 period, before the iron ore mine was closed down in 2015. The Port of Sveagruva on Svalbard exported up to 2 million tons of coal annually before closing in 2017 (except for Mine 7, which closed in 2025). The Port of Mo i Rana exports about 1.8 million tons of iron ore concentrate annually from Rana Gruber. Other producers of dry bulk cargo are Heidelberg Cement with 0.5 million tons of cement production annually, and Yara Glomfjord with annual fertilizer production of 820,000 tons. Both companies are dependent on imports of various chemicals to feed their production processes.

Limestone and dolomite, which are important for the production of cement, make up the largest volumes of industrial minerals, with several active mines in Nordland. Some of the material produced is for domestic processing, and some is exported. The largest quartzite mine, serving the metal refining and alloys industry in Nordland, is in Austertana in Finnmark, with annual production of about 850,000 tons. Nepheline syenite mined in Stjernøya in Troms (with annual production of 300,000 tons) is only exported to the EU, as is graphite from the Trælen graphite deposit in Skaland on Senja in Troms. Companies (in particular mining companies) try to ship their extracted goods from terminals that are as close as possible to their mining and production sites, to minimize road transport.

Crushed stone aggregates, sand, and gravel are in high demand in Northern Norway. Sand and gravel are used in concrete and crushed stone aggregates in the foundations of buildings and infrastructure projects. Stone aggregates are commonly produced by blasting in stone quarries, then crushed and mechanically sorted into different grades of aggregate. Industrial production of natural stone in Northern Norway has traditions that go back several centuries,

including slate in Finnmark and Troms, and marble in Nordland. Ports handling the largest dry bulk volumes for the domestic market include Brønnøy (limestone), Bergneset (stone aggregates), and Nesna (stone aggregates).

Liquid bulk cargo

Liquid bulk cargo is the second most common cargo type in Northern Norway. Tankers export about 4.65 million tons of LNG annually from the Melkøya LNG plant at the Port of Hammerfest to the EU (in addition to 0.34 million tons of LPG and 0.73 million tons of gas condensate). Oil from Norwegian FPSO oil platforms in the Barents Sea is regularly exported directly by tankers to global markets, for which shoreside infrastructure is not required. Shoreside infrastructure was also not required for ship-to-ship transshipments of Russian LNG near Honningsvåg (from Yamal LNG terminal in the Ob Bay) in the 2018-2020 period, and ship-to-ship transshipments of Russian crude near Kirkenes (from Varandey terminal on the Pechora Sea), peaking in the 2015-2016 period.

Large volumes of various oil products are imported to Northern Norway and Svalbard, from heavy shipping oil to refined petroleum (gasoline and diesel) for local use and regional distribution.

General and containerized cargo

The metal refining industry in Northern Norway exports alloys as general cargo (break-bulk) and containerized cargo. Annual production for each plant (smelter) is commonly about 100,000 tons. All the plants are located in Nordland except the plant in Finnsnes in Troms. The industry is also dependent on imported raw materials for the production of different types of alloys (e.g., ferro-silicon; silicon-manganese, ferro-manganese) whereas production of silica and silicon metal relies primarily on Norway's own quartzite resources. The Port of Helgeland imports raw materials for aluminium production at the Alcoa plant in Mosjøen, then exports about 230,000 tons of the final product to international markets. The Port of Mo i Rana exports 770,000 tons annually of reinforced steel produced by Celsa Armeringstål (now 7-Steel Nordic) from recycled iron scrap.

The fishing industry in Northern Norway, a cornerstone of coastal communities, relies heavily on ports for landing catches, processing seafood, and distributing products. Among the selected 21 seaports fishing vessels unload their catch (mainly cod) at the following eleven seaports:[105] Båtsfjord, Honningsvåg, Hammerfest, Alta, Tromsø, Sortland, Hadsel, Øksnes, Bodø, Helgeland and Brønnøy. Frozen wild-caught cod and frozen farm-raised salmon are exported from several fishing ports by reefers/refrigerator vessels in temperature-controlled containers. The cargo can also include processed seafood which has been salted, smoked or dried. Several of the seaports also distribute large quantities of fish feed to aquaculture facilities all over Northern Norway. This applies in particular to the Ports of Bergneset, Myre-Øksnes, and Sortland. Non-perishable consumer goods, building and construction materials,

[105] Anne Turi Baklien and Trond Amund Steinset, "08868: Catch, by fishing vessel's landing municipality and main group of target species (M) (closed series) 2000 - 2018," ed. SSB (2019). https://www.ssb.no/en/statbank/table/08868/.; Kystverket, "Kart," (2025). https://kart.kystverket.no/.

vehicles, equipment, and machinery are transported in Northern Norway both as general cargo and as containerized cargo (ro/ro and lo/lo).

The focus of the seaports in Northern Norway on handling primarily dry and liquid bulk cargo reflects the region's strategic importance in the global commodities market. More than half of the mineral raw material production in Northern Norway is exported to global markets without further processing. Nevertheless, significant mineral processing and refining industries have been established in Northern Norway, based on local raw materials and renewable electrical power. Though the mineral industry’s share of the Norwegian economy is small compared to that of oil and gas, it plays a vital role in regional development, particularly in rural and remote areas, as employment in mining and related industries supports local communities and fosters economic diversification. As Norway transitions away from fossil fuels mining is expected to become an increasingly important sector, providing the raw materials needed for emerging green industries. Many potential mining sites in Northern Norway are located in remote areas and could be in operation for several decades, requiring significant investments in mining facilities and power utilities. Another important requirement is a reliable transportation system with connections to efficient and specialized seaports.

5.3 Partners in international trade

Northern Norway’s international trade connections are mainly with Europe and the Middle East, though trade does also extend to Asia and the Americas (*Figure 9*). From 2012 to 2024 the international cargo flow at the 10 major seaports in Northern Norway was primarily with the eleven countries shown in *Figure 10*. These countries imported substantially higher volumes of goods from Northern Norway than they exported. The only exception was Russia, which maintained a trade surplus with Northern Norway.

Dry bulk made up 77.8% of the total volume, consisting mainly of iron ores and metals sourced from mining operations in both Norway and Sweden. Liquid bulk cargo, representing 19.6% of the trade, was primarily derived from Norway's oil and gas sector, but also included imports of refined petroleum. While bulk cargo dominates, containerized trade exists on a much smaller scale. The Netherlands is the primary partner for containerized goods, handling 2,8 million tonnes, whereas the United Kingdom's containerized volume is negligible at only 2,000 tonnes.

Over the past thirteen years, the Netherlands has emerged as Northern Norway's leading international maritime trade partner, facilitating 76.1 million tonnes of cargo flow. This volume represents 19.9% of total cargo flow across all 62 trading partners, highlighting the Netherlands' significant role in the region's maritime commerce. Germany follows closely, contributing 59.5 million tonnes, or 15.6% of the total cargo. The substantial cargo volumes exchanged with these two nations far exceed those of other partners, underscoring their dominance in Northern Norway's maritime trade landscape.

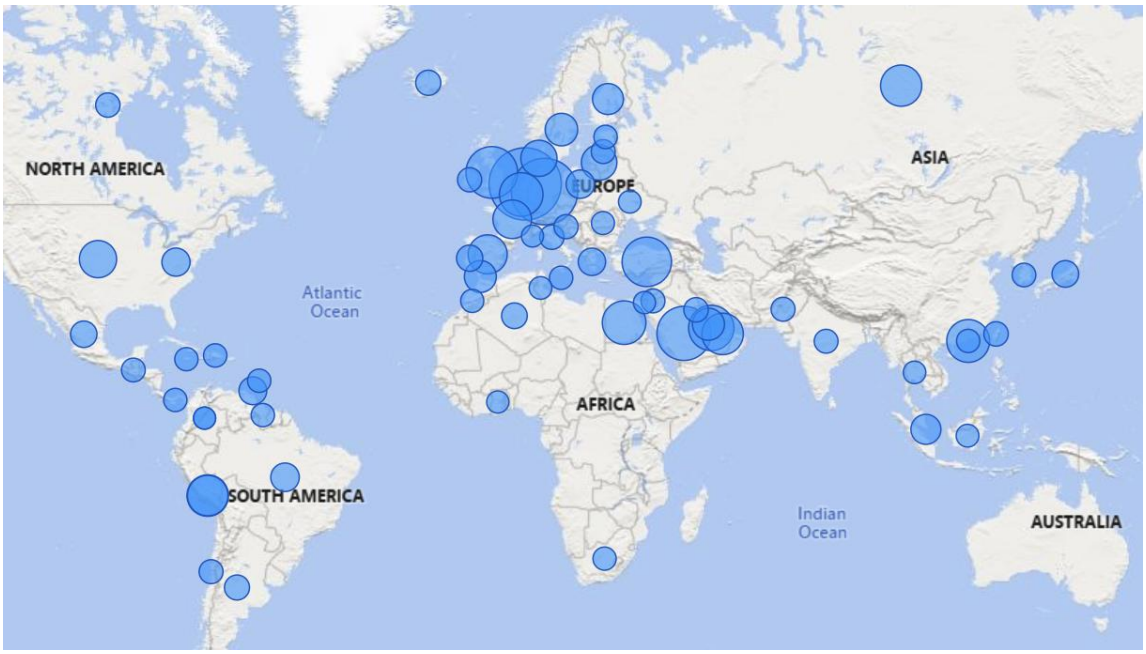

Figure 8: Mapping of international trading partners of Northern Norway in the 2012-2024 period. Source: Adapted from Eurostat table mar_go_qm_no

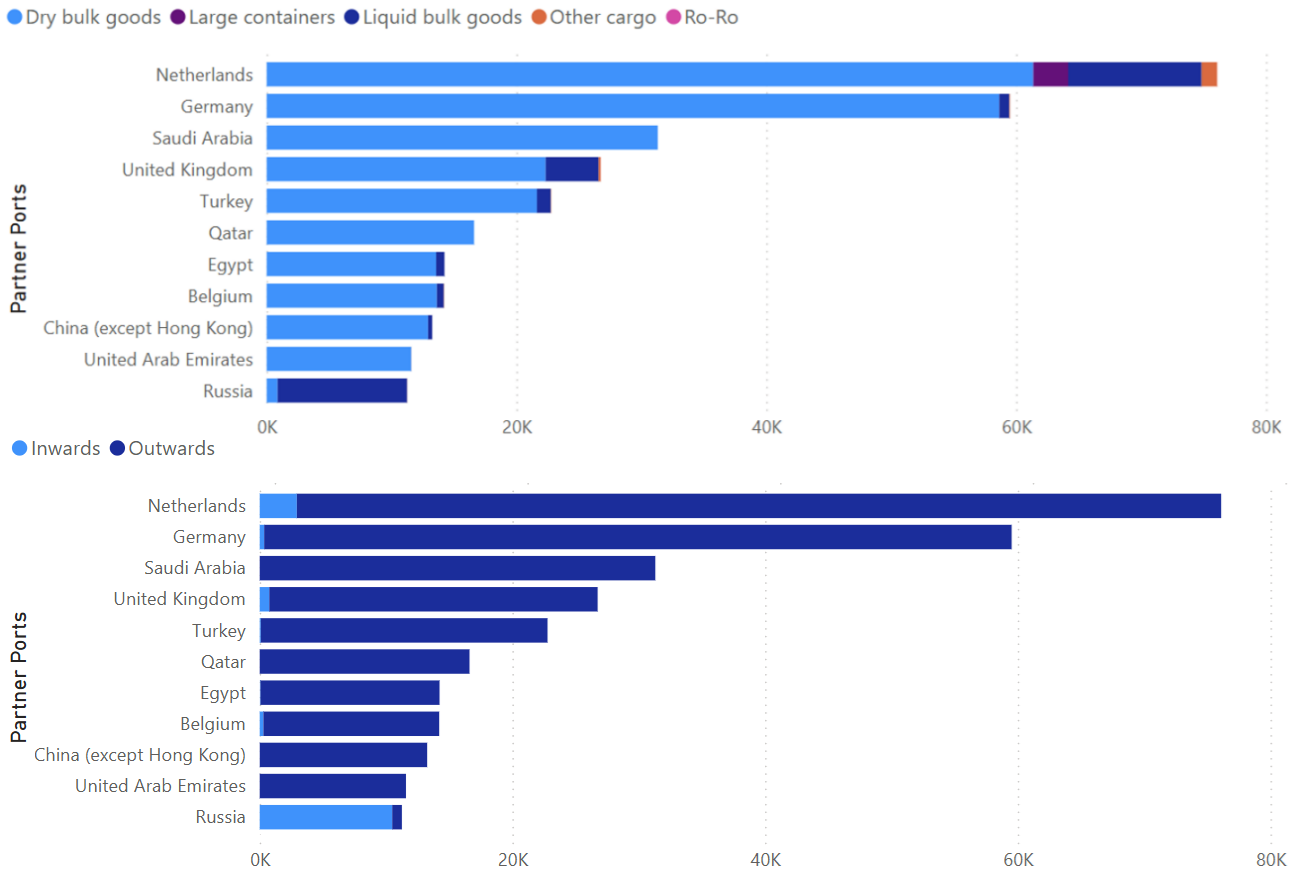

Figure 9: International trading partners of Northern Norway: sum of cargo volume in thousand tonnes, 2012-2024, by direction of flow and cargo type. Source: Adapted from Eurostat table mar_go_qm_no .

6. Norway's Future Strategic Industry

As discussed in Section 4, the EU's Critical Raw Material Act (CRMA)[106] clearly requires EU member states (and Norway as a member of the EEA) to increase exploitation of critical raw materials[107] within their national borders. The EU has identified 34 raw materials that are defined as critical, but this number will likely change in the future when the list is updated, which occurs every three years. Currently, the EU consumes about 25% of the world's critical raw materials but only produces 3%, making it heavily dependent on imports from other regions. Though the demand for these raw materials has increased, the current threat to supply is not a result of sudden scarcity or supply limitations, but rather of the fact that a large proportion of these critical raw materials is increasingly in the hands of only few countries with non-democratic governments, which can control the supply and subsequently the price of the commodities on global markets.

The goal is to reduce the current supply vulnerability by establishing a framework that ensures access and sustainable supply of these critical raw materials within EU.[108] This includes increased extraction from primary resources, as well as secondary recycled materials and reworking of older mine waste and tailings.[109] Several industrial minerals are also listed as critical raw materials.[110] Securing future access to critical raw materials is a prerequisite for any value chain in the mineral processing and metal refining sector, together with access to renewable energy sources. At the top of the EU's list of critical raw materials with high supply risks are rare earth elements (REEs), which are essential components in magnets, catalysts, optics, lasers, and semiconductor technology.

In the Norwegian Mineral Strategy of 2023[111] the government recognized Norwegian mining and mineral processing as industries of future strategic importance, driven by increasing global demand for critical raw materials to feed the green energy and digital transition. The government sees a significant opportunity for Norwegian mining companies to play a pivotal role in the green transition and in positioning Norway as a leader in innovative and environmentally friendly mining operations and mineral processing technologies. Norwegian mineral processing companies are encouraged to concentrate on high-value refined products

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[106] European Commission, "Critical Raw Materials Act," updated n.d., n.d., accessed 05.11, 2025, https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en.

[107] In 2023 the European Commission also defined a set of mineral raw materials of particular strategic value based on expected future production and demand.

[108] Every three years since 2011, the European Commission has assessed the supply risk and economic importance of raw materials required for the operation and development of industry in Europe. The results are presented in a list of 34 critical and strategic raw materials with the highest supply risks and greatest importance for the European economy.

[109] Nordic Innovation, *Recycling of Critical Raw Materials in the Nordics* (2024), https://www.nordicinnovation.org/2024/recycling-critical-raw-materials-nordics.

[110] Critical industrial minerals in Norway used for their physical and chemical properties include barite, dolomite (an Mg mineral), olivine (an Mg mineral), feldspar and nepheline syenite, fluorspar, natural graphite, phosphate, and quartz (of a high enough grade to produce Si).

[111] Industry and Fisheries Norwegian Ministry of Trade, *Norwegian Mineral Strategy* (2024), https://www.regjeringen.no/contentassets/1614eb7b10cd4a7cb58fa6245159a547/norges-mineralstrategi_engelsk_uu.pdf.

that are of critical industrial importance for both domestic and export markets. The government's aim is to unlock the full potential of the country's mineral resources while maintaining high standards of environmental and social responsibility. The last few years, with the pandemic and war in Eastern Europe, have changed perspectives on access to resources, and on the need to secure the local mineral industry by enhancing its resource autonomy and self-sufficiency.

Norway has significant potential as a source of several critical raw materials,[112] including graphite, high-purity quartz, copper, nickel, titanium minerals, REEs, phosphate, cobalt, niobium and vanadium. Norway has already identified possible REE deposits, the most important of which is the Fen deposit at Ulefoss in Telemark in Southern Norway. The Fen deposit may prove to be one of Europe's largest REE deposits.

Norway has access to cheap renewable electricity, which is generally the most expensive component of metal production. This has resulted in Norway being an important producer of nickel, cobalt, and aluminium, extracted from imported raw materials. Access to cheap electricity will become increasingly important.

Future development of the mining industry in Norway will require strong governmental involvement and oversight. The government is already considering several policy measures to stimulate increased extraction of critical raw materials. These measures include facilitating a faster permitting process and designating the Directorate of Mining as the main governmental authority responsible for overseeing and coordinating critical mineral projects. Detailed geological exploration and mapping of mineral resources is planned.

The mining industry also requires extensive capital investments. The government is considering policy instruments that could help give profitable mineral projects access to private capital. One idea is to set up a state-owned mineral company (similar to Equinor for oil and gas) or investment fund in order to ensure the profitable and sustainable development of critical raw material projects. Currently, the Norwegian government does not have such an ownership stake in the mineral industry on mainland Norway (although the coal mines on Svalbard are state-owned). Both Sweden and Finland have leading state-owned mining companies that manage their governments' mining assets and are responsible for developing the mining industry value chain (for example, LKAB in Sweden and the Finnish Minerals Group in Finland). In Norway, foreign or multinational enterprises own many of the larger export-oriented mining and mineral processing companies, and as of today there are no restrictions on foreign ownership in the mining sector in Norway.

Expanding the mineral sector could help Norway diversify its economy away from oil and gas, as discussed in Section 3. The mining sector's contribution to the Norwegian economy is currently limited. However, the sector provides jobs, revenue, and export opportunities, and while the industry's share of GDP is small compared to that of oil and gas, it plays a vital role in regional development, particularly in rural and remote areas. Employment in mining and related industries supports local communities and fosters economic diversification. As Norway transitions away from fossil fuels, mining is expected to become an increasingly

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[112] Håvard Gautneb, Terje Bjerkgård, and Jan Sverre Sandstad, "Overview of critical metals and minerals In Norway," (2024).

important sector, providing the raw materials needed for the green energy transition and emerging green technologies and industries.

6.1 Nordic cooperation on critical raw materials

The Nordic region (i.e., Norway, Sweden, Finland and Greenland/Denmark) has substantial supplies of critical raw materials[113] that are essential for Europe's green energy transition and future competitiveness and security.[114] The geological evolution of the region is comparable to the most ore-rich areas of the world (Canada, Australia, and South Africa). Several known metal-rich geological formations in the Nordic region extend across borders between neighbouring countries (*Figure 11*). Within the four countries many moderate to major deposits of critical raw materials have been identified but are still largely unexploited.[115] Greenland has the greatest supply potential for critical and strategic metals, and hosts the world's largest REE deposits, but no mining activities have been undertaken to date.

To assess future mining possibilities the governments of the Nordic countries have instructed their corresponding geological surveys to work together and establish a joint Nordic database of critical raw materials, making it easier for decision-makers and businesses to see future mining opportunities in the region.[116] Looking at the Nordic region as one big market for critical raw materials will also attract more international capital and increase the competitiveness of the Nordic mining sector on the global market.

A comprehensive Nordic plan could escalate mineral extraction and production and thus make the whole region more resilient to future supply risks.[117] Increase domestic processing of minerals and manufacturing capacity would enhance regional value creation and position the Nordic region as a leader in energy-efficient and environmentally friendly mineral processing and production technologies for several critical and strategically important metals. The Nordic countries already share a long history of smelting and refining metal, which includes the processing of some critical raw materials. Nordic countries have an advantage here due to a combination of a high-tech mining industry combined with environmental and health regulations for mining and mineral processing that are stricter than those of many other mining regions worldwide.

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[113] Based on a definition provided by the European Council: Those raw materials that are most important economically and have a high supply risk are called critical raw materials. Critical raw materials are essential to the functioning and integrity of a wide range of industrial ecosystems. European Council 2024; European Council, "An EU critical raw materials act for the future of EU supply chains," updated 21.03.2025, 2023, accessed 05.11, 2025, https://www.consilium.europa.eu/en/infographics/critical-raw-materials/.

[114] European Commission, "Critical raw materials," updated 11.10.2025, 2022, accessed 05.11, 2025, https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en.

[115] Erik Jonsson et al., "Critical metals and minerals in the Nordic countries of Europe: diversity of mineralization and green energy potential," (2023).

[116] Eilu Pasi et al., *The Nordic Supply Potential of Critical Metals and Minerals for a Green Energy Transition*, Nordic Council of Ministers and Nordic Innovation (2021).

[117] Nordic Innovation, "The Nordic Sustainable Minerals Program 2021-2024," updated 19.05.2025, 2021, accessed 05.11, 2025, https://www.nordicinnovation.org/programs/sustainable-minerals.

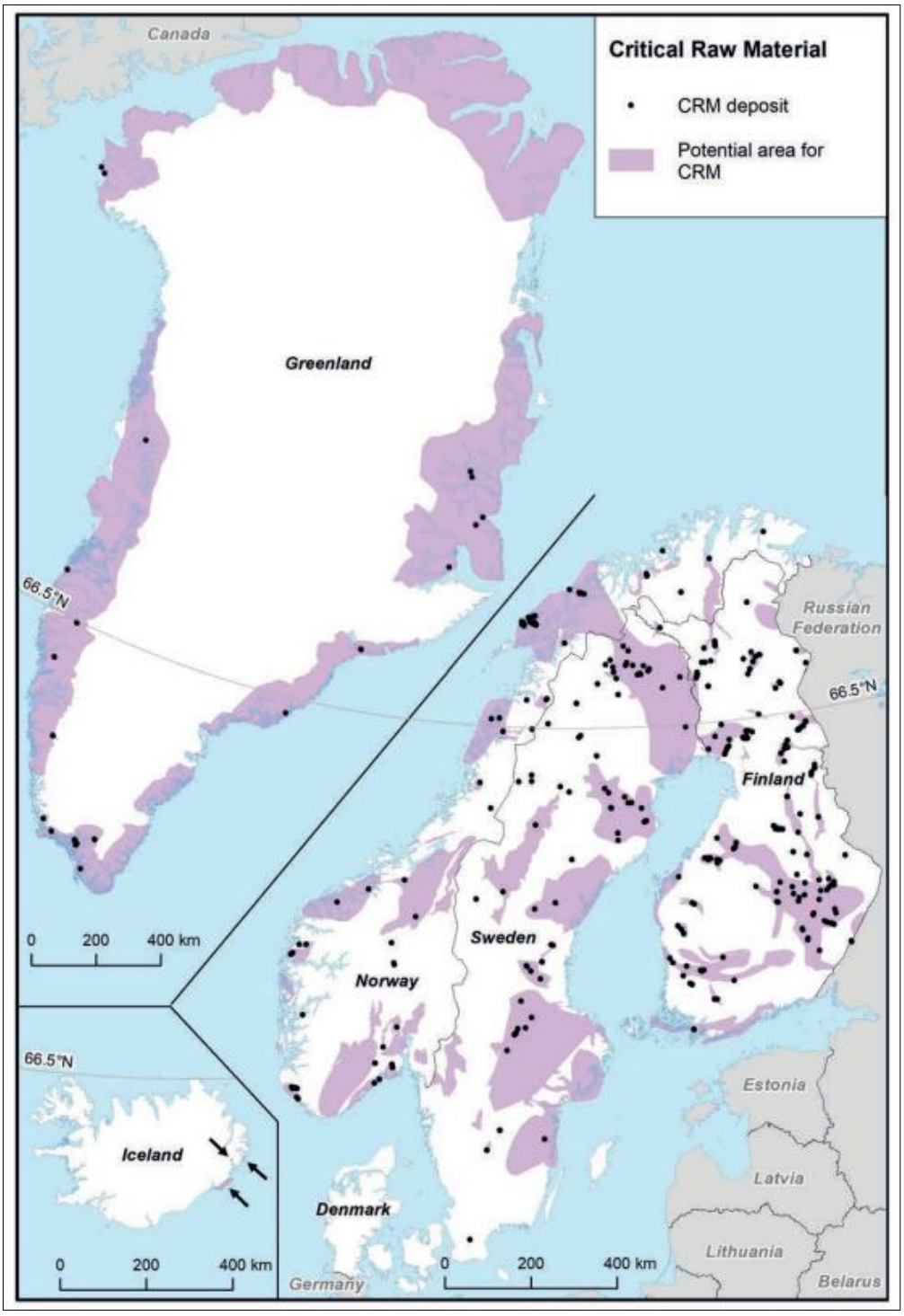


Figure 10: Locations of known and potential critical raw material deposits in the Nordic countries. Source: Nordic Innovation 2021[118]

[118] Pasi et al., *The Nordic Supply Potential of Critical Metals and Minerals for a Green Energy Transition*.

7. Conclusion

This first report of the BEAR Project provides a comprehensive analysis of transport-intensive industries in Northern Norway and examines the region's maritime cargo base, trade patterns, and future industrial potential. Consistent with the report's applied and empirical scope, this conclusion focuses on synthesizing the quantitative data and qualitative insights gathered by the study. The report concludes that Northern Norway's economy is at a critical juncture. The region has significant mineral deposits, renewable energy sources, and a world-leading seafood industry, but long transport distances to markets for the export-oriented industries lead to significant costs, demanding that local products be of exceptional quality, rarity, or a superior environmental footprint to remain competitive.

The region is dependent on maritime trade for bulk commodities yet reliant on overburdened roads for high-value perishables; poised for a green industrial revolution that depends on strategic infrastructure investment and coherent policy; and needs to cultivate higher-value industries and increase the domestic processing of existing resources. These actions will require strong and consistent political leadership at both state and local levels to facilitate and support transport and industrial development; if this is done, a more diversified, resilient, and sustainable economic future can be fostered in Northern Norway.

Analysis of the region's transport-intensive industries reveals, on one hand, that the maritime sector is the undisputed backbone for bulk cargo. Industries such as petroleum, mining, and power-intensive manufacturing are almost entirely dependent on seaports and specialized terminals. This is confirmed by cargo flow data from 21 seaports in Northern Norway for the 2012-2024 period. On the other hand, a critical segment of Northern Norway's economy, the seafood industry, is highly reliant on road transport for its most valuable products, with approximately 80% of fresh seafood exported via trailer trucks. This creates immense pressure on the road network, which is already struggling to cope with high traffic volumes. This mode choice, due to the need for speed and flexibility when transporting perishable goods, represents a significant logistical inefficiency and a major bottleneck for the industry's ambitious future growth targets.

Other key findings include:

1. The need for economic diversification: Norway's national economy is largely dependent on commodity exports, which represented 91% of exports by total value in 2022. Such strong dependence comes with economic vulnerability due to the volatile price cycles typical of global commodity markets, posing a strategic risk and underscoring the urgent need for economic diversification.

2. How to manage the renewable energy surplus: Northern Norway's electricity surplus and low-cost hydropower presents a powerful competitive advantage. It attracts power-intensive industries and positions Northern Norway as a potential hub for green energy production. However, this surplus is finite. Suggested future projects, such as using renewable energy sources for the electrification of oil and gas installations on the Norwegian continental shelf, may consume this advantage and increase electricity prices, potentially discouraging future investments. Therefore, the allocation of energy and grid capacity is a critical policy issue that will shape the region's industrial landscape.

3. Mining for critical raw materials: The development of Norway's mineral resources, particularly the critical raw materials essential for the green and digital transitions, has been identified as a strategic national priority. Northern Norway possesses significant deposits of these materials. Unlocking this potential is a key pathway to economic diversification and will help create job opportunities and increase income in remote areas. However, realizing this potential requires overcoming significant obstacles, including lengthy permitting processes for mining operations, access to capital, and ensuring the development is sustainable and has a low environmental footprint. The future success of companies in the industry will depend on a holistic ecosystem encompassing reliable transport, affordable energy, strong political leadership, access to technology, and the availability of a skilled workforce. Furthermore, the report highlights the strategic necessity of Nordic cooperation regarding critical raw materials. By aligning with the EU's Critical Raw Materials Act and establishing a joint Nordic mineral database, Northern Norway can leverage cross-border geological resources to enhance regional resilience and attract international investment.

Limitations of the study. This report serves as a foundational document for understanding the logistical dynamics of the High North. It aims to provide a robust knowledge base for policymakers, industry stakeholders, and researchers. However, the reliability of its findings is fundamentally influenced by the following limitations.

First, the prediction in this report regarding Nordic cooperation on critical raw materials is based on optimistic expectations of future green industries in the region. The future cargo base described in the report heavily depends on announced industrial projects that are extremely sensitive to global subsidy schemes and capital markets. The high mortality rate of these green industrial initiatives suggests that the projected demand for new port infrastructure may be overestimated.

Second, the mining section relies on the presence of geological resources to project future importance. However, this prediction neglects economic feasibility in the High North. The report discusses the "potential" of critical raw materials like REEs and graphite but does not deeply analyse the supply chain cost that has historically made Northern Norwegian mines less competitive than those in easier-to-access regions. The reasons for the extra cost in the High North include winter maintenance, long distances to market, and the need to attract a labour force to work in remote areas.

Third, due to the 2022 Russian invasion of Ukraine the research scope was narrowed down from the Barents Euro-Arctic Region to Northern Scandinavia. While this shift reflects the new geopolitical reality, it limits the report's utility for predicting long-term scenarios in which relations are normalized or where Russia continues to develop the Northern Sea Route with non-European partners such as China. The report positions Northern Norway as a logistics hub connecting the Nordics and the European mainland, rather than a transit node in a broader Eurasian network.

8. Recommendations

Based on the conclusions above, this section presents a set of strategic recommendations designed to guide policymakers, industry stakeholders, and infrastructure planners toward fostering a more diversified, resilient, and sustainable economic future for Northern Norway.

1. Emphasize economic diversification: The state must play a more active role in business policy by emphasizing innovation and diversifying the economy, actively promoting a shift from exporting unprocessed materials to manufacturing more specialized, high-value products that are higher up the value chain. This concept refers to the strategic shift from low-margin activities—such as simple raw material extraction—to high-value activities that involve processing, manufacturing, and specialization.

2. Integrate transport and industrial strategies and policies: Future industrial competitiveness is predicted by a reliable, effective, and fully integrated transport system. A holistic approach is needed that combines strategic transport infrastructure planning with industrial and land-use planning. Proactive land-use planning will minimize transport costs and reduce logistical bottlenecks for both import of materials and export of finished products.

3. Prioritize sea-land intermodal connectivity: The primary focus should be on strengthening the maritime backbone and investing in robust road and railway connections to key seaports. This is a fundamental precondition for enabling modal shifts and ensuring efficient, cost-effective export routes. In addition, technologies that enable the seafood industry to shift from road to sea transport (such as supercooling technology and floating slaughterhouses) should also receive government incentives.

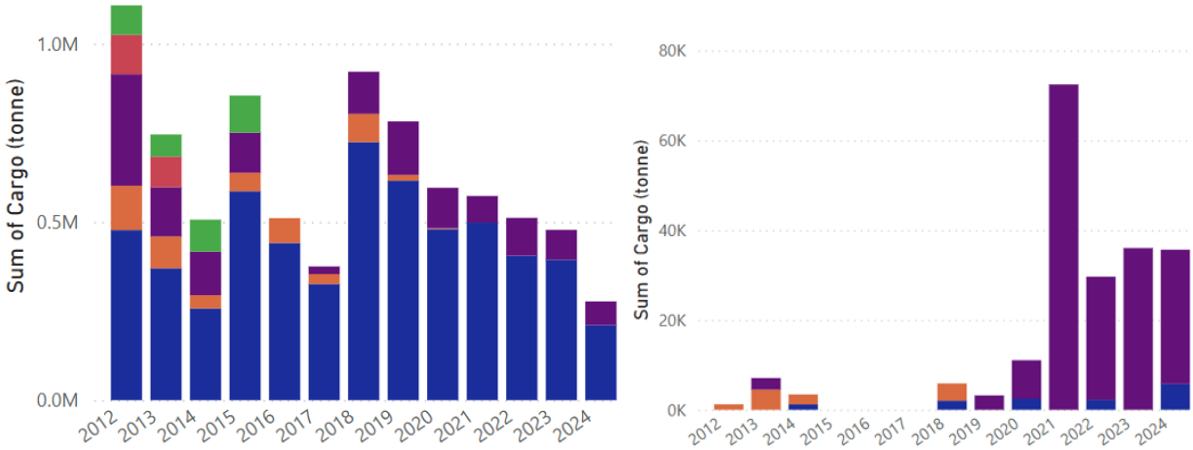
4. Prioritize local industry when allocating energy: A clear policy framework should be established to prioritize allocation of the region's renewable energy resources to local power-intensive industries and for local value creation, rather than being solely exported or used to meet national goals elsewhere. This strategy will bring industry to the power source and attract new green companies. Grid capacity must be managed wisely (including management of existing loads and physical upgrades) to ensure competitiveness. A careful balance must be struck between using renewable energy to achieve national CO_2 reduction goals and ensuring there is sufficient and affordable power for industrial production. Allowing high-demand projects to drive up electricity prices will deter future industrial operations and undermine the region's competitive advantage.

5. Invest in competence and technology: One of the major barriers to realizing Northern Norway’s industrial potential is the lack of skilled workforce. This should be addressed as a national priority. Vocational training programs need to be established in the region, and these should be closely aligned with the future needs of the industry and green technology sector.

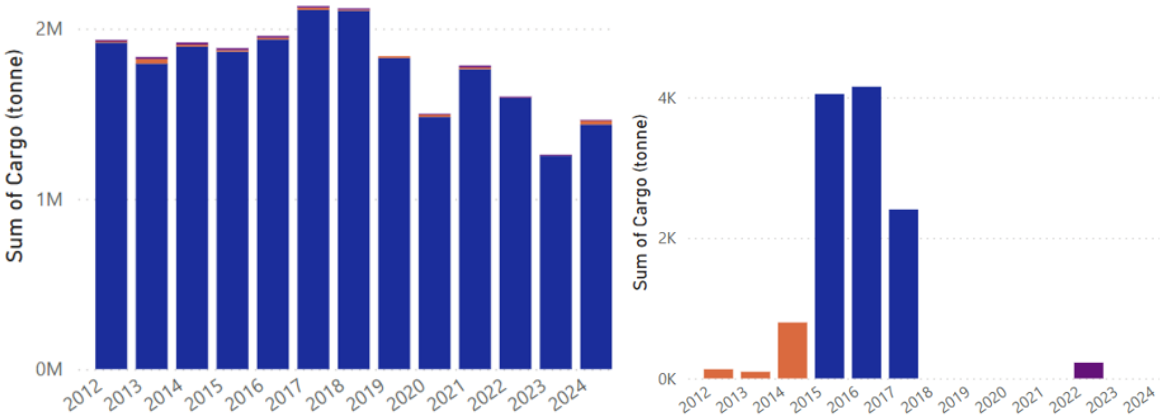
Appendix

The appendix is in support of sub-section 5.2 on the maritime cargo base, providing detailed information on the types and volumes of cargo handled by the 21 seaports in Northern Norway and Svalbard during 2012-2024 for both domestic and international trade.

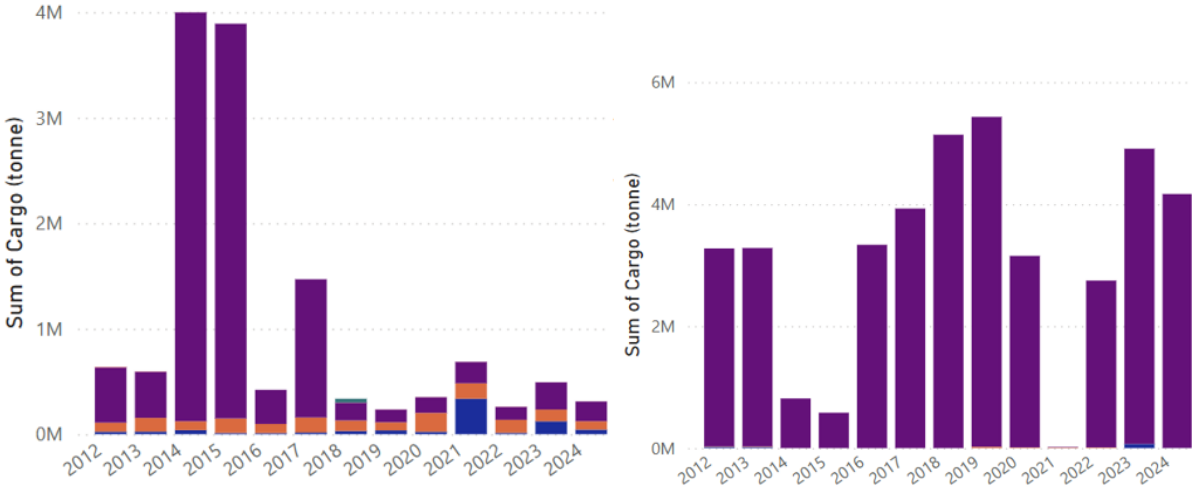
Domestic ***Port of Bodø*** *International*



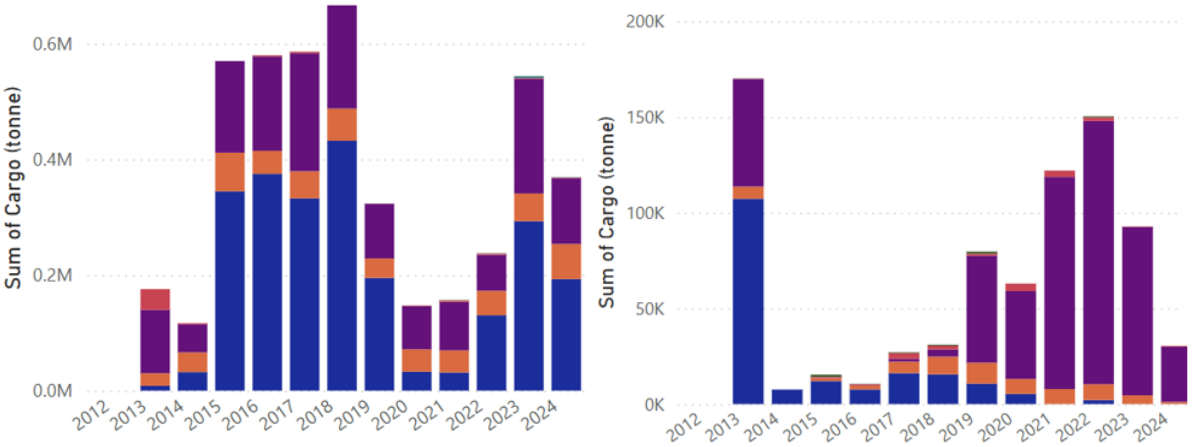
Domestic ***Port of Brønnøy*** *International*



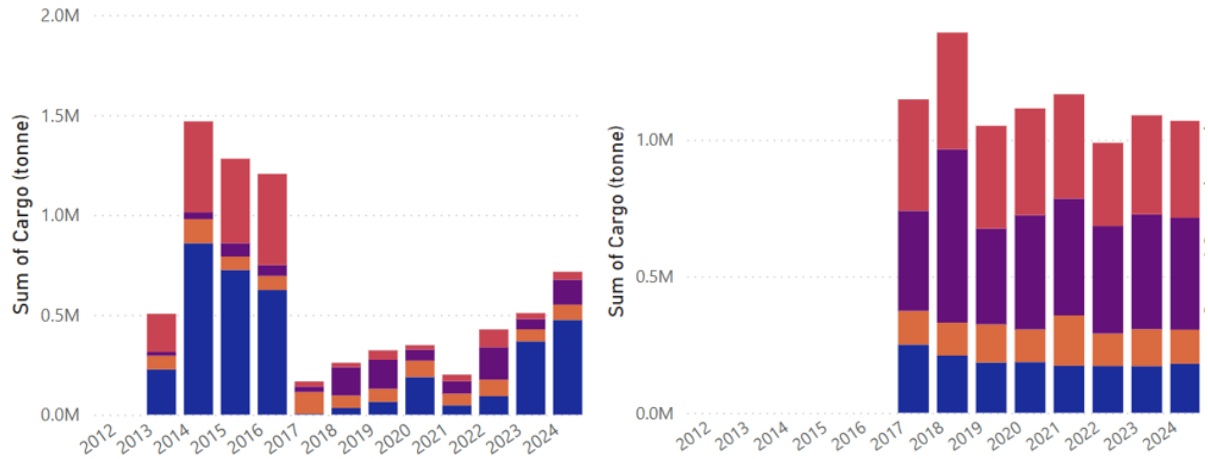
Domestic ***Port of Hammerfest*** *International*



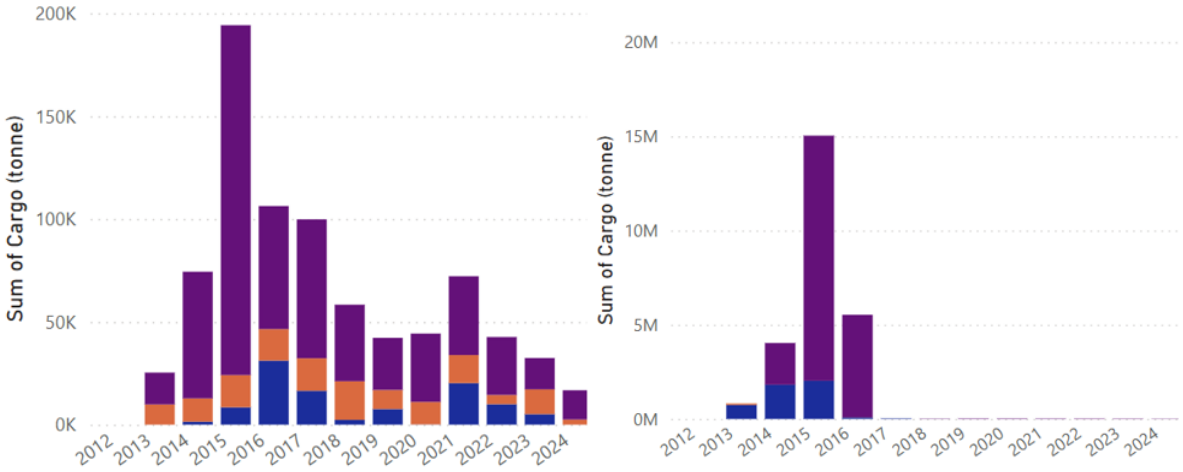
Domestic ***Port of Harstad*** *International*



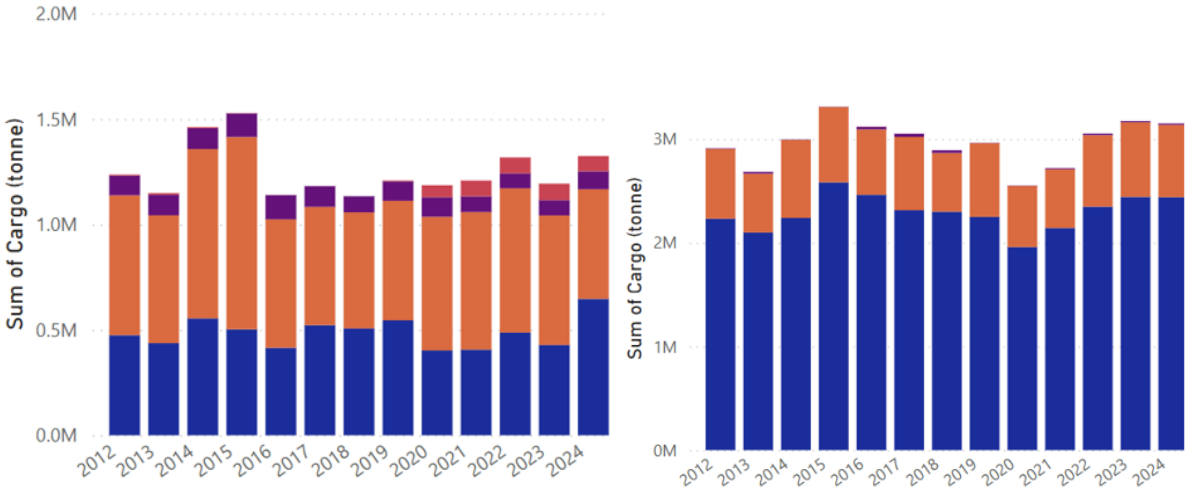
Domestic ***Port of Helgeland*** *International*



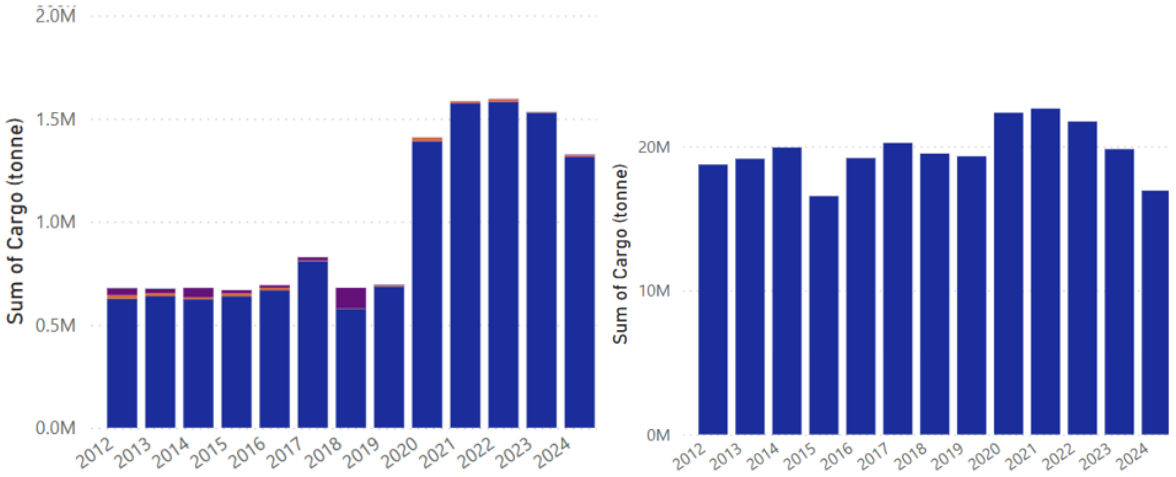
Domestic ***Port of Kirkenes*** *International*



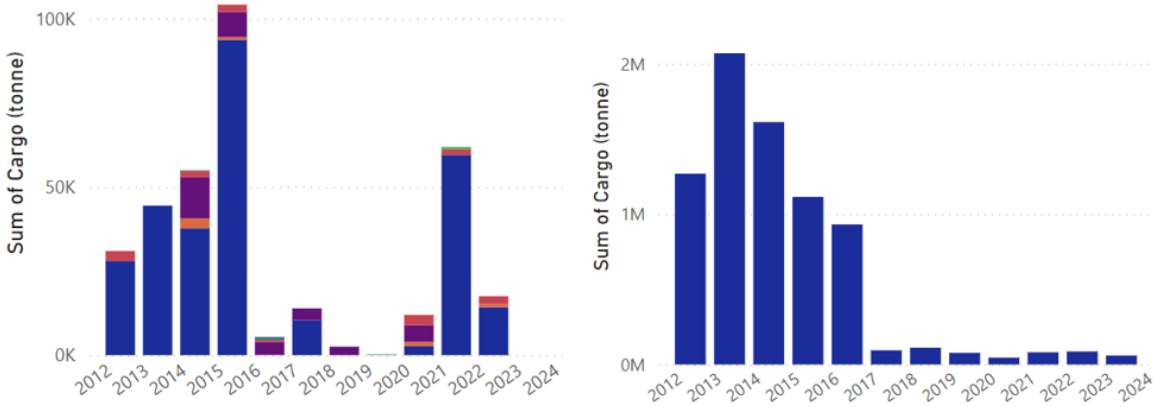
Domestic ***Port of Mo i Rana*** *International*



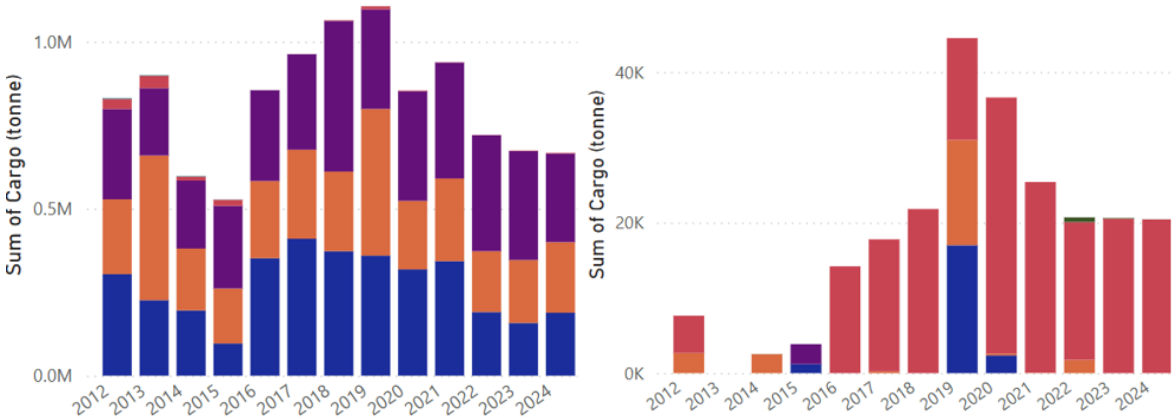
Domestic ***Port of Narvik*** *International*



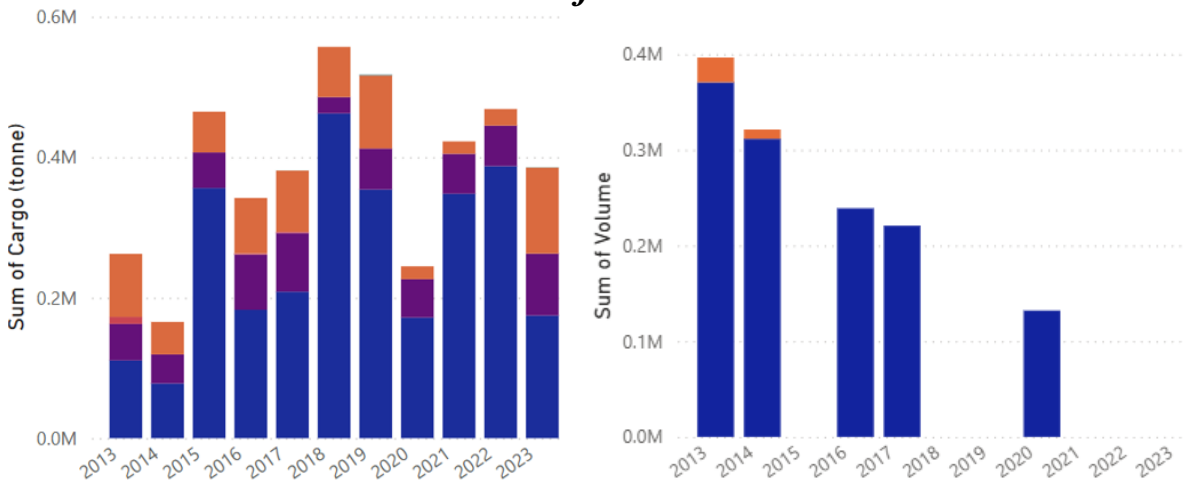
Domestic ***Port of Sveagruva*** *International*



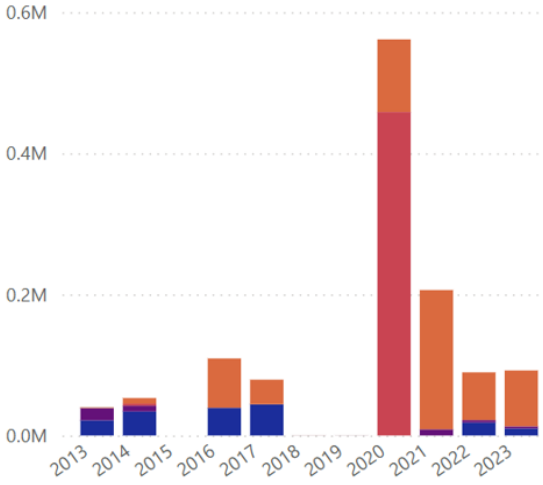
Domestic ***Port of Tromsø*** *International*

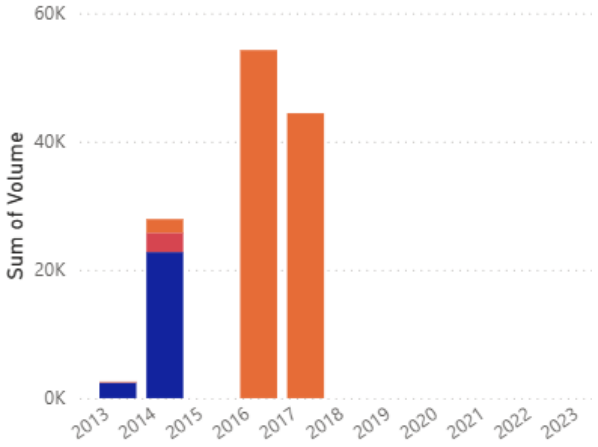


Domestic ***Port of Alta*** *International*

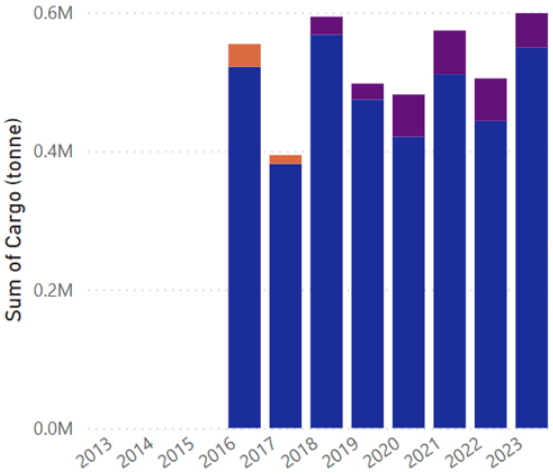


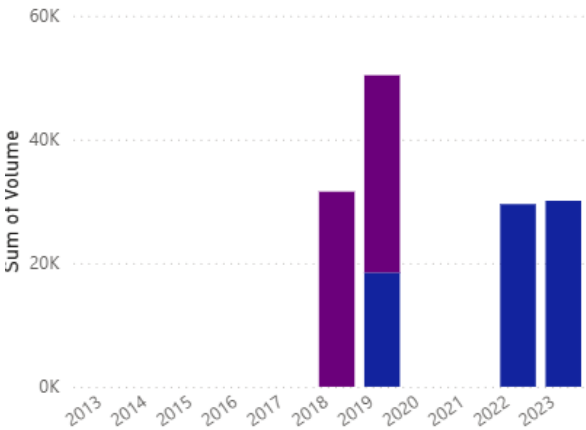
Domestic ***Port of Båtsfjord*** *International*



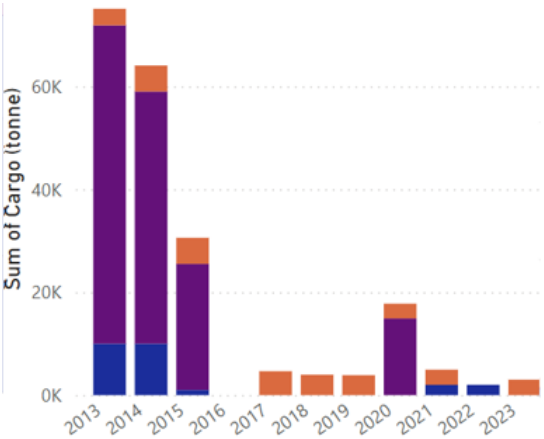


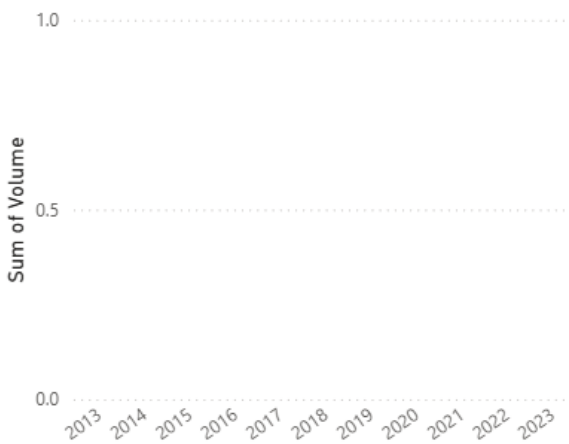
Domestic ***Port of Bergneset*** *International*



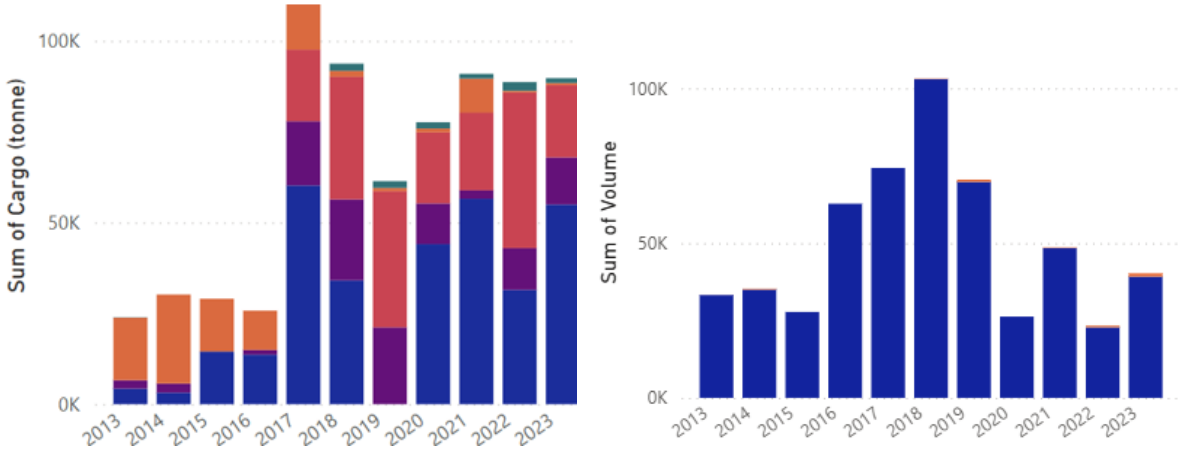


Domestic ***Port of Honningsvåg*** *International*

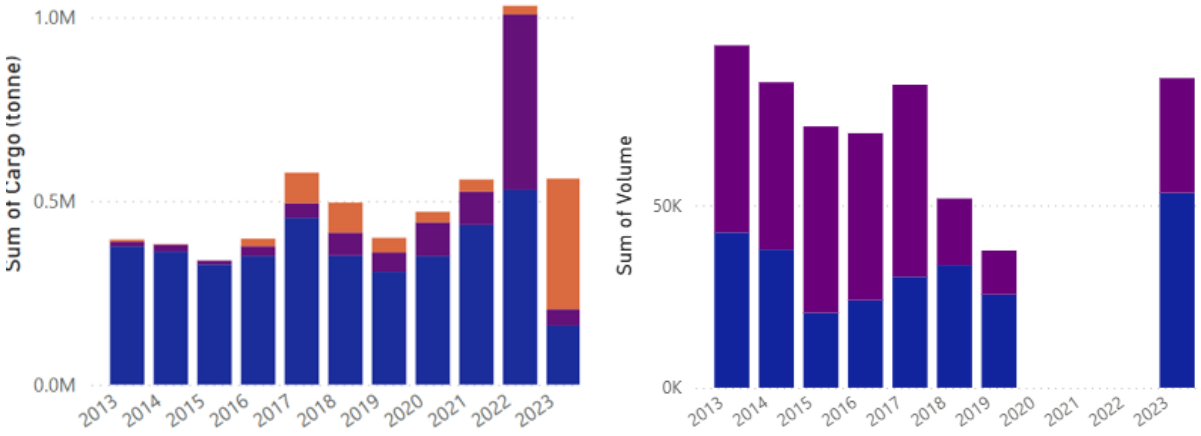




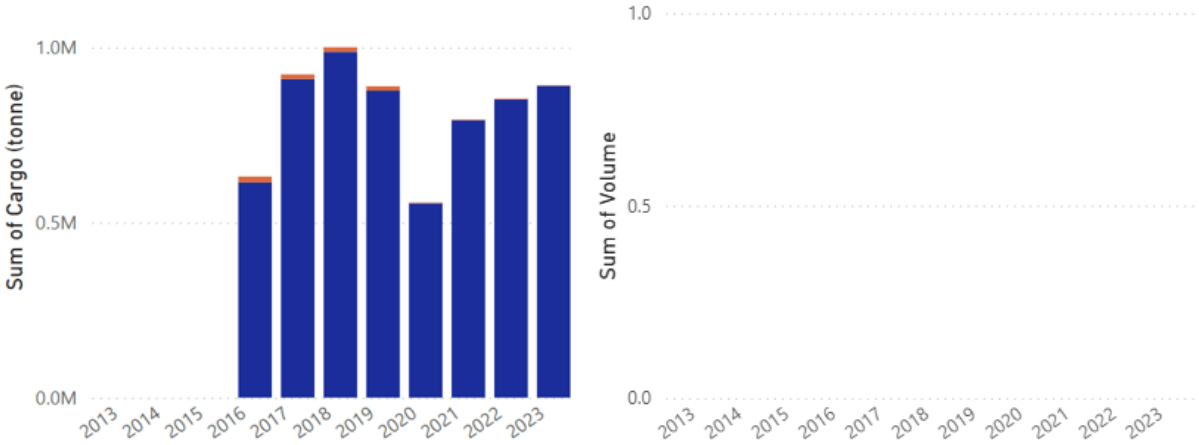
Domestic ***Port of Longyearbyen*** *International*



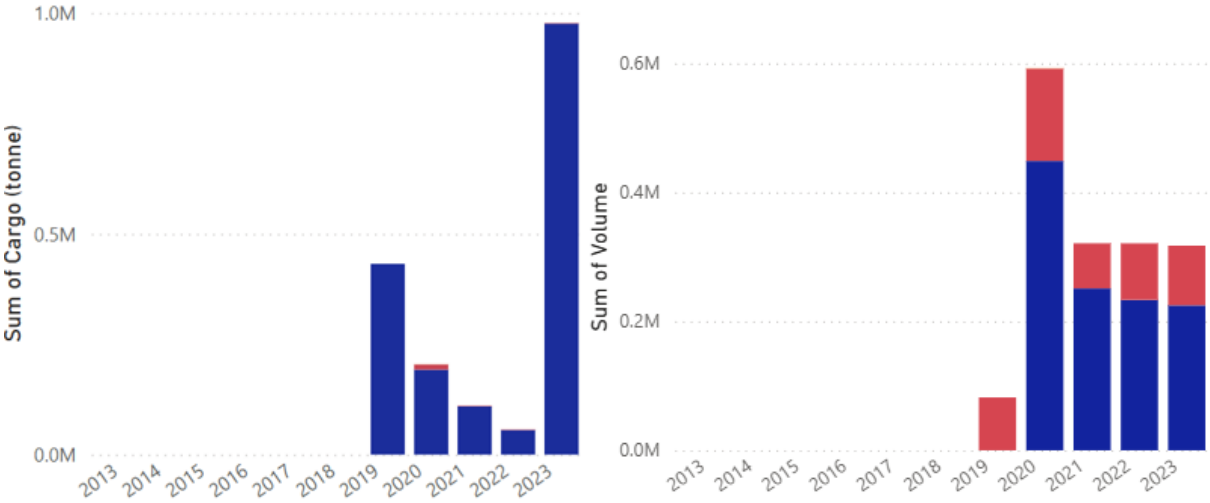
Domestic ***Port of Myre-Øksnes*** *International*



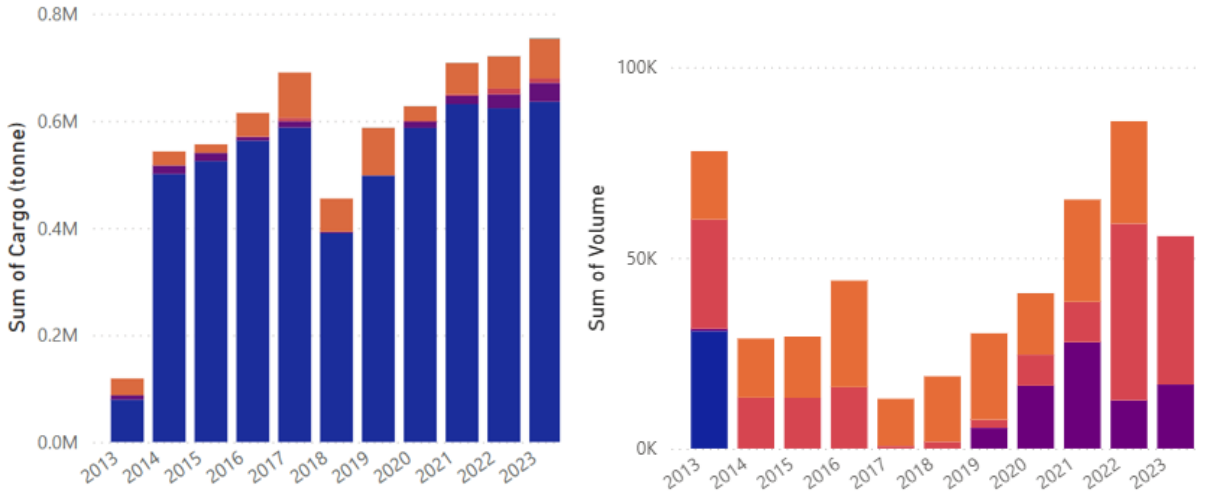
Domestic ***Port of Nesna*** *International*



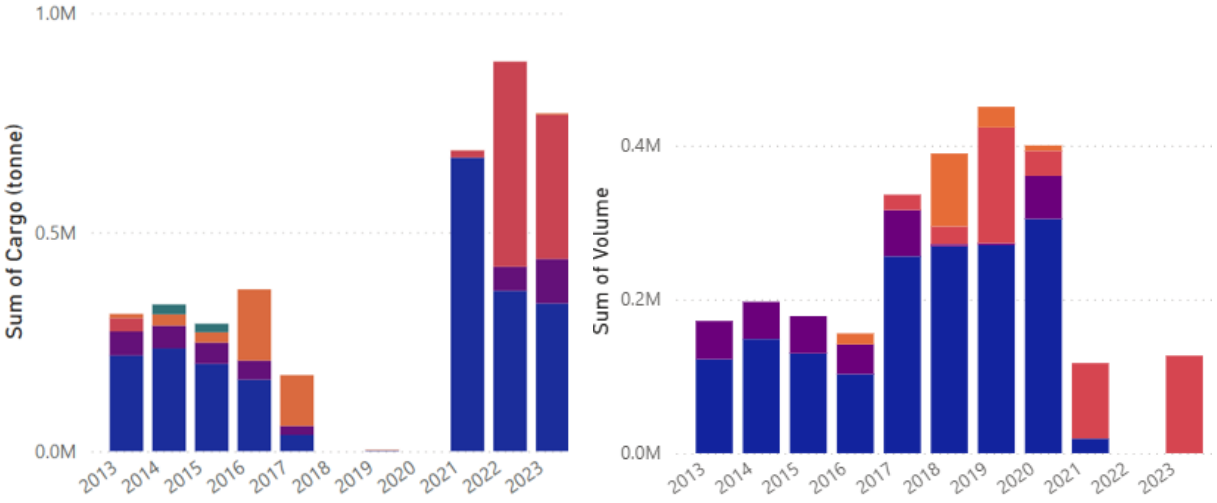
Domestic ***Port of Salten (Sørfold)*** *International*



Domestic ***Port of Sortland*** *International*



Domestic ***Port of Hadsel*** *International*



Domestic ***Port of Berlevåg*** *International*