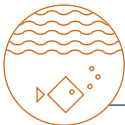


'Governance' is defined as the formal structures – on both the international, national and local level – that governs and regulates the various industries examined: offshore petroleum, offshore wind, fisheries, aquaculture and maritime transportation. On the national and local level, both Alaska and North Norway have a highly developed and complex regulative system. An important distinction – e.g. in the petroleum sector – is, however, that the US system is mainly prescriptive requiring industry standards through regulatory incorporation, setting specific technical and procedural requirements. Norway's system on the other hand can be characterized as a performance-based regulatory system with rather few mandatory technical requirements.



Maritime Transportation

With regard to maritime transportation, a comparison of the regulatory system of Alaska and North Norway in isolation does not bring that much to the table. Except for specific rules and standards for shipping around Svalbard, Norway has not developed specific national standards for Arctic shipping. Regulations for regional shipping of relevance should therefore be emphasized. To make Arctic shipping commercial and environmental viable regional and international cooperation is a necessity.



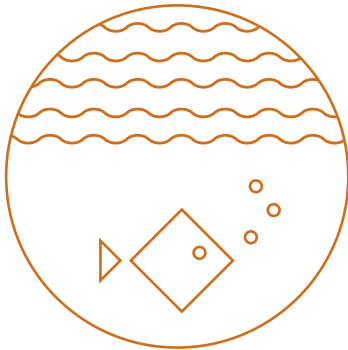
Fisheries

Also, fisheries are set in very different contexts. Alaskan fisheries management is characterized by close cooperation between federal and state authorities, while in Norway there is no management level below the national. On one hand, this is perhaps not so surprising given that the US is a federal state, while Norway is not. On the other hand, management can be delegated to the regional level also in non-federative states, and in Norway fisheries play a big role both economically and culturally in the northern and western parts of the country, but less in the more heavily populated eastern parts. There have been regular calls for regionalization in Norwegian fisheries management over the years, but national authorities have persistently opposed this. The devolution of the governance from federal to state level, prioritizing the domestic needs of the state could, however, be an example for Norway, since several issues with the Norwegian fisheries policy derive from the centralization of fisheries governance around Oslo.



Promoting Good Governance and Best Practices

Strengthen regional and international cooperation for sharing best practice and common regulative standards. This should be done via the Arctic Council and its various working groups, the International Maritime Organization (IMO), or by looking at the potential for a certification programs on sustainable Arctic aquaculture. Also, the potential of existing similarities such as the use of the precautionary approach in fisheries management could be explored further.



The fishing industry in the Arctic is currently undergoing a process of transformation driven by climate change, the global market's continuously increasing demand for fish, and the fact that most fisheries elsewhere are depleted and/or being fished at full capacity. Moreover, also the economic value of Arctic fish has been declining steadily – at least for some types of fish.

However, in Alaska and North Norway, the fisheries and aquaculture industries are among the best-managed and most sustainable in the world, counting for a substantial amount of landings and production in the United States and Norway.

ALASKA

NORTH NORWAY

Wholesale Value /
Landed value

~ **\$4.5** billion

~ **\$1.6** billion
(NOK 12.9 billion)

Fish landings
(metric tons)

~ **2.7** million

~ **1** million

Employment
(fisheries and
aquaculture)

~ **50,000**

~ **10,000**

Fishing vessels

~ **9,000**

~ **3,200**

Salmon production
(fish for food – tons)

~ **660,000** mt

~ **500,000** mt
(~ 550,000 tons)

Salmon production
(first-hand value)

\$650 million
in 2019

\$3.5 billion
(NOK 28 billion) in
2018

ALASKA

Alaska produces more than half the fish caught in waters off the coast of the United States, with an average wholesale value of nearly \$4.5 billion a year. If Alaska were its own country, it'd be the sixth-largest fishing nation in the world. The seafood industry contributes more than \$250 million in taxes and fees to the State, municipalities and a wide spectrum of state and federal agencies, providing numerous opportunities for the State's population.

In total, the seafood industry of Alaska adds yearly \$5.2 billion to the State's economy. Most of this revenue can be attributed to the abundance of wild salmon in its waters. Among all species in the Alaska seafood industry, salmon has the greatest economic impact (jobs, income, and total value), mainly thanks to the recent development of hatcheries and the sustainable management of salmon stocks.

In 2018, approximately 36,800 people worked in the seafood industry, 25,000 of whom were employed as processor workers in Alaska. Total 2018 harvest accounted for more than 61 percent of total U.S. seafood harvests, and more than 9,000 vessels have been home-ported in Alaska, delivering fish to 87 shoreside processing plants.

While fish farming in Alaskan waters is prohibited, the farming industry of aquatic plants and shellfish has been thriving and rapidly increasing. New aquaculture technologies such as mariculture production in the open ocean has already play a key role in growing the U.S. seafood market. Whilst the annual production of mariculture reaches approximately \$1 million, the AFDF's Alaska Mariculture Initiative has been established aiming to accelerate the development of mariculture in Alaska with the vision to grow a \$1 billion industry in 30 years.

NORWAY

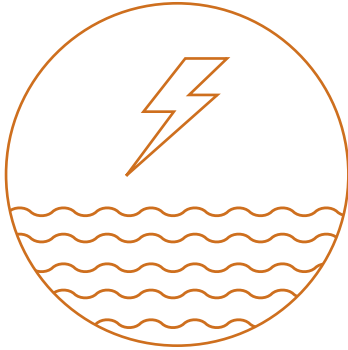
Northern Norway accounts for a substantial share of Norway's fishery landings. While Norway's total catch has decreased by around 25 percent over the past two decades, Northern Norway's amount has remained stable. In 2018, about 990,000 tons of wild fish was landed in the three northernmost counties (Nordland, Troms and Finnmark)*, with an estimated landed value of NOK 12.9 billion and representing around 40 percent of the total amount landed in Norway. Annual catch volume is fairly evenly distributed between the three counties, with Finnmark county accounting for 27 percent, Troms representing 35 percent, and Nordland constituting 38 percent.

Importantly, this represented 45 percent of all wild capture fish landed on a national level, while 55 percent of it was carried out by vessels registered in one of the three northernmost counties. In addition, it is estimated, that a substantial part of the fish caught in the according sea areas is landed in North Norway, creating further employment and value in related industries. Additional value creation from fisheries in North Norway during 2016 was estimated to be NOK 5.9 billion (~ \$700 mill), equivalent to 42 percent of the national total.

Over the last decades the development of the aquaculture industry has made Norway the biggest producer of Atlantic salmon in the world. During 2018, North Norway itself produced 556,872 tons of farmed fish (all species), with salmon accounting for most of the amount. Nordland stands for almost half of the production in the region, followed by Troms (33 percent) and Finnmark (20 percent). Nordland has been the leading producer on a national level with around 20 percent of the total produced amount.

The landed value of the production from Nordland, Troms and Finnmark was NOK 28 billion (~ \$3.5 billion), reflecting a rapid increase over the last 10 years. The region's contribution to the national value creation from aquaculture is estimated to have grown from 28 percent and NOK 1.1 billion (~ \$ 130 million) during 2008, and despite significant variations, it grew to 42 percent during 2016 with additional created values being NOK 13.2 billion (~ \$1.6 billion) in 2016.

**On 1 January 2020, Troms and Finnmark were merged into one county: Troms and Finnmark*



It is important to note some key distinctions between Alaska and North Norway, e.g. the considerable difference in population, size and infrastructure which heavily influences scale and economics. The more important difference, however, is that the North Norwegian Coast is generally ice free, while the Alaskan coastal regions are predominantly iced over for 6–7 months of the year and historically non-navigable. This constraint continues to develop as the impact of climate change is realized.



Oil and Gas

In general, Alaska and Norway are both mature oil provinces and have been major players in the world oil market. Both have significant experience in leasing, approving leases, and permitting exploration and development. Norway is currently producing 2 million barrels per day (bpd) of crude oil down from a peak of 3.5 million bpd. The majority of this production is from the North Sea, with only 110,000 bpd being produced in the North Norwegian Coast (Barents Sea). In Alaska, North Slope production is approximately 500,000 bpd down from a peak of 2 million bpd. While both regions continue to develop production, the volume of new production is not sufficient to reverse the decline.

In Alaska, very little offshore production has been developed. What does exist is limited - Cook Inlet (Southcentral/Anchorage) and two small facilities located on man-made islands in the Beaufort Sea. The majority of oil production in Norway still takes place in the legacy fields in the North Sea. Farther north in the Barents Sea, only the Goliat field is producing oil (110,000 bpd) and Snohvit is producing natural gas (500 million cubic feet/day). The large Johan Castberg field with proven volumes of 400-650 million barrels of oil is currently under development and expected to be producing oil in 2022.

In general, high development costs, in combination with heightened sensitivity around the potential impact on fishing and subsistence whaling, present challenges to offshore oil and gas development. Recent forecasts (EIA, BP Statistical Energy Review) project modest growth in demand until 2030 and then plateauing through 2040. Depending on the speed of the transition to a low carbon economy, this plateau may come sooner, or even decline.

In spite of these challenges, incremental field enhancement will continue to offset production decline trends. In Norway, the above-mentioned Johan Castberg field will be coming online in 2022. In Alaska, there are no near term plans for offshore development. Statewide, the greatest interest is in the western North Slope fields and development in the previously unavailable National Petroleum Reserve (NPR-A). Contribution of the oil sector to the Alaskan and (North) Norwegian blue economy will likely remain flat over the next 20 years.



Natural Gas/Liquified Natural Gas

With increasing global momentum in transitioning to cleaner fuels, the natural gas sector has considerable market potential. Getting that gas to markets, however, is more difficult. Snohvit - a Norwegian natural gas producer - is offshore and moves natural gas to market on ship. In Alaska, very significant natural gas resources remain stranded. Currently, the state-sponsored Alaska Gasline Development Corporation (AGDC) has the responsibility for developing the business case and obtaining licenses to construct an 800 mile pipeline that would take natural gas to tidewater, where it would be exported via tanker as liquified natural gas (LNG). This project is currently on hold as AGDC reevaluates the economics of the project. An alternative to the pipeline is currently being considered that would involve taking LNG directly off the North Slope for export to Asia.

Outside the potential of new LNG exports, opportunities exist for new uses of blue economy Arctic LNG.

- With the interest in lowering carbon emissions from maritime traffic, DNV-GL is championing the transition to LNG-fueled ships from traditional oil-based fuels. This interest, in conjunction with increased ship traffic on the Northern Sea Route over the North Pole and through the Bering Straits, provides the opportunity for development of an LNG “bunkering” network from Northern Norway to Alaska. This network could be supplied by tanker or barge from the existing natural gas production sources in Norway and North Slope of Alaska.
- A second market for LNG is power generation, especially seasonal power generation in North Norway (Finnmark) and Western Alaska. As maritime traffic increases, the need for infrastructure to support that traffic also increases. These needs will be seasonal rather than year-round, which could provide a market for barge-mounted power plants that can move where the demand is, and could supplement renewable energy sources such as wind and tidal. This hybrid operation could also serve as “electric” bunkering if the development of electric ships comes to fruition.

For Alaska and North Norway, the contribution of LNG as an alternative to traditional oil-based fuels over the next 5- 25 years, has significant growth potential as a bridge to the next generation of alternative fuels and renewable energy. While this report does not delve extensively into policy considerations, it must be noted that policy has the ability to change the overarching economics and the pace of renewable energy transition. Carbon pricing/trading, fugitive emission penalties (from methane and other sources) have the ability to change this picture.

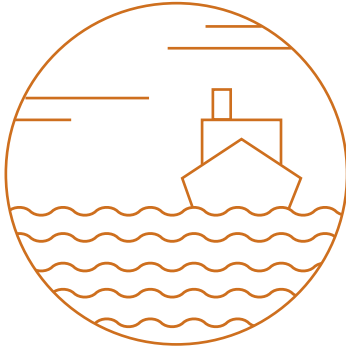


Alternative Energy

The utilization of renewable offshore energy in both Alaska and North Norway are (currently) limited by 1) demand, 2) infrastructure and 3) Arctic conditions. Currently, 99 percent of Norwegian electrical demand is being met by renewable energy, the majority being hydropower. A small amount of renewable power is being exported, but that is likely to increase substantially with the completion of a subsea interconnector to the United Kingdom and Germany. In rural Alaska, wind is the most developed renewable energy resource and is being utilized in communities where high costs of fuel make these wind-diesel hybrid installations economic. Battery energy storage and solar photovoltaics are being added to these rural microgrid systems as funds allow. More predictable operations, innovative financing and investments in microgrids could bring renewable power to communities that are only being served by diesel generators.

The Fire Island Wind Farm in Anchorage is the only major wind turbine installation in Alaska supplying power to the Anchorage community. The opportunity to double that amount of power exists but is limited by cost at this time. To date, the enormous tidal power resource of Cook Inlet, near Anchorage, remains untapped. That resource is estimated to have the potential to produce twenty times more electrical power than the state's only grid-connected region currently demands for over 500,000 people.

New energy demands created by new marine activity (large fish processing, ship repair in western Alaska) could provide the needed economies of scale to develop the large wind, hydro, solar, biomass, geothermal and tidal power resources that exist in Alaska.



Maritime transportation throughout the Arctic region has undergone sustained, and in some parts, significant growth over the past decade. The continued decline of sea ice, the resulting improved access to natural resources, and new developments in ship technology are the primary drivers of increased shipping activity throughout the Arctic Ocean. In addition, geopolitical interests, improved infrastructure, and evolving regulatory frameworks continue to influence maritime activity in the region.

The maritime transport sector in Alaska and Northern Norway display a number of noticeable similarities, including the dominance of bulk cargo as well as the importance of fishing and cruise tourism. Overall cargo volume in the two regions bears a striking resemblance.

ALASKA

**NORTH
NORWAY**

Total Cargo Volume (tons)	42.2 million	45 million
Bulk Cargo (tons)	35.9 million	38.5 million
Containerized Cargo (TEU)	800,929	< 30,000
Fish	2.7 million	1 million
Cruise Tourism (passengers)	1.2 million	~ 200,000
AMHS vs. Hurtigruten (passengers)	251,099	~ 300,000

ALASKA

In 2017 Alaskan ports handled 42.2 million tons of cargo, of which 9.3 million tons were inbound and 32.9 million were outbound. Alaska's shipping activity occurs almost exclusively below the Arctic Circle.

Bulk Cargo

The vast majority of Alaskan cargo volume comes in the form of bulk cargo, both dry and liquid bulk, such as crude oil, refined petroleum products, and mined ores. In 2017 Alaskan ports handled 35.9 million tons of bulk cargo, representing 85 percent of all cargo shipped by the region's ports. The vast majority of bulk cargo was outbound with 29.8 million tons compared to 6.1 million tons inbound. Outbound liquid bulk cargo, largely in the form of crude oil and petroleum products, constitutes around 75 percent of total bulk cargo.

Fisheries

Six of the U.S.' ten largest fishing ports are located in Alaska and Dutch Harbor has been the country's largest in terms of volume for much of the past three decades. If Alaska were its own country, it'd be the sixth-largest fishing nation in the world. The state's approximately 32,000 fishermen work on 5,300 commercial fishing vessels and land around 2.7 million tons of fish product each year valued at around \$2 billion.

Containerized Cargo

With limited road and no rail infrastructure connecting Alaska to other parts of the U.S. or Canada, maritime transport is responsible for virtually all inbound and outbound containerized cargo. In 2017, 800,929 loaded TEU (twenty-foot equivalent unit) passed through Alaskan ports.

Cruise Tourism

Cruise ship traffic is a major contributor to the Alaskan economy accounting for around 55 percent of all the state's out-of-state visitors. In 2018 the state saw 1.17 million passengers with 1.31 million expected for 2019. Cruise tourism contributes around \$1 billion in statewide spending, \$82.9 million in municipal revenues and \$104.8 million in state revenues.

NORWAY

In 2018 North Norwegian ports handled 44.9 million tons of cargo, of which 8.8 million tons were inbound and 36.2 million tons were outbound. This compares to around 215 million tons handled by all Norwegian ports that year. North Norway's shipping activity almost exclusively occurs above the Arctic Circle.

The vast majority of North Norwegian cargo volume comes in the form of bulk cargo, both dry and liquid bulk. In 2018 North Norway's ports handled 38.5 million tons of bulk cargo, representing 85 percent of all cargo shipped by the region's ports. The vast majority of bulk cargo was outbound with 32.2 million tons compared to 6.2 million tons inbound. Outbound dry bulk cargo, largely in the form of iron ore, constitutes around 70 percent of total. Liquid outbound bulk cargo, primarily in the form of liquified natural gas (LNG), represents 15 percent of all bulk cargo.

Northern Norway accounts for a substantial amount of fishery landings. While Norway's total catch has decreased by around 25 percent over the past two decades, Northern Norway's amount has remained stable. In 2017 Nordland, Troms, and Finnmark accounted for 980,347 tons representing around 43 percent of Norway's total of 2.3 million tons.

With a good road network and rail connection to Bodø and Narvik, seaborne container shipping to and from Northern Norway is very limited. In 2018, North Norwegian ports handled 537,682 tons of containerized cargo.

Cruise ship traffic and tourism-related maritime activity in Northern Norway has been increasing steadily over the past decade and cruise tourism is a growing contributor to the North Norwegian economy. In 2018, Norway saw almost 800,000 cruise passengers, of which around a quarter traveled throughout northern coastal Norway and Svalbard.

ALASKANOR is a three-year project, running from 1 August 2018 to 31 July 2021. It is coordinated by the **High North Center for Business and Governance, NORD University** and involves eighteen partners from Norway and the United States. AlaskaNor aims to improve knowledge-sharing about the blue economy potential in Alaska and North Norway, particularly in the sectors of offshore energy, fisheries and aquaculture, and maritime transportation, in order to enhance business and improve public policy decision-making.

FOR MORE INFORMATION, SEE:

www.alaskanor.com or reach out to the AlaskaNor project manager, Andreas Raspotnik:
andreas.raspotnik@nord.no.

These recommendations are a joint effort by the project's work package leaders - the **Fridtjof Nansen Institute**, the **Institute of the North**, **The Arctic Institute** and the **High North Center** - and their respective project partners. The recommendations are based on the first findings of the project reports that are currently being finalized. These reports analyze and compare the blue economic status quo of offshore energy, fisheries/aquaculture and maritime transportation in Alaska and North Norway, as well as related governance aspects.