R&D-Report

Blue Governance Governing the Blue Economy in Alaska and North Norway

AlaskaNor WORK PACKAGE V

Andreas Østhagen
Svein Vigeland Rottem
Tor Håkon Jackson Inderberg
Anne-Kristin Jørgensen
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Blue Governance

Governing the Blue Economy in Alaska and North Norway

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The figures, estimates, forecasts, and recommendations contained in this report were primarily collected and devised prior to the global Covid-19 pandemic. Due to the global economic impact of the pandemic, some estimates and forecasts may no longer represent the most likely scenarios and timelines may have to be adjusted to reflect new economic realities.

Table of Contents

Figures

List of Abbreviations

ABC	Acceptable Biological Catch
ADF&G	Alaska Department of Fish and Game
AECO	Association of Arctic Expedition Cruise Operators
AMSA	Arctic Maritime Shipping Assessment
ANWR	Arctic National Wildlife Refuge
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BSEE	Bureau of Safety and Environmental Enforcement
BUNKER	International Convention on Civil Liability for Bunker Oil Pollution Damage
BWM	International Convention for the Control and Management of Ships' Ballast Water and Sediments
CBD	Convention on Biological Diversity
CLC	International Convention on Civil Liability for Oil Pollution Damage
CLCS	Commission on the Limits of the Continental Shelf
COLREG	Convention on the International Regulations for Preventing Collisions at Sea
COP	Construction and Operations Plan
DoI	U.S. Department of Interior
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impacts Assessment
ERS	Electronic Reporting Systems
EU	European Union
FAO	United Nations Food and Agriculture Organization
FDA	Food and Drug Administration
FMP	Fisheries Management Plan
HKC	Hong Kong Convention
HNS	Hazardous and Noxious Substances Convention
ICES	International Council for the Exploration of the Sea
IFC	International Finance Cooperation
ILO	International Labour Organization
IMO	International Maritime Organization
IMSBC	International Maritime Solid Bulk Cargoes Code
IPIECA	International Petroleum Industry Environmental Conservation Association
IPOA-IUU	International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing
IOGP	International Association of Oil & Gas Producers
IRF	International Regulators Forum
ISO	International Organization for Standardization
ITC	Investment Tax Credit
kWh	Kilowatt-hour
MAB	Maximum allowed biomass
MARPOL	International Convention for the Prevention of Pollution from Ships
MCS	Monitoring, control and surveillance
MLC	Maritime Labour Convention

MPE	Norwegian Ministry of Petroleum and Energy
MSA	Magnuson-Stevens Fisheries Management and Conservation Act
MTIF	Norwegian Ministry of Trade, Industry and Fisheries
MW	Megawatt
NASCO	North Atlantic Salmon Conservation Organization
NCS	Norwegian Continental Shelf
NEPA	National Environmental Policy Act
NEAFC	North-East Atlantic Fisheries Commission
NEP	Northeast Passage
nm	Nautical mile
NOAA	National Oceanic and Atmospheric Administration
NPD	Norwegian Petroleum Directorate
NPFMC	North-Pacific Fisheries Management Council
NSR	Northern Sea Route
NVE	Norwegian Water Resources and Energy Directorate
NWP	Northwest Passage
OCS	Outer Continental Shelf
OED	Norwegian Ministry of Petroleum and Energy
OFL	Overfishing limit
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAME	Protection of the Arctic Marine Environment (Working Group Arctic Council)
PBA	Planning and Building Act
Polar Code	International Code for Ships Operating in Polar Waters
PTC	Production tax credit
PSA	Petroleum Safety Authority Norway
RED	EU renewable energy directive
RFB	Regional Fisheries Bodies
RFMC	Regional Fisheries Management Council
RFMO	Regional Fisheries Management Organization
SAP	Site Assessment Plan
SOLAS	International Convention for the Safety of Life at Sea
SSC	Statistical and Scientific Committee
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
TAC	Total allowable catch
TLS	Traffic Light System
TWh	Terawatt-hour
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNFSA	United Nations Fish Stocks Agreement
USDA	U.S. Department of Agriculture
VMS	Vessel monitoring system

A Blue Future for Alaska and North Norway

The Arctic, or the "High North," as this area is usually called in Norway, is one of the world's regions with the greatest prospects for economic value creation. With so much of the Arctic consisting of ocean, the area's potential is heavily dependent on the "blue economy," referring to the sustainable use of the ocean and its various resources for growth and improved livelihoods, in a way that preserves the health of the ecosystem.

The Arctic is changing, and it is changing fast, creating both new opportunities and responsibilities. So far, we know too little about these changes, which may be environmental, technological, and social in nature. Therefore, new knowledge must be created through serious and independent research focused on how to sustainably exploit the ocean's resources and ensure that residents of the region benefit equitably. We also need dialogue between the different Arctic stakeholders, openly sharing and discussing knowledge and experiences internationally.

The AlaskaNor Project aims to develop and communicate knowledge concerning the blue economy potential in Alaska and North Norway and make this knowledge available for relevant stakeholders and decision-makers. Alaska and North Norway are important regions in the Arctic and have extensive experiences and competence connected to business and societal challenges. Some of these experiences are held in common, such as commercial development of offshore oil and gas, management of commercial fisheries, support of operations in national and international defense activities as well as in maritime rescue and emergency preparedness activities. Others, such as approaches to fish farming, tourism, and indigenous stakeholder involvement in business ventures are unique in each jurisdiction. Until now, sharing of these experiences has not been done in a systematical way. AlaskaNor tries to develop platforms and networks for improving this.

For those like us living in the Arctic, the region is a natural treasure, supporting traditional resource utilization, developing new industries, and home to a diversity of fish and wildlife. And yet, we are increasingly faced with challenges connected to urbanization, demographic trends and climate change. There is a strong and growing need for more knowledge and sharing experiences where initiatives have worked well and where they have not. In particular, we need to understand how implementing management frameworks and policy formulation can help promote positive development and secure the potential for sustainable value creation and social development in the years ahead.

In the AlaskaNor Project, we focus primarily on four areas: offshore energy, fisheries and aquaculture, Arctic shipping and maritime transportation, and regional and international governance. Based on the studies and analyses of these areas, the aim is to give valuable input both for business activities and policy making, and strengthen cooperation within the blue economy between North Norway, Alaska, and the Arctic in general.

As highlighted in the last Business Index North (BIN) report, the spread of the Covid-19 virus and efforts to bring it under control, will most certainly affect activities and sustainability of the Arctic regions. The descriptions and analyses done in the AlaskaNor reports will also be valuable in analyzing the consequences of Covid-19 on the blue economy in the Arctic.

There are many who have been involved in drafting our four AlaskaNor reports, and we wish to thank each of them for this important work. We hope the reports will be of value for many in realizing value-creating opportunities in the blue economy, and strengthen cooperation between Alaska and North Norway.

BODØ (NORWAY) AND ANCHORAGE (UNITED STATES), FEBRUARY 2021

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Chair, Board of Directors
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Alaska and North Norway: At a Glance

The United States and Norway have been allies for over 70 years, enjoying bilateral diplomatic relations since 1905. Many Norwegians have cultural ties to the U.S. From 1825 until the early 20th century alone, approximately 800,000 Norwegians emigrated westwards and over the Atlantic Ocean. Today, nearly five million Americans claim Norwegian ancestry, supporting the two countries' close economic, political, and cultural relationship.

		Alaska	North Norway
GEOGRAPHY	**Coastline**	25,148 km	12,020 km
	Area	1,717,856 km²	112,975 km²
GOVERNMENT	**Organization**	State: 16 boroughs and unorganized region	2 counties (Nordland, and Troms and Finnmark) and 87 municipalities
	Capital	Juneau	Bodø (Nordland) Tromsø (Troms and Finnmark)
PEOPLE	**Largest cities**	Anchorage (291,845), Fairbanks (95,898), Juneau (31,986)	Tromsø (76,974), Bodø (52,357), Mo i Rana (26,184)
	Population (2020)	731,007	483,632 • 240,896 (Nordland) • 242,736 (Troms and Finnmark)
	Indigenous Groups	Aleut, Alutiiq, Athabascan, Eyak, Tlingit, Haida, Tsimshian, Inupiaq, Yup'ik, Cup'ik (15,6% of population)	Sámi (50,000-100,000)* *In Norway, there is no clear legal definition of who is Sámi. Therefore, exact numbers are not possible
ECONOMY	**GDP (2018)**	$54,61 billion (Alaska) $20,54 trillion (US)	$25,26 billion $359,299 billion (Norway)
	GDP/capita (2018)	$74,454 (Alaska) $62,639 (US)	$51,950 (North Norway) $67,640 (Norway)
	Major industries	Oil and gas production, mining, fisheries (incl. aquaculture), timber, tourism, agriculture	Oil and gas production, fisheries (incl. aquaculture), shipping (incl. ship building), pulp & paper products, metal, chemical, timber, mining
	Natural resources	Petroleum, natural gas, timber, zinc, gold, silver, fish, shellfish,	Petroleum, natural gas, iron ore, copper, lead, zinc, titanium, nickel, fish, timber, hydropower
	Unemployment rate (2020)	5,4% (Alaska) 6,6% (U.S.)	2,5% (Nordland) 2,7% (Troms & Finnmark) 3,5% (Norway)
	Main export commodities	Petroleum, zinc, seafood, lead, gold	Petroleum (and related products), seafood, machinery and equipment, metals
	Key values of export commodities (2019)	$5 billion	$5 billion (50,48 billion NOK)

SOURCES: Alaska State Department of Labor and Workforce Development, Business Index North, City Population, Norwegian Labour and Welfare Administration (NAV), OECD, Statistics Norway, U.S. Census Bureau, U.S. Department of Commerce Bureau of Economic Analysis

Preface:

WHAT IS THE BLUE ECONOMY?

Charles Colgan

The term “blue economy” has come into widespread use to denote an expansion of economic wealth derived from the oceans and coasts in such a way as to maintain or improve the natural systems upon which economic systems depend. The origin of the term is obscure; though some attribute it to the Rio +20 U.N. Conference in 2012, examples of the term can be found earlier. As a guide to policy, it has been used in quite different ways. Developed countries such as the United States or those in Europe have focused on a “blue technology” focused definition. Developing countries have paid particular attention to the challenges of over-and illegal fishing.

The blue economy does descend from decades of discussion about sustainability, which is also an imprecise term. The “blue economy” captures the definition of sustainability as meeting the needs of the present without sacrificing the ability to meet the needs of tomorrow. There are also links to the idea of sustainability as finding the right balance among the intersection of the economic, environmental, and social aspects of society.

Since these general ideas about sustainability were developed more than thirty years ago, much progress has been made in developing theoretically consistent and empirically viable ways to understand the complex socio-ecological interactions that define the blue economy. The result has been that the blue economy can be understood as something towards which changes can be directed and away from which changes are to be avoided. Two supporting ideas have also come to be essential: expanding the definition of capital and the emerging development of better data on both the physical ocean and the economy of the ocean.

Traditional economic development has focused on expanding investment in physical capital such as buildings, equipment, boats, etc. This capital is used to produce goods and services sold to customers; the income earned, including the income of the labor that uses the physical capital then is measured in national income and product accounts. These accounts are being expanded to take into account natural capital- the value of services created by appropriately functioning natural systems. The value of natural resources such as fisheries and minerals are now counted, as are the services provided by complete ecosystems. From this point of view a blue economy should increase the output of goods and services related to the ocean without reducing the ability of physical or natural capital to sustain growth.

To see the blue economy in these terms also requires greatly improving information about how physical changes in economic and environmental resources are connected to changes in the value of these resources. With respect to the former, many countries are now developing "ocean satellite accounts" to track the contribution of oceans to the output of goods and services. With respect to the latter, expanded oceanographic research, such as that scheduled for the upcoming U.N. decade of ocean science and the expansion of the Global Integrated Ocean Observing Systems (IOOS) provide foundations for understanding the changes in the economic values of the environmental and ecosystem resources upon which the blue economy depends.

These features of a blue economy ultimately represent a much closer integration of the contributions to economic output with changes in the environment. In this sense the blue economy is not defined as a binary condition ("blue"/"not blue") but an ongoing process of seeing the oceans resources in new ways in order to set goals and measure progress towards those goals. This requires:

1. A means of accounting for the contribution to the regional and national economies from ocean related activities including output, employment, and wages.
2. Support of innovations in technologies and services that can yield gains in output and employment at reduced environmental costs. This tracking of innovation is key to tracking changes in capital.
3. Resource accounts for renewable and nonrenewable resources based on measures of changes in physical stocks (e.g. fish stocks, oil and gas reserves).

4. Ecosystem services inventory and processes for establishing values over time. The relevant ecosystems and their services vary by location, so an initial step is to inventory the relevant ecosystems, including what is known of their current conditions. The economic values of the ecosystem services are usually not known so plans to develop this information are needed.

5. There are two essential governance elements. The first is that there need to be processes to set and update the goals of the blue economy based on the information available.

6. The second is to create institutional structures that integrate consideration of economic and environmental dimensions at the operational levels of both public and private organizations. The standard organizational structures based on narrow definitions of expertise will not be capable of seeing the integrated physical/economic relationships.

Executive Summary

In the Arctic, focus is increasingly on the sustainable blue economy. This entails utilizing ocean-based resources to the benefit of the global population, Arctic states and local communities. Obvious lessons of relevance concerning resource utilization and local adaptation are, however, not shared between Arctic regions. Limited coordination of knowledge when it comes to challenges and opportunities that arise as the blue potential unfold should be explored. This is what this report – as part of the AlaskaNor-project – sets out to do, with a view to the blue governance structures of the Arctic United States (Alaska) and North Norway.

Both regions share similar characteristics. Dependence on maritime industries and potential for the blue economy stand out. A key component here will be potential areas for expanded collaboration. What opportunities exist for cooperation and collaboration between Alaska and North Norway? Are there best practices and lessons that hold relevance across the regions?

The initial step in such an undertaking is to give an overview of how the blue economy is managed and regulated in Alaska and North Norway. The Law of the Sea-regime plays a vital part in providing the mechanisms and procedures for (Arctic) states to manage marine resources more broadly. However, the predominant mode of governance for Arctic maritime activities will remain unilateral management by each of the five coastal states. 'Governance' in this context is defined as the formal structures that govern and regulate the various Industries and areas examined in this report. Thus, both the international, national and local legal and political frameworks need to be mapped.

In this report, we will introduce how five sectors of importance for the development of the blue economy are governed: offshore petroleum, offshore wind, fisheries, aquaculture/mariculture and shipping. How are these areas governed as activities increase in the waters of Alaska and North Norway? This report will unpack the various regulatory mechanisms managing petroleum activities, shipping, wind power, fishing and aquaculture at the international, regional, national and local level.

This report is the end-product of Work Package (WP) 5, titled 'International Governance and the Blue Economy'. The explicit goal of this WP is to 'examine how parameters for blue economic projects are defined and determined in the interplay between the international and regional level'. The following actors are involved in the WP:

FRIDTJOF NANSEN INSTITUTE, Oslo, Norway

THE WOODROW WILSON CENTER, Washington DC, USA

NORDLAND COUNTY, BODØ, Norway

ARCTIC ECONOMIC COUNCIL SECRETARIAT, Tromsø, Norway

HIGH NORTH CENTER FOR BUSINESS AND GOVERNANCE, NORD University, Bodø, Norway

Law of the Sea

Andreas Østhagen

Since the turn of the millennium, certain global trends have amplified the role of the oceans in international affairs. Technological development, increased seaborne trade, changing marine resource distributions and growing demand for the same resources, as well as climate change effects on the oceans, are factors leading to a renewed focus on maritime space and states' rights and responsibilities within this domain.

Central here is the development of an international legal regime for the oceans: Law of the Sea. In 1945, US President Truman declared – inconsistent with contemporary international law – that the natural resources of the continental shelf were under the exclusive jurisdiction of the coastal state.[1] This was later codified in the 1958 Geneva Convention on the Continental Shelf, which preserved the prospect of exclusive coastal state jurisdiction over offshore seabed resources.[2]

After the Second World War, some states started expanding their territorial seas from three to twelve nautical miles (nm), as negotiations of an international regime for the oceans were underway. The first and second Law of the Sea Conferences were held in 1956–1958 and 1960. Already in 1952, Peru, Chile and Ecuador had made claims of exclusive rights out to 200 nm, seeking to reap benefits of an expansion in fisheries.[3] The international community followed suit, driven largely by a growing awareness of the possibilities for marine natural resource extraction (hydrocarbons, fisheries, minerals) and the desire of states to secure potential future gains.[4]

Negotiations aimed at developing a coherent international legal framework for the oceans took place throughout the 1970s and in 1982, most states agreed on a comprehensive legal regime: the United Nations Convention on the Law of the

[1] Truman Proclamation On The Continental Shelf - Presidential Proclamation No. 2667 28th September, 1945

[2] Convention on the Continental Shelf 1958, Done at Geneva on 29 April 1958, entered into force on 10 June 1964

[3] Chile, Ecuador and Peru, Declaration on the maritime zone. Signed at Santiago on 18 August 1952

[4] Brown, E. D. (1981). Delimitation of offshore areas. Hard labour and bitter fruits at UNCLOS III. Marine Policy, 5(3), 172–184. Friedheim, R. L. (1993). Negotiating the New Ocean Regime. Columbia: University of South Carolina Press.

Sea – UNCLOS, in force since 1994.[5] When it was agreed, UNCLOS provided the legal rationale for states to implement new maritime zones in addition to the twelve nm territorial sea, with a 200 nm 'resource zone' (what became termed the Exclusive Economic Zone – EEZ).

As a consequence, states had in the span of a few decades gone from having control over a relatively limited (often just 3 nm) maritime domain, to having an international agreement on expanding the length of the territorial sea to a maximum of twelve nm while also adding an EEZ for an additional 188 nm. Moreover, under UNCLOS it was concluded that states have continental shelf jurisdiction in alignment with the EEZ (up to 200 nm), and, when relevant, beyond 200 nm, where the shelf is a prolongation from its land territory. The outer limits of this is to be determined by submitting data on the limits to the Commission on the Limits of the Continental Shelf (CLCS).[6]

As of 2020, 168 parties have signed UNCLOS and its main components such as the 1995 UN Fish Stocks Agreement (UNFSA), which was adopted to facilitate the implementation of key UNCLOS provisions (91 parties). International law thus serves as framework that includes approaches and tools to manage "blue activity", such as regional fisheries management organizations (RFMOs), the CLCS or establishing marine protected areas.

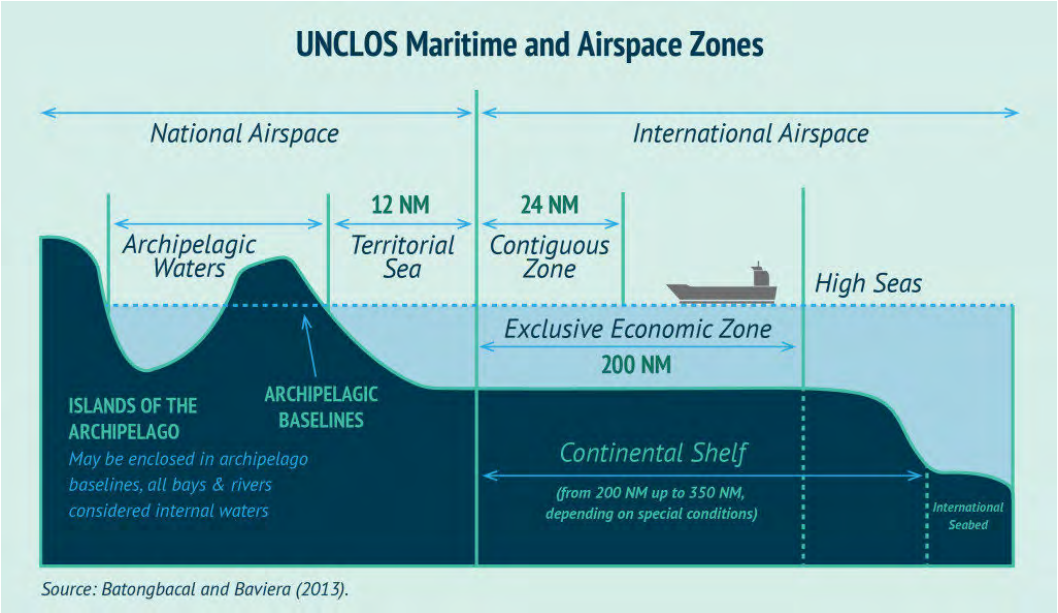

FIGURE 1: The various layers of jurisdiction under UNCLOS

SOURCE: Center for Strategic and International Studies (CSIS) based on Batongbacal and Baviera, 2013, p. 41.

[5] Convention on the Law of the Sea, 10 December 1982, 1833 U.N.T.S. 331; Harrison, J. (2011). Making the Law of the Sea: A Study in the Development of International Law. Cambridge: Cambridge University Press.

[6] United Nations Convention on the Law of the Sea, 10 December 1982, Art. 76 (8)

Offshore Oil and Gas

Svein Vigeland Rottem and Andreas Østhagen

International and Regional Governance

Global ocean law gives the Arctic coastal states relatively free reign in the regulation of continental shelf activities, yet several international and transnational norm-making processes influence coastal-state regulation and govern important petroleum-related activities, especially maritime transportation. UNCLOS codifies customary international law as regards the use of the oceans and provides the basic legal framework for managing all marine activities in the Arctic and elsewhere. It allocates regulatory competence differently among coastal states and flag states, depending on the type of activity and the distance from the coast.

CONTINENTAL SHELF

As regards continental shelf resources, coastal states enjoy exclusive management authority, but they are strongly encouraged "to harmonize their policies in this connection at the appropriate regional level" (UNCLOS, Art. 208). Since the Convention allows the coastal state to choose among several geological and geographic criteria for determining the outer boundaries of the continental shelf should it extend beyond the 200 nm EEZ, only a small part of the Central Arctic Ocean sea floor will eventually remain outside national jurisdiction. The coastal states have competence by default on the continental shelf.

The uncertainty surrounding final settlement of the outer boundaries is insignificant for ongoing and planned petroleum activities, since the accessible petroleum resources expected to be found in the Arctic are overwhelmingly located within 200 nm of the coastlines. If, however, the petroleum exploration and development in the future moves into areas beyond national jurisdiction and into the deep seabed area, the activities will be regulated by the International Seabed Authority.

Thus, the predominant mode of governance for Arctic petroleum activities will remain managed by each of the five coastal states, with two important caveats.

First, the maritime transport activities necessary for exploration, development, and production of hydrocarbons are mostly subject to flag state jurisdiction, so effective regulation requires global action under the International Maritime Organization (IMO).

Second, even as regards continental shelf activities the Arctic coastal states have committed themselves under several regulatory and soft-law institutions. By upshot, an Arctic regulatory outlook must cover not only coastal-state practices but also the legal form, the substantive scope and the dynamism of other norm-building processes – e.g. those under the IMO, the OSPAR Convention, the Arctic Council, and the International Organization for Standardization (ISO).

IMO AND OSPAR

The IMO activities most relevant to Arctic oil and gas concern platform-related provisions of the MARPOL Convention[7] and the Polar Code for vessels that operate in ice-covered waters.[8] All Arctic states are parties to the MARPOL Convention, which places legally binding restrictions on emissions and discharges that are sometimes more stringent for floating or fixed offshore platforms than for ships. The IMO Polar Code negotiations strengthened the substance, scope and form of the 2002 Guidelines for Ships Operating in Arctic Ice-covered Waters. [9]

These negotiations have generated more stringent and legally binding requirements concerning vessel construction and equipment, training and discharges, thus responding to the special challenges that derive from high latitudes (e.g. icing, poor satellite coverage), remoteness (e.g. poor hydrography, scarcity of navigational aids, inadequate emergency response capacity), and environmental sensitivities.

Furthermore, important but limited segments of the Arctic shelves are subject to mandatory rules developed under the OSPAR Convention on Marine Pollution in the North East Atlantic.[10] Among the Arctic states, Norway and Denmark (on behalf of Greenland) are bound by these rules, as are 13 non-Arctic coastal states and the European Union. The OSPAR Convention prohibits the disposal and abandonment of any offshore installation at sea, with certain exceptions subject to a national decommissioning permit.

[7] International Convention for the Prevention of Pollution from Ships (MARPOL), London, 2 November 1973, as modified by the 1978 Protocol (London, 1 June 1978) and as regularly amended.

[8] International Code for Ships Operating in Polar Waters (Polar Code), entered into force on 1 January 2017.

[9] Guidelines for Ships Operating in Arctic Ice-covered Waters, 23 December 2002, IMO Doc. MSC/Circ.1056—MEPC/Circ. 399 (2002).

[10] Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), Paris, 22 September 1992, entered into force on 25 March 1998.

Following the 2010 Macondo accident in the Gulf of Mexico, a formal German proposal to prohibit deep water drilling in the Arctic was prevented only by adamant protests from Greenland and the United Kingdom. The OSPAR Offshore Oil and Gas Strategy has generated more stringent discharge regulations than those globally applicable under the IMO, especially with respect to chemicals and oil in produced water.[11] These issues, and the reduction of radioactive discharges and the development and sharing of best available technology, is also important.

ARCTIC COUNCIL

Another regional body, the circumpolar Arctic Council, typically receives more attention from those following Arctic petroleum activities, yet unlike the IMO and the OSPAR Commission, the Arctic Council cannot adopt mandatory rules. It is not an international organization that can make binding decisions. Since 2002 it has maintained a set of Arctic Offshore Oil and Gas Guidelines and several other soft-law instruments that summarize best environmental practices.12 The Arctic Council has, however, also provided venue for negotiating legally binding agreements on certain maritime-infrastructure activities, those on Aeronautical and Maritime Search and Rescue (2011)[13] and Marine Oil Pollution Preparedness and Response (2013).[14]

The rising policy-making ambition indicated by these agreements should not be exaggerated – the agreements aim to utilize coastal-state capacities better, not to constrain their exercise of sovereign rights in their management of shelf activities. Tellingly, the mandate of a Task Force set up in 2013 to prepare an instrument concerning the prevention of oil spills – national regulatory standards are among the chief instruments for such prevention – made no mention of legal authority, emphasizing knowledge sharing instead.

Efforts to share experience and practices is also done in The International Regulators Forum (IRF).[15] IRF is set up to drive forward improvements in safety and health in the sector. This is done through joint programs and information sharing. Ten countries' regulators participate. IRF is thus also an example of a forum for developing non-binding instruments.

[11] OSPAR Trends in discharges, spills and emissions from offshore oil and gas installations: https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/pressures-human-activities/trends-discharges-spills-and-emissions-offshore-oil-and-gas-inst/

[12] The first Guidelines were published in 1997, the first revision was done in 2002 and the latest revision was in 2009, see PAME Arctic Offshore Oil and Gas Documents: https://pame.is/projects/arctic-marine-shipping/older-projects/324-arctic-offshore-oil-and-gas-documents

[13] Arctic Council Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic: https://oaarchive.arctic-council.org/handle/11374/531

[14] Arctic Council Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic: https://oaarchive.arctic-council.org/handle/11374/529

[15] International Regulators Forum: https://irfoffshoresafety.com/

INDUSTRY GOVERNANCE

Alongside with these binding or non-binding governmental processes, industry-based private governance is increasingly significant for Arctic petroleum activities. A major accident involving a large oil spill in the Arctic would have severe repercussions not only on the vessel owner, the well operator, or the pertinent service provider but on the entire scope of industries hoping to derive profits from the exploitation of regional hydrocarbon resources.

The Barents 2020 initiative,[16] which includes Arctic petroleum majors like Gazprom and Statoil (now Equinor), has developed standards for oil and gas operations in the Barents Sea that have subsequently been fed into the ISO work on cold region petroleum and natural gas activities (ISO 19906).[17] Part of the dynamism of Barents 2020 derives from the involvement of Norwegian and Russian authorities, who promote these industry standards also in the framework of the Arctic Council and the IMO.

Furthermore, the International Petroleum Industry Environmental Conservation Association (IPIECA)[18] and The International Association of Oil & Gas Producers (IOGP)[19] are worth mentioning here. IPIECA is a non-profit association that encourages improvement in industry performance. It is the industry's principal channel of communication with the United Nations. IPIECA partnered with the United Nations Development Programme (UNDP) and the International Finance Cooperation (IFC) in 2017 to develop a joint understanding of the implications of the Sustainable Developments Goals for the industry. IOGP's work on health, safety and environment improvements has also opened up a channel for industry associations to advocate industry views to relevant stakeholders, including international regulators and legislative bodies.

In short, although international and regional legally binding commitments have become more elaborate and stringent over time, and coastal states as well as flag states and industry actors are also increasingly attentive to non-binding or privately developed norms regarding commercial operations on the Arctic shelves, the constraints that international and transnational regimes place on the Arctic coastal states with respect to offshore oil and gas activities are relatively loose and go no further than each coastal state has been prepared to accept. The next step is thus to look closer at regulations at the national and local level.

[16] Barents 2020 initiative: https://www.dnvgl.com/oilgas/arctic/barents-2020-reports.html

[17] ISO 19906:2019, Petroleum and natural gas industries — Arctic offshore structures: https://www.iso.org/standard/65477.html

[18] IPIECA: https://www.ipieca.org/

[19] IOGP: https://www.iogp.org/

National and Local Framework: Alaska

FEDERAL GOVERNANCE

The focus below is on the regulations of potential offshore resources (outside three nm from land), which is not developed. There are near shore operations in the Arctic, and they are in state waters, not federal. The bulk of this production takes place in state waters in Cook Inlet and Alaska is one of four states with Outer Continental Shelf (OCS)[20] operations adjacent to its shore: Alaska, California, Louisiana, and Texas.

U.S. offshore oil and gas development is, thus, under federal jurisdiction. Under the Outer Continental Shelf Lands Act, the development of oil and gas outside three nm from land falls under the jurisdiction of the Department of Interior (DoI). For an area to be opened for public lease sale, it has to be part of the "Five Year OCS Oil and Gas Leasing Program".[20] Here the strategy for the development of natural resources on the U.S. OCS is set. The basic principle is that the Federal Government owns the OCS and makes land available for exploration through the auctioning of blocks (9 nm^2). The winner of the auction agrees to pay the highest upfront payment to the government (a bonus). The winner gets the right to drill for oil for a period of 5 years (with one renewal possible); they get producing rights if they find anything (paying a fixed royalty percentage). Bid winners must still get numerous permits before they can sink exploratory wells. A lease holder is not guaranteed the right to a permit. This is one reason that the U.S. sells "leases", which have no property rights associated with them. Leases may be made by consortia of oil companies with agreed upon shares of who will be the lead bidder and have responsibility for permitting and drilling, and who will supply capital and receive a share of any production. The U.S. is strictly a high-bid award country.

In the aftermath of the Macondo accident the DoI and Mineral Management Service, a bureau under the DoI, underwent a restructuring. The Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) was established. It later split into the Bureau of Ocean Energy Management (BOEM)[21] and the Bureau of Safety and Environmental Enforcement (BSEE).[22] BSEE looks after safety, emergency preparedness, environmental responsibility and appropriate development and conservation of offshore oil and natural gas resources".

BOEM is in charge of lease sales and the opening up of areas to offshore oil and gas development. BOEM will work closely with other federal agencies, the State of Alaska and

[20] IOGP: National OCS Oil and Gas Leasing Program: https://www.boem.gov/regions/gulf-mexico-ocs-region/leasing-and-plans/national-ocs-oil-and-gas-leasing-program

[21] Bureau of Ocean Energy Management: https://www.boem.gov/

[22] Bureau of Safety and Environmental Enforcement: https://www.bsee.gov/

local governments, indigenous groups, and other relevant stakeholders throughout this process. The split has been viewed as a way of de-politicizing the management of oil and gas activities. But both bureaus are still closely linked to the political leadership of DoI. For any area to be opened up for public lease sale, it has to be included in the regularly updated five year "OCS Oil and Gas Leasing Program", which sets out a strategy for the DoI's development of the natural resources of the U.S. OCS.

Several bodies are, thus, involved in the complex governance of offshore oil and gas in the United States (and Alaska). An important characteristic of the regulation of offshore drilling in the U.S. is that it is **mainly prescriptive** and **often requiring industry standards through regulatory incorporation**. Regulations set specific technical or procedural requirements.

ALASKA LEASES

Several leases have been sold over the past decades and Alaska has 12 planning areas. However, Shell was the only company to embark on exploratory drilling, which was unsuccessful in 2015 and the company abandoned the prospect. Furthermore, since the lease awards there have been a number of legal cases brought by indigenous tribes and environmental protestors. The awarding of those leases has, thus, been the catalyst not only for oil exploration activity in Alaska but also for a wave of protests that began as early as 2010, when the Chukchi lease sales were challenged in the U.S. District Court because of concerns related to the National Environmental Policy Act (NEPA).[23]

Initially, the court agreed that the lease sales did not comply with the NEPA rules, but that decision was overturned in 2011 by DoI, which confirmed the lease awards. This opened the way for Shell to proceed with exploration plans in both the Beaufort Sea and the Chukchi Sea. However, its activities since then, combined with reaction to the Deepwater Horizon oil spill in the Gulf of Mexico, have set back U.S. Arctic oil exploration significantly. Indeed, in January 2014 another court ruling called into question the 2008 lease sales, forcing Shell to postpone indefinitely its Arctic offshore activities in the United States.

However, this legal setback was not the only reason for Shell's decision to delay its Arctic exploration; rather, the decision came on the heels of several operational and legal incidents since 2012. But maybe most importantly, in 2015 Shell drilled a hole, after many delays, and did not find commercial quantities of oil and gas. Thus, the company has left the State and relinquished most of its leases. Moreover, in 2016, then U.S. President Barack Obama invoked the 1953 OCS Lands Act to block indefinitely energy development in large parts of the Arctic and Atlantic oceans.

[23] National Environmental Policy Act: https://www.epa.gov/laws-regulations/summary-national-environmental-policy-act

The withdrawal encompassed the entire U.S. Chukchi Sea and large portions of the U.S. Beaufort Sea. But shortly thereafter the policy was reversed by the Trump administration, and now there is a 5-year plan that includes all of Alaska.

FISCAL GOVERNANCE

The fiscal regime that applies to the petroleum industry in the United States consists of a combination of corporate income tax (federal and state), severance tax (states only) and royalty payments (to the subsurface rights holder, be they the federal government, state or private property owners). The federal corporate income tax rate is 21% (changed from 35% by Congress in 2017). The severance tax is payable to the state where the product is extracted, including offshore waters within 3 nm.

Moreover, different severance tax rates apply for different types of products produced and the tax rates and the tax base vary from state to state. In Offshore Alaska (here Beaufort and Chukchi Seas), producers under the U.S. OCS fiscal system experience significantly lower overall government take than in onshore Alaska (onshore) due to the lack of a severance tax and because the offshore infrastructure is outside the reach of the state tax on oil and gas exploration and production property. So, while Alaska does not have a state sales tax or personal income tax, it does have a state corporate income tax, along with a state severance tax and state royalty.

Offshore royalties are 12,5%, and rental fees range from $2,5 to $20 per acre. The general picture is that Alaska is viewed as a secure investment destination. But the fiscal regime applying for Alaska is heavily debated. It is argued that Alaska's fiscal terms (onshore) are not competitive with other states attracting industry investments. This debate could also spill over into the debate on OCS development, as oil companies build up infrastructure (pipes, roads, etc.) on state land to service offshore oil companies' operations, they must pay property tax. Thus, even though the State would receive less revenue from an offshore lease and production in offshore waters, the local and state benefits of development of Alaska's OCS are considered to be of major importance to the Alaskan economy.

National and Local Framework: North Norway

NORWEGIAN ARCTIC

The Norwegian oil sector is the country's largest industry measured in terms of state contribution to income, value creation and export revenues. As such, it has been of decisive importance for the country's long-lasting economic growth and the financing

of its welfare state. Given declining production elsewhere, development of petroleum resources in the Norwegian Barents Sea above the Arctic Circle has been considered the essential next horizon in the exploitation of the Norwegian Continental Shelf (NCS). That means it might to be a key focus area over the coming years.

The Barents Sea, which was first opened for exploration in 1981, is considered an immature petroleum province with huge potential – one whose identified prospects could compensate for falling reserves in the North and Norwegian seas. A factor in terms of anticipated costs is that, in contrast with other parts of the Arctic, the south-western part of the Barents Sea is almost ice-free, and conditions are similar to those of the Norwegian and North seas. This means that the weather window for drilling is long.

To date Norway has not allowed drilling in ice-covered areas owing to the associated safety risks, particularly regarding oil-spill containment. However, attempts are repeatedly made by stakeholders in both the industry and the government to redefine the term "ice-covered" in order to be able to extend the boundaries of existing exploration zones. Unsurprisingly, Greenpeace and other environmental organizations continue to oppose any such moves, and the debate is one that will certainly lengthen the timescale of any oil and gas developments in the Norwegian Arctic. The most important work initiated by the government in this respect is the revised management plan for the Barents Sea.[24]

AWARDING LICENSES

The Petroleum Act[25] and the appurtenant regulations to the Act[26] cover the general legal basis for the licensing system governing the NCS. Licenses can be awarded for exploration, production and transport of petroleum. Permits are necessary in all phases of the petroleum activities, from exploration to plans for field cessation. Furthermore, the Act confirms that the property rights to the petroleum deposits on the NCS are vested in the State. Before an area is opened for petroleum activities (exploration and production) an impact assessment must be carried out, evaluating economic and social effects and environmental impact.

The Norwegian government announces several blocks that may be included in applications for production licenses. Normally production licenses are awarded

[24] Norwegian Ministry of Climate and Environment, Meld. St. 20 (2019–2020) Helhetlige forvaltningsplaner for de norske havområdene — Barentshavet og havområdene utenfor Lofoten, Norskehavet, og Nordsjøen og Skagerrak: https://www.regjeringen.no/no/dokumenter/meld.-st.-20-20192020/id2699370/

[25] Norwegian Petroleum Directorate, Act 29 November 1996 No. 72 relating to petroleum activities: https://www.npd.no/en/regulations/acts/act-29-november-1996-no2.-72-relating-to-petroleum-activities/

[26] Norwegian Petroleum Directorate, Regulations to Act relating to petroleum activities. Laid down by Royal Decree 27 June 1997: https://www.npd.no/en/regulations/regulations/petroleum-activities/

through licensing rounds. The timeframe for licensing rounds is usually two years. Companies can apply as a group or individually. The Norwegian Ministry of Petroleum and Energy (MPE) awards production licenses based on the applications submitted.

Furthermore, the licensees become the owner of the petroleum produced. The license will regulate the rights and obligations of the companies, granting companies exclusive rights to exploration drilling and production within the given area. The license is valid for an initial period (the exploration period) lasting for up to ten years. If a field is considered commercially viable the authorities grant the final consent to start the development. In this process the company must submit a Plan for Development and Operation to the MPE. A vital part of this plan is to conduct an impact assessment, showing how petroleum activity could affect the society and the environment.

COOPERATION WITH RUSSIA

In April 2010, it was announced that Norway and Russia had reached a maritime delimitation agreement over an area in the Barents Sea that had been the subject of a territorial dispute for almost 40 years, opening new opportunities for petroleum development in the Barents Sea. As soon as the delimitation agreement was ratified, seismic work began on the Norwegian side. Under the agreement, each country has the right to develop oil and gas on its side of the border. In the case of Norway, this means that the area is governed by the same regulatory framework as the rest of the NCS.

The delimitation agreement also includes an Annex regulating the unitization of potential transboundary hydrocarbon deposits, based on analogues from the North Sea. The parties are required to reach agreement on the joint exploitation of deposits that extend into the continental shelf of the other country, and no party may start production from such deposits unilaterally. This means that potential developments on the Norwegian side could be delayed or halted by Russia, which might have a different time perspective on exploitation.

Furthermore, any big cross boundary discovery will require extensive Norwegian-Russian cooperation and joint development in order to reach the critical volumes needed to make the discovery commercial. And common solutions for infrastructure development will have to be found too.

REGULATORY SYSTEM

When conducting its petroleum policies, the Government is assisted by various ministries, underlying directorates and supervisory authorities, e.g. The Norwegian

Petroleum Directorate (NPD) as an important advisory body for the MPE, The Petroleum Safety Authority Norway (PSA) as responsible for technical and operational safety and The Norwegian Coastal Administration as responsible for oil spill preparedness. However, Norwegian regulations contain **few mandatory technical requirements**, and thus employ a **performance-based regulatory approach.**[27]

Furthermore, Norway has done extensive work on integrated management plans. They were introduced by the Norwegian government the first time in 2001/2002 and have been drawn up for all Norwegian sea areas.[28] The purpose is to offer a framework for value creation through the sustainable use of natural resources and ecosystem services. The stated ambition is to give clear priorities and strengthen coordination between relevant stakeholders, including regulatory actors.

FISCAL SYSTEM

Norway does not take a royalty share of its petroleum production but taxes the producers' profit and has a substantial equity share in many projects. The ordinary tax rate on the NCS is the same as on land, 28%, however, due to extraordinary profit associated with recovering the petroleum resources, a special tax rate of 50% is in general applied. Thus, a company involved in extractive activities (i.e., upstream activities) within the geographic areas described in the Norwegian Petroleum Tax Act is subject a marginal tax rate of 78% on its net operating profits.[29] However, deductions are allowed for all relevant costs, including costs associated with exploration, research and development, financing, operations and removal.

The refunds are part of Norway's incentive system for oil sector development, which, introduced in the early 2000s, aims at attracting companies to the NCS. However, in 2013 the Norwegian government decided to increase the special petroleum tax by 1% while lowering the rate of corporate tax for all companies by the same percentage, to redress imbalances between the dominant petroleum sector and the overall mainland economy. This means that the marginal tax rate for the petroleum industry has remained the same, but a further change means that certain deductions for investments made by oil and gas companies offshore are now restricted, as a result of which companies in effect pay more tax than before. Despite a high level of taxation, interest in the Norwegian Arctic (read the Barents Sea) is high. Furthermore, Norway is viewed as a stable and secure place to invest.

[27] A regulatory approach that focuses on desired, measurable outcomes, rather than prescriptive processes, techniques, or procedures. Performance-based regulation leads to defined results without specific direction regarding how those results are to be obtained.

[28] Norwegian Ministry of Climate and Environment, Management plans for marine areas: https://www.regjeringen.no/en/topics/climate-and-environment/biodiversity/innsiktsartikler-naturmangfold/forvaltningsplaner-for-havomrada/id2076485/

[29] The Petroleum Taxation Act, Act of 13 June 1975 No. 35 relating to the Taxation of Subsea Petroleum Deposits, etc. Last amended by Act of 21 June 2013 No. 66.

From the beginning of exploration of oil and gas in Norway various governments have implemented policy to protect interests of communities and the economy. When foreign operators entered the Norwegian petroleum industry in the 1970s, they were encouraged to form partnerships and joint development programs with Norwegian companies, sustaining the local content. This has led to the establishment of a strong technological expertise in the field of offshore development. Local content requirements are, however, not any longer included in licenses.

Comparing Alaska and North Norway

In Alaska and North Norway there are variations regarding both economic and political factors determining the future oil and gas exploration and production. The economic aspect mainly reflects the relative importance of potential Arctic production.

In the United States, the offshore Arctic oil and gas activities only have a marginal role in the overall economy. Alaska is, however, highly dependent on income from onshore oil and gas activities, particularly in the North Slope region, where oil production takes place on the shores of the Arctic ocean. In Norway, the Arctic resources are regarded as necessary in order to sustain the level of activity in the oil and gas industry.

If we turn to the political and legal realm, the variation of systemic factors is important. The U.S. is a federal state. The relationship between the State of Alaska and the federal government feeds directly into the prospect of oil and gas development in the Arctic. Most elected officials in Alaska are strongly in favor of increased oil and gas activity, while environmental concerns for a long period were high on the agenda of the federal government. This has, however, changed. The proposal to open the Arctic National Wildlife Refuge (ANWR) to oil development and the inclusion of possible lease sales in almost all of the Alaska OCS marks a significant shift away from environmental concerns at the federal government level. Yet, recent ANWR lease sales did not attract any interest from major oil producers and in parallel there has been rather successful activist trend in targeting financial institutions, many of which will no longer lend on Arctic drilling efforts. Moreover, the new Biden administration has also clearly signaled a return to pre-Trump policies.[30]

[30] DeMarban, A. (2021). ANWR lease sale fizzles for Trump administration, with revenue falling far short of hopes. Anchorage Daily News, 6 January 2021. Retrieved 1 February 2021 from https://www.adn.com/business-economy/energy/2021/01/06/anwr-lease-sale-brings-in-144-million-in-bids-mostly-from-alaska-state-owned-corporation/

Furthermore, the ownership of the geographical areas is divided between the State of Alaska and the federal government. Thus, both actors have limited opportunity to enforce restrictions in various parts of an oil or gas province. However, with new political constellations in Washington, D.C. from 2017, this dispute has vanished for the time being.

Although careful in its gradual approach to the Barents Sea, various Norwegian governments have been more enthusiastic about development than regional representatives and groups in North Norway. More recently, regional backing for petroleum development has increased, as long as it brings tangible local benefits in terms of local employment. At the same time, environmentally based resistance on the national level is getting stronger.

Turning to governance, we see that both Alaska and North Norway have a highly developed and complex regulatory system. An important distinction is, however, that the **U.S. system is mainly prescriptive** requiring industry standards through regulatory incorporation, setting specific technical and procedural requirements. In **Norway**, there **are few mandatory technical requirement**s, which the system being characterized as a **performance-based regulatory system**.

The **fiscal regimes also differ**. Norway does not take royalty shares of its petroleum production but has a substantial equity share in many projects and taxes the producers' profits. In U.S., the fiscal regime contains a combination of royalty payments, severance tax and corporate income tax. Bonuses paid on lease sales are the single largest source of federal revenue. The tax rate and the tax base vary, however, from state to state. But in offshore Alaska the producers under the U.S. OCS fiscal system have a lower government take than in onshore Alaska. The fiscal system is, however, heavily debated. An important fiscal question between the two systems is whether resource rents are captured. In the U.S., the bonus bid system extracts the maximum resource rent from the oil companies because in order to win a lease a company must be bid its maximum rent estimate. In the Norwegian system, where arrangements are more negotiated, it is not always clear who gets what share of the resource rents.

It is safe to conclude that **Arctic offshore development is controversial in both Alaska and North Norway** and that political uncertainty, which may translate into regulatory risk, must be considered by all commercial

For a detailed analysis on the economic aspects of maritime transportation and shipping in Alaska and North Norway, see the **Blue Energy Report**.

actors. Furthermore, the amount of oil and gas that eventually can be subject to commercial extraction in the Arctic offshore is highly uncertain.

In addition to market developments, the cost of Arctic operations increased more than elsewhere, very much because of stricter environmental standards as well as precautionary steps by the industry after the Deepwater Horizon catastrophe. Looking into the future some companies may fear stricter climate policies restraining Arctic projects, effectively leaving them as stranded assets.

However, the Arctic is a heterogeneous region climatically and socially and includes areas under many different jurisdictions. There may be projects or sub-regions in the Arctic where the logic referred to above does not apply or applies with less strength. One could ask how meaningful such comparison is? An overall conclusion is that the interests of the U.S. (Alaska) and Norway (North Norway) in, or dependence on, Arctic resource development has much to say for the framework conditions and incentives given to the industry. Framework conditions offered by host governments can only do so much to encourage Arctic petroleum development. Commercial calculations by the companies must show a considerable surplus, reflecting the residual risk, for investments to happen. It is, however, important not to understate the economic risks. Regulatory costs will be high but so will transportation and technology costs. The Arctic will remain one of the most expensive places in the world, and it is unclear that it will be worth developing Arctic oil and gas in a decarbonizing world.

Maritime Transportation / Shipping

Svein Vigeland Rottem

Trans-Arctic shipping is not a new phenomenon. The two existing passages, the Northeast Passage (NEP) and the Northwest Passage (NWP) are both intriguing and tempting for international shipping, since their usage would reduce the sailing distance between ports in Europe and Asia and between the U.S. East Coast and the Pacific.[31] The saving potential is largest for sailings from Northern Europe to North-East Asia, when compared with the Suez Canal route.

In this Chapter we will introduce regulatory measures (international, regional, national and local) of relevance to Arctic shipping, essentially focusing on international and regional regulations due to the international nature of maritime transportation. We will, however, include some examples of national regulations for the United States (Alaska) and Norway (North Norway).

For a detailed analysis on the economic aspects of maritime transportation and shipping in Alaska and North Norway, see the **Blue Maritime Transportation Report.**

Before we proceed, an important distinction must be made: the distinction between the law of the sea and maritime law (also known as admiralty law). The law of the Sea is a body of international law governing the rights and duties of states in the maritime domain. It concerns issues such as coastal waters jurisdiction and navigational rights and is drawn from several international treaties and agreements. The modern law of the sea derives largely from UNCLOS, see Chapter 2. Law of the sea is the public law counterpart to maritime law, which applies to private maritime issues, such as ship collisions, and marine insurance. When focusing on the United States (Alaska) and Norway (North Norway) in the last part of this Chapter the emphasis is on maritime law aspects.

International and Regional Governance

INTERNATIONAL REGULATIONS

International shipping is a mature industry with several established international governance institutions. It is an economic activity where vessels move across EEZs

[31] The NEP is commonly known as Northern Sea Route (NSR). However, properly speaking, while the NSR only concerns Russian waters, the NEP also includes the Barents Sea (and thus, Norwegian waters).

and the high seas. International regulations are thus a necessity. Most important is UNCLOS, which makes no specific mention of the Arctic Ocean.

However, Article 234, which regulates the right of coastal states to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas, is often referred to as the "Arctic article". While it is not limited to issues relating to polar waters, the Arctic Ocean was clearly what the drafters had in mind, leaving no doubt the applicability of the law of the sea to all parts of the polar sea.[32]

The IMO was established in 1948 as a specialized agency of the United Nations. It holds particular Arctic relevance as a broad variety of conventions prepared and finalized under an IMO umbrella also apply to the Arctic Ocean. Accordingly, this UN agency has adopted Guidelines for Ships Operating in Arctic Ice-Covered Waters and Guidelines for Ships Operating in Polar Waters, both recommendatory in nature, and has also developed a mandatory shipping code for polar regions, the International Code for Ships Operating in Polar Waters, commonly known as the "Polar Code", which came into force on 1 January 2017.

The Polar Code addresses navigation in Arctic waters, standards for ships operation in the Arctic, such as ships' design and construction; equipment; crew training, and search and rescue training. The amendments to the Polar Code require ships to attain a Polar ship certificate to operate in Arctic waters, where obtaining the certificate requires the assessment of the ship's adherence to the standards of the Code.

The IMO develops regulations covering requirements entering into force after being ratified by the required number of states, within the legal framework set by UNCLOS. The regulations are then implemented into the national law of the parties and establish a standard for international shipping. Furthermore, the International Labour Organization (ILO) develops frameworks for national legislation, with the aim to "promote rights at work, encourage decent employment opportunities, enhance social protection and strengthen dialogue on work-related issues."[33]

FLAG STATES AND PORT STATES

There is an important distinction between flag states and port states. A state is a "flag state" when the ship is registered in that state; the ship carries this national flag. A port state is a state with an international port. Each IMO member state (flag state) that also serves as a port state must install port state officers, who will

[32] Jensen, Ø. & Rottem, S. (2010). The politics of security and international law in Norway's Arctic waters. Polar Record 46(236), 75–83.

[33] International Labour Organization: https://www.ilo.org/

inspect ships according to international legislation and not according to national legislation. IMO rules require two national flags to be shown. Technically, the flag of registration is carried at the jack staff (on the stern of the ship); the flag of the port country being visited is carried on the mizzen, though in modern ships without sail, it is carried on the flag staff.

The port state officer will look at all IMO and ILO conventions in force and will not take additional flag state legislation in consideration. If for example a given state has not ratified one of the conventions, the port state officer still will look at this convention, while the flag state inspector will not look at this convention.[34]

CONVENTIONS

The list of IMO and ILO conventions is long. The most important treaty is Safety of Life at Sea (SOLAS).[35] The main objective of the SOLAS Convention is to specify minimum standards for the construction, equipment and operation of ships. Flag states are responsible for ensuring that ships under their flag comply with its requirements, and several certificates are prescribed in the Convention.

Control provisions also allow states to inspect ships of other contracting states if there are clear grounds for believing that "the ship and its equipment do not substantially comply with the requirements of the Convention". This is known as port state control. Another important convention is MARPOL, which includes regulations aimed at preventing and minimizing pollution of the marine environment by ships from accidental or operational causes.

POLAR CODE

In recent years the international community has developed new legal tools to address environmental risks and safety associated with polar navigation. The most important is the International Code for Ships Operating in Polar Waters (Polar Code). The Polar Code covers a wide range of shipping-related matters relevant to navigation in waters surrounding the poles, including ship design, construction and equipment; operational and training concerns; search and rescue; and, also, the protection of the environment and ecosystems of the polar regions.

OTHER CONVENTIONS

Other Conventions and legal instruments both relevant globally and for the Arctic are:

- The Maritime Labour Convention (MLC) includes minimum requirements for

[34] Ship's Survey and Inspection Blog, the Role of the Flag State at a Seagoing Ship, 9 January 2015: https://maritime-mea.com/blog/2015/01/09/the-role-of-the-flag-state-at-a-seagoing-ship/

[35] International Convention for the Safety of Life at Sea (SOLAS), London, 1 November 1974, in force 25 May 1980, 1184 U.N.T.S. 2.

seafarers to work on a ship regarding conditions of employment, accommodation, recreational facilities, food and catering and health protection, medical care, welfare and social security protection.[36]

- The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) prescribes minimum standards relating to training, certification and watchkeeping for seafarers which countries are obliged to meet or exceed.[37]
- The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) requires all ships to implement a ballast water management plan. Ships must carry a ballast water record book and are required to carry out ballast water management procedures to a given standard.[38]
- In the International Maritime Solid Bulk Cargoes Code (IMSBC) provisions from SOLAS are extended. The primary aim is to facilitate the safe stowage and shipment of solid bulk cargoes.
- The Nairobi Convention on the removal of wrecks provides a set of uniform international rules aimed at ensuring the prompt and effective removal of wrecks located beyond the territorial sea.[39]
- The Convention on the International Regulations for Preventing Collisions at Sea, (COLREGs) gives, among other, guidance in determining safe speed, the risk of collision and the conduct of vessels operating in or near traffic separation schemes.[40]
- The Hong Kong Convention (HKC) aim is to ensure that ships, when being recycled, do not pose any unnecessary danger to the environment or human health and safety.[41]

We also find several liability regulations:

- The International Convention on Civil Liability for Oil Pollution Damage (CLC) was adopted to ensure compensation to persons who suffer oil pollution damage from maritime casualties involving oil-carrying ships. It places the liability for

[36] Maritime Labour Convention, 2006, as amended (MLC, 2006), entered into force on 20 August 2013.

[37] International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), adopted on 7 July 1978, entered into force on 28 April 1984; Major revisions in 1995 and 2010.

[38] International Convention for the Control and Management of Ships' Ballast Water and Sediments, 13 February 2004, IMO Doc. BWM/CONF/36

[39] Nairobi International Convention on the Removal of Wrecks, adopted on 18 May 2007, entered into force on 14 April 2015.

[40] Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs), adopted on 20 October 1972, entered into force 15 July 1977

[41] The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, adopted on 15 May 2009, entry into force: 24 months after ratification by 15 States, representing 40% of world merchant shipping by gross tonnage, combined maximum annual ship recycling volume not less than 3% of their combined tonnage

[42] International Convention on Civil Liability for Oil Pollution Damage (CLC), adopted on 29 November 1969, entered into force on 19 June 1975; Being replaced by 1992 Protocol, adopted on 27 November 1992, entered into force on 30 May 1996

such damage on the owner of the ship.[42]

- The Hazardous and Noxious Substances Convention (HNS) aims to ensure compensation to those who have suffered from damage to person and/or property, including the cost of clean-up and resulting from maritime transport of hazardous and noxious substances.[43]
- The International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER) aims ensure that compensation is available to persons who suffer damage caused by spills of oil, when carried as fuel in ships' bunkers.[44]

Important to notice is that IMO and ILO do not enforce any regulations. Generally, port states exercise port state control based on domestic law and enforcing international regulations is the obligation of the flag state for ships flying its flag.

Furthermore, the European Union (EU) has also played an active role by introducing regulations. Examples include: EU Ship Recycling Regulation,[45] which aims to reduce impacts linked to the recycling of ships flying the flag of EU Member States, and the EU Monitoring, Reporting and Verification (MRV) systems for greenhouse gas monitoring, which aims to collect CO2 emission data for ships above 5000 gross tonnage calling at European Economic Area (EEA) ports.[46] Moreover, states can introduce additional domestic regulations.

NORTHWEST PASSAGE

In a regional context a short introduction to the NEP and the NWP is needed before we proceed to national and local regulations. There are international legal disputes regarding jurisdiction in both the NEP and NWP. The issues are politically sensitive, and legal uncertainty can also have an impact on the commercial use of the sea routes. But that does not mean that we have had obvious cases where a shipper would have liked to transit the routes but did not do so due to legal uncertainty. One could, however, argue that for the long-term economic development of the routes legal certainty would be beneficial. Especially in the case of the NEP the regime of fees and requirements Russia has put into place is more easily navigable than it was 4-5 years ago. For example, in 2009 the Beluga vessels faced significant hurdles and lack of information about requirements. This has mostly been rectified.

[43] International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 2010 (2010 HNS Convention)

[44] International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER), adopted on 23 March 2001, entered into force on 21 November 2008

[45] Regulation (EU) No 1257/2013 of the European Parliament and of the Council of 20 November 2013 on ship recycling and amending Regulation (EC) No 1013/2006 and Directive 2009/16/EC

[46] Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2015/757 in order to take appropriate account of the global data collection system for ship fuel oil consumption data

Regarding foreign vessels' right to navigate the NWP, the initial legal question is whether and on what basis Canada might be said to enjoy sovereignty over the waterways connecting the Atlantic and Pacific Oceans through its northern archipelago. Is the NWP Canadian internal waters? If so, are foreign vessels automatically precluded from using the NWP? Canada has continuously reinforced claims of sovereignty over the NWP by characterizing it as internal waters and denied that it is subject to an international straits' regime.

Canada's legislative and enforcement powers in the NWP would then under international law imply the right to deny foreign vessels access to the passage altogether or, for instance, prescribe such rules found appropriate for the construction or design of ships. It is questionable, however, if historic title is a conceivable base for the purpose of claiming the northern waterways as Canadian internal waters and thus subject to Canada's sovereignty.

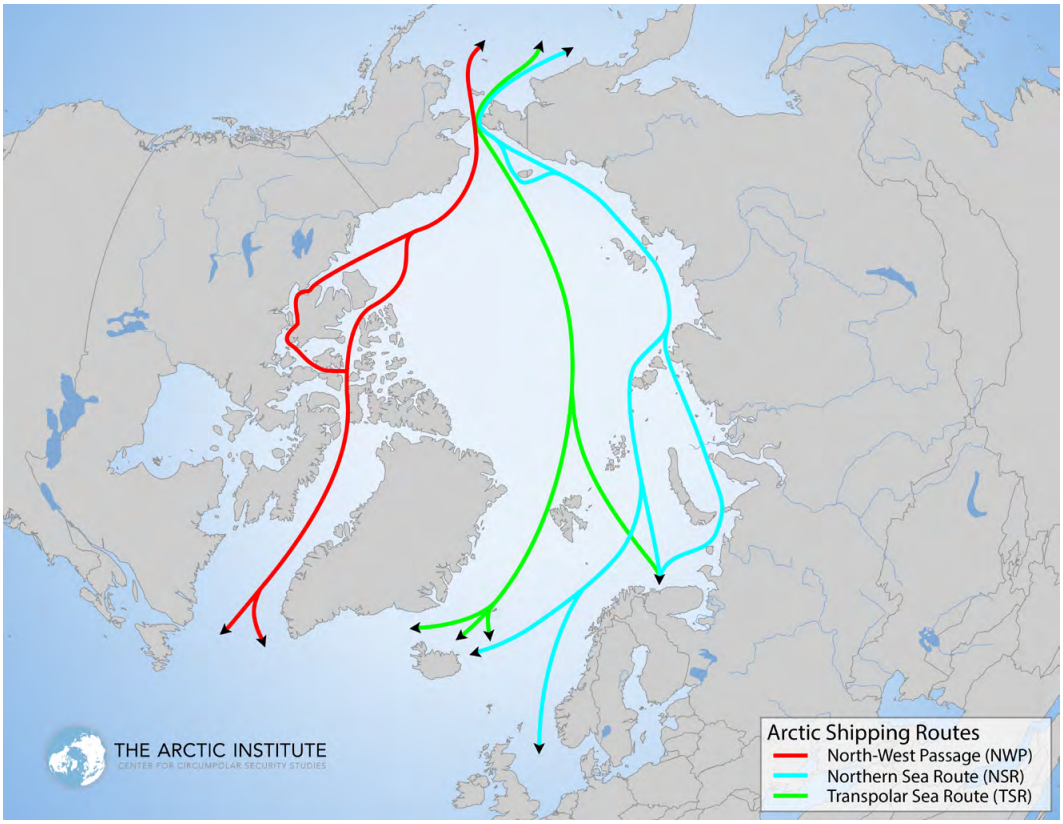

FIGURE 2: Arctic Shipping Routes

Visualization of the three Arctic Shipping Routes. In red, the Northwest Passage; in green, the Transpolar Sea Route and in cyan the Northeast Passage. SOURCE: The Arctic Institute Visualization of the three Arctic Shipping Routes. In red, the Northwest Passage; in green, the Transpolar Sea Route and in cyan the Northeast Passage. Source: The Arctic Institute

NORTHEAST PASSAGE

Quite clearly the largest potential for foreign navigation is in Russian Arctic waters. Russia has – step by step – expanded its Arctic jurisdiction over the years, constantly pushing domestic legislation toward greater coastal state jurisdiction. In terms of international law and state practice, controversy regarding navigational rights through the NEP is essentially about that the right of Russia to prescribe and enforce regulations for foreign vessel traffic: Where does Russia have what powers with respect to ships traversing the different maritime zones along her Arctic coastline?

Depending on which of the several potential routes is chosen, a ship navigating the NEP or Russian Arctic straits will continually find itself in different maritime zones, where Russian jurisdiction under international law varies accordingly. The right of free navigation exists through parts of the waters which constitute high seas, including in the EEZ. Innocent passage exists through the territorial sea. And the regime of transit passage applies to any international strait.

The basic problem for a foreign ship in Russian Arctic waters would thus be that its presence, for instance, in the EEZ, is "impossible" without prior or posterior navigation through territorial waters subject to Russian sovereignty. The legality of the Russian straits' regime and the imposition of administrative and environmental legal standards is a key concern for foreign maritime traffic. As regards the former, the problem is generally the same as for the NWP.

The five seas that provide passage through the NEP – Chukchi, East Siberian, Laptev, Kara and Barents – are linked by straits. Do foreign ships automatically enjoy the freedom of navigation for the purpose of continuous and expeditious transit of these straits? If so, what would be Russia's authority over foreign ships in transit? However, an important part of the picture is that vessels do not necessarily have to pass through these straits but travel further north.

Furthermore, Russia provides detailed regulations for any ship seeking to sail the Northern Sea Route. The aim of Russia's domestic laws is to allow navigation on a non-discriminatory basis for vessels of all states, while considering environmental concerns. The present-day legal regime is regulated by several basic regulations. These provide the framework within which navigation on the seaways of the Northern Sea Route must take place. For instance, vessels must be permitted to navigate.

Such permits may be issued pursuant to a request be made – in advance – to the Administration of the Northern Sea Route, located in Moscow. Information relating

to the vessel (port registry, name, tonnage, main dimensions, output of engines, IMO number, etc.) and the intended journey (time of navigation and aim of the journey) must be contained. The vessel must fulfil certain technical requirements. The master must have qualifications and experience to navigate in ice-covered waters. State pilots might be assigned. A fee must be paid. Civil liability must be secured in case of environmental damage. The vessel must follow the route appointed and be guided by appropriate means, for instance aircraft or icebreakers.

Under international law, Russia relies on UNCLOS, Art. 234 for the right to regulate navigation in its adjacent Arctic waterways. According to that provision, coastal states have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance.

Art. 234 is not free from controversy, however, either under international law or with respect to Russian state practice in the Arctic. Nevertheless, on the basis of Art. 234, Russia (and Canada) prescribes standards which are more stringent than those generally permitted under international law applied in “normal” adjacent maritime zones. Worth noting is also that UNCLOS is silent on whether the regime of transit passage prevails over the regime of Art. 234.

PRIVATE GOVERNANCE

In addition to international and regional regulations private governance mechanisms are increasingly significant. Classification societies, such as DNV GL, Lloyd’s Register, the American Bureau of Shipping and Bureau Veritas, play an important role as private governance actors. They develop and maintain standards and technical rules for ships and work together in the International Association of Classification Societies. Furthermore, Protection & Indemnity clubs, controlled by ship owners, underpin the enforcement and implementation of international conventions and regulations of class societies and flag states. Previously mentioned regimes such as CLC, BUNKER and the Nairobi Convention are mainly financed by Protection & Indemnity clubs.

We also find private initiatives such as The Sustainable Shipping Initiative, which is an independent non-profit organization with the objective to make shipping sustainable. Charterers, ship owners, shipyards, class societies and

technology companies participate. An interesting initiative in an Arctic context is the Association of Arctic Expedition Cruise Operators (AECO) aiming to manage responsible and environmentally friendly expedition cruising in the Arctic. AECO members are obligated to operate in accordance with national and international laws and regulations, in addition to AECO by-laws and guidelines. Several have been developed with input from among others the Governor of Svalbard, the Norwegian Polar Institute, WWF's Arctic Program Office, Visit Greenland and Greenland's Ministry of Nature and Environment. The guidelines do not, however, replace official laws and regulations or the need to know these regulations.

ARCTIC COUNCIL

Lastly, the work of the Arctic Council is worth mentioning when introducing international regulations and Arctic shipping. The Arctic Council is not an international organization with legal clout. The work of PAME (Protection of the Arctic Marine Environment) – one of the Arctic Council's working groups – has, however, been influential and relevant for Arctic shipping. PAME's main mandate is to work on the protection and sustainable use of the Arctic marine environment.
The most important achievement in recent years is the Arctic Maritime Shipping Assessment (AMSA). Here, PAME made numerous recommendations and helped present the most comprehensive survey of the challenges created by and facing maritime transport in the Arctic. AMSA has also provided input to the IMO and contributed to efforts to negotiate binding regulations for shipping in the region through the Polar Code.

Through AMSA, steps have been taken to enable monitoring mechanisms on enacted decisions and recommendations the group has formulated. Such mechanisms are quite unique in an Arctic Council context. PAME is not a technical working group monitoring the Arctic environment, but more a venue to discuss policy measures that can meet new challenges in the north such as, for example, increased maritime transportation and shipping.

National and Local Framework: Alaska

While Canada and Russia each have their own set of special rules and regulations for their Arctic waterways, the U.S. has never developed a distinct set of ship rules or standards for commercial ships in the U.S. maritime Arctic (including Alaska). International regulations, including the Polar Code, provide the U.S with a set of international rules and standards which it can implement for U.S. waters.

In this part of the Chapter, we will introduce some of the relevant international regulations that are incorporated in U.S. law as well as a set of more distinct U.S. shipping laws and regulations within several jurisdictions directly or indirectly affecting Alaskan Arctic shipping.

The most environmentally devastating accident in near Arctic waters was the Exxon Valdez oil spill in Alaska in 1989. Exxon Valdez went aground in Prince William Sound, which is in the North Pacific, not the Arctic. The accident had, however, an impact on regulations relevant for Arctic shipping. Several statutes and regulations addressing pollution caused by vessels have been enacted since the 1970s. The most recent and important of these is the Oil Pollution Act of 1990.[47] It was enacted as a response to the Exxon Valdes oil spill, and sets forth the liability of an owner or operator of a vessel, on- and off-shore facilities, and pipeline owners when oil is discharged from the vessel of the facility. The Act also required the use of double-hull oil tankers and tank-barges, phasing out the single-hull ships such as the Exxon Valdez.

Other statues of relevance addressing pollution and pollution control often work in conjunction with the Oil Pollution Act, e.g. the Federal Water Pollution Control Act,[48] and the Comprehensive Environmental Response, Compensation and Liability Act.[49] The BSEE will in the event of oil spill oversee the oil spill response operations. More specifically the U.S. Coast Guard has lead responsibility in all oil spills. BSEE's job is to deal with any issues on the rig, but the Coast Guard is in charge of clean up and investigation.

In case of a collision the Coast Guard has authority to investigate marine casualties and bringing criminal charges as part of their investigation. In case of major marine casualties, the National Transportation Safety Board will conduct a formal investigation and provide a comprehensive report and can make recommendations regarding changes to regulation. The U.S. is a signatory to SOLAS and COLREGs. Violation of these regulations is the most common cause of collision. U.S. collision law also includes other presumptions of fault, e.g. the Oregon Rule and the Louisiana Rule. Moreover, the Wreck Act[50] regulates the removing of a wreck.

Furthermore, cruise ship traffic is increasing in Alaskan waters and regulations on passenger claims are thus of relevance here. Generally, passenger claims involve injury or death, but may also involve concerning damaged or lost luggage. Such claims are governed by the general maritime law of the U.S.

[47] Oil Pollution Act, 33 U.S.C. § 2701 et seq. (1990)

[48] Federal Water Pollution Act, as amended through P.L. 107–303, 27 November 2002

[49] Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 et seq. (1980)

[50] Abandoned Shipwreck Act of 1987, 43 U.S.C. §§ 2101 et seq.

National and Local Framework: North Norway

In Norway, as in the U.S. the list of acts and regulations on shipping is long and covers a wide range of issues, including liability issues, passenger claims, sea lane regulations and technical standards.[51] Norway has not developed specific regulations on Arctic shipping, although shipping around Svalbard has stricter environmental regulations than in other parts of Norwegian Waters.

The Norwegian Maritime Code of 1994[52] is the most important act addressing issues like collision and pollution. Pollution liability is governed by chapter 10 which incorporates conventions like BUNKER and CLC. The Code establishes a strict liability on the ship owner. In the event of collision Norwegian Courts will rely on COLREGs.

As in Alaska, cruise ship traffic is increasing in North Norway (including Svalbard) and regulations on passenger claims are of relevance. The key regulations on the resolution of passenger claims are set out in the Norwegian Maritime Code which are based on the Athens Convention from 1974[53] and the EEA Agreement.

Comparing Alaska and North Norway

Shipping is truly international in its nature. Thus, to compare the regulatory system of Alaska and North Norway in isolation does not really bring much to the table. Moreover, the United States has not developed a distinctive set of rules or standards for commercial shipping outside Alaska.[54] Except for rules and standards for shipping around Svalbard, Norway has also not developed specific national standards for Arctic shipping. Regulations for regional shipping of relevance for Alaska and North Norway should therefore be emphasized. Thus, we will sum up basic features of NEP and NWP regulations.

First, under international law (UNCLOS, Art. 234) both Canada and Russia have prescribed standards more stringent than the ones applied in ice-free adjacent maritime zones. According to Art. 234 coastal states have the right to adopt and enforce non-discriminatory laws and regulations in areas with severe ice conditions. The regulations of the NEP (including the NSR) are detailed and complex, with several potential routes a transiting ship could sail and varying (international/national) jurisdiction being applied. In the NWP, the key question is whether and if so on what

[51] For a list of regulations and acts, see: https://www.sdir.no/en/shipping/legislation/#laws

[52] The Norwegian Maritime Code, Act No. 39 of 1994, adopted 24 July 1994

[53] Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL), adopted on 13 December 1974, entered into force on 28 April 1987; 2002 Protocol, adopted on 1 November 2002; entered into force on 23 April 2014

[54] However, a proposed Arctic Shipping Federal Advisory Committee will study new and emerging seaways, including new regulations, see https://www.arctictoday.com/alaskas-us-senators-push-for-a-new-arctic-shipping-committee/

legal basis Canada enjoys sovereignty over waterways in their Arctic areas. Canada claims that the NWP is internal waters and not subject to an international straits' regime. If it is not a strait but internal water, Canada has sovereignty.

> ***To sum up:*** *both passages are characterized by regulatory uncertainty and complexity that have an impact on the commercial use of the sea routes seen from Alaska and North Norway.*

Offshore Wind

Tor Håkon Jackson Inderberg

It is generally acknowledged that there is a need for increased electricity production from renewable sources in all or most regions in the world. As many of the available technologies such as solar and wind power have a large spatial footprint per produced unit of electricity, one solution is to move the power plants off shore to reduce spatial conflicts and access greater areas. Even though offshore wind power partly resolves some of the spatial conflicts, they still mean the more or less exclusive use of space in the air, surface, water, as well as seabed area, as even floating installations need anchors. This may lead to conflicts with a variety of interests, in particular fisheries, shipping, petroleum, as well as environmental concerns, for example linked to bird life.

Offshore wind turbines are mainly based on monopoles and gravity foundations in shallow water (depths down to 30 m). In depths between 30 m to 60 m, tripods, jackets and truss-type towers will be used, whereas in deeper waters than around 60 m floating turbines structures instead of fixed-bottom foundations may be used.

These technologies are currently at different development stages, where floating turbines are in the most initial stages, and the first floating wind park is the Hywind wind power plant outside of Scotland, which began operations in October 2017. Also, the size of commercial turbines has increased. In 2013 the typical height was just over 100 m (3 megawatt (MW) turbine), while it grew to more than 200 m in 2016 (8 MW turbine), which increased the swept area by 230%.[55] A 12 MW turbine now under development is expected to reach depths of roughly 260 m, developments which will reduce costs of offshore wind power.

Compared to terrestrial wind power, offshore installations tend to be more capital-intensive and technologically complex, but also have some benefits:

- There are generally more wind resources offshore than on land
- Turbulence is a smaller problem offshore, leading to more predictable production
- There are fewer conflicts concerning land-use and stakeholder interests offshore
- The distance to people leads to higher acceptance levels for the technology
- Larger turbines can be installed, leading to cost reductions

[55] IEA (2018), Offshore Energy Outlook 2018, IEA, Paris https://www.iea.org/reports/offshore-energy-outlook-2018

To ease the reading across the cases Alaska and North Norway, precision in some parts of the terminology used have been reduced. While differences and nuances in precise terms often are important, the purpose here is to describe the general approach to governance of the potential or actual development of offshore wind in these two areas. Such nuances often have roots in distinct traditions and legal origins, and the functions of such terms and practices may be very similar.

Two examples follow. Although a lease (U.S.) and a license (Norway) are legally different, for the purpose of the discussion here the distinction is less important as they both relate to the formal opening of an area for offshore wind development. Therefore, the two terms will be used interchangeably even if this is formally not correct. Similarly, the terms Environmental Impacts Assessment (EIA) and Environmental Reviews, or Surveys, will here refer to roughly the same practice of monitoring the predicted impacts and consequences of an offshore wind power plant on different environmental aspects.[56]

International and Regional Governance

First, is there a difference between floating wind turbines and seabed-based ones? According to UNCLOS, the coastal states may utilize wind power in the area out to the end of the EEZ. There are no essential differences between seabed mounted turbines and floating turbines.

The Paris Agreement is a voluntary international agreement addressing greenhouse gas emissions reductions. While the nationally determined contributions that each signatory state submits effectively comprise the emissions reductions targets, the increase of renewables generated electricity and electrification of sectors such as agriculture and transport is one of the most important areas for emissions reductions. While land-based wind power has been one of the primary strategies, and more than 100 countries world-wide use this technology, offshore wind power has the potential to assist in reaching the Paris objectives.[57] However, the Paris agreement does not regulate this in detail.

In terms of Arctic governance for offshore wind power, this is mainly a question of national relevance, which therefore is the focus in this Chapter.

[56] Morrison-Saunders, A. (2018). Advanced Introduction to Environmental Impacts Assessment. Cheltenham: Edward Elgar Publishing Limited

[57] IEA (2018). Offshore Energy Outlook 2018, IEA, Paris. Retrieved 25 January 2019 from https://www.iea.org/reports/offshore-energy-outlook-2018

National and Local Framework: Alaska

The population of Alaska of just over 700.000 is fairly dispersed, which means that the energy system is put under spatial strain. More than half of the State's citizens live in the municipalities of Anchorage, Juneau, or Fairbanks, while the rest of Alaska averages less than one resident per square mile. In 2017, natural gas accounted for 43% of the electricity production, hydropower 25%, petroleum liquids 15%, coal accounted for 9%, and wind power (terrestrial) and biomass collectively accounted for almost 4% of Alaska's net electricity generation.[58]

The spread-out population means that much of the citizens are not connected to a state-wide electricity grid. While some larger areas have transmission grids, much of the rural population does not, and relies on community-owned cooperatives for their electricity, often with state assistance to manage the high prices. This lack of infrastructure creates challenges for building larger scale renewables electricity production plants, including offshore wind power.

Wind power supplies more than 75% of Alaska's utility-based nonhydroelectric renewable production, from more than 100 land-based wind turbines with over 60 MW of combined generating capacity.[59] Other renewables technologies are also utilized, but as yet there are no concrete plans to develop offshore wind power. While Alaska has large coastal areas with significant wind potential, these are typically far from demand centers and policy support for renewables can at present more feasibly be directed elsewhere, like hydropower and onshore wind power, possibly supported by local solutions like microgrids with storage solutions, for example.

THE RESOURCE BASE AND DEVELOPMENTS SO FAR

There are currently no offshore wind power plants in operation Alaska, and only one in the United States. This is the 30 MW Block Island Wind Farm off the coast of Rhode Island. This five-turbine power plant began operation in 2016 and indicates some issues of relevance also for Alaska, in particular federal support, planning, and licensing processes. Some other projects have reached advanced stages of development, most of these off the east coast.

An important part of governance for the development of offshore wind power is to assist in the mapping of resources and technical potential for offshore wind power. The first close-to-comprehensive mappings were published from 2010 onwards, with

[58] EIA (2019). Alaska - State Energy Profile Analysis. Retrieved 25 January 2019 from https://www.eia.gov/state/analysis.php?sid=AK

[59] EIA (2019). Alaska - State Energy Profile Analysis. Retrieved 25 January 2019 from https://www.eia.gov/state/analysis.php?sid=AK

earlier studies establishing methodologies and narrower work done prior to this. There have been several studies of technical offshore wind power potential in the U.S., however, only in the most recent one has Alaska been part of the mapping.[60] The main reason given for this is that Alaska's remoteness from the lower 48 States means that it cannot contribute by exporting electricity to the other states. However, the offshore wind power potential of Alaska is significant.[61]

With its vast coastline and extensive regions of high-class wind resources (see Figure 2 below), Alaska would dwarf any other state's offshore resource. Because the Alaskan coastline is remote and its climate is severe, we assume that offshore Alaskan wind potential is stranded and will be unable to contribute to the national electric energy production beyond its own borders.

This means that full-scale feasibility studies of the potential of Alaskan offshore wind power have not been conducted. Single projects may still be applied and receive consent, but they have not been made part of a federal strategy to increase renewables electricity production. The latest (2016) federal assessment of Offshore Wind Energy Resource Assessment, Alaska was again omitted,[62] but finally received its own mapping in a separate report the following year. Here, the main finding is that "Alaska has a net offshore wind energy potential that is 68% higher than that of all other states combined and 11 times that of Massachusetts, which after Alaska is the state with the highest offshore resource in the United States".[63]

To put the numbers into perspective the net energy potential of offshore wind power in Alaska of 12,087 TWh/year (terawatt-hour) dwarfs the state's annual consumption of 6.1 TWh/year, and is even three times higher than the total U.S. consumption of 3,711 TWh/year.[64] However, there are problems with the feasibility of utilizing this potential, not least due to long distances to urban areas for consumption and available land for terrestrial wind power. However, with current projections and developments for offshore wind power prices, developments in some of the more attractive and less distant areas in Alaska may be feasible in a few years.

[60] Lopez, A., Roberts, B., Heimiller, D., Blair, N., & Porro, G. (2012). U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis.

[61] Schwartz, M., Heimiller, D., Haymes, S., & Musial, W. (2010). Assessment of Offshore Wind Energy Resources for the United States.

Musial, W, & Ram, B. (2010). Large-Scale Offshore Wind Power in the United States: Assessment of Opportunities and Barriers.

[62] Musial, Walter, Heimiller, D., Beiter, P., Scott, G., & Draxl, C. (2016). 2016 Offshore Wind Energy Resource Assessment for the United States.

[63] Doubrawa, P., Scott, G., Musial, W., Kilcher, L., Draxl, C., & Lantz, E. (2017). Offshore Wind Energy Resource Assessment for Alaska.

[64] Doubrawa, P., Scott, G., Musial, W., Kilcher, L., Draxl, C., & Lantz, E. (2017). Offshore Wind Energy Resource Assessment for Alaska.

LICENSING PROCESS

Any offshore wind power plant must go through a comprehensive licensing process that involves a number of public agencies. While terrestrial wind power plants distinguish between federal, state, and local siting processes (that vary among different localizations), for offshore a main distinction is drawn at three nm.

Regulated by the Submerged Land Act of 1953, each state bordering ocean waters has jurisdiction over submerged lands out to three (in some cases just over five) nm from land.[65] For most cases, beyond three miles from shore, the competence to grant licenses and rights-of-way and use for wind power lies with BOEM. This distinction means that licenses for wind power project closer to land than three nm are granted by state jurisdictional processes, while developments further out than this are granted by BOEM.

The federal lease or license process is run by BOEM, whose mission is to manage development of U.S. OCS energy and mineral resources in an environmentally and economically responsible manner.[66] In 2009, the DoI announced final regulations for the OCS Renewable Energy Program, which was authorized by the Energy Policy Act of 2005 (EPAct).[67]

In 2009, DoI announced the final regulations for the OCS Renewable Energy Program, which was authorized by EPAct. These regulations provide a framework for issuing wind power licenses on the continental shelf.

BOEM has established an Intergovernmental Renewable Energy Task Forces in states that have expressed interest in development of offshore renewable energy. The Task Forces collect and share relevant information that would be useful to BOEM, and otherwise facilitate during the license decision-making. To date, 14 BOEM Intergovernmental Task Forces have been established, none of these are currently in Alaska. However, Task Forces have helped identify areas of significant promise for offshore development and provided early identification of, and steps toward resolving, potential conflicts, and should not be ruled out for Alaska for the future.

BOEM's renewable energy program occurs in four discrete phases:[68]

- **Planning and analysis:** In this phase, BOEM seeks to identify suitable areas for wind energy licenses. This is done through a collaborative process that includes

[65] Stoel Rives. (2018). The Law of Wind - A Guide to Business and Legal Issues

[66] BOEM. (2017). BOEM Fact Sheet: Wind Energy Commercial Leasing Process

[67] Energy Policy Act of 2005. 42 USC 15801

[68] BOEM. (2017). BOEM Fact Sheet: Wind Energy Commercial Leasing Process

stakeholders, tribes, and State and Federal government agencies. Environmental compliance reviews are conducted, as are consultations with parties influenced by or otherwise engaged in the project.

- **Lease issuance:** Issuing a lease entitles the lease holder the exclusive right to seek license for constructing the development. While no construction can be made in this phase, the lease holder has the right to use the area to develop the plans that may lead to the application for a license.
- **Site assessment:** In this phase the site is evaluated for appropriateness for offshore wind development against other considerations. A Site Assessment Plan (SAP) must be submitted to BOEM and measuring devices such as meteorological measuring equipment can be deployed. The developing company performs site assessment that includes avian, marine life, and archaeological surveys but cannot install equipment until BOEM has approved the SAP. EIA are conducted for each project that has applied for a license, and is conducted by the Alaska Region's Environment Program Office, which gathers the 'best available scientific information' to inform decisionmakers in BOEM and DoI of the likely risks and benefits of the proposed offshore plant.[69]
- **Construction and operations:** Here, the developer submits a Construction and Operations Plan (COP) to BOEM, which effectively represents the license application. It is a detailed plan for the construction and operation of a wind energy project on the area of the lease. BOEM will review environmental and technical aspects of the COP and can on this basis grant or withhold a license, or grant a license with modifications. Finally, a decommissioning plan will have to be approved before construction may commence.

However, sectoral authorities within marine and environmental issues, as well as the Army Corps of Engineers, all have a formal role in the ultimate license decision, even though BOEM has the primary responsibility.

The state license process varies among the states. In most cases (including Alaska) it is relevant for power plants closer to shore than three nm.

[69] Alaska Environment Program Office. (n.d.). Environment Program Office | BOEM. Retrieved 31 January 31 2019 from https://www.boem.gov/Alaska-Environment-Program-Office/

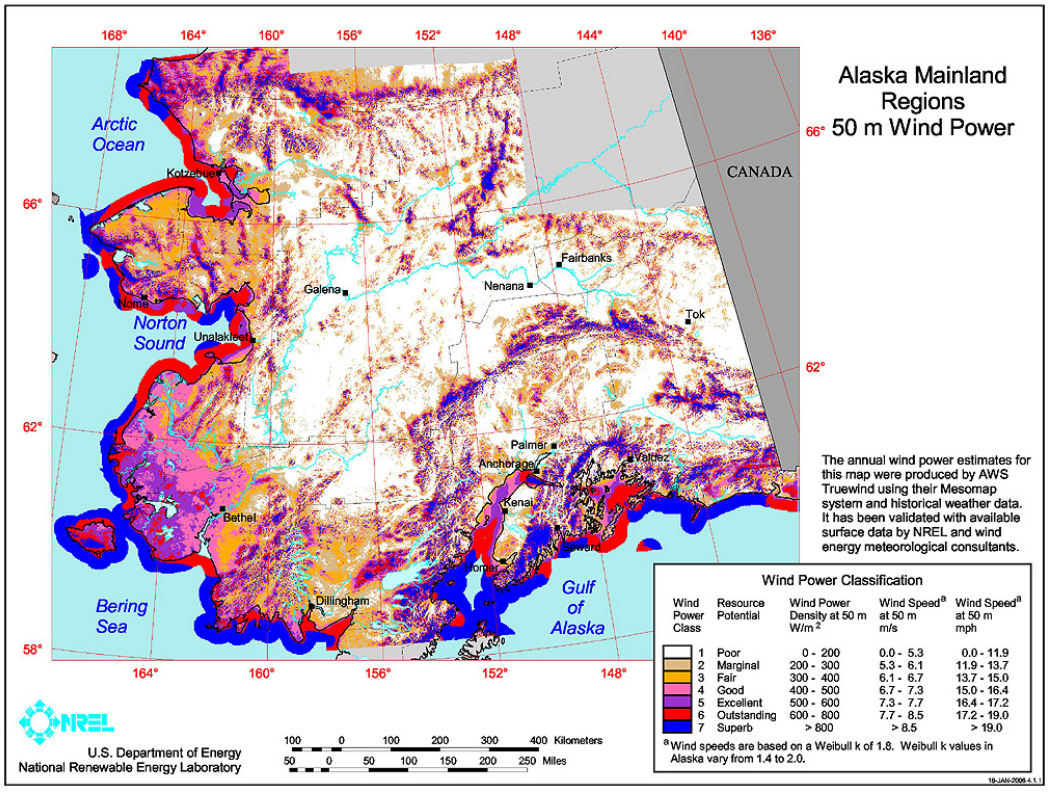

Figure 3: Alaska Wind Resource Map (at 50 m height)

SOURCE: United States Department of Energy (2004)

SUPPORT SCHEMES AND ENERGY PLANNING

State level policy: A number of policies have been issued to support development of renewable production at the federal level, of relevance to Alaska. These include three bills, all important for stimulation and coordination of government action on renewable energy:[70]

- House Bill 152 (in 2008), leading to the establishment of the Renewable Energy Grant Fund;
- House Bill 306 (in 2009), which introduced a roadmap for Alaska's sustainable energy future as well as a goal to achieve 50% of the state's electricity from renewable sources;
- Senate Bill 220 (in 2010), introducing a plan of action with the aim to achieve the goals set forth in HB 306.

[70] Herrmann, V. (2018). Breaking Free: Alaska's Path Forward for Renewable Arctic Energy. Retrieved 29 May 2019 from The Arctic Institute: https://www.thearcticinstitute.org/breaking-free-alaskas-path-forward-renewable-arctic-energy/

These bills, being quite generic, briefly mention the support of wind power, but do not distinguish between land-based and offshore wind power. It is therefore reasonable to assume that offshore wind is eligible. Even though no evidence has been found of actual projects that has applied for support, for future offshore projects these funds might be of relevance.

Federal policy: In the United States, the federal production tax credit (PTC) has been the primary incentive tool for renewable energy development. The scheme is per-kWh tax credit for electricity generated by qualified energy resources, with a duration of the credit of 10 years after the facility is operational. The amount for 2018 is $0,023/kWh for (all) wind power not claiming other schemes (such as the ITC below).[71]

An alternative for the PTC is the federal Business Energy Investment Tax Credit (ITC). This is an investment tax credit for each technology by year, where large wind investments (including offshore wind) receive a 30% tax credit per year, the amount being reduced annually.[72] A developer cannot utilize the double benefit of the PTC and the ITC.

Alaska Renewable Energy Fund Distributed $259 million between 2015 and 2018, but currently has no funds allocated and is effectively dormant.[73] Of the funding spent in this period, about 35% was used to develop wind power, but none of this was offshore. If the funding picks up again this might be of relevance to offshore wind.

National and Local Framework: Norway

While Norway is not formally an EU Member State, through the EEA Agreement it takes part in the internal market including the internal energy market. As such, Norway is required to implement relevant regulations within the energy sector.

The EU renewable energy directive (RED)[74] adopted in 2009 established an obligation for Norway to increase the share of renewable energy to 67,5% by 2020. By 2014 this was achieved, and there are complex ways of achieving this target. At the same time the target was among the reasons for adoption of the technology neutral support scheme "Green Certificates" in 2012. Offshore wind power, would be eligible for the

[71] U.S Department of Energy. (2014). Renewable Electricity Production Tax Credit (PTC) | Department of Energy. Retrieved 29 May 2019 from https://www.energy.gov/savings/renewable-electricity-production-tax-credit-ptc

[72] DSIRE. (n.d.). DSIRE: Program Overview. Retrieved 29 May 2019 from http://programs.dsireusa.org/system/program/detail/658

[73] The University of Alaska. (2018). Renewable Energy: Growth and Obstacles in the Renewable Energy Sector in Alaska. Retrieved 29 May 2019 from https://www.commerce.alaska.gov/web/Portals/6/pub/2EmergingSectorSeriesRenewableEnergy.pdf?ver=2018-04-18-071845-723

[74] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

support scheme, and would contribute to further overachievement of the renewables target. While RED has been important in different ways, it cannot be said to directly have influenced offshore wind power in Norway. However, the 2030 targets may be relevant for future developments.

Grid operators are obliged to connect renewable energy plants to their grids without discriminating against certain (groups of) plant operators. This obligation also applies if the realization of the new connection requires the development of the grid, although reasonable fees for such development might fall to the developer. This also applies to offshore wind power developments and means that any plans need to account for costs for grid connection, but will be able to connect.

Cross country interconnectors, while not directly governed by EU regulations, are subject to general guidelines from The European Agency for the Cooperation of Energy Regulators (ACER), and otherwise rests on bilateral agreements.[75]

NATIONAL AND ARCTIC CONTEXT

An important part of the background for offshore wind power is that Norway's electricity production is fully renewable. Traditionally production was based on 99% hydropower, with an increasing share of land-based wind power.[76] Interconnectors to abroad in combination with some diversification provide security of supply, which otherwise is highly dependent on weather and precipitation. In 2017, 1,9% of production (2,85 TWh) came from land-based wind power. This share is expected to pass 10% by 2021. In addition to existing interconnectors to Sweden, Denmark and the Netherlands, two additional interconnectors to the UK (2020) and Germany (2021) of a capacity of 1400 MW each, will increase access to export markets. These, however, are to be connected to the southern parts of Norway, and the grid capacity between North and South of Norway is limited.

For the more northern and Arctic areas this includes the coastline of the two counties Nordland and Troms and Finnmark. For both these regions the electricity infrastructure for both production and transmission is rather weak. This means that there is a need for new production to reduce supply vulnerabilities, but also that the grid in some areas has limited capacity for receiving large amounts of offshore production. This thus influences siting decisions.

[75] Jevnaker, T. V. (2019). Clean Energy Package-Will the recast ACER regulation change things? Retrieved from www.thema.no

[76] NVE. (2018). Vindkraft - Produksjon i 2017. Retrieved 1 January 2021 from http://publikasjoner.nve.no/rapport/2018/rapport2018_10.pdf

DESCRIPTION OF THE RESOURCE BASE AND DEVELOPMENTS SO FAR

Norway enjoys some of the best wind resources on land in Europe, and the offshore resources are even better. In 2007 and 2008, The Norwegian Water Resources and Energy Directorate (NVE) mapped the offshore wind resources, controlled for water depths, and concluded that most of the areas outside of the Norwegian cost were exceptional from a resource perspective. For shallow waters (less than 20 m), the potential was set to 6000-30.000MW, depending on whether the smallest distance from land was set to 1 or 10 km.[77] For deeper waters the potential is significantly larger, and for depths up to 100 m the technical-economic potential was estimated to be between 40.000 to 140.000 MW.[78]

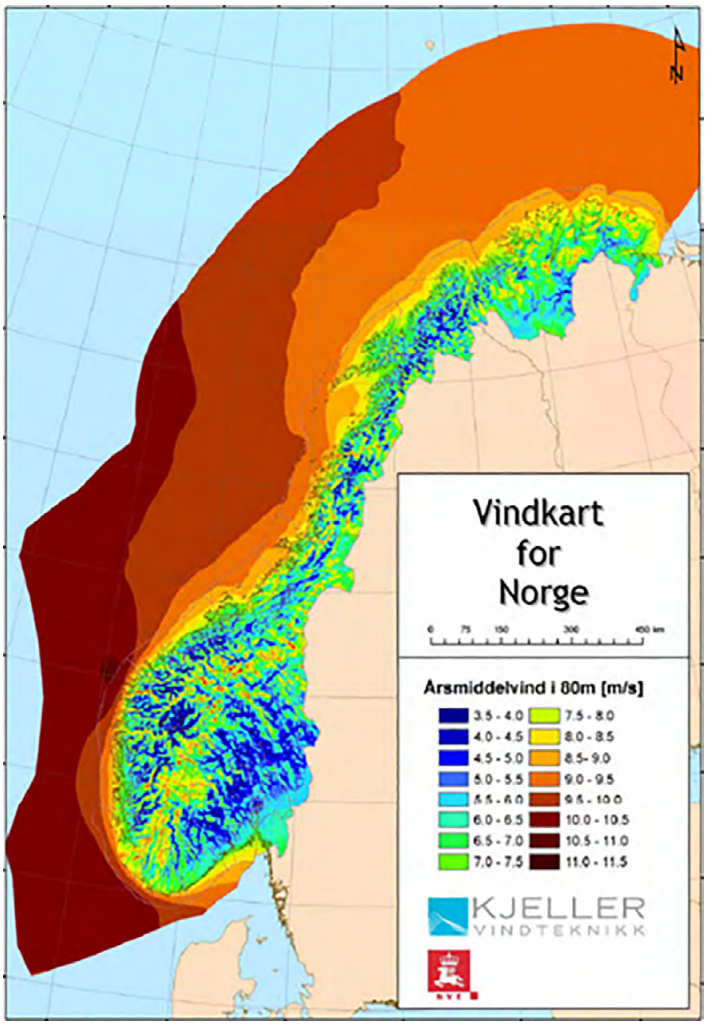

Figure 4: Average wind speeds for Norway (80 m altitude)

Wind card of Norway.
SOURCE: NVE (2009)

[76] Hofstad, K., & Tallhaug, L. (2008). Vindkraftpotensialet utenfor norskekysten (offshore) (Revidert utgave av NVE rapport 1-2007). Retrieved 29 May 2019 from www.nve.no

[77] Hofstad, K., & Tallhaug, L. (2008). Vindkraftpotensialet utenfor norskekysten (offshore) (Revidert utgave av NVE rapport 1-2007). Retrieved 29 May 2019 from www.nve.no

[78] Hofstad, K., & Tallhaug, L. (2008). Vindkraftpotensialet utenfor norskekysten (offshore) (Revidert utgave av NVE rapport 1-2007). Retrieved 29 May 2019 from www.nve.no

However, one challenge for developing Norwegian offshore wind power has been the depths of the continental shelf. Where British, German, and Dutch offshore projects have been anchored at lower depths and enable firm seabed attached constructions, much of the Norwegian waters are too deep for this, even though the resource mapping shows potential. Therefore, floating constructions may be more realistic in some years' time, as cost reductions have been significant. The Norwegian firm Equinor is the developer and operator of the Hywind floating wind park outside of Scotland, mentioned above. Experience from the offshore petroleum sector is widely regarded as well-positioned to support this kind of development.[79]

At present there are no full-scale offshore wind farms in Norwegian waters. Thirteen different development companies have submitted early notification or a full application of a total of 21 different projects, indicating some interest in offshore wind development. Fourteen of these have been withdrawn or put on hold, while two have not been granted a license. Currently six test sites have received license to operate. These range from 2,3 MW (a single turbine) to 350 MW of installed capacity, while the majority of the test sites have applied to install up to 10 MW capacity. However, in June 2020 the Norwegian Government opened two 'blocks', following the Ocean Energy Act: The Utsira Nord and Southern North Sea II. These two areas were opened for licensing applications from January 2021.

LICENSING PROCESSES

Licensing regulations and practices are key governance tools for controlling what kind of projects receive approval and where.[80] As part of the licensing process there are options for the government to strongly modify the size, shape or other aspects of a plant, including requirements for monitoring and modifications during and after construction and operation.

The licensing for installing and operating a wind power project, including the grid connections, is in principle quite similar for land-based and offshore locations, although some Important differences arise. Revisions to the Ocean Energy Act were adopted June 2020, and implemented from January 2021.[81] The license authority is national and located in the Ministry of Petroleum and Energy (OED). The body of appeal is formally the Council of State.

[79] Hanson, J., Afewerki, S., & Aspelund, A. (2019). Conditions for growth in the Norwegian offshore wind industry: International market developments, Norwegian firm characteristics and strategies, and policies for industry development.

[80] Inderberg, T. H. J., Rognstad, H., Saglie, I.-L., & Gulbrandsen, L. H. (2019). Who influences wind power licensing decisions in Norway? Formal requirements and informal practices. Energy Research & Social Science, 52(June 2018), 181–191

[81] Schjøtt (2020). Åpner områder for havvind – ny forskrift til havenergiloven. Retrieved 1 January 2021 from https://www.schjodt.no/en/news--events/newsletters/apner-omrader-for-havvind--ny-forskrift-til-havenergiloven/

As on land, offshore windpower requires a license to build and operate. Prior to the opening for license applications, there will have to be done a strategic EIA conducted for the block of sea in question. The competence of the government to decide block openings is with the OED. The formal licensing process following the Ocean Energy Act's revisions, implemented from January 2021, is initiated when an applicant submits an early notification of a project.[82] As part of the notification, a proposal for project specific EIA is included, as well as a description of all the main aspects of the power plant and grid connection. This notification is then submitted for hearing, for where any party can propose amendments to the EIA programme. Following the hearing submission, the OED determines the EIA programme to be conducted at its discretion. They may add investigations or areas for further scrutiny based on their own initiative as well.

There is a deadline for the full license application to be submitted within two years after the determination of the EIA programme. This full application will have to include, among other things, a presentation of the applicant, a full description of all the relevant aspects of the project, the plan for grid connection, economic estimates, and assessments of potential conflicts with other interests like fisheries, petroleum activities, defence or other. However, as a default there will not be granted license in areas where petroleum activities have been granted approval. The OED then handles the application for license and determines the outcome at their own discretion, and receives advice from the The Norwegian Water Resources and Energy Directorate (NVE). In the case of an appeal, the Council of State is the body to determine the final outcome of the application.

In the case of a license granted, this is followed by a process to approve the detail planning, which is a competence residing with the NVE.[83] There is a deadline for the applicant to construct the power plant within three years after the approval of this detailed planning.

SUPPORT SCHEMES

Financial schemes relevant to support offshore wind power are twofold: a so-called "green certificate scheme", and direct technology development support. Research indicates that for capital intensive technologies R&D investments do not automatically lead to innovation, but also that niche protection is crucial.[84] Support schemes play an important role in this regard, and in particular developing

[82] The Ocean Energy Act (June, 2020). Retrieved 1 January 2021 from https://lovdata.no/dokument/NL/lov/2010-06-04-21

[83] NVE (2020). «Vindkraft til havs». Retrieved 1 January 2021 from https://www.nve.no/energiforsyning/kraftproduksjon/vindkraft/vindkraft-til-havs/

[84] Normann, H. E. (2017). Policy networks in energy transitions: The cases of carbon capture and storage and offshore wind in Norway. Technological Forecasting and Social Change, 118, 80–93.

technologies that with higher prices than the electricity price has been a challenge in Norway, which has a fairly stable and low electricity price.[85]

The **green certificates scheme** is a market based Swedish-Norwegian collaboration where Norway joined an already ongoing Swedish renewable electricity support scheme in 2012, creating a shared "green certificate" market in 2012. It is technology neutral and seeks to encourage investments by setting a quantitative goal for new renewables, where most technologies qualify for support (Including offshore wind power), and where demand is guaranteed, and the price is floating. The shared goal for new installed capacity was initially set at 26.4 TWh by 2020, later changed to 28.4 by 2021. In Sweden this has triggered offshore wind power, but not in Norway, apart from mentioned pilots.[86] The effects for land-based wind power In Norway, however, have been significant.

Direct support is also available for some technology development projects. This is often referred to as ENOVA-support, its name coming from the state enterprise Enova SF, owned by the Ministry of Climate and Environment. This is usually determined on a case-by-case basis. This program has not supported offshore wind power to any significant degree, but in August 2019 Enova decided to grant NOK 2,3 billion in support of the Hywind Tampen project. This project is run by Equinor to provide electric energy to the petroleum Installations Gullfaks A, B, and C, as well as Snorre A and B located outside of Bergen city, on the West Coast. The full contract is for NOK 3,3 billion, and consists of 11 wind turbines, and one of the project's selling points is that it is the world's largest floating offshore wind power park.[87] Contracts between the developer and the sub-contractors of a total of NOK 3,3 billion were signed at the end of October 2019, and this included support from the Norwegian NOX-Fund, of NOK 556 million (currently about $55,6 million). Equinor and partnering companies will invest about NOK 470 million from their own means.[88]

[85] Inderberg, T. H. J., Tews, K., & Turner, B. (2018). Is there a Prosumer Pathway? Exploring household solar energy development in Germany, Norway, and the United Kingdom. Energy Research & Social Science, 42, 258–269.

[86] Afewerki, S., Aspelund, A., Bjørgum, Ø., Hanson, J., Karlsen, A., Kenzhegaliyeva, A., … Sæther, E. A. (2019). Conditions for growth in the Norwegian offshore wind industry: International market developments, Norwegian firm characteristics and strategies, and policies for industry development. Retrieved 1 January 2021 from https://www.ntnu.no/documents/7414984/0/CenSES-Offshore-wind-report-v9-digital.pdf/749a6503-d342-46f2-973e-eb9714572931

[87] Dagens Næringsliv. (2019). Hywind Tampen-prosjektet får 2,3 milliarder i Enova-støtte. Retrieved 12 December 2019 from https://e24.no/energi/i/VbedX6/hywind-tampen-prosjektet-faar-23-milliarder-i-enova-stoette

[88] Dagens Næringsliv. (2019). Equinor signerer torsdag kontrakter for en samlet verdi på 3,3 mrd. Retrieved 12 December 2019 from https://e24.no/energi/i/zGzEp9/equinor-signerer-torsdag-kontrakter-for-en-samlet-verdi-paa-33-mrd

Comparing Alaska and North Norway

Charting the situation in Alaska and North Norway there are some important similarities, but also striking differences that are likely to lead to different outcomes in the utilization and upscaling of offshore wind power.

First and foremost, both regions have significant - **indeed outstanding - offshore wind resources**. Alaska and North Norway places very differently, however, in the position to develop this potential.

Utilizing the resources in Alaska is difficult, particularly because large distances and sparse population make offshore wind power prohibitively expensive. As an isolated state with large distances to other markets, the export potential is also limited. These are the most important barriers, and they are difficult to overcome in the foreseeable future. Offshore wind is expensive in Norway too, particularly because of water depths of more than 60m, low electricity prices, and difficulties in reorienting companies from petroleum activities and towards renewables, have caused hesitancy in the offshore market, particularly when compared to other European countries. But costs are falling and there is development of technology for floating turbines, which may be more feasible in the longer run.

Another difference is the fact that Alaska is a federal state (part of a greater polity with varying priorities). Norway on the other hand, is a unitary state with a keen interest in a competitive edge specifically in offshore windpower, and for exporting clean and less conflictual offshore wind power. The market is present, and two additional interconnectors are being constructed with capacity of 1400 MW each, to the UK (finalized in 2020) and Germany (2021).

Fisheries

Anne Kristin Jørgensen

The United States and Norway are two of the world's leading fishing nations, with annual catches of wild fish of some 4.5 million tons and 2.5 million tons, respectively. Between one half and two thirds of these catches are taken in the cold but highly productive waters off Alaska and North Norway – the Bering Sea, the Gulf of Alaska, the Norwegian Sea and the Barents Sea. Today, most of the stocks in these areas are in good condition, largely thanks to prudent management in recent years.

The global picture is worrying, though: most commercial fish stocks are either fully exploited or depleted, and total output in the capture fisheries levelled off in the 1990s. Today, it is broadly understood that sustainable use of fish resources is key to prevent stock depletion and maximize the long-term output and value of fisheries. There is also a growing awareness of the broader environmental impact of fisheries, including their contribution to overarching problems like climate change and biodiversity loss.

For a detailed analysis on the economic aspects of maritime transportation and shipping in Alaska and North Norway, see the **Blue Fisheries and Aquaculture Report**

Several international agreements have been put in place to regulate the use of the oceans and their resources, and international efforts to conserve these resources have become progressively stronger. However, for these efforts to succeed, individual fishing nations also need to build well-functioning national management systems, based on internationally agreed-upon norms and principles.

International and Regional Fisheries Governance

The international legislative and institutional framework for the fisheries is multi-layered and complex. Rules and regulations, as well as institutions, exist at the global, regional, national and sub-national levels, and their number keeps increasing.

GLOBAL FRAMEWORKS

At the global level, there are several binding and non-binding agreements that set out general rules and principles for the exploitation, management and conservation of living marine resources. UNCLOS is the most important one, along with UNFSA, which was adopted to facilitate the implementation of key UNCLOS provisions.

Under UNCLOS, coastal states like the U.S. and Norway have exclusive rights to exploit the living marine resources in their 200 nm EEZs, but also a duty to protect the resources from overexploitation. This follows inter alia from UNCLOS Art. 56, which states that coastal states' sovereign rights are granted "for the purpose of exploring and exploiting, conserving and managing the resources (...)". UNCLOS also obliges coastal states to cooperate on resource conservation and management with competent international organizations (Art. 61). If a stock occurs in the EEZs of several states or moves between one or more EEZs and the high seas outside them, coastal states must cooperate with each other and/or with states fishing in adjacent high-seas areas, in order to ensure proper conservation and management of the stock (Art. 63).

UNFSA is concerned primarily with straddling and highly migratory fish stocks and its principles apply universally – that is, stocks that occur both in EEZs and in adjacent or distant high seas areas. UNFSA reiterates the obligations of coastal states and states fishing on the high seas regarding the management of such stocks and, in Part III, carves out a central role for RFMO. It is an obligation in UNCLOS. Moreover, reflecting developments in international environmental law since the adoption of UNCLOS, UNFSA incorporates principles like sustainable resource management, protection of marine biodiversity and the precautionary approach.

The UN Food and Agriculture Organization (FAO) is the key global institution overseeing fisheries. FAO compiles and disseminates raw data, analyses and reports on global, regional and national fisheries. The organization also plays an important legislative role and has been the negotiating forum for several binding and non-binding agreements pertaining to the fisheries. These include the *1995 FAO Code of Conduct for Responsible Fisheries* and the *2001 International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU)* – both non-binding instruments. In 2009, *the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PSMA)* was adopted – the first binding international agreement that specifically targets IUU fishing. The IPOA-IUU is one of four IPOAs under the Code. There are many more FAO instruments.

REGIONAL FRAMEWORKS

While global agreements and institutions provide general rules and guidelines for fisheries conservation and management, rules concerning the management of stocks are normally adopted at the regional level or below. RFMOs are concerned primarily with the management of high-seas stocks in their respective regions of

responsibility. For stocks that occur predominantly or exclusively within the EEZs, the coastal states play the main role. Stocks that keep within the EEZ of a single state are, of course, managed by that state alone. Shared stocks – those occurring in the EEZs of two or more states – are normally subject to some form of joint management. Usually, this is formalized in one or more bi- or multilateral agreement(s) between the states in question.

The role of RFMOs is not confined solely to the management of high-seas stocks. However, it is up to their member states to decide which tasks fall within their competencies, and many states are loath to delegate too much of their sovereignty to international organizations. Still, in recent years, several RFMOs been endowed with new and important tasks, notably the implementation and enforcement of regional arrangements set up to combat IUU-fishing.

In addition to RFMOs, most major fishing regions in the world also have one or more international scientific organization(s), whose main task is to provide scientific advice on the management of regional fish stocks. Coastal states are obliged to set annual quotas (often referred to as "TAC" – total allowable catch) on exclusive and shared stocks in accordance with scientific recommendations (UNFSA).

In the decades that have passed since the adoption of UNCLOS, much progress has been made both at the global level and in many regions to make the fisheries of the world more sustainable. However, a "sustainability gap" has opened between developed and developing states. In developed countries, including the U.S. and Norway, management has improved, catches have stabilized, and many overfished stocks have recovered. Meanwhile catches have kept increasing, or decreased because of overfishing, in many developing countries. This is partly due to weak management capacity, but also a result of growing demand for their fish, including from developed countries.

National and Local Framework: Alaska

The fishing industry is immensely important to the state of Alaska and is second only to oil in terms of economic contribution. No other U.S. state leans more heavily on its fisheries. If Alaska had been an independent country, it would be among the world's top 10 fishing nations.

The distant-water fishery motivated Alaskan politicians to push for the extension of U.S. jurisdiction at sea to 200 nm. After various hurdles, the act authorizing the

extension was passed by Congress in 1976. Today it is known as the *Magnuson-Stevens Fisheries Management and Conservation Act* (MSA)[89] named for the late Alaskan senator Ted Stevens and his Washington colleague Warren Magnuson.

The current U.S. system of fisheries management has evolved in tandem with the MSA. In the early years, the main priority was the "Americanization" of fisheries, and from 1981 to 1991, the share of foreign catches in the U.S. EEZ was reduced from 60% to a mere 1%.[90] After the adoption of the 1996 *Sustainable Fisheries Act* – a major amendment to the MSA – the focus shifted towards ending overfishing and rebuilding overfished stocks. The emphasis on sustainability was further strengthened in the 2006 Reauthorization of the MSA. As a result of these developments, fishing operations in US waters are now dominated by US nationals and subject to strict regulations to protect the stocks and the environment.

In principle, U.S. marine fisheries in state waters – within 3 nm from the coast – are managed by state authorities, while fisheries further out to sea are managed by federal authorities. In practice, the states' involvement goes beyond 3 nm. Co-management is a key feature of the system, and stakeholder consultations play a central role.

Under the MSA, formal authority for managing fishery resources in the EEZ rests with the Secretary of Commerce. However, the MSA also set up a system of Regional Fisheries Management Councils (RFMCs) who exercise this authority on the Secretary's behalf. Both federal and state authorities are represented on the RFMCs, along with industry representatives and other stakeholders. In accordance with the MSA, the RFMCs manage the fisheries through the preparation and implementation of Fisheries Management Plans (FMPs) for each fishery.[91]

In this work, the RFMCs are guided by ten national standards spelled out in the Magnuson-Stevens Act. Key obligations reflected in the standards include preventing overfishing while achieving the optimum yield for the fisheries, basing regulations on the best scientific information available and ensuring that the allocation of fishing privileges is fair and equitable and promotes resource conservation.

[89] Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801 et seq. (1976)

[90] Committee on Evaluating the Effectiveness of Stock Rebuilding Plans of the 2006 Fishery Conservation and Management Reauthorization Act. (2011). Evaluating the Effectiveness of Fish Stock Rebuilding Plans in the United States. Washington D. C.: The National Academies Press. Available at https://www.nap.edu/catalog/18488/evaluating-the-effectiveness-of-fish-stock-rebuilding-plans-in-the-united-states

[91] Criddle, K. R., Evans, D., Stram, D. L. (2011). 'Marine Fisheries off Alaska'. In Lovecraft, A. L. & Eicken, H. (eds), North by 2020: Perspectives on Alaska's Changing Social-Ecological Systems, Fairbanks: University of Alaska Press, Ch. 5.2

The RFMCs are supported by two types of advisory bodies: Statistical and Scientific Committees (SSCs) and Advisory Panels. The SSCs prepare scientific advice for each commercial stock, using reference points for fishing mortality (F) and spawning stock (B). They set an overfishing limit (OFL) which triggers the immediate closure of a fishery, a limit for the Acceptable Biological Catch (ABC) that is well below OFL, and a TAC – that is lower yet. The process rests on the precautionary approach, with the distances between OFL, ABC, and TAC reflecting the degree of uncertainty.

Importantly, the MSA requires the FMCs to set TACs at or below scientifically established limits, so the FMC cannot overrule the advice from the SSC. Conservation and allocation are separate processes, undertaken by separate organs. This is a fundamental principle in U.S. fisheries management, whose purpose is to prevent undue political influence over conservation measures.

The North-Pacific Fisheries Management Council (NPFMC) is the RFMC responsible for federal fisheries offshore Alaska. However, the crab fisheries are managed jointly with state authorities, while the salmon fisheries are managed by state authorities alone, although part of the catch is taken in federal waters. The halibut fisheries are managed jointly with Canada, and the NPFMC is only involved in the internal, U.S. allocation process.

The State of Alaska has several voting representatives in the NPFMC, and the NPFMC meets regularly with state authorities. The FMPs worked out by the NPFMC describe the status of the fisheries and encompass regulations on the allocation of TACs, regulations regarding gear, bycatch and discards and regulations that limit access to resources in space and time. For instance, several areas Bering Sea and Aleutian Islands and the Gulf of Alaska have been closed to bottom trawling in order to protect marine mammals and sensitive habitats and/or to control bycatch. Changes to the FMPs are subject to are subject to extensive public review, involving experts, stakeholders and the general public.

The fisheries off Alaska are hailed for their sustainability, and rightly so. However, the task of making the fisheries environmentally, economically and socially sustainable all at the same time, is an exceedingly difficult one.

National and Local Framework: North Norway

The fishing industry contributes significantly to Norway's economy, and it plays a particularly important role in the north. With less than 10% of the total population, North Norway is home to nearly 50% of Norway's full-time fishers and more than 50% of all fishing vessels.

Norway is a member of the scientific organization *International Council for the Exploration of the Sea (ICES)* and of the RFMO *North-East Atlantic Fisheries Commission (NEAFC)*. ICES provides management advice on stocks in the North-East Atlantic, including all major stocks targeted in the Norwegian fisheries. NEAFC's main tasks include management of high-seas fish stocks and administration of a regional *Scheme of Port-State Control and Enforcement* that was adopted in 2007 to counter IUU-fishing.

The Norwegian system for fisheries management has evolved over more than a century and is now codified in the *2008 Marine Resources Act* and its secondary legislation as well as several other acts. The Act applies to all catch and use of marine resources and their genetic material and covers issues such as bioprospecting, catch levels and quotas, catch and use of marine resources, arrangements on the fishing fields, liability for damage and local regulations and monitoring, enforcement, sanctions and criminal liability. The Marine Resources Act is a framework law, which in the main authorizes the Government to issue specific regulations within designated fields.

The most important rules are found in the *Regulation on the Execution of Marine Fisheries*, which is updated annually. The Regulation contains rules for mesh size, selection and limitations on the use of specific catch gear, seasonal restrictions, bycatch, minimal fish size, discard ban, restrictions on the use of trawl in specific areas, protection of coral reefs, documentation on hold volumes, marking of vessels and gear, loss of gear and fish welfare. Other important legal instruments are the *1999 Act on the Right to Participate in Fisheries*, the *2015 Act on First-Hand Sales of Wild Catch of Marine Resources*, the *2016 Regulation on Participation in Fisheries*, the *2016 Regulation on Licensing* and the *2016 Regulation on Landing and Sales Notes*. All Regulations are subject to running modifications and additions through so-called J-orders, which are distributed to the fishing fleet electronically. This includes dedicated and regularly updated annual regulations for the fishery of each specific species.

The executive body at governmental level is the Ministry of Trade, Industry and Fisheries (MTIF), while the practical regulation of fisheries is delegated to the Directorate of Fisheries. Enforcement at sea is taken care of by the Coast Guard, which is part of the Royal Norwegian Navy, but performs tasks on behalf of several ministries, including the MTIF. Scientific research for management is performed by the Institute of Marine Research. Fisheries management authorities coordinate their regulatory work with that of other bodies of governance, for instance the Ministry of Climate and Environment and the Norwegian Environmental Agency, which are responsible for the implementation of the integrated management plans for different marine areas.

Fish is considered a national resource in Norway - as stated In the Marine Resources Act: "The wild living marine resources belong to Norwegian society as a whole" – and there is no regional management layer, although the fishing industry is concentrated in the western and northern parts of the country. Moreover, nearly all the most important fish stocks under Norwegian jurisdiction are subject to international management.

The economically most important fisheries in Norway take place in the Barents Sea, home to the world's largest cod stock, the Northeast Arctic cod. When agreement was reached on the new zonal arrangement (EEZ) at the Third UN Conference on the Law of the Sea in 1975, Norway and the Soviet Union immediately agreed to manage the shared stocks of the Barents Sea jointly, and set up the Joint Norwegian-Soviet (today: Russian) Fisheries Commission. When the Commission came together for the first time in 1976, the parties had already agreed to divide the two most important stocks, cod and haddock, 50/50. Capelin, Greenland halibut and red fish have later been added to the list of stocks managed jointly between Norway and Russia, all with a major share to Norway.

The Joint Commission sets TACs for the shared stocks and coordinates research efforts, harmonization of technical regulations and enforcement activities between the two countries In the Barents Sea. The Commission is not an organization as such with its own secretariat, but it is a complex network of permanent and ad hoc subcommittees and working groups, which work together throughout the year even though the Commission itself convenes for just a week every autumn. The Commission has succeeded both in keeping the Barents Sea stocks at high levels and in maintaining a constructive working atmosphere even in periods of East-West political tension, such as during the Cold War and the period following the Crimea/Ukrainian crisis.

In the North Sea, Norway and the EU entered into a framework agreement on fisheries cooperation in 1980. The agreement is not specific as to how shared stocks should be managed, but according to practice six stocks have been identified as "joint stocks", which are jointly managed (among them cod and haddock), while four stocks are considered "shared stocks but not jointly managed".

Other stocks are exclusive Norwegian or EU stocks, and TAC for the joint and jointly managed stocks are set in annual negotiations between the two parties, where quotas for exclusive stocks are exchanged. Although the state of the North Sea stocks has in general not been as good as that of the Barents Sea stocks, the EU-Norway partnership is also considered to be well-functioning. The situation is less satisfactory in the Norwegian Sea, where all the three big pelagic fisheries – mackerel, herring and blue whiting – are subject to international management among the coastal states in the region.

Key partners are Norway, the EU and the Faroe Islands, but as stocks have moved north- and westwards Iceland and Greenland have also wanted a say in the management process – and a piece of the quota. For several years, Faroe Islands refused to stick to the previously agreed distribution keys.

Norway has a long tradition of including non-governmental organizations in fisheries management, with continuous consultation and close cooperation between governmental agencies and user-group organizations, in particular the Norwegian Fishermen's Association, but also more specialized organizations such as the fishermen's sales organizations. The sales organizations are owned by the fishermen and have monopoly of first-hand sale of all fish in Norway. These have offices around the country (headquartered in Trondheim and Tromsø, respectively), and their representatives are actively involved in policy-making, ensuring that local knowledge is also taken into consideration in the management process.

So-called Regulatory Meetings are organized twice a year or more and are open to all; user-group organizations and NGOs attend on a regular basis. Distribution of the national quota between different gear and fishing fleets has in practice been delegated to the Norwegian Fishermen's Association, which includes all fishermen from the smallest coastal vessels to ocean-going trawlers. Hence, the inherent conflict of interest between different vessel types is handled at the level of the Fishermen's Association, and the outcome is formalized by the Ministry or Directorate after agreement has been reached within the Association.

Technical regulation measures are to a large extent decided upon in direct consultations "over the table" between authorities and user groups at the Regulatory Meetings. The Sami Parliament is formally consulted in the management of fisheries that are of historical importance to the indigenous Sami population, such as lumpfish. In addition to formal and informal consultation on the running regulation of the fisheries, user-group organizations and authorities work together – e.g. in designated working groups – to tackle new and emerging challenges to the fishery, such as conflicts with the petroleum sector, marine litter, ghost fishing and other threats to the marine environment. User groups such as the Norwegian Fishermen's Association also participate in the annual negotiations conducted between Norway and other countries.

The Marine Resources Act places the overall responsibility for monitoring, control and surveillance (MCS) in Norwegian fisheries with the Directorate of Fisheries. *The 1997 Coast Guard Act* provides the Coast Guard with the authority to conduct inspections in waters under Norwegian jurisdiction, within the fields covered by the Marine Resources Act and secondary legislation given with statutory authority in that Act.

Hence, MCS in Norwegian fisheries is taken care of through shared responsibility and close collaboration between the Directorate of Fisheries, the Coast Guard and the regional sales organizations. The Directorate of Fisheries keeps track of how much fish is taken of the quotas of individual vessels, different vessel groups and other states at any given time, based on reports from the fishing fleet. Norwegian vessels are required to have electronic logbooks, or more specifically Electronic Reporting Systems (ERS). This implies that real-time data are forwarded to the Directorate of Fisheries, with the possibility to make corrections of data submitted each day within 12 hours into the next day.

Norway has agreements in place with a number of other countries about the exchange of ERS data, including the EU. The self-reported catch data can be checked at sales operations through the sales organizations, which have monopoly on first-hand sale of fish in Norway, and through physical checks performed by the sales organizations, the Directorate of Fisheries and the Coast Guard. The sales organizations are required to record all landings of fish in Norway and keep track of how much remains of a vessel's quota at any given time, on the basis of the landings data. This information is compared to the figures provided by the vessels to the Directorate of Fisheries through the electronic logbook.

The value of any catch delivered above a vessel's quota is retained by the sales organization and used for control purposes. The sales organizations have their own inspectors who carry out physical controls of landings. They check, among other things, weighing equipment, quantity and size distribution of the catch, the quality of the fish and documentation.

The Directorate has seven regional offices along the coast, staffed with inspectors that carry out independent physical control of the fish at the point of landing, including total volume, species and fish size. All landings have to be reported six hours in advance in order to give the inspectors the possibility to check the landed catch. The landed volumes are compared to the volumes reported to the Directorate through the logbooks. Both landing and at-sea control is conducted using a risk-based framework aimed at utilizing resources to optimize compliance at any given moment.

There is an extensive exchange of information (e.g. inspection data) among the North East Atlantic states, bilaterally and multilaterally through the NEAFC control and enforcement scheme. As follows, there are a number of possibilities for enforcement authorities to physically check whether the data provided by fishers through self-reporting are correct. In addition, vessel monitoring system (VMS) data enables control of whether area restrictions are observed, among other things.

As mentioned above, the Coast Guard performs tasks on behalf of several ministries, but its most important field of work in practice is fishery inspections. Coast Guard inspectors board fishing vessels and control the catch (e.g. catch composition and fish size) and fishing gear (e.g. mesh size) on deck and the volume of fish in the holds. Using the established conversion factors for the relevant fish product, the inspectors calculate the volume of the fish in round weight and compare this with the catches reported to the Directorate through the logbooks. Hence, there are a number of possibilities for enforcement authorities to physically check whether the data provided by fishers through self-reporting are indeed correct. In addition, VMS data enables control of whether area restrictions are observed, among other things.

Comparing Alaska and North Norway

The fisheries in Alaska and those in North Norway are set in very different contexts. Alaskan fisheries management is characterized by close cooperation between federal level and North Pacific Fishery Management Council, while in Norway there is no management level below the national. However, the key distinction in the U.S.-context is that there are in fact two different management systems—one for state

waters (primarily for salmon) and one for federal waters (most other fisheries). Although there is cooperation in the management in federal waters, the federal government has very little to do with management of salmon.

On the one hand, this is perhaps not so surprising given that the United States 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 to in the more heavily populated eastern parts. There have been regular calls for regionalization also in Norwegian fisheries management over the years, but national authorities have persistently opposed this, and as we have seen, the 2008 Marine Resources Act explicitly states that the fish stocks belong to the entire Norwegian society, implicitly not to the people of a specific region.

Furthermore, the most important fish stocks under Norwegian jurisdiction are subject to some level of international management: in the Barents Sea by the Joint Norwegian-Russian Fisheries Commission; in the Norwegian Sea by the coastal states' regimes for the different pelagic stocks; and in the North Sea, as well as Skagerrak, by the EU-Norway agreement. While Norway is sovereign to set its own regulations, the countries' regulatory measures are to a large extent shaped in the interfaces with other states. Hence, while the federation/state interface is the pivot of U.S. fisheries management, the national/international junction point has the same function in the Norwegian system.

There are also a number of similarities between the U.S. and Norwegian systems for fisheries management. The precautionary approach has become the main device in both systems, and both manage according to harvest control rules based on biological reference points for stock size and fish mortality. While focus has traditionally been on single-stock management, both systems increasingly apply a broader ecosystem approach and give more attention to the impacts of fishing on e.g. bottom habitats. Both systems also allow for a high degree of user-group involvement, at regional/state, national and international level. And both have had a considerable amount of success in maintaining fish stocks at sustainable levels. The NPFMC system is very different from the Norwegian, yet they arrive at similar results by different avenues.

Aquaculture

Svein Vigeland Rottem

In the last decades the aquaculture industry has undergone a major global expansion, and this development is often referred to as a "blue revolution".[92] Fish farming is the fastest growing food producing sector, accounting for half of world seafood consumption.[93] In this context, a critical difference between Alaska and North Norway is that all finfish farming is banned in Alaska while (in drastic contrast) Norway is a world leader in finfish aquaculture.

This section will give an overview on key elements of the international regulatory framework related to aquaculture and how this sector is regulated in the U.S. (Alaska) and Norway (North Norway).

AQUA- OR MARICULTURE?

The word 'aquaculture' is normally used to describe the art, science and business of producing aquatic plants and animals; often also confusingly referred to as 'mariculture'.[94] However, globally, it is difficult to distinguish between coastal aquaculture production and mariculture with the latter often referred as a specialized branch of aquaculture. According to the Food and Agriculture Organization of the United Nations (FAO), marine aquaculture is practiced in the sea, in a marine water environment, while coastal aquaculture is practiced in completely or partially human-made structures in areas adjacent to the sea, such as coastal ponds and gated lagoons.[95] In the AlaskaNor project, and due to national and local usage of the terms, we use the them interchangeably. However, often we refer to 'aquaculture' when discussing the North Norwegian case and 'mariculture' when referring to Alaska.

International and Regional Governance

There is no international aquaculture specific legislation. However, several legal instruments are directly or indirectly relevant for the development of the sector. First and foremost, all activities at sea are determined by the provisions

[92] Roderburg, J. (2011). Marine Aquaculture: Impacts and International Regulation. Australian and New Zealand Maritime Law Journal, 25(1), 161-179.

[93] FAO (2018). The State of World Fisheries and Aquaculture 2018, Rome. Retrieved 1 January 2020 from http://www.fao.org/documents/card/en/c/I9540EN/

[94] Roderburg J. (2011). Marine Aquaculture: Impacts and International Regulation. Australian and New Zealand Maritime Law Journal, 25(1), p. 161.

[95] FAO (2020). The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome, pp. 25-26. Retrieved 1 July 2020 from https://doi.org/10.4060/ca9229en

of UNCLOS. Aquaculture is not outlined in UNCLOS, but its provisions on the protection and preservation of the oceans is broad and thus also include several aspects of aquaculture.

THE LAW OF THE SEA

First, we need to distinguish between the areas fish farming can take place. Coastal states have sovereignty in the twelve nm zone of the territorial sea, and this is where most aquaculture sites are. Thus, legislation concerning the sector is mainly national law.

Secondly, however, fish farms could be expected to be set up in offshore waters, in EEZ or in the high seas. States do not have complete sovereignty, but they have the right to control and exploit natural resouzrces and enforce jurisdiction over environmental matters, economic activity and scientific research. In UNCLOS Art. 60 a coastal state is given the right to construct "installations and structures". Although this term is not defined, aquaculture facilities are likely to qualify as structures in this context.[96]

Furthermore, in its continental shelf zone coastal states are not granted an exclusive right to build structures. One could thus argue that other states may set up aquaculture sites without the coastal states' permission. While due regard shall be paid to the interest of other states, one could also argue that the construction of aquaculture sites constitutes a part of the freedom of the high seas.

UNCLOS also addresses environmental law by underscoring the importance of securing the seas from pollution and conserve them as a source of food. However, the requirements set by UNCLOS are often described as weak leaving legislative gap, also in the aquaculture sector. The expansion we have seen in this sector since the enactment of UNCLOS has revealed gaps in the legal regime. This is where international environmental law comes in.

INTERNATIONAL ENVIRONMENTAL LAW

The 1972 Stockholm Conference is often regarded as the start of international environmental politics. It resulted in, among other things, several international environmental agreements on, for example, conservation of endangered species. During the 1970s, several treaties aimed at combating pollution were signed. The *1992 Rio Conference on Environment and Development* is considered a watershed event in international environmental politics. It was during this period the UN-appointed World Commission on Environment and Development launched the versatile concept

[96] Roderburg, J. (2011). Marine Aquaculture: Impacts and International Regulation. Australian and New Zealand Maritime Law Journal, 25(1), 161-179.

of sustainable development, a term that also plays an important role in the debate on the growth in aquaculture. At the *1992 Summit, the Convention on Biological Diversity* (CBD)[97] evolved, which relates to elements of aquaculture, e.g. the introduction of alien species and other externalities.

Furthermore, as part of the implementation of CBD the *Jakarta Mandate of 1995* calls for sustainable aquaculture operations, including that one should use local rather than alien species in fish farming.[98] The work under CBD has continued having aquaculture on its agenda, but without leading to legal binding regulations in this issue area.

Moreover, FAO has played an important role as knowledge sharer and by formulating international rules and standards on aquaculture. In 1995, the *Code of Conduct for Responsible Fisheries* (the Code) also included a section on aquaculture. The intention was to create a template for domestic regulations. The Code is, however, voluntary and does not create any legal obligation. FAO has also drafted guidelines for aquaculture development.[99]

REGIONAL BODIES AND REGULATIONS

We also find regional intergovernmental organizations that address aquaculture planning. Regional Fisheries Bodies (RFBs) have an important role to play, e.g. the North Atlantic Salmon Conservation Organization (NASCO). Canada, Denmark, the EU, Norway, Russia and the U.S. are members. It has among others adopted measures to protect wild stocks from the effects of aquaculture, for example by pushing member states to implement action plans to reduce the escape of farmed fish. But as with the work of FAO, guidelines are not mandatory.

The OSPAR Convention has also initiated measures affecting aquaculture. The most important is the *PARCOM Recommendation 94/6 on Best Environmental Practice for the Reduction of Inputs of Potentially Toxic Chemicals from Aquaculture Use*.[100]

Several other international arrangements have direct or indirect relevance for the aquaculture sector, e.g. the World Trade Organization, World Organisation of Animal Health, Convention on International Trade in Endangered Species of Wild Fauna and Flora and Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean.

[97] Convention on Biological Diversity: https://www.cbd.int/

[98] Jakarta Mandate: https://www.cbd.int/doc/publications/jm-brochure-en.pdf

[99] FAO Technical Guidelines on Aquaculture Certification: http://www.fao.org/3/a-i2296t.pdf

[100] PARCOM Recommendation 94/6: https://rod.eionet.europa.eu/obligations/478/legislation

It is also worth mentioning that the Arctic Council is yet to develop guidelines and best practices on aquaculture, but measures have been discussed. The Council is, however, engaged in numerous projects; directly or indirectly concerning the use of Arctic waters and thus aquaculture. For Norway, the EEA Agreement imposes several legal obligations. EU legislation on veterinary inspection, aquatic animal health and food hygiene being to most important regarding aquaculture.[101]

Lastly, certification of aquaculture products has played an increasingly prominent role in "governance" of this increasingly important industry, e.g. Friend of the Sea runs a certification program for sustainable aquaculture and in 2011, the WWF launched *The Aquaculture Stewardship Council* which created an eco-label for farmed seafood.

National and Local Framework: Alaska

FEDERAL REGULATIONS

Aquaculture in the United States is regulated at the federal and state level. The federal government regulates aquaculture activities that involve the trade of goods and services between the states, or foreign trade. The Food and Drug Administration (FDA) of the Department of Health and Human Service, the Department of Agriculture (USDA), and the Environmental Protection Agency, are the leading agencies that regulate aquaculture at the federal level. National Oceanic and Atmospheric Administration (NOAA) also has a number of important roles in aquaculture, including both NOAA Fisheries, Coastal Management, and Sea Grant.

FDA is responsible for protecting the public health by ensuring among other things the security of human and veterinary drugs and the safety of U.S.' food supply. The USDA, working on food, agriculture, natural resources, rural development, has set up Regional Aquaculture Centers, which support aquaculture research aiming to enhance viable and profitable U.S. aquaculture production.

The Environmental Protection Agency's mission is to protect human health and the environment by implementing U.S. law by writing regulations and setting national standards that states enforce through their own regulations. Other agencies and programs at the federal level involved in aquaculture activities includes among other the NOAA in the Department of Commerce, the Joint Subcommittee on Aquaculture, the Center for Veterinary Medicine (as part of the FDA), the Animal and Plant Health Inspection Service (in the USDA), and the U.S. Fish and Wildlife Service (FWS) of the DoI.

[97] Convention on Biological Diversity: https://www.cbd.int/

[98] Jakarta Mandate: https://www.cbd.int/doc/publications/jm-brochure-en.pdf

[99] FAO Technical Guidelines on Aquaculture Certification: http://www.fao.org/3/a-i2296t.pdf

[100] PARCOM Recommendation 94/6: https://rod.eionet.europa.eu/obligations/478/legislation

In federal waters, fish farming is technically not banned, but rather federal political and regulatory obstacles are too high for fish farming to have developed to date almost anywhere in U.S. offshore waters. The development of aquaculture in the U.S. (which is far behind Norway) has been greatly hampered by the lack of an "enabling regulatory framework" which makes it extremely difficult or impossible to get permission to start a fish farm anywhere in U.S. federal waters.[102]

STATE LEVEL

Federal regulations rarely address aquaculture directly, however, and more detailed legislation exists at the state level. For example, acts like the *Federal Water Pollution Control Act*, the *Food, Drug & Cosmetic Act, the Animal Drug Availability Act*, and the *Magnuson-Stevens Fisheries Conservation Act* do not address aquaculture specifically, but provide the regulatory framework for food safety, veterinary medicines, coastal zone management, and other activities related to aquaculture.

Additionally, it is most often the State that monitors and enforces both federal and state aquaculture regulations. Generally, federal regulations only become applicable within the State when aquaculture activities involve interstate modes of transport, or interstate waters. The State owns tidal and submerged land up to 3 nm away from any given shoreline. There is, however, a growing pressure to promote aquaculture in federal waters in Alaska. [103] But for now, the State remains in the driver seat.

Many would claim that Alaska's coastal areas make it a perfect place for aquaculture. However, Alaska – in the waters it has jurisdiction over – has banned offshore fish farms apart from shellfish, and Pacific oysters, littleneck clams, and mussels, which make up most of Alaska's aquatic farm products. Furthermore, Alaska's aquaculture industry is rather young. In 1988, the *Aquatic Farm Act*[104] was signed into law authorizing the Commissioner of the Alaska Department of Fish and Game (ADF&G) to issue permits for the construction and operation of aquatic farms and hatcheries. Within ADF&G, the Division of Commercial Fisheries, Aquatic Farming carries out the statutory and regulatory responsibilities of the department relating to aquatic farming in Alaska.

Further complicating this issue is the fact that while net-pen farming (like Norwegian salmon aquaculture) is banned, a specific exception is made to allow a very extensive of salmon hatcheries which release salmon smolt into the ocean, the returns of which account for a very significant share of total Alaska "wild" salmon

[102] Knapp G. & Rubino M. (2016). The Political Economics of Marine Aquaculture in the United States. Reviews in Fisheries Science & Aquaculture, 24(3), 213-229

[103] Resneck, J. (2018). Alaska wary of federal push for marine aquaculture. Alaska Public Media, 6 September 2018

[104] Aquatic Farm Act (Section 19, Chapter 145, SLA 1988)

catches (as high as 30 or 40% in some years). This very important salmon hatchery system, or in effect a salmon ranching industry, was initially developed by the State but subsequently taken over by regional private non-profit associations, financed by taxes on fishermen and a right to harvest part of the returning hatchery system. This salmon ranching industry is in effect halfway between a wild fishery and aquaculture.

AQUACULTURE APPLICATIONS

Furthermore, several agency authorizations are mandatory to site, construct, and operate an aquaculture site. An aquatic farm applicant can fill out one Joint-Agency Aquatic Farm Program Application. This application makes available information for every agency that has authority to supervise aspects of the aquaculture project. The process goes through several steps.

First, the Alaska Department of Natural Resources Division of Mining, Land, and Water when receiving a proposal will review it, make preliminary decisions, and provide a public review and comment period. If approved, the proposed project is issued a ten-year aquatic farm site lease. Secondly, once an aquatic farm site lease agreement is complete and approved, the ADF&G can issue permits, including an Operation Permit. Furthermore, for aquatic farms located in a critical habitat area such as a State game refuge or game sanctuary, the ADF&G Habitat Division must issue a Special Area Permit. The purpose is to protect essential fish and wildlife habitat.

After going through this process and receiving State agency authorizations, an operator must make a request to the U.S. Army Corps of Engineers for setting up aquaculture sites within the navigable waters of the U.S. Finally, the Department of Environmental Conservation must do a survey including water quality classification; shellfish harvester permit, processing, and shipper permits; paralytic shellfish poisoning testing; export certifications, and authorizations for dive boats to be used for shellfish harvesting.[105]

Others and more specific permits may also be needed, e.g. a stock transport permit when transferring aquatic farm stock to, from, or between an aquatic farm, hatchery, or nursery site, an aquatic stock acquisition and transport permit to collect wild stock from outside an aquatic farm site, and an approval as a seed distribution source to distribute shellfish seed to a permitted aquatic farm, nursery, hatchery within Alaska or for export.

[105] Aquatic Farming Permits: https://www.adfg.alaska.gov/index.cfm?adfg=aquaticfarming.main

Furthermore, there are several fees in connection with the submission of the Joint-Agency Aquatic Farm Program Application: $5000 for a proposed subtidal farm, $2500 for a proposed intertidal farm; operation permit renewal: $100; operation permit transfer: $100; water quality classification: variable, to cover costs of shoreline survey, testing, etc., shellfish harvester permit: $162, paralytic shellfish poisoning testing: variable, to cover shipment and testing, export certifications: $25 for each certificate issued and authorizations for dive boats to be used for shellfish harvesting: $162.[106]

FISCAL SYSTEM

There are no specific tax incentives, reliefs or penalties for actors involved in aquaculture activities in the United States. Aquaculture companies formed in the U.S. are generally taxed according to corporate tax principles and earnings are subject to federal income of 21%. This is the top marginal rate for businesses filing as corporations. Many smaller businesses can pay their income tax at individual tax rates, and by and large most small businesses do this. Companies would also be subject to state taxes. Generally, however, taxpayers may deduct certain development and research costs in connection with their activity, including developing new products and improving a process or product.[107] R&D costs can get special treatment over and above ordinary production costs, but the rules can be complicated. Most aquaculture firms do not qualify.

National and Local Framework: North Norway

Norway is the world's largest producer and exporter of salmon. Salmon is the most important product in Norwegian fish farming and thus our focus will be on this species. The Norwegian aquaculture governance regime is based on the *Aquaculture Act (2005, No. 79)*. The Act covers aquaculture of any aquatic organism and regulates both aquaculture carried out for scientific or educational purposes and commercially. It regulates areas such as land use and coastal area management, emission and pollutants, animal health and genetic effects of escaped fish on wild populations. The MTIF oversees the administration of the Act and the Directorate of Fisheries is responsible for enforcing it.

The regime can be described as a multilevel management system and several sector-based ministries and directorates (e.g. coastal, environment, food and agricultural, fisheries and transport) are involved and the decision-making authority is divided between three levels of administration: national, county and municipal.

[106] Aquatic Farming Permits: https://www.adfg.alaska.gov/index.cfm?adfg=aquaticfarming.main

[107] KPMG (2020: Taxation of aquaculture 2019: A country overview. Retrieved 28 February 2020 from https://home.kpmg/no/nb/home/nyheter-og-innsikt/2019/05/taxation-of-aquaculture.html

MULTILEVEL MANAGEMENT

Basically, we can divide the management system in three: planning, operation (production) and food safety. The first step when planning for a new fish farming site is to get a permit through an allocation round. Aquaculture cannot be carried out without a license. The power to grant licenses is vested in MTIF, who has delegated this power to the Directorate of Fisheries.

The Aquaculture Act also regulates the use and access to land and water for aquaculture. A license to operate may not be given in contravention of land use plans. The municipalities must implement a land use plan, including relevant use within internal waters bordering the municipality. The municipalities, thus, have the power to facilitate (or not) the establishment of new aquaculture sites.

Furthermore, a license may not be granted if the applicant does not get a permit from the National Coastal Administration pursuant to the Act relating to harbors, fairways, etc. Moreover, a permit for abstraction of watercourse may be required from the Water Resources and Energy Directorate pursuant to the Act relating to watercourses and ground water. This is, however, primarily relevant for land-based hatchery production.

The Directorate of Fisheries can limit the number of licenses out of environmental considerations. The most pressing concern over the last several years has been the negative impact on wild salmonids caused by lice infection pressure from the salmon farms, as well as interbreeding due to escape of cultured salmon into the wild. A short description of regulation efforts regarding these issues can thus tell us something about how aquaculture is regulated in Norway.[108]

The fish-farming industry is governed by a permit system that allows companies to produce fish at specific sites. Permits are subject to a maximum allowed biomass (MAB). The MAB is higher in North Norway than in southern and western part of Norway. These permits are, as previously mentioned, distributed by the MTIF through allocation rounds. Companies compete to comply with the criteria for new permits the Fisheries Directorate then distributes to successful firms, for a fixed price. Permits can also be subject to open or closed auction (the latter requiring pre-qualification), and issued to the highest bidders. Awareness of the environmental impacts of fish farming has grown, with growing public concerns that the proliferation of sea lice is threatening the survival, of wild salmon populations. The Norwegian government has faced criticism for having prioritized growth over the protection of wild salmon.

[108] The following part is a shortened version of: Vormedal I. & Skjærseth J. (2019). The good, the bad, or the ugly? Corporate strategies, size, and environmental regulation in the fish-farming industry. Business and Politics, 1-29

Growing resistance to medical treatments and increasing stocking density, have increased sea-lice proliferation. In response, the government begun to enact increasingly stricter sea-lice regulation from 2012, all farms were now obliged to keep adult female lice per fish levels below 0.5. These regulations were made stricter in 2013, and. in 2015, after heated debate over whether further growth in salmon aquaculture was environmentally justifiable, the government made capacity increases conditional on a use of max. 2 medicinal delousing treatments per production cycle and a sea-lice limit of 0.2.

Moreover, a new category of 'Development Permits' was introduced for large-scale and capital-intensive demonstration projects, that would develop radical innovative environmentally technology. Furthermore, a new lice management and growth regime—the Traffic Light System (TLS)— was implemented in 2017 through the new "production-area regulation." Norway was divided into 13 production areas, where the sea-lice pressure in the commons are monitored. An 'unacceptable' impact in a production area means a red light for area, leading to a reduction of production capacity up to 6%. With 'moderate' impact (amber light), increased production volume will not be allowed. If the impact is deemed acceptable, the area is given the green light for growth. Most 'green' areas are in North Norway, where the sea-lice problem is less severe. However, there is an exception to the rule, firms within amber or red zones can increase capacity if they can enforce sea-lice levels below 0.1, and maximum 1 medicinal treatment per production cycle. Subsequently, sea-lice standards have become significantly more stringent after 2012.

After receiving a license and starting production several acts relating to e.g. disease control, animal welfare, feed and drugs, fish movement and water and wastewater are of relevance. Important here and showing the power of the County in this management system is that according to the Pollution Control Act, disposal or discharge of waste is prohibited unless permission by law or through a permit given by the County Governor.

WATER QUALITY AND FOOD SAFETY

Furthermore, we find several requirements connected to water quality and surveys that shall be carried out by the operator. Breeding of alien species is regulated as well and prohibited unless a specific permit has been granted. This is also regulated under the *Food Safety Act*. Under the Aquaculture Act, we find regulations related to preventing fish from escaping and recapturing of escaped fish, floating aquaculture installations must be certified in compliance with Norwegian Standard NS 9415 or comparable international standards.

Furthermore, regulations adopted under the Food Safety Act concern several aspects of aquaculture production, e.g. movement of fish, disease prevention and control, importation of aquatic animals, the use of veterinary drugs, feed, food safety in general and animal welfare. The *Act Relative to Prevention of Cruelty to Animals* has also several legal implications for the operating of aquaculture facilities regarding animal welfare.

FISCAL SYSTEM

An aquaculture company is subject to corporate income tax at 22% and in principle determined in accordance with ordinary tax principles. A company may be subject to municipal property tax as well and exports are subject to a market fee and research fee.[109] The fees are financing the activities of the Norwegian Seafood Council and the Fishery and Aquaculture Industry Research Fund.[110]

Comparing Alaska and North Norway

Comparing aquaculture / mariculture in Alaska and North Norway is a bit like comparing apples and oranges. Alaska has banned offshore fish farms and (North) Norway is a world leading producer and exporter of salmon. All finfish farming is banned in Alaska while Norway is a world leader in finfish aquaculture. This also results directly from differences in regulatory institutions (particularly the role of Alaska as a State in management of inshore fisheries) as well as differences in regional priorities (particularly local environmental and economic concerns) and also the fact that Alaska's wild salmon fisheries are very abundant and healthy while Norwegian commercial salmon fisheries are insignificant. There is, however, a growing pressure to promote fish farming in federal waters outside Alaska. At the time of writing, mussels, clams and oysters make up the bulk of aquaculture production in Alaska.

However, there are some similarities in the two sectors. Although the Norwegian system is more complex, **both regimes can be described as multilevel management systems** where different levels of administration are involved. Several agency authorizations are needed to get a license to start up with production and aquaculture is regulated at the national (federal) and local (state) level.

Regulations are related to food safety, environmental issues, use of medicines and coastal state management. In Alaska, several fees must be payed when applying to set up an aquaculture site. In Norway, a company may only be subject to market and

[109] KPMG (2020: Taxation of aquaculture 2019: A country overview. Retrieved 28 February 2020 from https://home.kpmg/no/nb/home/nyheter-og-innsikt/2019/05/taxation-of-aquaculture.html

[110] For more information, see the Norwegian Seafood Council: https://en.seafood.no/

research fees in connection to export; fees that are financing the Norwegian Seafood Council and the Fishery and Aquaculture Industry Research Fund. In general, an aquaculture company operating in Norway is subject to corporate income tax (22%) following ordinary tax principles. But a company may also be subject to municipal property tax. There is, however, an ongoing debate in Norway on the aquaculture tax regime. In Alaska the federal income tax is 21% but companies will also be subject to state taxes.

Concluding Remarks

Andreas Østhagen

For the AlaskaNor project, we have defined "governance" as the formal structures that govern and regulate the various industries and areas examined. In this report we have introduced how five sectors of importance for the development of the blue economy is governed: offshore petroleum, maritime transportation/shipping offshore wind, fisheries and aquaculture. How are these areas governed as activities increase in Arctic/AlaskaNor waters? Both the international, national and local legal and political framework need to be mapped.

Global ocean law gives the coastal state relatively free reign in regulation of its blue economy, yet several international and transnational norm-making processes influence Arctic coastal-state regulation and govern ocean activities. Most important is the 1982 UN Convention on the Law of the Sea (UNCLOS) which codifies customary international law as regards use of the oceans and provides the basic legal framework for managing all marine activities, in the Arctic as elsewhere. It allocates regulatory competence differently among coastal states and flag states, depending on type of activity and distance from the coast.

Offshore Petroleum

As regards continental shelf resources, coastal states enjoy exclusive management authority, but they are strongly encouraged "to harmonize their policies in this

connection at the appropriate regional level" (UNCLOS, Art. 208). Since the Convention allows the coastal state to choose among several geological and geographic criteria for determining the outer boundaries of the continental shelf should it extend beyond the 200-mile exclusive economic zone, only a small part of the Central Arctic Ocean sea floor will eventually remain outside national jurisdiction.

Thus, the predominant mode of governance for Arctic petroleum activities will remain unilateral managed by each of the five coastal states, with two important caveats. The maritime transport activities necessary for exploration, development, and production of hydrocarbons are mostly subject to flag state jurisdiction, so effective regulation requires global action under the International Maritime Organization (IMO). Second, even as regards shelf activities the Arctic coastal states have committed themselves under several regulatory and soft-law institutions. By upshot, an Arctic regulatory outlook must cover not only coastal-state practices but also the legal form, the substantive scope and the dynamism of other norm-building processes, e.g. those under the IMO, the OSPAR Convention, the Arctic Council, and the International Organization for Standardization (ISO).

Turning to national and local governance we see that both Alaska and North Norway have a highly developed and complex regulatory system. An important distinction is, however, that the U.S. system is mainly prescriptive requiring industry standards through regulatory incorporation, setting specific technical and procedural requirements. In Norway, there are few mandatory technical requirements and can be characterized as a performance-based regulatory system. Moreover, it is safe to conclude that offshore development is controversial in both Alaska and North Norway. Thus, our purpose is not to provide national recommendations on how to strengthen future petroleum activities in the Arctic. A key recommendation is, however, to strengthen regional and international cooperation for sharing best practice and common regulatory standards on security and environmental issues in e.g. IMO, the Arctic Council if petroleum activities will develop further north.

Maritime Transportation / Shipping

International shipping is a mature industry with several established international governance institutions. It is an economic activity where vessels move across EEZs and the high seas. International regulations are thus a necessity. Most important is UNCLOS, which however makes no mention of the Arctic Ocean. Yet, Art. 234, which regulates the right of coastal states to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas, is often referred to as the "Arctic article". While it is

not limited to issues relating to the polar sea, the Arctic Ocean was clearly what the drafters had in mind.

The IMO develops regulations covering requirements entering into force after being ratified by the required number of states, within the legal framework set by UNCLOS. The regulations are then implemented into the national law of the parties and establish a standard for international shipping. Furthermore, there is a long list of conventions, legal instruments and private governance mechanisms that regulate international shipping. Important here is that shipping is truly international in its nature.

Thus, to compare 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 for Alaska and North Norway should therefore be emphasized. To make Arctic shipping commercial and environmental viable, regional and international cooperation is a necessity. A key recommendation is, thus, to strengthen cooperation in regional fora, such as the Arctic Council through its working group PAME and the Arctic Maritime Shipping Assessment.

Offshore Wind

Charting the situation in Alaska and North Norway there are some important similarities, but also striking differences that are likely to lead to different outcomes in the utilization and upscaling of offshore wind power. First and foremost, both regions have significant – indeed outstanding – offshore wind resources. Alaska and North Norway places very differently, however, in the position to develop this potential. Utilizing the resources in Alaska is difficult, however, particularly because large distances and sparse population make offshore wind power prohibitively expensive. As an isolated state with large distances also to other markets, the export potential is limited too.

Offshore wind is expensive in (North) Norway too, particularly because of the depth of the relevant offshore areas of more than 60m, in combination with low electricity prices and difficulties in reorientation companies from petroleum activities towards this type of activity. This has led to hesitant developments in the offshore market, particularly when compared to other European countries. But costs are falling and there is development of technology for floating turbines, which may be more feasible in the longer run.

Another difference that might be relevant is the fact that Alaska is a federal state (part of a greater polity with varying priorities). Norway on the other hand is a unitary state with a keen interest in a competitive edge, and for exporting clean and less conflictual offshore wind power. The market is present, and two additional interconnectors are being constructed with capacity of 1400 MW each, to the UK (finalized in 2020) and Germany (2021). Here, obvious lessons for both early-phase governance and industry best practice can further be shared between both rule-makers and businesses in Alaska and North Norway.

Fisheries

The fisheries in Alaska and those in North Norway 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 the one hand, this is perhaps not so surprising given that the United States 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 to in the more heavily populated eastern parts. There have been regular calls for regionalization also in Norwegian fisheries management over the years, but national authorities have persistently opposed this, and the 2008 Marine Resources Act explicitly states that the fish stocks belong to the entire Norwegian society, implicitly not to the people of a specific region.

Furthermore, most important fish stocks under Norwegian jurisdiction are subject to some level of international management: in the Barents Sea by the Joint Norwegian-Russian Fisheries Commission; in the Norwegian Sea by the coastal states' regimes for the different pelagic stocks; and in the North Sea, as well as Skagerrak, by the EU-Norway agreement. While Norway is sovereign to set its own regulations, the countries' regulatory measures are to a large extent shaped in the interfaces with other states. Hence, while the federation/state interface is the pivot of U.S. fisheries management, the national/international junction point has the same function in the Norwegian system.

There are a number of similarities between the U.S. and Norwegian systems for fisheries management that could be explored further, of relevance to both regions as well as the Arctic at large: The precautionary approach has become the main device in both systems, and both manage according to harvest control rules based on biological reference points for stock size and fish mortality. While focus has traditionally been

on single-stock management, both systems increasingly apply a broader ecosystem approach and give more attention to the impacts of fishing on e.g. bottom habitats. Both systems also allow for a high degree of user-group involvement, at regional/ state, national and international level. And both have had a considerable amount of success in maintaining fish stocks at sustainable levels.

Aquaculture

There is no international aquaculture specific legislation. However, several legal instruments are directly or indirectly relevant for the development of the sector. First and foremost, all activities at sea are determined by the provisions of the Law of the Sea. Aquaculture is not outlined in UNCLOS, but its provisions on the protection and preservation of the oceans is broad and thus also include several aspects of aquaculture. Coastal states have, however, sovereignty in the twelve nm zone of the territorial sea, and this is where most aquaculture sites are. Thus, legislation concerning the sector is mainly national law. There are however several agreements and guidelines that are of relevance in the sector, but none of them regulate coastal aquaculture directly.

Looking at the national level, comparing Alaska and North Norway is a bit like comparing apples and oranges. Alaska has banned offshore fish farms apart from shellfish, and Norway is a world leading producer and exporter of salmon. However, there are some similarities in the two sectors. Although the Norwegian system is more complex, both regimes can be described as multilevel management systems where different levels of administration are involved. Several agency authorizations are needed to get a license to start up with production and aquaculture is regulated at the national (federal) and local (state) level. Furthermore, exchanging best practices on broader issues of aquaculture should be done in the Arctic Council and by looking at the potential for a certification program on sustainable Arctic aquaculture.