Indigenous Considerations in Marine Transportation Decarbonization in Newfoundland & Labrador

Canada's Voice for the Sustainable Blue Economy

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Ocean Alliance Canada

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Future Skills Centre | Centre des Compétences futures

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Purpose of this Report

Transportation is the single biggest contributor to greenhouse gas (GHG) emissions in Newfoundland and Labrador (NL). Marine transportation makes up a large share of all transportation in NL and is responsible for 8%[1] of all of the province's emissions. In order for NL to meet its net zero by 2050 commitment, decarbonization within the marine transportation sector will be necessary.

However, the marine transportation sector is complex. It is not a single source of emissions; rather, it is the collection of GHGs that result from the movement of many different types of ships and vessels – from tankers, to fishing boats, to ferries, to supply ships, and more. In addition, as the province with the longest coastline in Canada, marine transportation is fundamental to the livelihoods of its residents. Marine transportation is a large part of life in NL – whether that interaction be recreational or commercial.

The cultural connection in NL to the ocean runs deep – and this is even more true Indigenous Nations in Newfoundland and Labrador. Since time immemorial Indigenous peoples have used the ocean for transportation, food, and recreation. Increasingly, Indigenous Nations in NL are involved in ocean industries as well.

This report will seek to answer three guiding questions:

1. As plans for decarbonization of the marine transportation sector in NL are advanced, what does this mean for Indigenous Nations?
2. What must rightsholders and stakeholders be mindful of in making decisions in pursuit of net zero?
3. As new fuels and technologies are introduced, what training and professional development solutions will be required?

This report relies primarily on secondary research and is not intended to represent the perspectives or views of Indigenous people in NL.

This report aims to serve as a starting point for conversations on marine transportation decarbonization with Indigenous Nations in NL.

RESEARCH PARTNERSHIP

This research was undertaken in partnership with *econext.*

econext is a not-for-profit association with a mission to accelerate clean growth in Newfoundland and Labrador by: (1) stimulating research, development, and innovation; (2) preparing its workforce for a greening economy; and (3) acting as a catalyst for climate change action within its industries, businesses, and communities. econext has been working for over 30 years on behalf of its members across many sectors to support environmentally sustainable economic development.

More information can be found at https://econext.ca

[1] https://www.gov.nl.ca/eccc/files/Historical-GHG-Emissions-Summary-NL-1990-2023-Mar-2025.pdf

Indigenous Nations in Newfoundland and Labrador

In order to explore Indigenous considerations as they relate to marine transportation decarbonization in NL, it is important to first appreciate the history of Indigenous peoples in the province.

This means gaining an understanding of the origins of Indigenous people in what is now known as NL, recognizing the impacts that European settlement has had on their culture, and the present day communities and organizations which they are associated with.

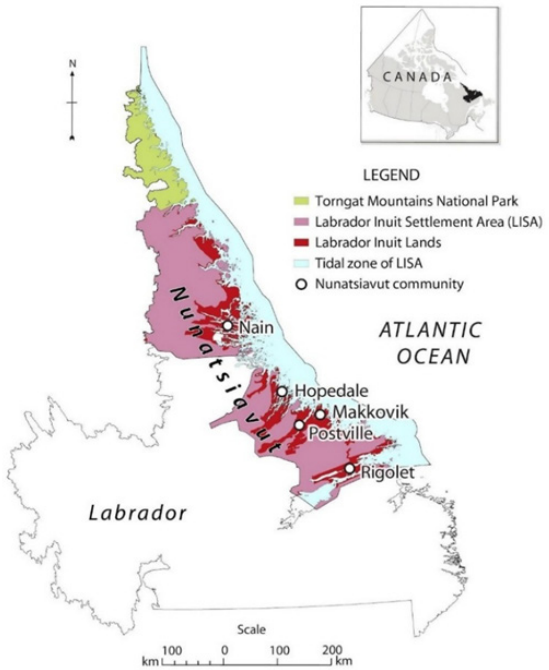
NL is home to four peoples of Indigenous ancestry: the Inuit, the Innu, the Mi'kmaq, and the Southern Inuit of NunatuKavut (formerly the Labrador Inuit-Metis).

Inuit

Our earliest ancestors lived mainly on the north coast of Labrador, where they travelled all over, harvesting the resources of the Land and sea. The primary Inuit settlements are Nain, Hopedale, Postville, Makkovik and Rigolet on the north coast of Labrador, but Inuit people are also found in a number of other Labrador communities.

The Labrador Inuit way of life remained untouched by the rest of the world until the 1760s. Their earliest ancestors lived mainly on the North Coast of Labrador and travelled widely to harvest the resources of land and sea. For thousands of years, they had little or no contact with European cultures. In the 16th Century, they first encountered Basque whalers and, later, a growing settler population. In the 1770s, Moravian missionaries became the first Europeans to establish a presence north of Hamilton Inlet, and their way of life began to experience sweeping changes. Over time, Inuit life became more sedentary, and more connected to the emerging trade economy of NL.

The demise of trade in the 1920s brought further social and economic upheaval. The Hudson's Bay Company and, later, the Commission of Government, took control of the Moravian stores. After Confederation, the Moravian Church, the Grenfell Mission, and the provincial government of Newfoundland suspended services to the northern communities of Hebron, Okak, and Nutak. Residents were resettled. Nunatsiavut (meaning 'our beautiful land' in Inuktitut) is the homeland of the Labrador Inuit with many living within the settlement area in five communities: Rigolet, Postville, Makkovik, Hopedale (the legislative capital) and Nain (the administrative capital)[3].



Regional Labrador Inuit Association (LIA) and Inuit Land
Map Courtesy of Sustainable Nunatsiavut Futures[2]

In the 1970s, a new era dawned for Labrador Inuit. They formed the Labrador Inuit Association (LIA) and filed a land

[2] https://www.ofi.ca/sustainable-nunatsiavut-futures/communities/nunatsiavut

[3] https://thecanadianencyclopedia.ca/en/article/nunatsiavut

claim with the Government of Canada. For the next several decades, they worked hard to promote their culture, their health, their well-being, and their constitutional, democratic and human rights. They began the long road to establishing autonomous self-government.

Their transitional government came into effect in 2005, and they began preparations for the first ever Nunatsiavut elections which took place the following fall. The first elected Nunatsiavut Assembly was sworn in on October 17, 2006[4]. Today the Nunatsiavut Government is responsible for health, education, cultural affairs, and more with the Labrador Inuit Settlement Area (LISA).

Innu

The Innu, formerly called the Montagnais-Naskapi, lived across a wide range of territory which straddled the border of present-day Labrador and Quebec. Throughout this landscape, they followed the seasonal migrations of caribou, their most important sustenance physically and spiritually, as well as seasonal migrations of birds and fish[5]. For thousands of years the Innu were a nomadic people travelling in small bands as hunter-gatherers, following the herds throughout the lands of Labrador and northeastern Quebec known as Nitassinan (our land)[6].

In the early 19th century, the trading posts arrived bringing with them dramatic changes to the Innu way of life. European laws and regulations were enforced that excluded the Innu from their lands and waterways. The Innu people of Labrador were one of the last aboriginal groups in Canada to settle into permanent villages in the 1950s: Natuashish and Sheshatshiu.

SHESHATSHIU INNU FIRST NATION

Sheshatshiu is a First Nation community adjacent to North West River. The next nearest town and airport is 32 Kilometres south in Happy Valley-Goose Bay. Sheshatshiu is a federal reserve that occupies the lands bordering on the North West River that narrowly divides Grand Lake (Kakatshuuthsishtun) and Lake Melville (Atatshuninipeku). On the opposite side of the river sits the town of North West River[7].

MUSHUAU INNU FIRST NATION

The Mushuau Innu First Nation live in the community of Natuashish, a remote settlement on the northeastern coast of Labrador. Initially located in Davis Inlet in the 1960s – a move which proved problematic due to poor planning, lack of infrastructure, and environmental unsuitability – the Canadian government initiated the relocation of the Mushuau Innu people to Natuashish in 2002, a move intended to improve living conditions and restore cultural pride[8].

The communities of Sheshatshiu and Natuashish are distinct from each other – but they share a political organization, the Innu Nation[9].

Figure 2: Innu communities in Labrador. Map Courtesy of the Community Conservation Research Network[10]

[4] https://nunatsiavut.com/our-history/

[5] https://www.communityconservation.net/innu-nation-labrador-canada/

[6] https://sheshatshiuinnufirstnation.com/history/

[7] https://sheshatshiuinnufirstnation.com/about/

[8] https://mifn.ca/

[9] https://www.gov.nl.ca/exec/irr/overview/land-claims/innu-nation-of-labrador/

[10] https://www.communityconservation.net/innu-nation-labrador-canada/

The Innu Nation is the recognized organization that formally represents the approximately 3,200 people making up the Innu of Labrador. The Innu Nation's mandate is to speak as one voice to protect the Indigenous rights and interests of the Innu and to oversee all its political and business affairs.

The Innu Nation is involved in on-going land claim and self-governance negotiations with the Federal and provincial governments. As of 2006, the Innu of Labrador have been formally recognized under The Indian Act of Canada.

The Innu Nation is also involved in the social and economic development and the well-being of its community[11].

Southern Inuit

The Southern Inuit are descendants of Europeans and Labrador Native people, primarily the Inuit. Southern Inuit today live in a number of communities on the central and southern Labrador coast.

They are represented by the NunatuKavut Community Council (NCC) which is currently attempting to win acceptance of its Indigenous status from the federal and provincial governments[11].

The NCC represents roughly 6,000 Inuit across South and Central Labrador. As the governing body of their people, they serve as the collective voice of their nation—advancing the interests of their communities, protecting their rights, and upholding the values passed down through generations[12].

In 1991, the NCC, formerly known as the Labrador Metis Nation (LMN), filed a land claim with the Federal Government covering a significant portion of Labrador. On July 12, 2018, the Federal Government announced its establishment of a Recognition of Rights and Self-Determination Table (the "Table") with NCC. The Table was described as the start of discussions on recognition of NCC's Indigenous rights and aspirations for self-determination[13].

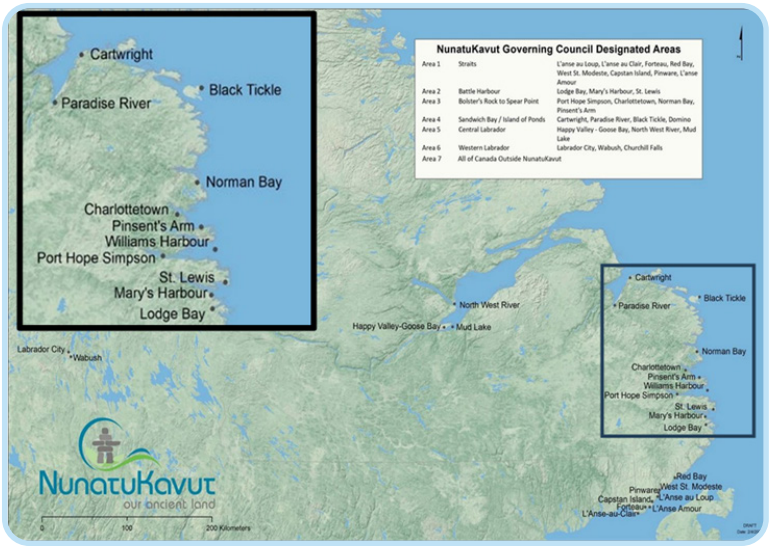


Figure 3: Figure 3: Area the NunatuKavut consider as traditional territory Map Courtesy of Net Zero Atlantic[12]

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[11] https://www.innu.ca/

[12] https://netzeroatlantic.ca/sites/default/files/2025-12/251212_ncc_geothermal_rfp_-_final.pdf

[13] https://nunatukavut.ca

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Newfoundland Mi'kmaq

The Newfoundland Mi'kmaq are found on the island of Newfoundland. They are descended from Algonkian hunter-gatherers whose homeland included what is now Nova Scotia, Prince Edward Island, part of New Brunswick, and the Gaspé peninsula.

MIAWPUKEK FIRST NATION

The largest Mi'kmaq community is Conne River in Bay d'Espoir on the island's south coast. Conne River is a reserve recognized by the federal government and its people are represented by the Miawpukek Band Council.

Miawpukek First Nation is an Indian Act band that was established as a federal Indian Reserve in 1987. Approximately 850 members of Miawpukek First Nation live at Conne River, with an additional 2,000 members living off-Reserve.

Miawpukek became a permanent community sometime around 1822. Before 1822 it was one of many semi-permanent camping sites used by their people who were at the time still nomadic. Miawpukek Reserve was "established according to traditional oral history in 1870[16].

Figure 4: Location of Miawpukek First Nation Reserve. Map Courtesy of Pew Charitable Trusts [17]

Miawpukek First Nation administers its own school curriculum alongside provincially authorized curriculum and also manages the design and delivery of community-based health programs[18].

[14] https://nunatukavut.ca/about/

[15] https://www.gov.nl.ca/exec/irr/nunatukavut-community-council/

[16] https://mfngov.ca/about/

[17] https://www.pew.org/en/research-and-analysis/articles/2024/04/04/why-newfoundlands-south-coast-fjords-are-sacred-to-indigenous-communities

[18] https://www.gov.nl.ca/exec/irr/miawpukek-first-nation/

QALIPU FIRST NATION

Qalipu is part of the Mi'kmaq Nation whose territory extends from Maine to Quebec, through the Maritime Provinces and into Ktaqmkuk (Newfoundland). This territory is also known as Mi'kma'ki. This Indian Act Band is unique in its size (one of the largest Bands in Canada) and representation. Qalipu is made up of 67 traditional Mi'kmaq communities, spread out over 9 Electoral Wards[19].

Qalipu First Nation has no reserve land; rather, its membership is primarily spread through Western and Central Newfoundland[20].

Qalipu First Nation's service offerings include education and training, tourism development, health benefits and services, employment programs, registration assistance, environmental monitoring, culture and heritage, and community economic development.

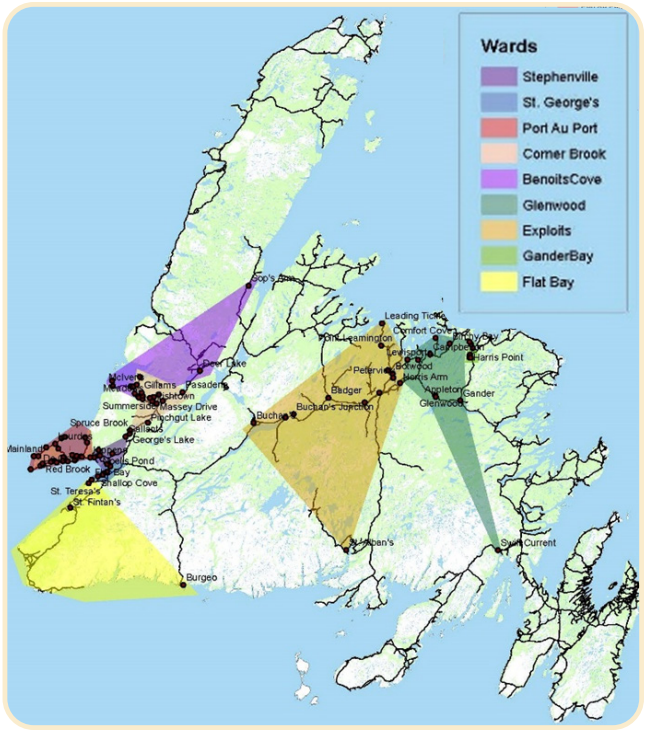
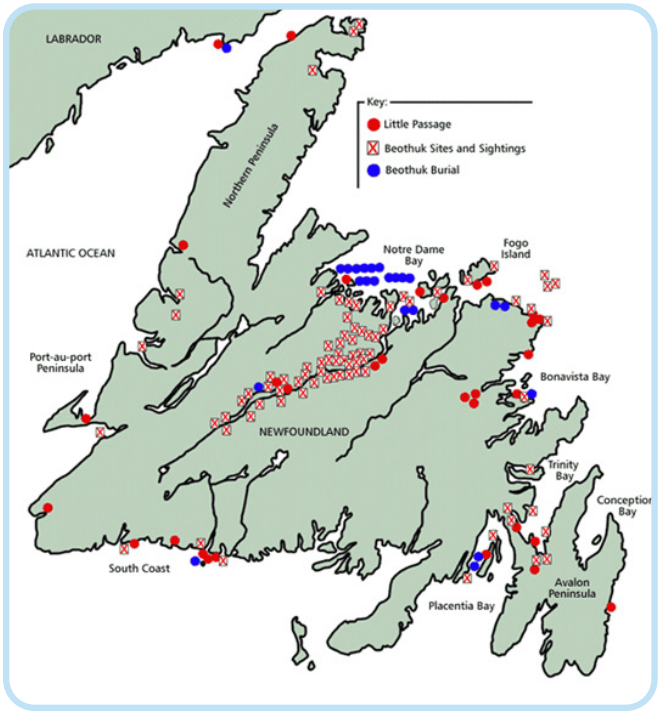


Figure 5: Qalipu First Nation Electoral Wards.
Map Courtesy of Qalipu First Nation [21]



Beothuk

An overview of Indigenous groups in NL would not be complete without acknowledging the Beothuk. The Beothuk were Indigenous inhabitants of the island of Newfoundland. They were Algonkian-speaking hunter-gatherers who once occupied most of the island. As a result of a complex mix of factors, the Beothuk became extinct in 1829 when Shanawdithit, the last known Beothuk, died in St. John's[22].

Figure 6: Map Showing Little Passage Campsites, Beothuk Campsites and Sightings and Beothuk Burials. Map Courtesy of Heritage Newfoundland and Labrador[23]

[19] https://qalipu.ca/about/background/
[20] https://www.gov.nl.ca/exec/irr/qalipu-first-nation/
[21] https://qalipu.ca/site/wp-content/uploads/2015/06/Wards.jpg
[22] https://www.heritage.nf.ca/articles/indigenous/indigenous-peoples-introduction.php
[23] https://www.heritage.nf.ca/articles/indigenous/beothuk-distribution.php

Indigenous Communities and Marine Transportation

The history of NL's Indigenous Nations is closely intertwined with the ocean. In present day, with many of the province's Indigenous communities being on or near coastlines, this continues to be the case. To understand possible Indigenous perspectives on marine transportation decarbonization, it is important to be aware of how Indigenous communities have and are interacting with the ocean. These interactions range from traditional and cultural uses to commercial uses.

Traditional and Cultural

Present day interactions with the ocean are still greatly shaped by the unique histories of Indigenous peoples and the communities they belong to.

For example, to harvest different resources as they became available, the Mi'kmaq moved seasonally from one part of their territory to another. They often spent the warmer months near the coast to exploit rich marine resources. They arrived at the coast in the early spring, when the ice was melting and fish were plentiful in rivers, streams, and inshore waters. Winter flounder was one of the earliest fish to become available and was followed by a string of other species until the early fall – smelt, herring, salmon, sturgeon, trout, cod, bass, plaice, and eels.

Fishers employed a variety of methods. They set loosely woven baskets in rivers and streams to act as nets and built stone weirs (underwater fences or dams) to corral fish. They fished with bone hooks as well as with spears and a three-pronged leister able catch salmon, sturgeon, and other large species. The Mi'kmaq also harvested shellfish, sea mammals, seabirds, and their eggs during the spring, summer, and early fall. From the perspective of marine transportation, precontact Mi'kmaq built canoes using cedar frames and birch-bark shells.

These vessels were of varying lengths (typically between 5.5 and 8.5 metres) and resilient – it is said that these vessels were used to cross from Cape Breton to Newfoundland.[24]

Inuit are considered a maritime people[25]. Early Inuit ancestors lived mainly on the north coast of Labrador, where they travelled all over, harvesting the resources of the land and sea. Until recent times, the 'umiak' was the primary method of summer transport for coastal Inuit, used for moving family and possessions to seasonal hunting areas and for whaling expeditions. The craft could hold more than 20 people and was six to 10 m in length and more than 1.5 m wide at the centre. The frame was constructed of salvaged driftwood or whalebone, and hide lashings on pegs of antler, ivory or wood held the boat together. Hides of bearded seal sewn together with waterproof seams were stretched to dry tightly around the frame[26]. The kayak – a one-person craft – was used for the transport of goods and hunting. Unlike the umiak which was open, the kayak had a covered deck, which improved its maneuverability in waters. Covered with de-haired seal or caribou skins, the frame was often made of driftwood, with ribs of willow branches[27].

[24] https://www.benoitfirstnation.ca/mikmaq_article10._canoe.html

[25] https://imappivut.com/about/

[26] https://www.thecanadianencyclopedia.ca/en/article/umiak

[27] https://thecanadianencyclopedia.ca/en/article/kayak

For Inuit, sea ice represents an important aspect of the relationship with the ocean. Sea ice is considered to be critical infrastructure and is a central part of culture, community and livelihood. Ice is an extension of the land — its existence is imperative for Inuit to travel and access crucial areas, as well as being a platform to the ocean and its resources. Sea ice connects Inuit, allowing for travel between communities. The ice also allows Inuit to access harvesting areas (both on land and water) at different times of the year, depending on the seasonal patterns of the species and the condition of the sea ice. Inuit have extensive knowledge about the different types and forms of ice, how ice changes in relation to environmental factors and what changes happen during the different seasons of the year. This knowledge has been passed on for generations and is imperative to Inuit use and occupancy of sea ice. Relying on this knowledge allows Inuit to safely access areas of importance, to travel to other communities and to harvest food and resources as needed, even during the times of sea ice formation and breakup[28].

The Innu are traditionally associated with living as nomadic hunter-gatherers in the boreal forests and tundra, with less of a tie to the ocean. Although our understanding of precontact Innu groups is incomplete, archaeological evidence suggests they likely spent the colder months hunting caribou inland before visiting coastal areas in the spring and summer to catch seals, fish, and other marine animals. Some archaeologists believe the Innu's immediate ancestors reduced their use of the Labrador coast after the Thule (whose descendants are the Inuit), arrived in the region between about 1250 AD and 1450 AD. The Thule relied heavily on marine resources and competition with them may have prompted Innu ancestors to spend more time in interior regions of the Quebec-Labrador peninsula. In the 16th and early 17th centuries, as the Basque arrived, the Innu visited fishermen at their stations in southern Labrador. These summer trips to the coast became more frequent after French traders and missionaries in the 17th century, and British and Moravians in the 18th century. The late 19th and 20th centuries were marked by increasing competition from white and settler fur trappers particularly in Central Labrador[29]. The Indian Act caused the Innu to forfeit their nomadic lifestyle for stationary dwellings and along with them, a sedentary subsistence[30].

Overall, fishing has played an important role for Indigenous groups in NL – both from a historical perspective and in the present day. Fishing still contributes to the food supplies and livelihoods of many Indigenous people. For example, Labrador Inuit have the right to fish throughout the LISA at all times of the year in such quantities as are required to meet their full needs for food, social, and ceremonial purposes.

From a marine transportation perspective, traditional vessels of Indigenous communities like umiaks are rarely used today; they have been replaced by the same motorized crafts that are found in many other communities throughout NL and coastal communities worldwide.

[28] https://indigenouspeoplesatlasofcanada.ca/article/sea-ice/

[29] https://imappivut.com/about/

[30] https://www.thecanadianencyclopedia.ca/en/article/umiak

Fisheries

Beyond fishing for cultural and recreational purposes, there are a number of instances in NL where Indigenous Nations (or Indigenous-owned corporations) have commercial interests in the fishing industry. These interests not only provide financial returns to the Indigenous communities which own them – but also provide employment opportunities for their people.

NUNATSIAVUT GOVERNMENT (NG)

The NG is the governing body which manages fisheries interests within the LISA through community consultations and the Torngat Join Fisheries Board. The Nunatsiavut Government is a quota-holder for a limited quantity of various commercial fish species.[31] Labrador Inuit historically have fished commercially for cod, salmon, arctic char, and seals, but have expanded into fishing snow crab, scallops, shrimp, and turbot. The fisheries are broadly recognized as a renewable resource that can help build a sustainable economy for the benefit of Labrador Inuit.

The NG also holds three enterprises in the inshore sector with multiple species licences which were acquired prior to signing its land claims agreement. In addition, the NG holds one inshore enterprise with a seal licence. The NG has additional fishery interests with other entities such as Pikalujak Fisheries, Torngat Fish Producers Co-operative Society Limited, and the Labrador Inuit Development Corporation. These interests provide additional access to fishing allocations including offshore shrimp[32].

UEUSHUK FISHERIES LIMITED (UFL)

UFL was established by the Innu Development Limited Partnership (IDLP) to manage its commercial Innu fishery. IDLP is the economic arm for the Innu of Labrador with a focus on Innu employment across all job levels.[33]

UFL is 100% owned by IDLP and has been successful in acquiring fishing enterprises, which are now under their management. Active in the mid-shore and offshore fishing industry, UFL holds various quotas for species like northern shrimp, cod, and Atlantic halibut, and owns the Harbour Grace Shrimp Company. UFL also acquired a vessel and rights to harvest turbot at the northeastern tip of the Labrador Peninsula.[34]

[31] https://nunatsiavut.com/department/lands-natural-resources/inuit-harvesting-rights/

[32] https://indigenousfisheries.ca/en/wp-content/uploads/2018/07/Indigenous-Program-Review-Northern-Integrated-Commercial-Fisheries-Initiative-Discussion-Paper.pdf

[33] https://innudev.com/who-we-are/about-idlp/

[34] https://innudev.com/partners/our-partners/ueushuk-fisheries-limited/

MI'KMAQ COMMERCIAL FISHERIES (MCF)

Qalipu First Nation's participation in the commercial fishery dates to 2000. By 2017, Qalipu held 11 inshore enterprises; primary species of interest are shrimp, crab and lobster followed by groundfish, herring, mackerel and capelin[35]. These interests are now managed by Mi'kmaq Commercial Fisheries (MCF). MCF is an independent, Indigenous-owned company of the Qalipu First Nation. Acting on behalf of Qalipu members, MCF manages commercial fishing operations and ensures that inherent Mi'kmaq rights to fish in traditional waters are carried forward with respect and responsibility. MCF owns or operates 16 commercial fishing enterprises and has built long-term harvesting partnerships with processors across NL. In 2020, MCF launched WASPU, a premium seal oil supplement rooted in tradition and backed by science. WASPU has grown from a provincial product to one sold across Canada, with international export arrangements underway. This innovative venture reflects MCF's commitment to sustainable resource use, economic development, and cultural revitalization[36].

NETUKULIMK FISHERIES LIMITED (NFL)

Miawpukek First Nation has a significant commercial fishery presence on the south coast of Newfoundland that involves multiple species. The Miawpukek First Nation commercial fisheries represent one of Miawpukek First Nation's largest sources of own-source revenue. Netukulimk Fisheries Limited (NFL), which is wholly owned by Miawpukek First Nation, operates 35 commercial enterprises across 7 vessels. For 2024, species and quotas are as follows: Cod – 577,626 lbs; sea cucumber – 2,340,000 lbs; crab – 3,000,000 lbs; whelk – competitive fishery[37]. Miawpukek First Nation has been building its capacity in the commercial fishery industry since 1999, including by self-funding several acquisitions. For example, in 2015, Miawpukek First Nation built a 50-foot vessel to fish their fixed-gear cod allocations, the tuna fishery, and the Nova Scotia lobster fishery accessed through arrangements with a Nova Scotia-based First Nation. By 2016, Miawpukek First Nation held 10 fishing enterprise licences in the inshore sector focusing on groundfish, snow crab, pelagics, and whelk. The community also had one sea cucumber and three tuna licences, along with inshore allocations of crab and cod. Miawpukek First Nation has been actively involved in the 'Aboriginal Aquaculture in Canada Initiative'. Miawpukek First Nation was an early participant in commercial salmonid aquaculture in NL as: shareholders in early commercial farms; owners and operators of industry supply and services businesses; employees on farms; and collaborators on research and development on production and environmental effects.[38]

NDC FISHERIES LIMITED (NDCF)

NDC Fisheries Limited (NDCF) is a commercial fisheries company owned by Nunacor, the business development arm of the NunatuKavut Community Council (NCC). Currently, NDC Fisheries' quota holdings include nearly 230,000 pounds of snow crab and two shrimp quotas, with access to up to 12 Turbot 2+3k permits and 12 license designations in the stewardship fishery for Northern Cod[39].

CLEARWATER

In 2021, Clearwater was 50% acquired by a newly formed Mi'kmaq Coalition between Miawpukek First Nation in NL and Membertou, Paqtnkek, Pictou Landing, Potlotek, Sipekne'katik, and We'koqma'q First Nations in the Maritimes. Representing the single largest investment in the seafood industry by any Indigenous group in Canada[40], Clearwater fishes multiple species across the Atlantic region, but in NL the focus is on shrimp and clams offshore NL in addition to research.

[35] https://indigenousfisheries.ca/en/wp-content/uploads/2018/07/Indigenous-Program-Review-Northern-Integrated-Commercial-Fisheries-Initiative-Discussion-Paper.pdf

[36] https://qalipu.ca/corporate/qalipu-development-corporation/

[37] https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-84343/comment-62234/2024.Sept.16(Updated)-MFN%20Response%20to%20Interim%20RA%20OSW%20Report_Redacted.pdf

[38] https://indigenousfisheries.ca/en/wp-content/uploads/2018/07/Indigenous-Program-Review-Northern-Integrated-Commercial-Fisheries-Initiative-Discussion-Paper.pdf[39] https://innudev.com/who-we-are/about-idlp/

[39] https://nunacor.com/group-of-companies/ndc-fisheries-2/

[40] https://www.clearwater.ca/en/our-story/indigenous-ownership

Supply and Services

In addition to the commercial fishery, there are a number of instances in NL where Indigenous communities (or Indigenous community-owned corporations) have business interests in other ocean enterprises.

MIAWPUKEK HORIZON MARITIME SERVICES

Miawpukek Horizon Maritime Services is a company that evolved from a relationship between a private sector company (Horizon Maritime) and an Indigenous group (Miawpukek First Nation). The partnerships started with the recruitment and development of First Nations seafarers as Horizon Maritime sought to expand its seafarer network and further diversify its workforce. Today, Miawpukek Horizon Maritime Services operates the Polar Prince vessel and can support a number of different activities within the marine sector. The company has worked with federal and provincial governments, the offshore oil and gas sector, renewable sector, not for profits, and other private industry clients to provide services in scientific explorations, cargo/general operations support, chartering services, work activities in isolated areas like the arctic, academia projects, and more[41].

NEWDOCK

In 2024 Newdock (St. John's Dockyard Ltd.) was acquired by a partnership including the Qalipu First Nation, by Membertou First Nation, and Horizon Naval Engineering. Horizon Naval Engineering is a subsidiary of Horizon Maritime (which is a partner on the join venture listed above). Established in 1884, Newdock is one of the oldest shipyards in Canada serving the marine industry in eastern Canada. Newdock provides ship repair, upgrade, and maintenances services for vessels all types including the Canadian Coast Guard, navy, offshore supply, seismic, commercial tugboats and barges, aquaculture and the traditional fishery[42]. According to the partnership, the investment – one of the most significant First Nations business investments in the province's history – is focused on generating prosperity for generations to come and will provide meaningful, sustainable opportunities for First Nations communities in NL and in Nova Scotia[43].

CANSHIP INNU MARINE GP INC.

Canship Innu Marine GP Inc. is a limited partnership between Innu Development Limited Partnership (IDLP – 51% share) and Canship Ugland Ltd. Canship Ugland Ltd., is a ship owner and management company based in St. John's established 1996 in connection with the start of offshore oil production on the Grand Banks. Canship operates a diverse fleet of 11 vessels, which include three dynamically positioned crude oil shuttle tankers, an ice breaking bulk carrier operating between, Long Harbour, Quebec City and the Canadian North, two specialized tractor tugs capable of firefighting, escorting and docking services, three pilot boat launches operating in Placentia Bay, an oil/chemical tanker operating within Atlantic Canada and an oil/chemical tanker operating in BC. Furthermore, the company provides crew management services to other vessel owners and operators. These services include offshore supply, construction, FPSOs, seismic, dredging and ice breaking vessels. Many of these vessels operate under Canadian flag and the jurisdictions of the petroleum Boards, CAPP and the requirements for local employment of and local benefits to the business community are respected[44].

[41] https://oceansadvance.net/listing/miawpukek-horizon-maritime-services-ltd/

[42] https://newdock.nf.ca/services/

[43] https://newdock.nf.ca/wp-content/uploads/2024/12/240926-Newdock-Press-Release.pdf

[44] https://www.sac-isc.gc.ca/REA-IBD/eng/profile?id=18FD49C15C59A24794A9364145A57CCF&index=14

NATUASHISH SHIPPING GP INC.

Natuashish Shipping LP is a new venture in marine freight and passenger service. The Company is 100% owned by Mushuau Innu First Nation and the vessel is being managed by Canship Innu Marine GP Inc. Available for contract or charter is the MV Norther Ranger - a 1A Super Ice class vessel built in 1986 - 71.0 metres - 131 passengers[45].

AFN ENGINEERING INC.

Atlantic First Nations Engineering (AFN) is a leading Newfoundland-based provider of environmental, civil, municipal, and transportation engineering services, while specializing in Aboriginal needs. The company's mission is to use its knowledge of the Aboriginal culture and sensitivity to the environment to provide clients with effective and efficient engineering services that benefit communities. AFN designs and constructs a wide range of marine infrastructure including harbour development, wharf construction, reconstruction, and extension, as well as launch way construction. AFN provides numerous environmental assessments for small craft harbours, oil storage facilities, service stations and other commercial/residential facilities. AFN also provides identification and removal evaluation of hazardous building materials including asbestos, mercury, and toxic mold[46].

ECOAXIS INC.

An Indigenous owned business providing comprehensive site management, business development, and operational oversight for marine bases and industrial facilities, ensuring efficiency, safety, and long-term sustainability. Through strategic industry partnerships, the company helps others identify new opportunities, expand into new markets, and build strong relationships to drive long-term growth and resilience. EcoAxis has established an aquaculture waste division, transforming the way aquaculture waste is managed. The company's mobile plastic shredding technology enables on-site processing of HDPE waste, converting it into valuable plastic chips. These chips can be repurposed into new, high-quality products, such as infrastructure materials[47].

SMARTICE

SmartICE is a community-based Work Integrated Social Enterprise (WISE) offering climate change adaptation tools to integrate Indigenous knowledge of ice with advanced data acquisition, remote monitoring and satellite mapping for ice travel safety. SmartICE offers a suite of climate change adaptation tools that integrate Indigenous and local knowledge of ice with advanced data acquisition, remote monitoring and satellite mapping for ice travel safety. The organization's community-based services provide invaluable, data-driven insights into ice thickness and local ice travel conditions, in near real-time[48].

[45] https://www.sac-isc.gc.ca/REA-IBD/eng/profile?id=0D55A4398761BD4AA1BA1FEEDDD370BC&index=54

[46] https://afnengineering.ca/

[47] https://ecoaxis.net/

[48] https://smartice.org/who-we-are/

Science and Research

MAMKA

The Qalipu First Nation and the Miawpukek First Nation came together in 2005 under the protocols of the Aboriginal Aquatic Resource & Oceans Management (AAROM) program to form the Mi'kmaq Alsumk Mowimsikik Koqoey Association (MAMKA). MAMKA represents the Mi'kmaq people and of the Qalipu First Nation and Miawpukek First Nation in aquatic resource and ocean management issues. Its mandate is to gather Indigenous Knowledge and scientific data to support Miawpukek First Nation and Qalipu First Nation in the management, protection, and development of aquatic and marine resources toward a sustainable blue economy[49].

MAMKA is widely known within Aboriginal communities. MAMKA is also recognized externally due to its Aboriginal involvement and representation in various marine matters that have an impact on communities and their waters. MAMKA participates with First Nation Communities to ensure their involvement and advice in the decision-making process used for aquatic resources and oceans management. Their activities include: environmental monitoring; marine resources and oceans management; Indigenous knowledge input from communities; and marine spatial planning[50].

MAMKA has built personnel and equipment capacity since 2020 and has become an experienced, Indigenous-led, ocean research organization in Atlantic Canada. Through partnerships with the Fisheries and Marine Institute of Memorial University, Canadian Parks and Wilderness Society (CPAWS), and others, MAMKA works with deepwater and drop cameras and Remotely Operated Vehicles (ROVs) to discover new habitats and uncover the amazing biodiversity of Bay d'Espoir and several fiords to the west. Some current projects include a macroinvertebrate survey at Little River (with Parks Canada); identification of sea birds, shorebirds, migrating birds, and nesting areas; eDNA sampling for aquatic invasive species (green crab); marine debris surveys and documentation of debris on shorelines and beaches; microplastics collection in water and bottom sediments (with Memorial University's Ocean Sciences Centre); and many community and youth engagement activities.

MAMKA's upcoming plans include a new research boat, a marine research centre facility at Miawpukek First Nation, oil spill training and coastal marine response plan, and expanding its marine projects through partnerships and collaborations[51].

MAMKA is also pursuing the construction of an 18-metre aquaculture support vessel which utilizes a hull design developed by TriNav Marine Design Ltd. which was the winner of the federal government's Hull Design Efficiency Challenge[52]. The vessel will feature a diesel/electric hybrid engine. MAMKA aims to position its Indigenous Nation owners – and the commercial fishing and aquaculture operations that they invest in – as leaders in marine transportation decarbonization. The support vessel is comparable in terms of size and use as many of the fishing vessels operating in NL – making the pilot project highly relevant to emissions reductions within the industry.

REAL-TIME OCEAN DATA SERVICES LTD.

RODS is a small Canadian company, with 51% Indigenous ownership, involved in research activities from multi-beam work and image work to marine/species surveys. The company has also partnered with Miawpukek First Nation on several marine economic development projects. The company uses the F/V Patrick and William and has many applications to suit the current demands of oceanic research and commercial needs[53].

[49] https://www.thejot.net/article-preview/?show_article_preview=1677

[50] https://aarom.ca/aarom-department-profiles/mikmaq-alsumk-mowimsikik-koqoey-association/

[51] https://www.thejot.net/article-preview/?show_article_preview=1677

[52] https://www.canada.ca/en/atlantic-canada-opportunities/news/2021/05/trinav-marine-design-inc-captures-hull-design-efficiency-challenge-prize.html

[53] https://www.sac-isc.gc.ca/REA-IBD/eng/profile?id=22D412E2A557654CB973188A83891EC6&index=74

CLEARWATER

Clearwater owns and operates the Fundy Leader, a harvesting vessel dedicated to research. In 2011 Clearwater was 50% acquired by a Mi'kmaq Coalition of seven Mi'kmaq Nations in NL and NS. Sustainable seafood harvesting is at the core of Clearwater's business, understanding that the only way to continually bring high-quality seafood to the marketplace is to ensure the long-term sustainability of the resources. Significant investments in the ongoing and continued analysis of our shellfish populations to understand their well being, including reproduction, growth and maturity within their specific habitats, assist us in developing the most optimal and environmentally efficient harvesting plans[54].

MIAWPUKEK HORIZON MARITIME SERVICES

CCGS Sir Humphrey Gilbert was a Canadian Coast Guard light icebreaker and buoy tender that was active from 1959-1986 and is now owned by Horizon Maritime Services as an Arctic icebreaker named Polar Prince. Rebuilt, the icebreaker is now plying the waters of the Arctic Ocean. The Polar Prince now serves as a dedicated training vessel for Miawpukek Horizon's Cadet & Trainee Program and supports scientific missions[55].

PUTJOTIK FISHERIES LTD.

Putjotik is an Inuit-owned commercial fishing vessel available to perform scientific research in marine environments surrounding the coast of Labrador and Newfoundland including offshore areas[56].

Conclusions

The above is not an exhaustive list of Indigenous Nation interests in oceans-focused commercial enterprises; however, this overview does provide insights into the marine transportation modes which would be mostly owned, operated, and or crewed by Indigenous peoples in NL. A number of observations can be made about Indigenous Nations in NL and their current relationship with the ocean as it pertains to transportation:

1. Many Indigenous people are employed by the fishery industry, and most of the Indigenous groups in NL are owners and operators of fishing vessels – from boats to trawlers. This is the segment of marine transportation within which Indigenous communities are most engaged.

2. Vessel ownership and operation is not limited to the fishery. Indigenous Nations in NL own vessels involved in freight and passenger services, science and research, and have interests in companies that own tanker sized vessels (e.g., crude oil, bulk) and tugs.

3. Indigenous Nations in NL are also heavily engaged in marine science and research, supply and logistics, and vessel repair and maintenance.

[54] https://www.clearwater.ca/en/ocean-to-plate/harvesting/research-vessel/

[55] https://miawpukekhorizon.com/

[56] https://www.sac-isc.gc.ca/REA-IBD/eng/profile?id=01BDA44A6AECDF41B4AD136F5ECCDB11&index=70

Marine Transportation and Greenhouse Gas Emissions in Newfoundland and Labrador

What will marine transportation decarbonization look like in NL? To come to conclusions about training and workforce development needs relating to marine transportation decarbonization – and consider Indigenous community perspective in these findings – it is necessary to understand the causes and reasons behind GHG emissions in the sector.

MARINE TRANSPORTATION IN NL

NL has the longest coastline in Canada and has relied on the ocean for sustenance and economic activity since it was first populated. From the fisheries, to offshore oil and gas, to tourism, to aquaculture, to science and research, the people of NL have relied on marine transportation for their livelihoods and it is ingrained in their culture.

Most marine transportation methods in the last 150 years have involved combustion engines and the burning of fossil fuels for propulsion. Therefore, it is not surprising that marine transportation is a significant source of greenhouse gas (GHG) emissions for the province.

Sitting at 44%, transportation is the single largest contributor to GHGs in NL. Marine transportation accounts for a quarter of these emissions. At almost 8%, NL has the highest share of GHGs attributed to its marine transportation sector amongst the provinces in Canada.

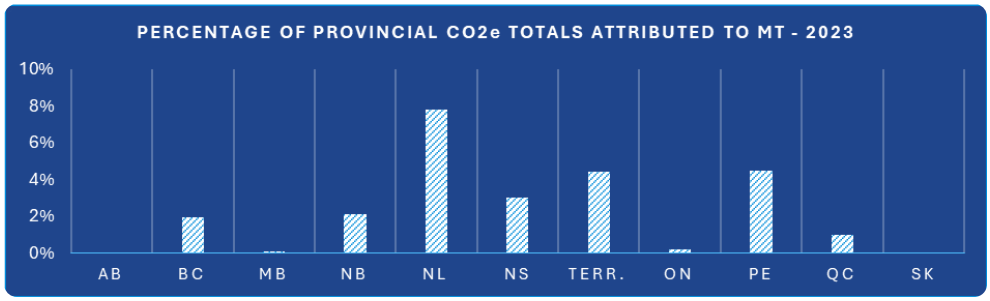


Figure 7: Percentage of Provincial CO2e Totals Attributed to MT – 2023 Data from Canada's Official Greenhouse Gas Inventory[57]

[57] https://data-donnees.az.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory?lang=en

In terms of absolute emissions, NL's marine transportation sector is one of the largest emitters in Canada with British Columbia (BC) and Quebec (QC) the leaders nationally.

On a proportional basis, NL has more reason to focus on marine transportation decarbonization than any other province in Canada. In totality, Canada's efforts in marine transportation decarbonization would be most impactful in BC, QC, and NL.

The sector is multi-faceted. Vessel types are designed differently, have unique applications, and have many ports of call. Therefore, the decarbonization of the sector will be complex.

However, with a rich history in ocean industries, the private sector and research institutions are well positioned to advance initiatives to address it. This is why the province's Net Zero Advisory Council (NZAC) highlighted marine transportation as an area that NL should prioritize in its pursuit of carbon neutrality by the year 2050 and recommended that the provincial government 'develop a marine transportation decarbonization strategy by 2025 with ports and clean energy as the focus'[59].

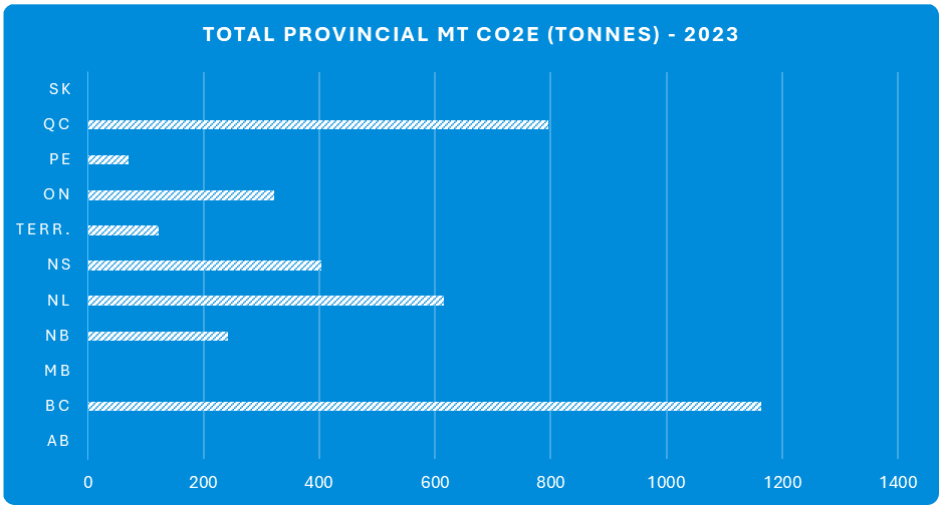


Figure 8: Total Provincial MT CO2e – 2023. Data from Canada's Official Greenhouse Gas Inventory [58]

Data Acquisition

Decisions in support of marine transportation decarbonization must be data and evidence driven. Fortunately, sufficiently granular data is becoming available.

The Canadian government is able to track marine traffic and make a variety of different determinations on routes, ship design, and more. Marine Communication and Traffic Services (MCTS) under the Canadian Coast Guard (CCG) leads these vessel traffic services. The MCTS undertakes its work through the exchange of information between ships and shore-based control centers. The MCTS communicates traffic information to vessels in all navigable Canadian waterways – all which must comply with Canadian marine traffic regulations.

The data that MCTS acquires includes a vessel's geospatial information (current position, origin, destination, estimated arrival time, passage times at specific points, source position, etc.), design characteristics (e.g. main engine power, length, deadweight, build year, flag, main and auxiliary engine ratings, engine stroke type, engineer RPM, scrubber information, etc.), detailed itineraries and other trip specific details (e.g. cargo information or tug/barge towing data).[60]

Collectively this information can be used to make GHG emissions calculations.

In 2025 Environment and Climate Change Canada (ECCC) published its updated Marine Emissions Inventory Tool (MEIT). The tool utilizes information obtained from MCTS to provide an inventory of shipping activity, energy use, and air pollutants and GHGs from marine vessels in Canadian waters. The MEIT tool allows users to: view marine emissions geospatially; filter emissions by year, region or other basic conditions; and generate emissions reports[61].

This tool provides rich information from which substantive research can be undertaken. The data provided through this tool is used in this discussion paper in detailing marine transportation and GHG emissions in NL.

[58] https://data-donnees.az.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory?lang=en

[59] https://econext.ca/wp-content/uploads/2025/07/Attachment-NZAC-Summary-of-Recommendations-2024-12-30.pdf

[60] Publication forthcoming

[61] https://www.canada.ca/en/environment-climate-change/services/managing-pollution/marine-emissions-inventory-tool.html

Vessel Classes and Types

There are many forms of marine transportation in NL ranging from fishing boats, ferries, supply ships, cargo vessels, tankers, tugs, science vessels, recreational boats, and much more. To decarbonize the sector, priorities must be established and this requires an understanding of where the majority of GHGs are created.

The MEIT categorizes vessels according to 'classes' and 'types'. This information is taken from MCTS which in turn is informed by vessels in Canadian waters through automated processes. Ship builders, owners, and operators are expected to align their vessel classification according to norms established by the International Maritime Organization (IMO) and classification societies such as DNV and Lloyd's Register.

However, there are no standardized definitions of vessel classes and types that are universally used worldwide. A number of factors complicate efforts at universal classification: marine transportation often crosses national boundaries; shipbuilding involves international supply chains and customers; there are many different types of vessels and vessel use cases; and vessels can have long lifespans. The lack of a fully standardized classification scheme can create difficulties in the analysis of data.

Therefore, in interpreting the data from tools like the MEIT, assumptions must be made through an examination of vessel travel patterns, origins and destinations, etc. to gain a fulsome understanding of the vessel types being characterized. With a working knowledge of economic activity and marine transportation norms within a region, reasonable deductions can be made to produce useful definitions for analysis.

For example, an analysis of traffic in the MEIT classified as 'tug – supply' reveals that almost all traffic categorized in this manner applies to vessels moving back and forth between offshore oil and gas installations. Thus, this category represents vessels that are most often referred to locally as 'offshore supply vessels'.

Using the MEIT, the following vessel classes and types are of interest in the NL context:

VESSEL CLASSES	VESSEL TYPES
Merchant Container	
Merchant Bulk	
Tanker	Merchant chemical/oil products tanker Merchant chemical Merchant (tanker) Merchant VLCC Merchant ore/bulk/oil Merchant liquified gas
Merchant Passenger	Merchant Ferry Merchant Passenger
Merchant Other	Merchant general Merchant RO/RO Merchant auto Merchant reefer Merchant coastal Merchant cement
Tug	Tug supply Tug Tug ocean Tug harbour Tug fire
Fishing	Fishing vessel Trawler Factory ship Fishery patrol
Cruise	Cruise Merchant passenger
Special Purpose	Special purpose supply VSL Special purpose Special purpose crane ship Special purpose VSL Special purpose pilot boat Special purpose pipe-layer Special purpose survey ship
Coast Guard	Coast guard icebreaker Coast guard scientific Coast guard rescue Coast guard lifeboat Coast guard tender

Some of the vessel types listed produce very little in terms of GHGs within NL. Some of the vessel types are also redundant within the NL context. To arrive at a more useful number of definitions for marine transportation activity in NL, it is reasonable to combine some of these vessel types.

The following is a list of vessel categories which allows for productive analysis of marine transportation GHGs within the province:

VESSEL CLASSES	VESSEL TYPES
Excursion Passenger	
War	Warship surface Warship – general
DFO Fishing Surveillance Vessel	DFO fishing surveillance vessel Coast guard patrol Marine security patrol CCG-RCMP

MERCHANT CONTAINER
A large cargo vessel designed to transport goods in standardized intermodal containers, which are stacked both above and below deck. In NL this would include container ships that operate at ports in St. John's and Corner Brook.

MERCHANT BULK
A specialized merchant vessel designed to transport large quantities of unpackaged, dry cargo in its large cargo holds. In the NL context this would mostly involve the transportation of iron ore, nickel, etc.

TANKER
A tanker ship is a vessel designed to transport liquid or gaseous cargo in bulk, such as crude oil, chemicals, and liquefied natural gas (LNG).

TANKER – MERCHANT CRUDE
A tanker ship that moves unrefined crude oil from extraction sites to refineries or intermediary destinations. In the NL context this would mostly involve the transportation of crude from offshore oil production facilities.

TANKER – MERCHANT CHEMICAL/OIL PRODUCTS TANKER
A tanker ship that moves chemical or oil products. In the NL context this would mostly involve the distribution of refined products to and throughout ports in NL.

TANKER – MERCHANT CHEMICAL
A tanker ship that moves chemical products. In the NL context this would mostly involve the distribution of refined products to and throughout ports in NL.

TANKER – MERCHANT (TANKER)
A tanker ship that moves unrefined crude oil or refined petroleum products like gasoline and diesel.

TANKER – OTHER
A catch-all for tankers moving non-oil or non-chemical products.

MERCHANT OTHER
A commercial vessel transporting cargo not as containers as not as defined in 'bulk'. This would include any cargo that is not container or classified as 'bulk'.

TUG – SUPPLY ("OFFSHORE SUPPLY SHIP")
In the NL context, this refers mostly to supply vessels carrying cargo (people, equipment, and other goods) to offshore oil and gas facilities.

TUG – OCEAN
A marine vessel used to tug a large payload (e.g., propelled ship, barge, etc.) by pushing or pulling them, with direct contact or a tow line, over a long distance.

TUG – TUG / HARBOUR ("TUG - HARBOUR")
A marine vessel that manoeuvres other vessels over a shorter distance by pushing or pulling them, with direct contact or a tow line, such as those found within harbours and docking wharves.

FISHING
All vessels involved in catching, harvesting, transporting, or processing fish and other aquatic life.

FISHING – FISHING VESSEL
A boat or ship used for catching, harvesting, transporting, or processing fish and other aquatic life.

FISHING – TRAWLER
A commercial vessel designed to drag a large, funnel-shaped net called a trawl through the water to catch fish.

FISHING – FACTORY SHIP
A commercial vessel with extensive on-board facilities for processing and freezing caught fish.

MERCHANT PASSENGER ("FERRY")
A commercial vessel designed primarily to transport more than 12 passengers. In the NL context this includes all ferries in the province such as those operated by Marine Atlantic, the provincial government, and contractors to the provincial government.

CRUISE ("CRUISE SHIP")
A large ship that carries people on voyages for pleasure, typically calling at several places. In NL cruise ships dock in St. John's, Corner Brook, and St. Anthony.

EXCURSION PASSENGER
A vessel used for short trips for pleasure or recreation, such as sightseeing, dinner cruises, or tours, and carries passengers for hire. In NL these would be vessels used within the tourism industry.

SPECIAL PURPOSE
A vessel with a unique design and function, such as a research or icebreaker ship, built for specific tasks rather than general cargo. In NL can include survey ships, pilot boats, crane ships, etc.

BARGE
Barges are flat-bottomed, box-shaped or nearly box-shaped vessels with simple configurations. Barges are used for a wide variety of purposes, from general-purpose cargo carriage to heavy lifting of structures such as offshore platforms.

COAST GUARD
All Coast Guard vessels active in NL which could include science vessels, rescue vessels, icebreakers, lifeboats, etc.

WAR
Vessels owned and operated by the Department of National Defence or militaries from other jurisdictions.

DFO FISHING SURVEILLANCE VESSEL
Vessels operated by both DFO and the RCMP for the purposes of surveillance, patrol, and security.

OTHER
A collection of vessel types not found within the categories above with minimal GHGs.

This discussion paper will use the categories described above in its subsequent analysis and conclusions.

Emissions Sources

MEASUREMENT

The MEIT calculates a variety or air contaminants, pollutants, and GHGs including: nitrogen oxides (NOx); non-methane hydrocarbons (HC); particulate matter (PM, PM10, and PM2.5); sulphur oxides (SOx); carbon monoxide (CO); black carbon (BC); carbon dioxide (CO2); nitrous oxide (N2O); and methane (CH4).

The MEIT also calculates 'carbon dioxide equivalent' or CO2e. CO2e is a standardized unit (usually expressed in million metric tonnes) used to measure a greenhouse gas's impact on the basis of their global-warming potential (GWP). The unit converts amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential[62]. This allows for blended use of a number of GHGs simultaneously to understand total climate impacts. This analysis uses CO2e as the comparable metric.

Below is a table which summarizes MT GHGs in NL from 2015-2024 in tonnes.

Category	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Merchant container	170,970	168,836	252,228	273,274	275,411	251,909	226,009	287,557	296,265	273,819
Merchant bulk	142,879	159,911	215,346	209,389	209,673	242,304	229,674	247,604	231,005	287,606
Tanker	224,976	255,548	273,644	299,845	298,590	298,164	253,093	249,728	237,514	323,512
Merchant other	75,810	70,372	86,848	83,316	87,909	77,885	73,533	71,999	80,850	122,827
Offshore supply ship	71,707	53,307	58,362	55,291	72,036	41,095	33,037	43,616	42,215	45,471
Tug - ocean	28,496	23,840	33,549	35,810	29,227	13,210	8,161	5,568	4,866	12,181
Tug - harbour	7,627	9,167	9,419	10,226	9,944	10,976	7,846	9,415	8,754	7,606
Fishing	38,824	44,652	45,144	55,477	44,413	40,644	64,922	51,365	46,852	91,320
Ferry	88,436	108,298	104,797	103,409	112,711	103,140	107,363	117,976	117,356	105,287
Cruise ship	17,874	16,330	26,835	27,890	36,554	208	-	30,077	39,704	46,108
Excursion passenger	870	2,875	1,889	1,940	1,921	-	1,485	1,958	1,901	1,292
Special purpose	15,417	19,374	32,226	34,278	39,704	33,433	22,667	28,779	30,450	29,939
Barge	734	71	2,813	730	659	2,666	736	501	-	4,583
Coast guard	18,063	10,307	10,951	11,605	10,080	10,220	8,675	12,117	8,067	7,551
War	5,746	2,447	1,783	2,008	1,258	773	1,704	857	1,652	335

[62] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Carbon_dioxide_equivalent

DFO Surveillance	4,861	2,582	1,991	1,956	1,791	1,188	1,233	1,489	969	-
Other	188	607	450	844	392	505	440	246	184	47
Other	913,478	948,524	1,158,275	1,207,288	1,232,273	1,128,320	1,040,578	1,160,852	1,148,604	1,359,484

Figure 9: 2015-2024 NL Marine Transportation Emissions – CO2e
Results recorded from the Marine Emissions Inventory Tool

TOTAL EMISSIONS VS. ACCOUNTED EMISSIONS

The data referenced above includes international marine transportation, i.e., ships with international origins that arrive in NL or ships that depart from NL for international destinations.

For the purposes of this study, it was decided that GHGs associated with international marine transportation would be included in analysis. This is based on the fact that international marine transportation is a significant contributor of GHGs within NL's jurisdiction and its decarbonization presents a variety of opportunities for research and development, international collaborations, and uses of domestically produced clean fuels.

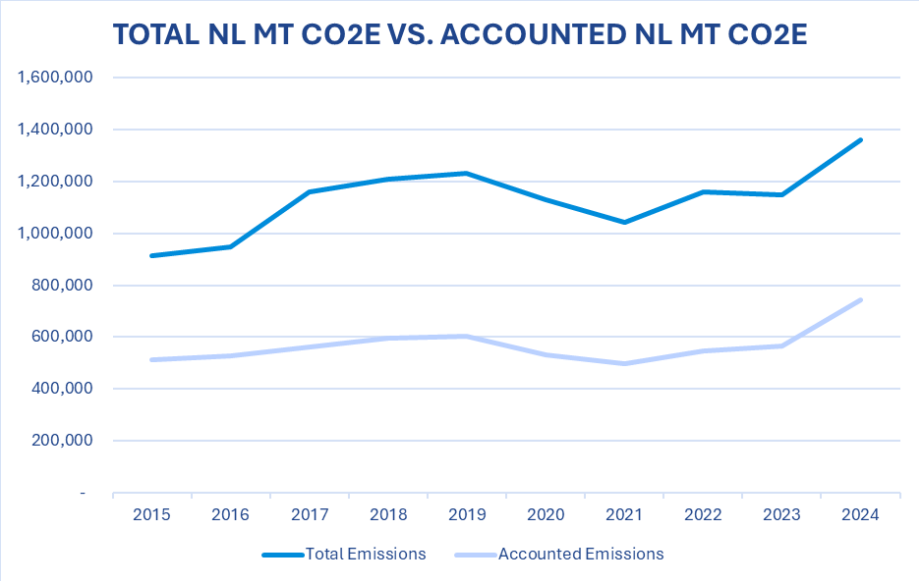


Figure 10: Total NL MT CO2e vs. Accounted NL MT CO2e

However, it should be noted that GHGs associated with international marine transportation are not considered 'Canadian' under internationally standardized GHG accounting practices. International marine transportation emissions are intended to be covered under possible future International IMO regulations. Therefore, the MT GHG data used for analysis in the report will differ from what is officially reported Canada and its provinces.

The graph below shows the difference between total NL MT CO2e (including international marine traffic) versus what is accounted for and reported on in Canada (not including international marine traffic).

As would be expected, 'tanker', 'merchant container', 'merchant bulk', and 'merchant other' vessel types account for significantly more GHGs when including transportation to and from international destinations.

Note that the figures presented above and used for analysis do not include any transportation that is classified as 'innocent passage' - or marine traffic that traveled through NL waters but did not depart or arrive at an NL port.

EMISSIONS OVER TIME

Total GHGs emanating from marine transportation have grown from 913,478 CO2e in 2015 to 1,359,484 CO2e in 2024, represented a growth of almost 49%.

As the data for 2024 has been recently published as of the time of this writing, it is recognized that there may be some adjustments made to it. There is a significant jump between 2023-2024 MT GHGs and therefore the data should be used with caution until such time that it is confirmed. For these reasons, 2023 will be the base year from which the remainder of this analysis is drawn from. Total GHGs emanating from marine transportation have grown from 913,478 CO2e in 2015 to 1,148,605 CO2e in 2023, represented a growth of almost 26%.

CO2E BY VESSEL CATEGORY

Decisions around the prioritization of marine transportation decarbonization can be informed by the total GHGs associated within each vessel category. The higher the emissions in a category – the more impetus there may be to drive solutions to reduce them.

It is worthwhile comparing MT GHG totals in NL against those that would be accounted for with the purpose of provincial and federal reporting as the results may impact the decarbonization priorities of industry versus governments.

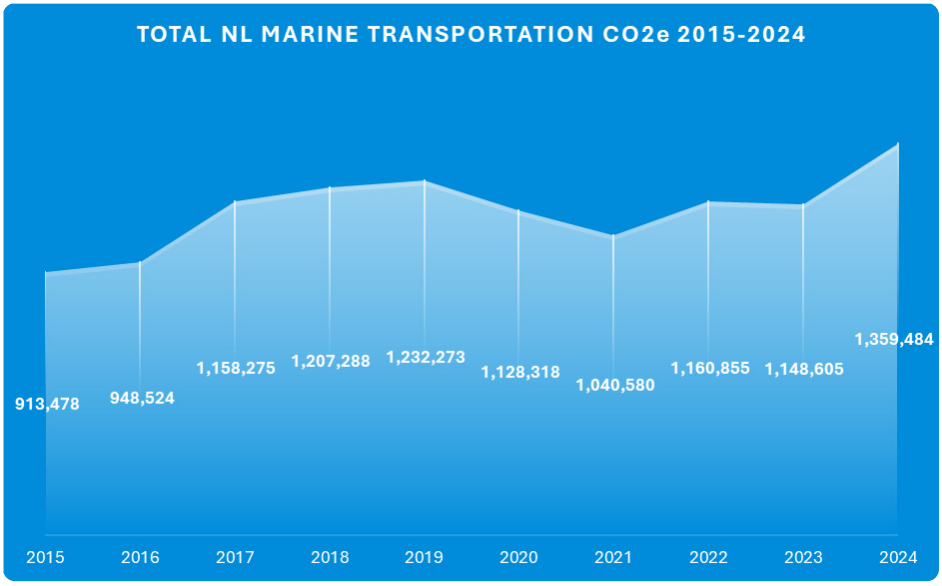


Figure 11: TOTAL NL Marine Transportation CO2e 2015-2024

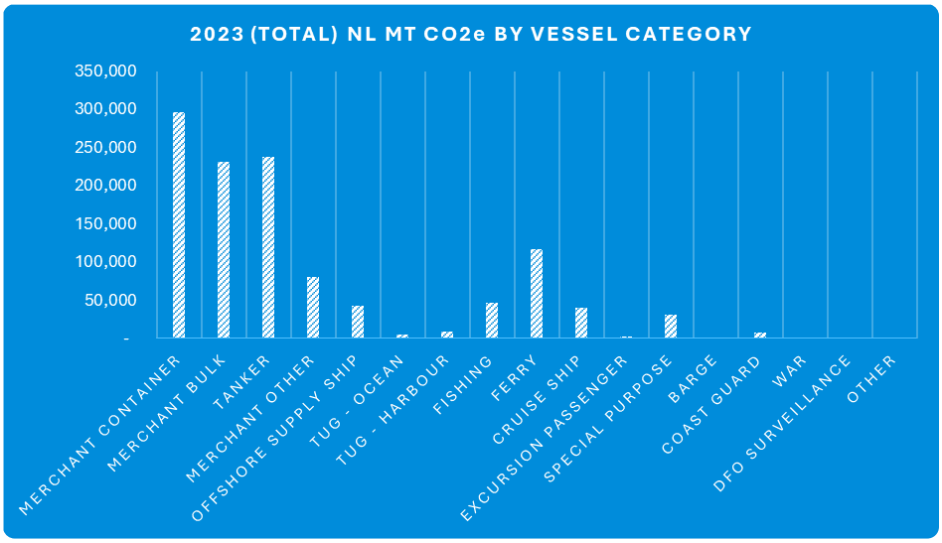


Figure 12: 2023 (Total) NL MT CO2e by Vessel Category (Bar)

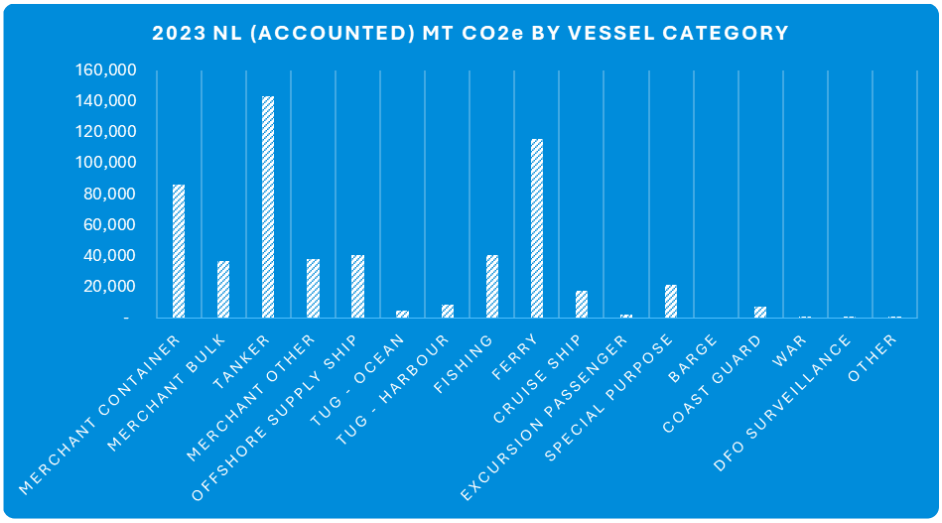


Figure 13: 2023 (Accounted) NL MT CO2e by Vessel Category (Bar)

Overall 2023 marine transportation GHGs in NL rise from 565,052 tonnes of CO2e to 1,148,605 tonnes of CO2e when including traffic with either an international origin or destination.

Of particular interest when comparing these data sets is the prevalence of merchant container, merchant bulk, and tanker vessel categories when including all GHG data.

This is unsurprising as there is a significant amount of good and services that arrives in NL from international origins via container shipping. Additionally, markets for NL's primary natural resource exports (crude oil, iron ore, nickel, etc.) are international and would be represented by bulk and tanker traffic.

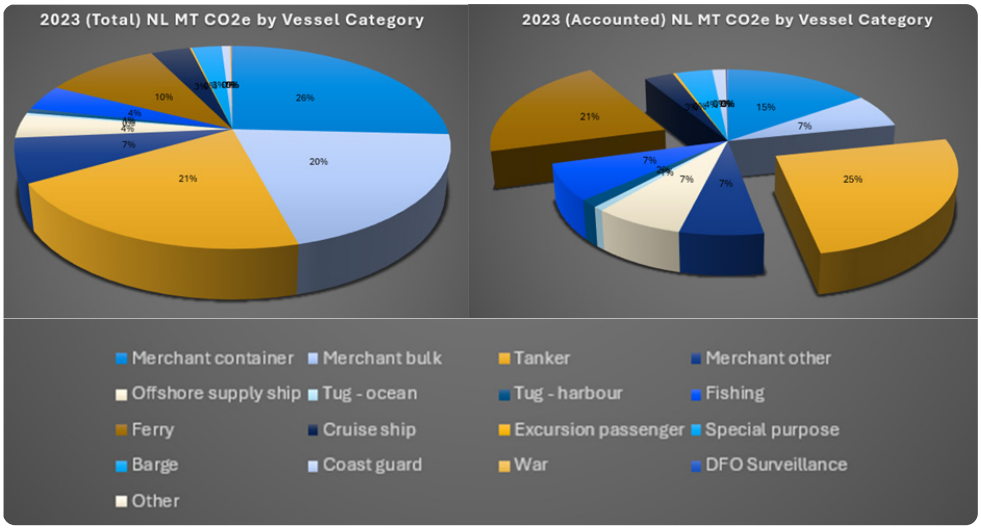


Figure 14: 2023 (Total vs. Accounted) NL MT CO2e by Vessel Category (Pie)

Notable when considering the accounted GHGs (official figures that would be reported federally/provincially) is the increased share that ferry and tanker traffic have relative to other emissions sources.

Examining each vessel category in greater detail – including a high-level overview of decarbonization pathways for each in NL – will help to inform training and workforce development considerations. However, in advance of this examination it is important to have a general understanding of the technologies that can be deployed to assist in and drive emissions reductions within maritime transportation.

Marine Transportation Decarbonization in NL

To outline marine transportation decarbonization pathways for NL, it is first necessary to have a general understanding of the primary technologies that are being developed and deployed internationally in support of it.

Marine Transportation Decarbonization Technologies

VESSEL OPTIMIZATION

In the same way that changes in habits and energy efficiency measures in a home or building can reduce GHGs, the optimization of marine vessel operations can yield emissions reductions. Energy efficiency measures on ships can be classified as follows[63].

- **Energy consumers** – improvement in energy efficiency of onboard consumers such as lighting equipment and cargo handling systems.
- **Energy harvesting** – measures that capture energy from the surroundings, converting it to propulsion power or electricity (e.g. sails and solar panels).
- **Propulsion and hull** – measures that improve the hydrodynamical performance of the vessel.
- **Machinery** – measures that relate to the machinery on board the vessel, including main engines, auxiliary engines, and related systems.
- **Operational** – measures that relate to the way in which the ship is maintained and operated (i.e., route optimization) and the cargo is handled.

It is estimated that operational and technical energy-efficiency measures can reduce fuel consumption in the maritime industry by 4% to 16% by 2030[64]. The effect of each energy efficiency measure varies depending upon a range of factors such as vessel type, size, age, location, and route[65]. As optimization can achieve both emissions reductions and cost savings, this is the first best place for vessel owners / operators to start in their decarbonization journey.

[63] https://brandcentral.dnv.com/original/gallery/10651/files/original/216954a7-8cc8-49b6-b99e-37e76a41410a.pdf

[64] https://www.dnv.com/expert-story/maritime-impact/strategies-for-meeting-upcoming-decarbonization-targets/

[65] https://www.dnv.com/maritime/insights/topics/ship-energy-efficiency/solutions/

ELECTRIFICATION

Batteries on ships allow stored electrical energy to be used for propulsion and other onboard systems instead of the burning of fuel. Fully battery-powered ships produce zero direct emissions of GHGs and harmful pollutants during operation (while it should be noted that the overall GHG reduction potential is dependent on the characteristics of the electricity used to charge the battery). Electric propulsion systems powered by batteries are significantly quieter than traditional engines, reducing noise pollution in marine environments. Batteries can provide quick and precise power adjustments for better control and manoeuvrability and can provide power to smooth peak loads in the ship network. Fewer energy conversions are required than when using fuel, and therefore fewer energy losses. Additionally, electric motors are more efficient than combustion engines.

There are some challenges associated with fully electric ships. First, they have a limited range compared to ships using liquid fuels. The recharging batteries takes longer than conventional refuelling of ships, impacting scheduling and operational efficiencies. Electrified ships also require significant infrastructure port-side to enable their charging. Onboard batteries also present a risk of uncontrolled exothermic chemical reactions which are not present on conventional ships[66].

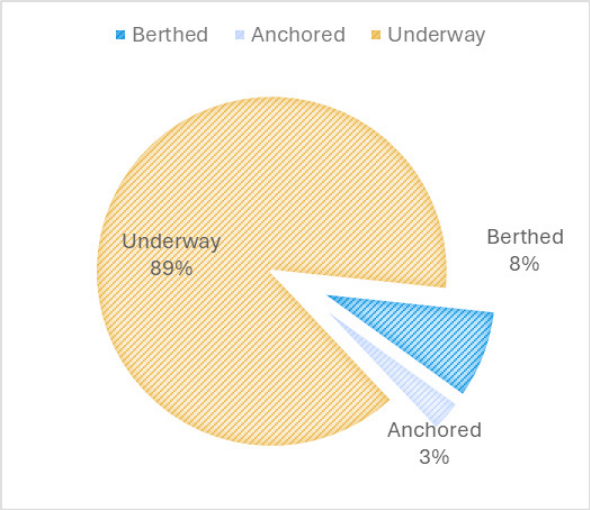
Over the last decade the maritime industry has started to embrace hybrid and electric technology – particularly in smaller vessels such as workboats, pleasure craft and ferries[67]. This is because electric ships are most ideal for shorter routes due to limitations in range and charging infrastructure[68]. Short voyages allow frequent battery-charging and for batteries to cover a substantial amount of a ship's annual energy needs[69].

HYBRID ELECTRIC

The use of batteries in hybrid power systems (i.e. in combination with other higher energy density technologies) increases potential applications. A hybrid vessel is one where a battery is supplemented by a more conventional ship engine. The battery can be charged through shoreside power or the ship's engine itself. To achieve greater decarbonization, hybrid vessels can be built to use alternative fuels when the propulsion shifts to using the engine.

SHORE POWER

The use of shoreside electricity when berthed is an additional GHG reduction opportunity. Most vessels run at all times, even with docked, burning fuel in the process. This is also referred to as 'hotelling'. The MEIT calculates 'berthed' emissions in 2023 in NL as being 91,000 CO2e or being responsible for 8% of all marine transportation GHGs in the province.



Retrofitting ships with the capability to 'plug in' to access shoreside electricity – and providing the enabling infrastructure at the port – can result in meaningful GHG reductions. This is particularly true when vessels are able to access clean electricity.

The presence of batteries (and associated equipment) on vessels presents the potential for different types of chemical reactions which previously did not need to be considered by crew and maintenance workers. Therefore, electrification in marine settings requires specialised training.

[66] https://www.lr.org/en/knowledge/research/zcfm/electrification/

[67] https://www.idtechex.com/en/research-report/electric-boats-and-ships/948

[68] https://brandcentral.dnv.com/original/gallery/10651/files/original/216954a7-8cc8-49b6-b99e-37e76a41410a.pdf

[69] https://www.dnv.com/expert-story/maritime-impact/strategies-for-meeting-upcoming-decarbonization-targets/

LOW-CARBON FUELS

'Low-carbon fuels' is a catch-call term which refers to fuels that have a lower carbon intensity that conventional fuels – which in the marine transportation sector would include fuels such as heavy fuel oil (HFO), marine diesel oil (MDO), etc. There is a wide variety of different low-carbon fuels relevant to marine transportation, each with their own characteristics to consider.

LIQUIFIED NATURAL GAS (LNG)

While still a fossil fuel, the use of LNG as a marine fuel offers several benefits, including reduced emissions: LNG combustion produces lower levels of sulphur oxides (SOx), nitrogen oxides (NOx), particulate matter, and carbon dioxide (CO2) compared to HFO. LNG is a potential transitional fuel as the industry looks towards a carbon-neutral future that includes non-fossil fuels[70].

BIOFUELS

Biofuels are renewable fuels made from recently living organic matter (biomass) like plants, agricultural waste, or animal fats, offering alternatives to fossil fuels. There are a wide variety of different types of biofuels depending on the type of biomass used and the processes used in their creation. Biomass can be converted to fuels through a number of different processes including direct combustion, thermochemical and chemical conversion, and biological conversion. A biofuel can be produced with much lower GHGs than their fossil fuel-based counterparts, and when 'burned' can also be less harmful. However, biofuels cannot directly replace their fossil fuel-based counterparts at a 1:1 ratio without causing harm to equipment. To achieve environmental benefits, biofuels are most often blended with petroleum-based products to reduce the GHG intensity of their use. 'First generation' biofuels are those made from sugar, starch, or vegetable oil. Their feedstocks are those that might have an impact on food supply if used in large quantities. 'Second generation' biofuels are those made from sustainable feedstocks as defined by the feedstock's availability, its impact from a GHG perspective, and land use[71].

RENEWABLE BIOFUELS

Produced through a different method ('catalytic pyrolysis'), renewable biofuels are chemically identical to their petroleum-based counterparts (i.e., diesel and renewable diesel). This means that renewable biofuels can potentially be used as a direct replacement (i.e., as a 'drop-in') for conventional fuels in existing technology (i.e., combustion turbines, car/truck/ship engines, other heavy equipment) if not a heavy additive in blending. This also means that existing transportation, storage, and refueling infrastructure can be used – simplifying the logistics of decarbonization. Relevant examples in marine transportation include renewable diesel and liquefied bio-methane (Bio-LNG).

There are different terms used, sometimes interchangeably, when various types of biofuels are referenced. For the remainder of this paper the term 'biofuels' will serve as a catchall for both traditional biofuels and renewable fuels – recognizing that there are important distinctions. Overall, biofuels are considered technologically ready for deep-sea shipping, as they can be used as drop-ins or blends with minor modifications to existing engines, machinery, and storage systems. This simplifies the transition from existing fossil-derived fuels[72].

[70] https://www.lr.org/en/knowledge/research/fuel-for-thought/lng/

[71] https://econext.ca/wp-content/uploads/2025/06/Biomass-Energy-Potential-NL-Version-1.0-2025-06-11.pdf

[72] https://www.lr.org/en/knowledge/research/fuel-for-thought/biofuel/

METHANOL

Methanol as a fuel is a light, versatile, colourless and flammable alcohol. In an internal combustion engine, methanol reacts with the oxygen in the air and creates carbon dioxide and water as well as heat/energy. Despite the carbon dioxide emitted, methanol shipping is a viable option to achieve net-zero carbon lifecycle emissions if the methanol is produced using biomass or renewably sourced hydrogen and carbon dioxide (i.e., 'green methanol', 'e-methanol'). Methanol as a fuel has several potential benefits, including low emissions, low cost, and excellent energy density. It is biodegradable and miscible in water – reducing the environmental impacts of a potential spill. However, methanol does have corrosive characteristics which requires specific storage and handling arrangements. It has a low flashpoint and toxicity, requiring increased safety systems[73].

AMMONIA

Unlike traditional marine fuels, ammonia is virtually free of sulphur oxide (SOx) and particulate matter (PM) emissions, contributing to cleaner air quality. When produced using renewable energy, ammonia (i.e., 'green ammonia, 'e-ammonia') can achieve a lifecycle GHG emissions reductions of up to 90% compared to conventional fossil fuels. Ammonia can be used in a variety of marine engines, including dual-fuel engines that can switch between ammonia and conventional fuels. Its high energy density and low viscosity make it a suitable option for long-range shipping operations. Challenges such as its toxicity, storage, and handling safety need to be addressed when discussing ammonia's suitability as a marine fuel[74].

HYDROGEN

Green hydrogen, produced through electrolysis powered by renewable energy, could hold the key to sustainability. When used in fuel cells, it generates electricity with only water vapor as a byproduct, eliminating harmful pollutants. Hydrogen's low energy density compared to conventional fuels necessitates larger storage tanks, impacting ship design and cargo capacity.

Additionally, the technology is nascent, with infrastructure for production, distribution, and bunkering still in its early stages. While pure hydrogen might struggle with long-distance journeys, it could be suitable for short-sea shipping or powering port equipment[75]. Hydrogen's role in shipping, however, is seen to be significant overall as it is a key input into low-carbon methanal, ammonia, and various biofuels.

ADDITIONAL CONSIDERATIONS

RETROFITS

Newbuilds can be constructed to be 'fuel-ready' for methanol, ammonia, or other alternative fuels, ensuring long-term flexibility and regulatory alignment. But it should be understood that the retrofit of existing vessels is also an option. Retrofitting existing vessels enables shipowners to extend the operational life of their assets while adapting to a decarbonizing market. Through targeted upgrades – such as engine modifications, fuel system conversions, and energy-saving technologies – retrofitted ships can meet evolving regulatory requirements and reduce their carbon footprints without the need for full replacement[76]. Extensive techno-economic feasibility assessments would need to be undertaken in advance of vessel retrofitting.

FUEL BLENDS

It is important to highlight the opportunity that blending conventional fuel with low-carbon fuels can provide in marine transportation decarbonization. While the blending of fuels does not provide the environmental benefits that wholesale adoption of fuels like green ammonia and green methanol might, given the long lifespans of vessels and low turnover rate, it presents an immediate opportunity to achieve GHG emissions reductions. Fuel blending can be done in many different existing engine types and does not require expensive vessel retrofits. For example, the Canadian Coast Guard is already testing fuel blends composed of 10% biodiesel, 40% renewable diesel, and 50% conventional diesel[77] in its ships. There are many different possible fuel blends with optimizations unique to engine types and their uses indicating a need to focus on R&D that meet the needs of particular regions and the nature of marine transportation within them.

[73] https://www.lr.org/en/knowledge/research/fuel-for-thought/methanol/

[74] https://www.lr.org/en/knowledge/research/fuel-for-thought/ammonia/

[75] https://www.lr.org/en/knowledge/research/fuel-for-thought/hydrogen/

[76] https://brandcentral.dnv.com/original/gallery/10651/files/original/216954a7-8cc8-49b6-b99e-37e76a41410a.pdf

[77] https://www.ccg-gcc.gc.ca/corporation-information-organisation/greening-initiatives-ecologisation-eng.html

DUAL-FUEL ENGINES

Dual-fuel marine engines are designed to run on multiple types of fuel. These engines can seamlessly transition between fuels without any interruption in power output. The use of dual-fuel engines can help to optimize fuel consumption, reduce environmental impact, and ensure operational flexibility in different maritime conditions. Within the context or marine transportation decarbonization, dual-fuel engines allow for vessel owners / operators to de-risk the energy transition; they can commit to the use of low-carbon fuels while also protecting against supply, logistics, or reliability issues that may be associated with them.

OTHER TECHNOLOGIES

The decarbonization of marine transportation is a pursuit attracting global interest. A discipline unto itself, there are many innovations occurring on a regular basis. While there are other technologies relevant to marine transportation decarbonization that exist or are in development (such as nuclear propulsion and on-board carbon capture and storage systems), the above highlighted solutions provide the context necessary for this paper.

INTERNATIONAL SHIPPING REGULATIONS

Marine traffic with international origins or destinations are not included in federal or provincial GHG reporting, and this is consistent with internationally standardized methodology. GHGs that result from international marine transportation are envisioned to be regulated under the IMO.

In 2023, the IMO adopted a revised GHG strategy targeting net zero by or around 2050. To ensure that shipping reaches these ambitions, the IMO plans to implement a basket of measures consisting of both technical and economic elements. The IMO Net-Zero Framework (IMO NZF), which incorporates these two elements, had its draft legal text approved in April 2025, though a vote on its adoption was later postponed until October 2026[78].

While the framework has become heavily political with its adoption in doubt[79], industry continues to move towards decarbonization. Cargo owners are increasingly facing customer and investor expectations to decarbonize their operations across the entire supply chain. In response, many have announced their own GHG reduction targets – some even ahead of regulatory requirements – and are integrating these goals into their business strategies. In some industry segments, there is a clear green premium for low- or zero-emission products[80].

In parallel with the IMO's ongoing process, national and regional GHG regulations are also moving forward. The EU ETS and FuelEU Maritime have already entered into force in 2024 and 2025, respectively, imposing higher costs on the use of fossil fuels and effectively facilitating the transition toward low-GHG fuels. Other national and regional GHG regulations are emerging, and their actual implementation is heavily connected to the outcome of the IMO sessions on a global framework. For instance, the UK plans to incorporate ships over 5,000 GT into the UK Emissions Trading Scheme starting in 2026[81].

While delays and uncertainty with IMO regulations may delay the adoption of new technologies, it is evident that the decarbonization of marine transportation will move forward regardless.

[78] https://brandcentral.dnv.com/original/gallery/10651/files/original/216954a7-8cc8-49b6-b99e-37e76a41410a.pdf

[79] https://www.bbc.com/news/articles/c3vnl0yxg53o

[80] https://brandcentral.dnv.com/original/gallery/10651/files/original/216954a7-8cc8-49b6-b99e-37e76a41410a.pdf

[81] https://brandcentral.dnv.com/original/gallery/10651/files/original/216954a7-8cc8-49b6-b99e-37e76a41410a.pdf

SUMMARY

Significant uncertainty remains as to the speed at which marine transportation decarbonization will occur and what technologies that will be adopted in support. However, there are a number of important observations that can be made which will help decision-makers understand how marine transportation decarbonization can occur in NL.

Methanol and ammonia are considered two of the most promising alternative shipping fuels due to their potential to significantly reduce ships' emissions, decrease in cost over time, and achieve the scale of production needed to decarbonise the sector.

- Methanol is moving towards initial scale, with around 60 methanol-capable vessels on the water, more than 300 further ships on order, and just under 20 ports offering green methanol bunkering.
- Meanwhile, ammonia is rapidly approaching proof of concept as a shipping fuel, with the first ammonia-powered vessels successfully piloted, engine testing near completion, and bunkering trials underway at major ports[82].

Green ammonia is expected to be the most popular maritime fuel in the long term – on average the share of green ammonia is 35% in 2050. Hydrogen-based fuels overall are seen as the leading candidates for decarbonizing shipping. On average, they can make up 14% of the total fuel mix by 2030 and reach 66% by 2050[83].

Interviews and analysis of planned investments suggest that over 60% of future vessel purchases are focused on low-carbon methanol and ammonia, although most remain at an early stage. Analysis shows that the container segment has seen the greatest increase in demand for green shipping solutions, while decisions around bulk are made closely with those that are shipping specific cargo[84].

Despite their drop-in compatibility with current ships, biofuels are not expected to be as scalable as ammonia or methanol and life cycle emissions can vary significantly depending on feedstock and production process[85]. However, the potential for biofuels to reduce GHGs in the near term through blending should not be ignored, nor should its potential to continue to factor into the energy mix in the long term – albeit at a smaller scale. By 2050, biodiesel and biomethane are predicted to continue to be used widely[86].

Electric vessels are not expected to be suitable for long-distance shipping but are ideal for powering short-sea ferries and small vessels[87]. Battery-powered vessels are particularly appropriate for relatively short routes (recognizing the limitations of battery ranges) and/or routes with consistent ports of call (recognizing challenges associated with providing charging infrastructure shoreside).

The provision of shorepower for 'berthing' or hotelling vessels is applicable to all almost all vessel categories. The positive GHG impact of vessel electrification is directly connected to the carbon intensity of the electricity used for charging/power – i.e., an electricity grid with significant renewable energy penetration will result in a more positive outcome.

Given the diversity of vessels operating within NL performing different tasks in different settings – the path to decarbonization will be slightly different in each case.

[82] https://globalmaritimeforum.org/news/zero-emission-shipping-fuels-methanol-and-ammonia/

[83] https://maritime.lr.org/l/941163/2023-09-04/86cyj/941163/1693881339KV19NyGO/LR_Fuel_Mix_Report_v1.pdf

[84] https://www.shell.com/business-customers/marine/decarbonising/_jcr_content/root/main/section_945430094/promo_copy_copy_1424/links/item0.stream/1685556533872/b8cfc522e207d5e92a19b9f5943f9eb1f73a9d10/all-hands-on-deck-digital-thirty-first-may.pdf

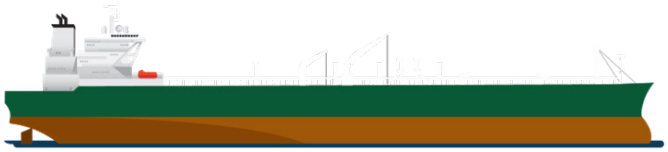
[85] https://globalmaritimeforum.org/news/zero-emission-shipping-fuels-methanol-and-ammonia/

[86] https://maritime.lr.org/l/941163/2023-09-04/86cyj/941163/1693881339KV19NyGO/LR_Fuel_Mix_Report_v1.pdf

[87] https://globalmaritimeforum.org/news/zero-emission-shipping-fuels-methanol-and-ammonia/

Marine Transportation Decarbonization Pathways for NL

With an understanding of the technologies being deployed to support marine transportation decarbonization, a more in-depth examination of sectoral GHG sources in NL can yield important insights that will help inform training and skills development priorities and how they might relate to Indigenous Nations and their values and activities.

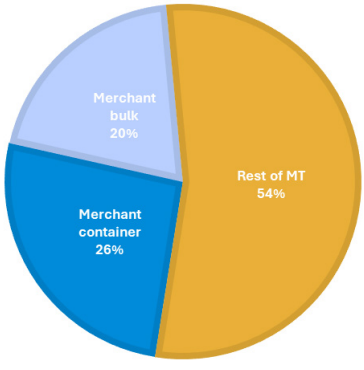


SHIPPING (MERCHANT CONTAINER, MERCHANT BULK)

In 2023, 'merchant container' was responsible for 26% of NL's marine transportation GHGs, while 'merchant bulk' was responsible for 20%. These categories both involve the movement of goods oftentimes to or from international ports. Therefore, for a significant portion of NL's marine transportation GHGs (46%), a high degree of international collaboration is required between vessel owner / operators, ports, fuel suppliers, etc. is required for decarbonization.

A significant majority of this traffic arrives at the Port of St. John's, with further analysis required to fully delineate points of origin and destinations involving NL.

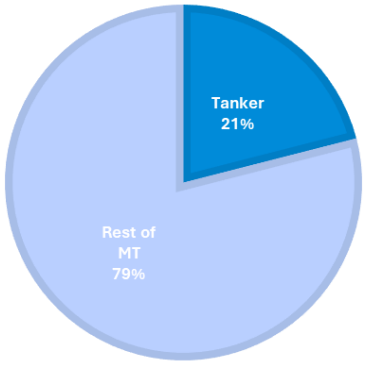
International shipping will be the driver for the adoption of low-carbon fuels. NL should be aware of the technology pathways key owners/operators (that have a port of call in in the province) are choosing to ensure that ports are in a position to provide supply. For example, Maersk planned to add 19 dual-fuel container ships capable of running on traditional fuel or methanol between 2023-25[88]. As decisions around merchant bulk are made closely with those that are shipping specific bulk cargo (i.e., iron ore, nickel), NL should maintain close dialogue with relevant industrial operators.



TANKER

In 2023, 'tanker' was responsible for 21% of NL's marine transportation GHGs. At least 70% of tanker traffic is the transport of crude oil, with the vast majority being between Whiffen Head / Come by Chance and offshore oil and gas facilities like Hebron, Hibernia, White Rose, and Terra Nova.

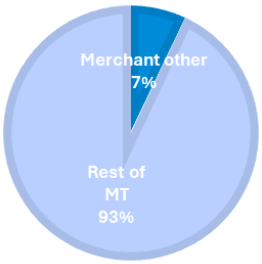
Tankers are similar to large container and bulk ships in terms of their potential for low-carbon fuels adoption yet have more routes with both NL departures and arrivals. 60% of tanker traffic has both a Canadian origin and destination. These factors suggest that there is more of an opportunity to influence the speed and type of technology adoption in the tanker category (versus container and bulk) as much of the marine traffic is within national jurisdiction.



[88] https://www.reuters.com/business/sustainable-business/maersk-agrees-project-with-spain-make-e-methanol-its-fleet-2022-11-03/

DOMESTIC SHIPPING (MERCHANT OTHER)

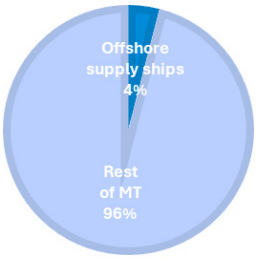
In 2023, 'Merchant other' was responsible for 7% of NL's marine transportation GHGs.



This category typically involves the movement of goods that are not containerized or classified as 'bulk'. More work is required to fully characterize this activity in NL, but vessels within this segment typically share the characteristics of shorter routes. This may present opportunities for electrification[89].

OFFSHORE SUPPLY VESSELS

In 2023, offshore supply ships were responsible for 4% of NL's total marine transportation GHGs, a percentage that rises to 7% if viewing through the lens of Canadian GHG accounting and reporting. The vast majority of offshore supply traffic is between offshore oil and gas installations (Hebron, Hibernia, White Rose, Terra Nova) and the Port of St. John's with some traffic to the Port of Long Pond, Bull Arm, and Bay Bulls.



Fuel blending presents a significant decarbonization opportunity for offshore supply vessels. Due to their relatively short transit routes, they are also a candidate for increased electrification or hybrid propulsion systems. For example, in 2021 Atlantic Towing began working to retrofit one of their four offshore supply ships, the Atlantic Shrike, with electric battery technology. Following the retrofit, the Atlantic Shrike has delivered strong and measurable results: 11% fuel savings across all operations; 362 tonnes of CO_2 reductions in 2024, verified by operational data; reduced engine noise, improving crew comfort; and lower engine running hours, extending maintenance intervals and enhancing working conditions in the engine room[90].

FISHING

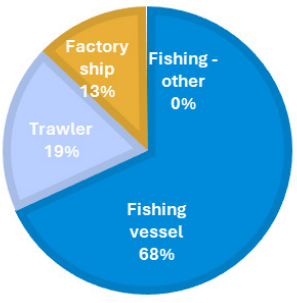
In 2023, fishing vessels were responsible for 4% of NL's total marine transportation GHGs, a percentage that rises to 7% if viewing through the lens of Canadian GHG accounting and reporting. There are many fishing vessels in NL, many of which are small, and most of which are independently owned and operated.

The MEIT differentiates between fishing vessels (68% of fishing GHGs), trawlers (19% of fishing GHGs), factory ships (a large ocean-going vessel with extensive on-board facilities for processing and freezing – 13% of fishing GHGs), and 'other' (close to 0% of fishing GHGs). More research is required to better characterize vessels in the province's fishery.

With so many variables to consider in fishing, and the fact each trip is often so important to its owner's livelihood, propulsion needs to be highly reliable and easy to use.

Decarbonization solutions must meet the needs of the vessel owners and operators; these needs vary significantly between the sub-categories listed – with many being small boats with small crews.

These factors challenge the adoption of low-carbon fuels which would require new and different safety protocols.[91] To ease the transition towards new fuels those which are more similar to fossil marine diesels should be used. This suggests that the most direct decarbonization opportunity in the near term is fuel blending. Electrification may be suitable for fishing vessels which are typically have shorter routes. This is less true of larger fishing vessels like trawlers operated by larger companies. These companies have the capacity to progress more quickly towards electrification and the adoption of clean fuels.



[89] https://www.shell.com/business-customers/marine/decarbonising/_jcr_content/root/main/section_945430094/promo_copy_copy_1424/links/item0.stream/1685556533872/b8cfc522e207d5e92a19b9f5943f9eb1f73a9d10/all-hands-on-deck-digital-thirty-first-may.pdf

[90] https://www.vard.com/articles/atlantic-shrike-achieves-11-fuel-reduction-with-seaq-energy-storage-system

[91] https://www.tandfonline.com/doi/full/10.1080/1059924X.2025.2453056?src=exp-la

FERRIES

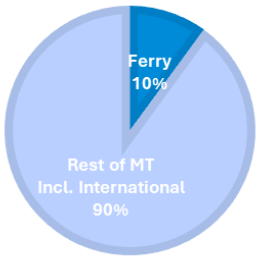
In 2023, ferries were responsible for 10% of NL's total marine transportation GHGs, a percentage that rises to 21% if viewing through the lens of Canadian GHG accounting and reporting. This is particularly relevant because NL's provincial government is directly responsible for 14 ferry routes as either the owner/operator of vessels or the contracting party for ferry services. Meanwhile, a federal crown corporation (Marine Atlantic) is responsible for ferry traffic between NL and NS. The ferry service between Fortune, NL and Saint-Pierre and Miquelon is owned and operated by the French territorial government.

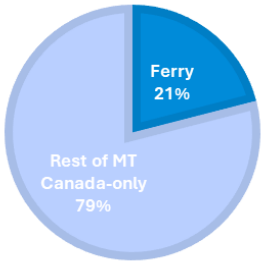
While more research is needed to confirm the analysis, 44,667 tonnes of CO2e of ferry traffic in 2023 can be attributed to Marine Atlantic routes between Sydney and Port aux Basques and Argentia. This represents 39% of all ferry emissions.

Meanwhile the remainder can be attributed to routes operated (or contracted) by the provincial government[92]:

- Bell Island – Portugal Cove
- St. Brendan's – Burnside
- Fogo Island – Change Islands – Farewell
- Long Island – Pilley's Island
- Charlottetown – Norman's Bay
- Goose Bay – Rigolet – Ports North to Nain
- Goose Bay – Cartwright – Black Tickle
- Blanc Sablon – St. Barbe (Strait of Belle Isle Area)
- La Poile – Rose Blanche
- Ramea – Grey River – Burgeo
- Francois – Grey River – Burgeo
- Gaultois – McCallum – Hermitage
- Rencontre East – Bay L'Argent – Pool's Cove
- South East Bight – Petite Forte

More research is required to estimate the GHG emissions that are associated with specific ferry routes. Ferries are the perfect segment for electrification and battery power. Short, regular routes between the same ports makes it easier to charge regularly and reduces the need for large batteries[93]. Hybrid systems provide similar opportunity in situations where there is increased risk averseness. In the near term the most direct decarbonization opportunity is fuel blending.





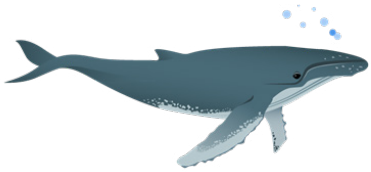
TUG - HARBOUR

Tugboats escort vessels from the open ocean into ports to provide extra layers of safety in case the ship loses power, or its rudder fails. These tasks require tugs to be powerful and maneuverable. Despite the relatively small size of tugboats, their powerful propulsion systems allow them to exert enormous force – a necessity given the important role that they play. Tugs used for short distances (such as for ports or small harbours) are prime for full electrification with backup generators and can provide quicker and more powerful tugging. Tugs used for longer hauls would typically be more suited for hybrid electric configurations[94]. In the near term the most direct decarbonization opportunity is fuel blending. Harbour tugs represented 1% of NL's marine transportation GHGs in 2023, with 'tug-ocean' representing just under 0.5%. While these are not significant contributions on a provincial level, the decarbonization of these vessels may be more meaningful to the ports that industries that they serve.

[92] https://www.gov.nl.ca/ti/ferryservices/schedules/

[93] https://www.dnv.com/expert-story/maritime-impact/showcasing-innovations-in-the-ferry-industry/

[94] https://clearseas.org/insights/why-make-tugs-electric



CRUISE SHIPS

Cruise ships can vary significant in size, which would influence their movement towards either low-carbon fuels adoption or battery electrification. More than 15% of the vessels set to launch over the next five years will be fully equipped to integrate fuel cells or batteries and 85% of CLIA-member vessels coming online between now and 2028 will be able to plug into shoreside electricity[95]. Most cruise ships arriving in NL are relatively large. Shoreside power connectivity is particularly important to the cruise industry as it improves air quality for its passengers when docked. Therefore, from an environmental and business development perspective, the provision of electricity infrastructure in ports like St. John's, Corner Brook, and St. Anthony should be considered, Meanwhile, cruise companies are actively testing the use of low-carbon fuels in their fleet. In the near term the most direct decarbonization opportunity is fuel blending.

EXCURSION PASSENGER

This type of vessel is similar to ferries in that the voyages of tourism boats in NL are typically short and regular between the same ports. Therefore, this segment is ideal for electrification and battery power as inventory turns over. In the near term the most direct decarbonization opportunity is fuel blending.

OTHER (SPECIAL PURPOSE, COAST GUARD, WAR, DFO FISHING SURVEILLANCE VESSELL)

The types of vessels can vary significantly in these categories. In most cases these vessels travel great distances and spend significant time offshore. Electrification will not likely be the most practical decarbonization solution. Owners of these vessels are typically more risk averse (i.e., governments, contractors on strict timelines conducting complex tasks and maneuvers) therefore it is likely these segments will not be the first movers in adopting new fuel technologies. In the near term the most direct decarbonization opportunity is fuel blending.

[95] https://porthole.com/cruise-industry-commits-to-pursue-net-zero-carbon-for-global-cruising-by-2050/

Conclusions

Decarbonization pathways for marine transportation are difficult to predict. Pathways are likely to diverge from one another depending on the sector in question. In some of the segments of marine transportation, NL has little control over decarbonization pathways that are chosen. Yet, in other segments, NL does have a degree of control.

The following observations can be made following an analysis of marine transportation decarbonization pathways as they apply in the NL context:

1. Container ships contributed 26% of all marine transportation GHGs for NL in 2023. NL will not influence the decarbonization decisions made by large international shipping companies, however it should pay close attention to developments to ensure that it is able to supply these vessels with the fuels that they will demand in order to (a) enable decarbonization and (b) support domestic low-carbon fuels producers.

2. Bulk shipping contributed 20% of all marine transportation GHGs for NL in 2023. NL should engage with those shipping bulk cargo (i.e., iron ore, nickel) to influence or understand plans to (a) enable decarbonization and (b) support domestic low-carbon fuels producers.

3. Ferries contribute 21% of all domestic marine transportation GHGs in NL. Federal and provincial governments are owners, operators, and/or contractors of these services. Therefore, there is a direct opportunity for Canada and NL to control future decisions that impact the environment and the economy.

4. Tankers and offshore supply ships make up 25% of NL's marine transportation GHGs. Much of the traffic of these vessels is within NL jurisdiction. There may be an opportunity to develop a decarbonization strategy that supports local low-carbon fuel producers while supporting the reduction of GHGs in NL's offshore oil and gas supply chain.

5. A low-hanging fruit in marine transportation decarbonization in NL is reducing 'berthed' or hoteling GHGs – which were estimated to be 8% of all sector GHGs in NL in 2023. NL is an ideal location for shorepower given its 90%+ clean electricity grid. Shoreside infrastructure is a key enabler of marine transportation decarbonization and is within NL's direct control to provide. More search is required to better understand the demand and supply particulars in vessel electrification.

6. While different decarbonization pathways exist for each vessel type, one commonality with most is the potential that fuel blending presents. More focus needs to be placed on testing and trialing fuel blends in NL. This can begin with low-carbon fuels that are already produced in the province (i.e., renewable diesel) and advance to include hydrogen and its derivates in the future. This also creates an opportunity for local biofuel production. To achieve the above, a focus must be placed on local research, development, and training around fuel blending.

7. More research is required to better characterize emissions relating to the fisheries, ferries, and intra-provincial shipping.

Decarbonization: Insights from Indigenous Nations

With an understanding of the sources of marine transportation GHGs in NL, to explore how Indigenous communities might view decarbonization strategies it first is important to appreciate their views on the climate change, action to address it, and the green economy.

A starting point is to highlight plans and communications that have been made by their representative organizations on subjects relating to the environment and climate change. In doing so, it is important to consider that each Indigenous group has a different history and cultural relationship with the environment, have different approaches to planning and communicating, and advance such things at different paces. Some Indigenous groups in NL are self-governing and have land reserves, while others are fighting for recognition and/or do not manage reserve lands on behalf of the Federal government.

Geography also plays a fundamental role. The effects of climate change are being felt more acutely in Labrador. The average summer temperature in Nain is expected to go from 8.9 degrees from 1971-2000 to 11 in 2021-2050, and winter temperatures from -16.2 degrees to -12.2 degrees. The number of days with frost in this period will go from 220 to 192[96]. By the end of the century, sea surface temperatures are expected to rise 4 degrees[97], and total precipitation will rise by 24%. As these changes in climate in Labrador are so significant, Indigenous communities are hyper aware of their impacts as they are clear and present.

As each Indigenous Nation is distinct in culture, geography, and their relationship with the environment, their response to climate change and views on decarbonization are equally diverse. In some cases, Indigenous Nations have fully articulated climate plans while the views and opinions of others can be surmised through other media.

[96] https://porthole.com/cruise-industry-commits-to-pursue-net-zero-carbon-for-global-cruising-by-2050/

[97] https://porthole.com/cruise-industry-commits-to-pursue-net-zero-carbon-for-global-cruising-by-2050/

Nunatsiavut Government

SILAVUT ASIANGUVALLIAJUK

Much insight can be gained about Inuit perspectives on climate change adaptation and mitigation through reviewing findings from 'Silavut Asianguvalliajuk' – the Nunatsiavut Climate Change Workshop held in Nain in 2024[98]. The workshop convened communities, organizations, institutions, and governmental bodies to engage in discussions pertinent to climate change in Nunatsiavut.

- snow thaw impacting berry quality and vegetation growth;
- decline in certain berry species due to shading by invasive species / shrubs;
- changes in mussel picking due to earlier ice melt and potential health risks with warmer water;
- impact of erosion and permafrost thaw on cabin relocation and land stability;
- unstable weather patterns, including inconsistent cold and warm temperatures and sudden temperature fluctuations;
- changes in fish sizes and species distribution; decrease in black;
- and much more.

The workshop findings made it clear that Nunatsiavut community members were well connected with the environment and were concerned with the changes that they were seeing in it.

CLIMATE RESEARCH

The community is also highly engaged in climate research, with 41 projects being conducted or supported by the Nunatsiavut Government – many of which are a direct response to previous climate workshops. Research projects include but are not limited to:

- MakkovikTrails project (increase access to alternate routes when ice is unsafe);
- SmartICE (monitoring of sea ice and relaying information to the community);
- Hopedale Avalanche Awareness (training for community members to understand and recognize avalanche risks and companion rescue);
- Polar Bear and Human Conflicts (preparing for increased interactions between polar bears and humans through training);
- Partridge monitoring (this came from the community hunters as their primary hunting spots were no longer successful);
- arctic char monitoring;
- plastic concerns in wild food and environments;
- weather monitoring;
- Community-based Observations of Nunatsiavut Ocean Circulation (CONOC);
- aquatic invasive species monitoring;
- sea ice and marine habitat change through SIKU;
- ice monitoring;
- Voisey Ship Tracking;
- migratory birds monitoring;
- subsea permafrost monitoring;
- and more.

[98] https://nunatsiavut.com/wp-content/uploads/2024/06/DETAILED-WORKSHOP-REPORT-Silavut-Asianguvalliajuk-March-2024-compressed.pdf

ENERGY SECURITY PLAN

The importance placed on the environment is clear in the NG's 'Energy Security Plan' . One of the key initiatives of the plan is to 'target sustainable energy opportunities' with the intent to engage with governments and agencies to promote sustainable energy projects related to wind, solar, biopower, energy efficiency, and facilities.

Among the 10 sustainable energy principles identified in the plan, there are references to sustainable energy technologies and innovation, promoting energy for economic development, and sustainable energy partnerships. A number of initiatives have emerged because of this plan, including :

- **Nain Wind Microgrid Project –** The Nain Wind Micro Grid aims to reduce community reliance on diesel fuel for electricity generation. Upon completion, the 2.3-megawatt project is expected to be the largest wind energy-powered microgrid across the Canadian Arctic. The project will provide 50% of Nain's electricity on an annual basis, displace over one million liters of diesel fuel per year, and generate hundreds of thousands in annual revenue for NG to invest in self-determined priorities.

- **High Efficiency Woodstoves Replacement Program –** The $1.3mn High Efficiency Woodstove Replacement Program contribution agreement was finalized with Natural Resources Canada in February of 2021. They plan to procure, ship, and install at least 200 high efficiency woodstoves across our communities by the spring of 2023. The high efficiency woodstoves will make a major difference in the lives of the Inuit, cutting household wood consumption by at least 33%, significantly improving local air quality, and displacing an estimated 100,000 liters of diesel fuel in Nunatsiavut on an annual basis.

- **Solar Demonstration Projects –** Building upon the success of the Makkovik solar-pv project, Nunatsiavut Government plans on constructing four 20 kilowatt solar projects in Nain, Hopedale, Postville, and Rigolet, done in partnership with each Inuit Community Government. Upon completion, every community in Nunatsiavut will be producing their own clean, renewable energy for local consumption. The projects will have an important impact in our communities – producing over 70 megawatt hours of clean electricity annually and reducing harmful greenhouse gas emissions by over 60 tonnes, which is equivalent to over 20,000 liters of diesel fuel per year.

It should be noted that 'energy security' is the top consideration for the NG as it relates to its energy planning. This is likely due to the risk that unreliable energy systems could have in geographies which can get extremely cold in the winter months. Diesel generators have provided this reliability and, as such, Indigenous groups like the NG are taking great care in considering how (or if) these should be replaced despite their environmental impacts.

AN INUIT APPROACH TO CLIMATE CHANGE MITIGATION AND ADAPTATION

In March of 2025, the NG launched 'Adapt Nunatsiavut: An Inuit Approach to Climate Change Mitigation and Adaptation in Nunatsiavut'[101] – 'the culmination of a collective effort grounded in the voices, experiences, and knowledge of our people, and it reflects our commitment to facing the challenges of climate change with resilience and determination.'

The plan is guided by Inuit principles: Inuit self-determination; Inuit values, culture, and language; health, safety, and social well-being; knowledge, capacity, and innovation; sustainable community practices; communication and relationships; and research and evaluation. The comprehensive climate change plan focusses on five areas with a series of related actions:

- **Environment:** tracking changes to our environment; managing climate risks; living sustainably together; working together on climate solutions; Inuit leadership in climate action
- **Infrastructure and transportation:** healthy homes and buildings; safe and reliable travel; protecting our coasts and waterways; clean water and safe waste; building resilient infrastructure; being ready for emergencies
- **Energy:** energy efficient homes and buildings; clean energy for our communities; finding new energy solutions; safe and reliable energy access
- **Food security:** food for everyone; growing our own food; sharing our traditional foods; building strong food systems
- **Health and wellbeing:** prepared and protected; supporting strong minds and healthy communities; protecting health from climate risks; reliable healthcare in a changing climate
- **Culture and education:** better education for all; protecting our culture; learning on the land
- **Economic development:** helping local businesses grow; skills for the future; innovating for a green future

While there are no specific references to marine transportation decarbonization, there are many objectives relating to carbon management, exploring alternative solutions to pollutive practices, enhancing marine infrastructure, and investigating technology solutions to facilitate the construction of infrastructure powered by renewable energy.

IMAPPIVUT

However, the connection between ocean and climate change is clear. 'Imappivut' is a plan to manage and protect Labrador Inuit interests in the coastal and marine areas of Labrador. Imappivut means 'Our Oceans' in English and was designed to represent the relationship that Labrador Inuit have with coastal and marine areas. The plan is guided by the values, knowledge, and interests of Labrador Inuit. Imappivut celebrates the connections Inuit have with the marine environment and works to contribute to the health and wellbeing of Labrador Inuit.

Using the best available traditional, local, and scientific knowledge, Imappivut will identify research, monitoring, and stewardship activities that will address community priorities. Imappivut prioritizes Nunatsiavut's interests and works to ensure that Labrador Inuit will continue to enjoy a healthy marine environment for generations to come. Imappivut will work with communities to gather knowledge about areas, uses, and activities that have ecological, social, cultural, and economic importance to Labrador Inuit. This knowledge will inform the development of a marine plan that represents Labrador Inuit interests and priorities[102].

[101] https://nunatsiavut.com/wp-content/uploads/2025/03/ADAPT-NUNATSIAVUT.pdf

[102] https://imappivut.com/about/

Qalipu First Nation

STRATEGIC PLAN

The Qalipu First Nation's 2020-2029 Strategic Plan[103] offers significant insight as to how the community values the environment and positions its future related to it:

> "Qalipu First Nation takes its responsibility for environmental stewardship seriously. Responsible management of resources, promotion of traditional lifestyles in which members live in harmony with the environment, balancing protection of the environment with natural resource development and land usage, embracing green technologies and preservation of the land for future generations are all part of the Band's collective identity."

This is echoed in the Qalipu First Nation's stated principles underlying the development of its strategic plan:

> "Qalipu First Nation believes in reflecting the principles of environmental protection and conservation in its day to day decision making around issues of natural resource development, the terrestrial and aquatic environment, land planning and usage, climate change and the promotion of a healthy traditional lifestyle."

Under its commitment to environmental stewardship, the stated goal is to "be a leader in environmental stewardship while pursing sustainable development and resource-based opportunities for members". This is reflected in the 2020-2029 objectives which included:

1. Qalipu First Nation will be an advocate for climate change and will pursue activities that aim to mitigate the impact of climate change for seven generations.

2. Expand research, monitoring, and enforcement activities in the aquatic and terrestrial environment.

3. Enhance engagement with youth through participatory and interactive experiences in the natural resources sector.

COMPREHENSIVE COMMUNITY PLAN

These values were echoed in the Qalipu First Nation's 2021 Nation Comprehensive Community Plan (CCP)[104], which was its first. The plan 'outlines some of the big dreams' that its membership has for the future. A key principle of the CCP is that it will 'be sustainable and not sacrifice future generations' wellbeing for immediate gains'. These values are also evident in the science and research projects that the Qalipu First Nation is involved in, ranging from marine bird monitoring, habitat monitoring for branded killifish and the piping plover, and the improvement of habitats for Atlantic salmon and brook trout[105].

GREEN ECONOMY AMBITIONS

Beyond environmental protection and stewardship, the Qalipu First Nation also has interest in being a participant in the growth of the green economy in NL. World Energy GH2 signed a Memorandum of Understanding (MOU) with the Qalipu First Nation for its Project Nujio'qonik[106] – a large wind project being advanced in Western Newfoundland with environmental approval for the development of 2 GW of wind farms and a green hydrogen / ammonia plant on 108,000 hectares of secured Crown land. One of the end-uses envisioned for the product is within the marine sector: 'the marine industry is transitioning from hydrocarbon-based diesel fuels to cleaner, green fuels, and the Port of Stephenville is the ideal location to test and develop these processes and technologies'[107].

This is in addition to a partnership with EVREC (Exploits Valley Renewable Energy Corporation) which aims to build one of the world's largest energy transition projects in Central Newfoundland. This project will use 3.5 GW of 100% renewable wind energy and 150 MW of solar power to produce up to 180,000 tonnes of zero-carbon hydrogen and approximately 1 million tonnes of green-certified ammonia every year[108]. The specifics of these partnerships and their intentions are not public knowledge, and likely will not be until final investment decisions are made on the projects.

[103] https://qalipu.ca/qalipu/wp-content/uploads/2021/03/QFN%20Strategic%20Plan%202020%20-%202029%20QM-POL-015_Rev_0_02172021.pdf

[104] https://qalipu.ca/qalipu/wp-content/uploads/2021/11/Comprehensive-Community-Plan.pdf

[105] https://qalipu.ca/category/natural-resource-reports/

[106] https://worldenergygh2.com/community/

[107] https://worldenergygh2.com/offtake/

[108] https://evrec.ca/

Miawpukek First Nation

The Miawpukek First Nation has not published specific strategies that reference environment, climate change, or decarbonization. However, recent activity the Miawpukek First Nation has been involved in suggests both a strong connection to and appreciation for the environment – and an interest in being a participant in province's emerging green economy.

MARINE CONSERVATION AREA

The Miawpukek First Nation (in addition to the Qalipu First Nation) is a key supporter of the proposed 'South Coast Fjords National Marine Conservation Area'. The Government of Canada, the Government of Newfoundland and Labrador, Miawpukek First Nation, Qalipu First Nation, and the Town of Burgeo signed an MOU in June 2023 to work together to assess the feasibility of creating a national marine conservation area in the South Coast Fjords area on the southwest coast of the island of Newfoundland. The partners are also exploring the possibility of redesignating Sandbanks Provincial Park as a national park in southwestern Newfoundland. The Qalipu First Nation sits on the project steering committee which oversees all aspects of the feasibility assessment. The process is informed by scientific study, Indigenous Knowledge and feedback received through ongoing engagement with federal and provincial government departments, stakeholders, First Nations peoples and affected local communities[109].

GREEN ECONOMY AMBITIONS

The Miawpukek First Nation (again, in addition to the Qalipu First Nation) are also participants in the NL Hydrogen Innovation Partnership (HyIP)[110] – a 'unique collaboration between research institutions, industry, and Indigenous groups' to advance clean energy research, development, and deployment within the province.

Other partners in the HyIP include Memorial University, the Marine Institute, the College of the North Atlantic, and the Qalipu First Nation. One of the focus areas of the HyIP has been identified as being 'marine transportation decarbonization' which has been the driver of several activities led by its partners. For example, in 2025 econext has held a number of events informed by the group's interest including a webinar titled 'Clean fuels adoption in NL's marine transportation sector'[111], a session held at its annual conference titled 'Net zero and marine transportation in Newfoundland and Labrador'[112], a workshop titled 'Navigating the future: a conversation on marine transportation decarbonization'[113], a webinar titled 'Marine Transportation Decarbonization: Technology and Training Priorities'[114], in addition to a number of ongoing research projects aimed at identifying opportunities for research and development related to this subject.

The Miawpukek First Nation have interests in future renewable energy projects in NL; in joining the province's industry association Energy NL, the Miawpukek First Nation stated 'as an equity partner in the Island's newly developing green energy sector, Miawpukek First Nation feels it is essential to participate in the discussion amongst energy proponents and government agencies. Our unique perspective on people, culture, and the environment will help guide us all into this new economy as we look to sustainability for the next seven generations'[115].

This is a reference to the belief that all decisions made today must consider their impact on the next seven generations of unborn descendants, ensuring a sustainable and healthy world for the future. Miawpukek First Nation has a strong environmental and conservation minded approach to development. Preserving the environment and marine resources for 7 generations is a strong aspect of Indigenous culture and traditions[116].

[109] https://parks.canada.ca/amnc-nmca/cnamnc-cnnmca/fjords-cote-sud-south-coast-fjords

[110] https://hy-ip.ca/

[111] https://econext.ca/econext-insights-clean-fuels-adoption-in-nls-marine-transportation-sector/

[112] https://econext.ca/2025-conference/

[113] https://www.eventbrite.ca/e/navigating-the-future-marine-transportation-decarbonization-workshop-tickets-1701626152629?aff=oddtdtcreator

[114] https://econext.ca/econext-insights-marine-transportation-decarbonization-technology-and-training-priorities/

[115] https://events.energynl.ca/member-profiles/Details/miawpukek-first-nation-2739141

[116] https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-84343/comment-62234/2024.Sept.16(Updated)-MFN%20Response%20to%20Interim%20RA%20OSW%20Report_Redacted.pdf

NunatuKavut Community Council

For generations, NunatuKavut Inuit have relied on the land, sea, and ice for survival. Today, its people continue to hunt, fish, trap, and gather in the same places their ancestors did and are committed to protecting them through stewardship and sustainable practices[117]. The NCC recognizes that climate change is reshaping the North at an alarming pace, affecting everything from sea ice and wildlife patterns to food security and community safety.

The NCC is moving to create Inuit-led harvesting laws and engaging in climate and conservation planning. This work is guided by shared leadership, traditional knowledge, and the principle of free, prior, and informed consent as outlined in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)[118].

COMMUNITY SUSTAINABILITY INITIATIVE

In 2017, the NCC launched its 'Community Sustainability Initiative' via the Department of Research, Education, and Culture. The primary objective of the initiative is to support Southern Inuit in creating a stronger future for their communities. This was supplemented by a research project, titled 'Community Energy Planning and Sustainability Assessment in NunatuKavut, Labrador', which sought to extend the initiative to consider and address energy-related challenges in the pilot communities[119].

The primary goal of the research program is to develop community-driven sustainable energy actions plans for each pilot community. The action-plans will outline the impacts of existing energy systems; community member concerns; preferences for renewable energy and energy efficiency options; as well priorities for the future. A report was released the end of October 2018 to share the preliminary findings of the research[120].

In general, community-members expressed higher levels of social acceptance for energy efficiency technologies than supply-side energy options. Research participants are open to hybrid-conventional renewable energy technologies (wind and solar), but reliability of energy remained a primary concern.

GREEN ECONOMY AMBITIONS

Nunacor, the NCC's economic development corporation, owns and operates NunatuKavut Energy – a subsidiary renewable energy development company wholeheartedly devoted to advancing renewable energy projects throughout the South Coast of Labrador. The company is actively exploring partnerships and recently has taken control of a small solar energy system within the community and signed a Power Purchase Agreement (PPA) with NL Hydro noting that the advancement has significant implications for the community's energy sustainability and future development[121].

In December 2025, in partnership with Net Zero Atlantic, the NCC released a request for proposals (RFP) seeking a consultant to carry out an assessment of geothermal resource potential in NunatuKavut communities in southern Labrador. The aim is for the successful proponent to gather available geological and subsurface data that will inform a comprehensive map and report, with an objective to focus on the geothermal resource's application for commercial greenhouse heating in the region. The potential for green energy (geothermal) is, in this case, tied to food security and vulnerability in the north[122].

[117] https://nunatukavut.ca/about/

[118] https://nunatukavut.ca/climate-change/

[119] https://nunatukavut.ca/wp-content/uploads/2025/07/community-energy-planning-in-nunatukavut.pdf

[120] https://nunatukavut.ca/land-stewardship-sustainable-energy/

[121] https://nunacor.com/group-of-companies/nunatukavut-energy/

[122] https://netzeroatlantic.ca/sites/default/files/2025-12/251212_ncc_geothermal_rfp_-_final.pdf

Innu Nation

The Innu Nation does not have a public-facing environmental or climate change policy which can be reviewed. However, information that is available does suggest a strong connection to the land and sea and values to protect them.

Innu knowledge offers generations of observational insight, cultural context, and sustainable practices, upon which the Innu Nation's research efforts heavily rely. Innu knowledge informs all of the Innu Nation's land and water stewardship and conservation efforts, including those related to marine monitoring, planning, and management[123].

ENVIRONMENT OFFICE AND GUARDIANS

In 2011 the Innu Nation established a dedicated Environment Office in Sheshatshiu which provides infrastructure and support staff[124]. The Innu Nation Environment Office monitors woodland caribou populations to inform community hunts as well as wildlife and land management approaches. The office also runs a 'Environmental Guardians' program to monitor commercial and community fisheries, monitors compliance and impact of mines and hydro-electric projects, and consults extensively with the community to link country-based knowledge with scientific knowledge.

Training and professional development of the Innu Nation Environmental Guardians by St. Mary's University build capacity in various aspects of environmental management and research (EMR) and enhances the capacity of the Innu Nation to:

- manage Innu lands and resources;
- design and implement environmental management and research (EMR) projects to take full advantage of the Voisey's Bay IBA and similar agreements;
- conduct effective environmental compliance monitoring under the Voisey's Bay IBA and similar agreements;
- network with governmental/non-governmental organizations in EMR and co-management partnerships;
- ensure appropriate use and protection of Innu knowledge and cultural heritage in EMR;
- provide technical and logistic support to collaborative EMR projects;
- ensure consistent environmental reporting back to the Innu people; and
- develop environmental education materials for use in the Innu communities[125].

The Innu have been doing a number of things to support the development of their environmental policy. As part of this work, the Innu invited researchers and conducted interviews and focus groups with Sheshatshiu community members – including youth and Elders – to better understand what conservation means to them and its connection to restoring, protecting and maintaining their traditional lifestyle. This was achieved through a multi-day workshop which included the Guardians and staff of the environment department from Natuashish and Sheshatshiu. In addition, a member of the Innu Nation environment department staff attended Saint Mary's University for three weeks to gain practical skills training (e.g. report writing, project management, and negotiation skills) and attend classes, lectures and public talks on environmental issues and policy, successfully obtaining two certificates from the university[126].

[123] https://nunatukavut.ca/about/

[124] https://nunatukavut.ca/climate-change/

[125] https://nunatukavut.ca/wp-content/uploads/2025/07/community-energy-planning-in-nunatukavut.pdf

[126] https://nunatukavut.ca/land-stewardship-sustainable-energy/

OCEAN SCIENCE AND THE UINIPEKU EXPEDITION

Relatively recent advancements in the quality, accessibility, and cost of environmental monitoring technologies has presented the Innu with an opportunity to develop these capacities within Innu Nations. Ocean technology is being employed by Innu Nation to supplement Innu knowledge, providing tools to Innu to measure, monitor, and visualize changes in the marine environment. Together, Traditional Knowledge and modern science and technology capacities provide a holistic understanding of ocean systems, supporting more effective and culturally rounded stewardship of marine ecosystems[127].

The Innu Nation uses a variety of underwater technologies to study its waters. It primarily uses remotely operated vehicle (ROV) systems to conduct video transect surveys at study sites as a means of exploring and describing these environments. The Innu Nation also uses baited remote underwater video systems, drop camera/video systems, tow camera systems, autonomous underwater vehicles, and eDNA sampling for research, monitoring, exploration, and conservation[128].

The annual Innu Nation Uinipeku Expedition[129] is instructive to understand the Innu's relationship with the ocean. The Uinipeku Expedition is a collaborative ocean science initiative led by Innu Nation, in partnership with Fisheries and Oceans Canada, Students on Ice Foundation, Mastercard Foundation, and Parks Canada. The Expedition brings together the knowledge of Innu Elders, Guardians, Innu Nation Environment and Innu Parks staff, ocean science researchers and technologists, and educators to build a comprehensive understanding of the Innu Marine Zones while equipping young Innu with skills to pursue careers in land and marine stewardship.

The expedition route departs Sheshatshiu, travels through Lake Melville, Labrador Sea, remote islands, inlets and bays, proceeding north to Natuashish, Davis Inlet, Iluikoyak and Ukasiksalik and surrounding islands before finishing in Natuashish. Each Uinipeku Expedition is an interdisciplinary marine science program which conducts marine monitoring and studies in Innu waters. These expeditions have gathered more ocean science data than has ever been gathered in these areas.

GREEN ECONOMY AMBITIONS

'Forecast NL' – a special edition of the annual NL Vital Signs report – focused on climate change impacts in NL[130]. Through a message provided to the publication by the Innu Nation, a number of observations about the community's relationship with the environment can be made. Innu understand that the climate crisis is real – and that solutions are urgently required.

> "For thousands of years, our culture has been a reflection of what the land itself has taught our ancestors. Because of this deep relationship, we also know that things are changing. The evidence is all around us. The land itself is changing. Places that were once barrens are becoming shrubs, and wetlands are starting to turn into meadows, and may eventually become forests. The behaviour and migrations of animals – particularly the caribou – have changed, and new species are showing up on our lands and in our waters. Our travels on the land and on the sea are now far less safe, as the ice forms later and is less secure. Our weather – while never predictable – has become very uncertain. And we know that these changes are all happening more quickly in our territory than in many other places where these problems are caused."

The message goes on to describe its commitment to accelerating the transition to a renewable, low-carbon economy and points to a number of specific initiatives. The 'Innu-Inuit Envest Limited Partnership' is referenced which aims to provide the local mining industry with renewable wind power that will replace approximately 10 million litres per year in diesel consumption and avoid approximately 25,000 tonnes of GHGs per year. The message also notes early-stage research into utilizing excess hydroelectric capacity from the Lower Churchill project to create green hydrogen fuel.

The Innu play a crucial role in biodiversity conservation, restoration, and stewardship throughout their lands and waters as they have done for millennia[131].

[127] https://www.thejot.net/article-preview/?show_article_preview=1676

[128] https://www.thejot.net/article-preview/?show_article_preview=1676

[129] https://www.uinipekuexpedition.ca/

[130] https://www.mun.ca/harriscentre/media/production/memorial/administrative/the-harris-centre/media-library/misc/Vital%20Signs%202022%20FINAL%20web.pdf

[131] https://www.thejot.net/article-preview/?show_article_preview=1676

Conclusions

While each Indigenous Nation and their relationship to the environment is unique, there are some commonalities amongst them as it pertains to informing marine transportation decarbonization in NL.

1. While not every Indigenous Nation has in place a formal environment / climate change plan or policy, each values the natural environment to a great degree and wishes to protect it.

2. While the level of involvement differs between Indigenous Nations, each has a strong relationship with the ocean whether that be through research and environmental monitoring, protection, fisheries, or other commercial interests.

3. Each of the Indigenous Nations has stated interests in being a partner – if not a driver – of green economic development in NL. From wind, to solar, to hydro, to hydrogen – Indigenous groups want to be part of the energy transition.

4. There are common references to the environment, the ocean, and clean energy. However, there are no specific references to marine transportation decarbonization – which could be considered a combination of all three.

While marine transportation decarbonization was not an explicit consideration for any of the Indigenous groups – the combination of environmental values, ocean involvement, and green economy ambitions strongly suggests that marine transportation decarbonization is a subject that may be of future interest.

Training and Skills Development for Marine Transportation Decarbonization in NL

Marine Transportation Programs in Canada

In determining the training and skills that are needed to be developed for marine transportation decarbonization in NL, it is important to first understand potentially relevant programming that already exists in Canada.

POST-SECONDARY EDUCATION

While many universities and colleges in Canada offer programming in ocean-related areas like marine conservation, marine biology, marine spatial planning, climate adaptation, fisheries, knowledge systems, ocean policy, etc., the list of institutions that includes an applied focus on boats, vessels, ships (i.e., 'marine transportation') is short. Below is a summary of these institutions and the programs offered that have relevance to the subject of marine transportation decarbonization.

FISHERIES AND MARINE INSTITUTE (MI) – ST. JOHN'S, NL

As a campus of Memorial University of Newfoundland (MUN), MI is Canada's most comprehensive centre for education, training, applied research and industrial support for the ocean industries. As such, MI offers a number of programs that would touch on marine decarbonization and potentially its decarbonization. Offerings include: diploma programs in Marine Engineering, Marine Mechanical Design, and Naval Architecture; a technical certificate in Marine Diesel Mechanics; and Bachelors and Masters degrees in Technology (Engineering Technology and Applied Sciences)[132]. MI's parent university MUN offers Bachelors, Masters, and PhD programs in Ocean and Naval Architectural Engineering[133].

GEORGIAN COLLEGE – OWEN SOUND, ON

Georgian College's Marine Training and Research Centre (MTRC) is a leader in marine innovation, customized training, research and development, delivering industry-driven marine training and certifications. MTRC offers advanced diplomas in Marine Technology – Navigation and Marine Engineering Technology. MTRC also offers a variety of training courses in relevant areas including vessel operations, navigation, and engineering.

INSTITUT MARITIME DU QUEBÉC (IMQ) – RIMOUSKI, QC

IMQ provides training and development for the marine workforce in all areas related to the sea, offering diplomas in areas including Naval Architecture Technology, Navigation, Marine Mechanical Engineering Techniques, and Operations and Supply Chain Management[134]. The school includes a research focus on 'energy and environment', with diverse expertise in transport electrification, alternative fuels, and techno-economic analyses. This research focus area provides students with the opportunity to assist in reducing the industry's carbon footprint through new energy solutions and more environmentally friendly fuels[135].

[132] https://www.mi.mun.ca/

[133] https://www.mun.ca/undergrad/programs/engineering/ocean-naval-architectural-engineering/

[134] https://www.imq.qc.ca/

[135] https://www.innovationmaritime.ca/

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY (BCIT) – NORTH VANCOUVER, BC

The BCIT School of Transportation's Marine Campus is the primary provider of accredited professional training for the maritime industry in Western Canada. BCIT offers a number of relevant diploma and advanced diploma programs including Marine Engineering; Master 150GT Domestic; Master 500GT Domestic; and Master 3000GT Domestic. BCIT also offers a 'flexible learning courses' in areas like marine engineering, nautical, ship and port security, tanker and oil transfer, etc. The flexible learning courses allow students to learn at their own pace in the manner which best suits them (i.e., daytime, evening, and online)[136].

CONCORDIA UNIVERSITY – MONTREAL, QC

Delivered by the Shipping Federation of Canada, Concordia University offers a 'Certificate in Marine Transportation'. This program covers operations, logistics and maritime law to give students a clearer picture of the shipping industry. The certificate is composed of three university courses including: Introduction to Shipping; Ship and Port Operations; and Commercial and Legal Aspects of Shipping[137].

NOVA SCOTIA COMMUNITY COLLEGE (NSCC) – PORT HAWKESBURY, NS

With 14 campuses across Nova Scotia, the NSCC campus in Port Hawkesbury (and to a lesser extent Bridgewater) focuses on marine-related programming including diplomas in Diesel Repair – Industrial and Marine, Marine Engineering Management Technology, Marine Engineering Technology, Marine Foundations - Small Vessel Operator Proficiency, Marine Geomatics, Marine Navigation Management Technology, and Marine Navigation Technology.

OTHER RESOURCES

Aside from post-secondary programming, there are a number of other learning opportunities in Canada specific to marine transportation decarbonization such as micro-credential and upskilling courses, industry-led training, and key conferences and seminars.

OCEAN ALLIANCE CANADA

Ocean Alliance Canada (OAC) is a national collaboration that supports Canada's sustainable blue economy through people, progress and partnerships. OAC coordinates national efforts across workforce development, innovation readiness, applied research, and long-term sustainability. The OAC features a number of working groups including: workforce development; Indigenous engagement; ocean policy and action; and global competitiveness. While the OAC itself does not provide training, it does offer the Sustainable Blue Economy Professional (SBEP) designation which recognizes individuals whose knowledge, experience, and ethics support a sustainable global ocean economy.

DECARBONIZATION OF THE SHIPPING INDUSTRY – FISHERIES AND MARINE INSTITUTE (MI)

MI often works with industry to develop and deliver bespoke programming; through a partnership with econext in 2024 MI developed a micro-credential course titled 'Decarbonization of the Shipping Industry'. The objective of the course is to introduce students to the basics of carbon emissions, technology used for reduction, current research on blue-green energy, and international regulations. Modules focus on understanding emissions from ports and ships; describing technology used to reduce carbon emissions; summarizing the research and development of fuels; discussing safety and operational risk management; and discussing international regulations. This course has not yet been delivered.

[136] https://www.bcit.ca/transportation/areas-of-study/marine-studies/

[137] https://www.concordia.ca/cce/programs/marine-transportation.html

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MARINE TRAINING PROGRAM

The Marine Training Program prepares underrepresented groups, such as Indigenous Peoples, Northerners, and women, for rewarding careers in the Canadian marine industry. Through the Oceans Protection Plan, Transport Canada has provided funding to four institutions to deliver advanced marine courses and hands-on training at facilities across Canada. This program benefits underrepresented groups by giving them the skills and training to access new employment opportunities. It also addresses the marine industry's increasing need for a skilled and diverse workforce. Under the Marine Training program, hundreds of courses and training sessions have been delivered and over 1,100 students have graduated, finding employment with the Canadian Coast Guard, on cruise ships, with ferry operators, and other leading employers. The four participating institutions include: Nunavut Fisheries and Marine Training Consortium (NFMTC); Nova Scotia Community College (NSCC); British Columbia Institute of Technology (BCIT); and Western Arctic Marine Training Consortium (WAMTC)[138]. It is notable that no programming was funded which provided opportunities for underrepresented groups in NL.

CLASSIFICATION SOCIETIES

There are a variety of organizations worldwide – called 'classification societies' – which develop and enforce technical standards for the design, construction, and maintenance of vessels and offshore structures to ensure safety and environmental protection. Classification societies like DNV[139] and Lloyds Register[140] offer specific training courses relating to the decarbonization of marine transportation. Training is also available through the International Maritime Organization[141] as well as through vessel operators like Maersk[142], however all of the above would approach the subject from a macro level and a global perspective (and not a Canadian-specific one).

CONFERENCE AND SEMINARS

There are a number of annual or semi-annual conferences and seminars which focus on marine transportation decarbonization in Canada which provide a forum for learning. For example, the Vancouver Maritime Centre for Climate hosts its 'Greenship' conference which convenes a diverse cross-section of industry stakeholders, from ship owners, terminal operators, technology suppliers, regulators and academia to discuss the acceleration of maritime decarbonization[143].

There does not appear to be a wealth of programming in Canada – degree, certificate, or otherwise – that focuses specifically on marine transportation decarbonization. A thorough review of institutions approved by Transport Canada to provide marine specialized training[144] may uncover additional programming which exists.

[138] https://tc.canada.ca/en/campaigns/protecting-our-coasts-oceans-protection-plan/stronger-partnerships-indigenous-coastal-communities/marine-training-program

[139] https://www.dnv.com/training/decarbonizing-shipping-online-training--196265/

[140] https://informaconnect.com/diploma-in-decarbonisation-in-shipping/

[141] https://www.imo.org/en/mediacentre/pages/whatsnew-2249.aspx

[142] https://www.maersktraining.com/

[143] https://vmcclimate.ca/gs2025

[144] https://tc.canada.ca/en/marine-transportation/publications/tp-10655e-recognized-institutions-approved-training-courses-11-2025

Indigenous Training Approaches and Resources in NL

In considering training and workforce development opportunities in marine transportation decarbonization, it is valuable to outline Indigenous-led programs and infrastructure that already exists in NL. Understanding these programs will help to arrive at related workforce development recommendations.

Indigenous training approaches and resources in NL can be divided into three categories: (1) Indigenous government activities, (2) training partnerships, and (3) internship programs.

INDIGENOUS GOVERNMENT ACTIVITIES

Each of the Indigenous Nations in NL attaches an importance to training and professional development.

QALIPU FIRST NATION

In its strategic plan the Qalipu First Nation highlights a goal 'to expand, increase and improve the quality of education and training programs and services provided to members through a process of continuous consultation, program design, planning and evaluation.[145]' In addition, the Qalipu First Nation had entered into a partnership to establish a joint venture with a Netherlands-based firm to provide training and professional development related to wind energy and hydrogen production for its community members (and others)[146]. While the advancement of this partnership has slowed in line with the industrial project's pace of development, it is an indicator of the Qalipu First Nation's interest in becoming actively involved in training. Qalipu First Nation's Newdock acquisition is intended to pay immediate returns to the for social and cultural programming and is an investment in sustainable economic development for the communities. To support ambitious growth in the blue economy, a large talent pool will be required, and the Newdock ownership group intends to provide training and employment opportunities for young people[147].

MIAWPUKEK FIRST NATION

Miawpukek First Nation's Training and Economic Development Department (TEDD) has a mission "To provide education, training programs and services for the Miawpukek First Nation members that enhance their quality of life by increasing employability in the First Nation and broader labour markets. This will be provided in a professional, fiscally responsible and culturally sensitive manner.[148]"

NUNATSIAVUT GOVERNMENT

The NG places a high priority on skills and training in the environmental field as is evident in its recently released climate action plan. 'Culture & Education' is one of the 7 pillars of the plan, with a key guiding principle being that 'enhancing education to include more climate change curriculum and programming will build capacity in our communities, foster leadership skills, and ensure that we are integrating diverse perspective in our climate change adaptation initiatives.[149] Moreover, the NG has led a variety of different training initiatives in recent years. In 2021 it launched its Youth Energy Training Initiative (YETI) with a goal 'to ensure that Nunatsiavut beneficiaries possess the skills, knowledge, and educational background necessary to lead sustainable energy transitions in their own communities'. The objective of YETI is to lessen NG's reliance on external contractors and encourage local economic development in their communities[150].

[145] https://qalipu.ca/qalipu/wp-content/uploads/2021/03/QFN%20Strategic%20Plan%202020%20-%202029%20QM-POL-015_Rev_0_02172021.pdf

[146] https://www.cbc.ca/news/canada/newfoundland-labrador/qalipu-dob-academy-world-energy-gh2-partnership-1.6839607

[147] https://newdock.nf.ca/wp-content/uploads/2024/12/240926-Newdock-Press-Release.pdf

[148] https://mfngov.ca/tedd/

[149] https://nunatsiavut.com/wp-content/uploads/2025/03/ADAPT-NUNATSIAVUT.pdf

[150] https://nunatsiavut.com/department/nunatsiavut-secretariat/policy-and-planning-2/

INNU NATION

IDLP, the economic arm for the Innu of Labrador, has a focus on Innu employment across all job levels. The IDLP implements training initiatives for Innu people with all contractors and subcontractors[151]. The Uinipeku Expedition is an example of such an initiative. The interdisciplinary research program consists of dive surveys, water sampling (nutrients and eDNA), CTD casts, deep sea dive surveys, ROV surveys, beach and coastal environment surveys, multi-beam mapping, drifter deployments, and seabird and marine mammal observations. Innu youth take part in as many aspects of this research as possible[152].

NUNATUKAVUT COMMUNITY COUNCIL

The NCC launched a new NunatuKavut Inuit Education Action Plan called Ikupiatsik at its 2020-2021 Annual General Assembly. This action plan sets out some clear initiatives under three categories: redressing, reclaiming, and revitalizing. NCC is working with an education consultant to develop a template that will guide curriculum development centered around NunatuKavut Inuit history, culture and tradition[153].

TRAINING PARTNERSHIPS

LABRADOR ABORIGINAL TRAINING PARTNERSHIP (LATP)

The LATP is an incorporated, non-profit organization that is a partnership between the three Labrador Aboriginal groups: Innu Nation; NG; and NCC. The LATP was officially launched March 8, 2010 and since that time has assisted over 2000 Aboriginal clients to explore their career choices and paths, and over 1400 of those clients have been successful in finding employment. The LATP goals include providing quality employment for Aboriginal people in the Natural Resource Sector and training and workplace experience to secure long term, sustainable jobs in natural, resource based and spin-off industries. The LATP facilitates training programs in partnership with the College of the North Atlantic and others, provides funding for students to attend training and wage subsidies to employers to facilitate the hiring of their clients, and cultural awareness workshops for businesses and other organizations providing a valuable opportunity for organizations and businesses to gain enhanced awareness and understanding of cultural practices and variances when working with Aboriginal groups[154].

TRAINING AND TUITION ASSISTANCE INITIATIVES

Indigenous groups in NL use federal programs from Indigenous Services Canada (ISC) and Employment Services and Development Canada (ESDC) to administer programs to the benefit of their people. Through ISC, First Nations take advantage of the Post-Secondary Student Support Program (PSSSP) which provides financial assistance to First Nations students who are enrolled in eligible post-secondary programs. First Nations are responsible for determining the selection criteria and funding allocations in accordance with the provisions of their funding agreement and national program guidelines. Eligible costs covered by the program can include: tuition; books; travel support; and living allowances[155]. Through ESDC, several groups take advantage of the Indigenous Skills and Employment Training Program (ISETP) which is designed to help Indigenous people improve their skills and find employment. The ISET Program provides funding to Indigenous service delivery organizations that design and deliver job training services to First Nations, Inuit, Métis and urban/non affiliated Indigenous people in their communities[156].

[151] https://innudev.com/who-we-are/about-idlp/

[152] https://www.uinipekuexpedition.ca/

[153] https://nunatukavut.ca/educational-programs/

[154] http://www.latp.ca/home/

[155] https://www.sac-isc.gc.ca/eng/1100100033682/1531933580211

[156] https://www.canada.ca/en/employment-social-development/programs/indigenous-skills-employment-training.html

INDIGENOUS SKILLED TRADES OFFICE

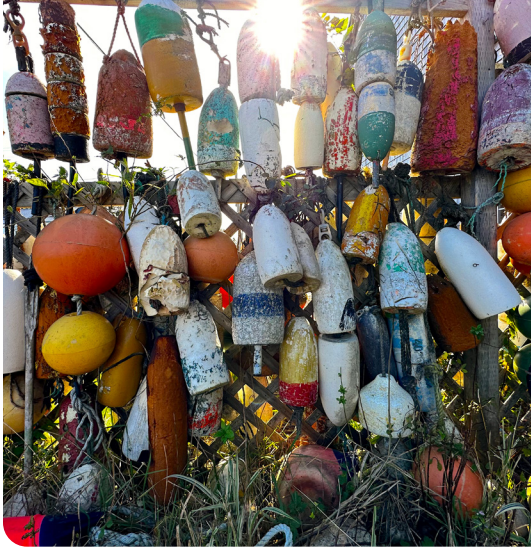
Trades NL is an umbrella labour organization which promotes and coordinates the interests of 14 building and construction trades unions and their international affiliates operating in NL. Its Indigenous Skilled Trades Office seeks to: create new employment opportunities for Indigenous apprentices and journeypersons; increase apprenticeship completion rates; and foster greater commitment and participation of employers and unions. The goals of the office – which has locations in Happy Valley-Goose Bay, Corner Brook, and St. John's – are to create employment opportunities, overcome barriers and enhance supports in the workplace. Services provided at all three offices for Indigenous jobseekers include: job search; company connections; resume writing; apprenticeship navigation; union navigation; wage subsidy application assistance; interview and exam preparations; and support for disability disclosure[157].

MI'KMAQ ALSUMK MOWIMSIKIK KOQOEY ASSOCIATION (MAMKA)

MAMKA is an Indigenous non-profit Mi'kmaq organization, comprised of 50% MAMKA South located at Miawpukek First Nation in Conne River, NL and 50% Qalipu First Nation in Corner Brook, NL. While primarily an organization that focuses on ocean research, MAMKA leads many community and youth engagement activities. In October 2025, MAMKA commenced construction on the Little River Learning Centre at Arran's Back Cove, Little River. This will be a dedicated space for youth engagements in coastal/marine stewardship, cultural learning, and environmental education through experiential learning activities[158].

MARINE INSTITUTE AND QIKIQTAALUK CORPORATION

It is worth highlighting MI's partnership with the Qikiqtaaluk Corporation (QC). MI and QC are moving forward with their shared goals to foster opportunity, innovation, and capacity in ocean education, research, and technology. In May 2025, MI formalized a five-year Memorandum of Understanding with QC. The agreement paves the way for enhanced cooperation and innovation in the Qikiqtani Region. The new agreement outlines opportunities for collaboration in several areas. The first objective is to develop joint research opportunities in the Qikiqtani Region, Arctic gateway, and the Northwest Atlantic. On the learning side, MI and QC will optimize education and training programs for Inuit in the region while also engaging youth in career insights; experiential learning programs; and diploma, undergraduate, and graduate studies[159]. While the QC is based in Nunavut, there may be transferable opportunities in NL given the important role MI plays in the province.



QIKIQTANI FUTURES

The Qikiqtaaluk Corporation Fisheries Division (QCFD) has partnered with the Canadian Hydrographic Service, a division of Fisheries and Oceans Canada, Miawpukek Horizon Maritime Services, and other partners, to offer the first eight-week paid research internship in July-August 2025 for Inuit youth ages 18 to 30 onboard the vessel, the Polar Prince. The internship provides hands-on work experience at sea, marine training, and mentoring to prepare a group of Inuit youth from the Qikiqtani Region of Nunavut for careers and future employment in the fisheries and marine sector in the Eastern Arctic[160]. The Polar Prince is owned by Miawpukek First Nation and Horizon Maritime Services Ltd.; it is a former Canadian Coast Guard ice breaker that can be chartered by scientific organizations and non-governmental organizations to conduct research, training, and data collection at sea.

[157] https://innudev.com/who-we-are/about-idlp/

[158] https://www.uinipekuexpedition.ca/

[159] https://nunatukavut.ca/educational-programs/

[160] http://www.latp.ca/home/

INTERNSHIP PROGRAMS

In recent years, federal government funding from various departments including Natural Resources Canada, Environment and Climate Change Canada, ESDC, and others has been targeted to support internships for Indigenous youth. For example, the Fisheries and Marine Institute (MI) of the Memorial University of Newfoundland and Labrador ran its International Aboriginal Youth Internships initiative (IAYI) through Global Affairs Canada funding which connected Indigenous youth in Canada with international work opportunities through a 12 week, full-time, paid virtual internship. Throughout the program, interns contributed to international research projects at Memorial University and Parkland College, work with international partners, learn from Indigenous leaders in Canada, and connect the global work interns are doing with Canadian and local community issues[161].

Federal departments have partnered with many different organizations across Canada to provide wage subsidies for youth and new graduates with a special interest in supporting Indigenous participants through additional funding. Participating organizations have included ECO Canada, Pinnquak, Electricity and Human Resources Canada, Clean Foundation, Biotalent Canada, Information and Communications Technology Council, Canadian Agricultural Human Resources Council, Mining Industry Human Resources Council, Clear Seas, and more[162]. Indigenous peoples in NL were eligible to participate in these programs but, as these were national or regional programs, they were not specifically designed for them.

Overall, the remoteness of communities can be a barrier in training and professional development. For example, given the isolation of communities in the LISA, the NG notes that it is significantly more difficult for its residents to access opportunities for education and training than those living outside the LISA. The commercial fishery is thus one of the most viable options for employment and economic opportunities in the LISA.[163]

CANADIAN INITIATIVES

A wide array of different training and professional development initiatives exist across Canada. For example, Clear Seas is developing and delivering its 'Shipping and Ocean Conservation Integration (SOC-I) Program' – an emerging initiative to support First Nations communities in exploring the intersection between marine shipping and ocean conservation. The project will provide an opportunity for First Nations voices to be heard while simultaneously cultivating a relevant research environment for these communities[164].

Marine Transportation Decarbonization Skills and Training Needs in NL

Based on an overview of marine transportation decarbonization technologies and pathways for different vessel categories in NL, the following have emerged as skills and training needs.

GENERAL CONCEPTS IN MARINE TRANSPORTATION DECARBONIZATION

Marine transportation decarbonization is a long-term pursuit which will take place over the course of several decades. It will occur incrementally with a mix of a variety of different technologies. It is a subject which is not well understood in NL, however the availability of new data and the MEIT will be helpful in determining and communicating challenges and opportunities. Training and professional development on the general concepts and considerations associated with marine transportation decarbonization will build capacity within the sector and serve to accelerate the process.

[161] https://shorturl.at/NExH6

[162] https://econext.ca/green-jobs-programs/

[163] https://nunatsiavut.com/wp-content/uploads/2021/05/NG-Commercial-Fishery-Designation-Policy.pdf

[164] https://clearseas.org/soc-i-shipping-and-ocean-conservation-integration-program/

VESSEL OPTIMIZATION

As it is estimated that between 4-16% of GHG emissions reductions in marine transportation can be achieved through vessel optimization – owners, operators, and crew should be well aware of the opportunities that exist. Many of these activities relate to energy efficiency and changes in habits and processes (i.e., not just new technology or equipment modification). Since more efficient fuel use also means reduced costs, there should be interest on behalf of stakeholders to learn more. This training would be particularly relevant for smaller operations which would likely not have the benefit of company-led programs.

HANDLING AND SAFETY OF ALTERNATIVE FUELS

In the medium to long term, low-carbon fuels like ammonia, methanol, hydrogen, etc. are likely to be adopted by owners/operators in international shipping. Pilot and demonstration projects are possible in the short term. These low-carbon fuels require technical and operational measures for accident prevention due to risks related to fire, explosion and inhalation of gases. While these fuels are used in other aspects of NL's economy (i.e., ammonia for ice hockey rinks, hydrogen in renewable diesel production), broader training relating to the handling and safety of these fuels will be required.

ELECTRIFICATION AND PORTS

While providing electricity dockside may be a low-hanging fruit in marine transportation decarbonization, more work is required to prioritize and implement these opportunities. Port owners, operators, and workers know their logistics best and what will work (and not work) as it pertains to the installation and implementation of new infrastructure. To engage in these discussions, these stakeholders need a thorough understanding of what is involved in the adoption and operations of shorepower.

FUEL BLENDING

The blending of fuels is a near-term decarbonization opportunity in almost all marine transportation categories. NL should build its research, development, and deployment capabilities related to fuel blending. This can include training and professional development for targeted audiences – from vessel owners and operators, to port workers, to fuel producers and suppliers, to testing facilities, etc. Building these skills within the province would align with other energy production and use opportunities in the province (i.e., electricity generation, heavy industry, etc.), making the effort cross-sectoral.

PROCUREMENT

Decisions on vessel refits, purchases, fuel supply, and logistics are critical in marine transportation decarbonization. In some categories, these decisions are made within NL. The public and private sectors are involved in these decisions, in addition to Indigenous groups. Professional development on the impact that these seemingly routine choices can have on the economy and environment can help to accelerate marine transportation decarbonization in NL.

Conclusions

An overview of training and workforce development programs in Canada focused on marine transportation, the training approaches and activities of Indigenous Nations in NL, and identified skills and training needs in NL relating to marine transportation in NL suggests a number of findings:

1. It is evident that post-secondary programming in Canada does not include marine transportation decarbonization as the focal point of programming or courses. As marine transportation decarbonization is a niche and relatively 'new' area of study, it is not surprising that dedicated programming is not front-and-centre at post-secondary institutions. This is not to say that the fundamentals and key concepts of marine transportation decarbonization have not been incorporated into existing programming and courses. Further research is required to ascertain the level of which this has occurred.

2. There is not a wealth of micro-credential / upskilling programming available in Canada focused on marine transportation decarbonization. There appears to be an opportunity to fill this gap.

3. Each Indigenous Nation in NL has a focus on providing training and professional development for their people. In some cases, partnerships exist or are in development to advance training initiatives related to the environment, oceans, and/or clean energy. While there are no programs that focus specifically on marine transportation decarbonization, the subject is a combination of each of these three areas and therefore may present future training and professional development opportunities.

4. While each Indigenous Nation is unique, it would be a valuable exercise to understand different training and professional development initiatives (specific to marine transportation) that exist across Canada that Indigenous Nations are involved in. These examples could be learned from, borrowed from, leveraged, and/or replicated to the benefit of interested rightsholders in NL. Meanwhile, there are examples of effective programming in NL that might be of interest to Indigenous Nations in other part of Canada.

5. Areas emerging as training needs in NL include: vessel optimization; handling and safety of alternative fuels (in the marine context); vessel electrification and port infrastructure; fuel blending (in the marine context); and procurement (in the marine context).

6. Marine transportation decarbonization is an emerging field, with pathways yet to be decided upon in many areas. While target audiences could greatly benefit from marine transportation decarbonization training, these are the same audiences that are key to informing strategies as they will be most familiar with the barriers that will need to be overcome. Therefore, training and workforce development efforts should be simultaneously viewed as opportunities for engagement and designed to accomplish valuable consultation.

Recommendations

Through the course of this research, 20 distinct observations were made which inform the resulting recommendations.

Summary of Findings

1. Many Indigenous people are employed by the fishery industry, and most of the Indigenous Nations in NL are owners and operators of fishing vessels – from boats to trawlers. This is the segment of marine transportation within which Indigenous communities are most engaged.

2. Vessel ownership and operation is not limited to the fishery. Indigenous Nations in NL own vessels involve in freight and passenger services, science and research, and have interests in companies that own tanker sized vessels (e.g., crude oil, bulk) and specialized tugs.

3. Indigenous people in NL are also heavily engaged in marine science and research, supply and logistics, and vessel repair and maintenance.

4. Container ships contributed 26% of all marine transportation GHGs for NL in 2023. NL will not influence the decarbonization decisions made by large international shipping companies, however it should pay close attention to developments to ensure that it is able to supply these vessels with the fuels that they will demand in order to (a) enable decarbonization and (b) support domestic low-carbon fuels producers.

5. Bulk shipping contributed 20% of all marine transportation GHGs for NL in 2023. NL should engage with those shipping bulk cargo (i.e., iron ore, nickel) to influence or understand plans to (a) enable decarbonization and (b) support domestic low-carbon fuels producers.

6. Ferries contribute 21% of all domestic marine transportation GHGs in NL. Federal and provincial governments are owners, operators, and/or contractors of these services. Therefore, there is a direct opportunity for Canada and NL to control future decisions that impact the environment and the economy.

7. Tankers and offshore supply ships make up 25% of NL's marine transportation GHGs. Much of the traffic of these vessels is within NL jurisdiction. There may be an opportunity to develop a decarbonization strategy that supports local low-carbon fuel producers while supporting the reduction of GHGs in NL's offshore oil and gas supply chain.

8. A low-hanging fruit in marine transportation decarbonization in NL is reducing 'berthed' or hoteling GHGs – which were estimated to be 8% of all sector GHGs in NL in 2023. NL is an ideal location for shore power given its 90%+ clean electricity grid. Shoreside infrastructure is a key enabler of marine transportation decarbonization and is within NL's direct control to provide. More research is required to better understand the demand and supply particulars in vessel electrification.

9. While different decarbonization pathways exist for each vessel type, one commonality with most is the potential that fuel blending presents. More focus needs to be placed on testing and trialing fuel blends in NL. This can begin with low-carbon fuels that are already produced in the province (i.e., renewable diesel) and advance to include hydrogen and its derivates in the future. This also creates an opportunity for local biofuel production. To achieve the above, a focus must be placed on local research, development, and training around fuel blending.

10. More research is required to better characterize emissions relating to the fisheries, ferries, and intra-provincial shipping.

11. While not every Indigenous Nation in NL has in place a formal environment / climate change plan or policy, each values the natural environment to a great degree and wishes to protect it.

12. While the level of involvement differs between Indigenous Nations, each has a strong relationship with the ocean whether that be through research and environmental monitoring, protection, fisheries, or other commercial interests.

13. Each of the Indigenous Nations has stated interests in being a partner – if not a driver – of green economic development in NL. From wind, to solar, to hydro, to hydrogen – Indigenous Nations want to be part of the energy transition.

14. There are common references to the environment, the ocean, and clean energy. However, there are no specific references to marine transportation decarbonization – which could be considered a combination of all three.

15. It is evident that post-secondary programming in Canada does not include marine transportation decarbonization as the focal point of programming or courses. As marine transportation decarbonization is a niche and relatively 'new' area of study, it is not surprising that dedicated programming is not front-and-centre at post-secondary institutions. This is not to say that the fundamentals and key concepts of marine transportation decarbonization have not been incorporated into existing programming and courses. Further research is required to ascertain the level of which this has occurred.

16. There is not a wealth of micro-credential / upskilling programming available in Canada focused on marine transportation decarbonization. There appears to be an opportunity to fill this gap.

17. Each of the Indigenous Nations in NL has a focus on providing training and professional development for their people. In some cases, partnerships exist or are in development to advance training initiatives related to the environment, oceans, and/or clean energy. While there are no programs that focus specifically on marine transportation decarbonization, the subject is a combination of each of these three areas and therefore may present future training and professional development opportunities.

18. While each Indigenous Nation is unique, it would be a valuable exercise to understand different training and professional development initiatives (specific to marine transportation) that exist across Canada that Indigenous Nations are involved in. These examples could be learned from, borrowed from, leveraged, and/or replicated to the benefit of interested rightsholders in NL. Meanwhile, there are examples of effective programming in NL that might be of interest to Indigenous Nations in other part of Canada.

19. Areas emerging as training needs in NL include: vessel optimization; handling and safety of alternative fuels (in the marine context); vessel electrification and port infrastructure; fuel blending (in the marine context); and procurement (in the marine context).

20. Marine transportation decarbonization is an emerging field, with pathways yet to be decided upon in many areas. While target audiences could greatly benefit from marine transportation decarbonization training, these are the same audiences that are key to informing strategies as they will be most familiar with the barriers that will need to be overcome. Therefore, training and workforce development efforts should be simultaneously viewed as opportunities for engagement and designed to accomplish valuable consultation.

Recommendations

While there are many different actions that could be gleaned from the contents of this report, the focus of the following recommendations are on training and workforce development – with a particular consideration given to Indigenous Nations.

1. Undertake additional primary research to gain enhanced understanding of Indigenous Nation perspectives on marine transportation decarbonization.

2. Deliver 'General Concepts in Marine Transportation Decarbonization' upskilling course – like that which the Marine Institute has developed – across Canada to address what has been identified as a clear gap.

3. Develop and deliver upskilling courses focused on: (1) vessel optimization; (2) handling and safety of alternative fuels (in the marine context); (3) vessel electrification and port infrastructure; (4) fuel blending (in the marine context); and (5) procurement (in the marine context).

4. Identify training and workforce development initiatives (specific to marine transportation) that exist across Canada that Indigenous Nations lead or are partners in. This listing will outline potential opportunities for collaboration in the delivery of programming specific to marine transportation decarbonization.

5. Where possible, partner with existing Indigenous training and workforce development initiatives to deliver content of particular relevance to individual communities.

6. As marine transportation decarbonization is an emerging field, training providers should use course delivery as an opportunity for stakeholder consultation and engagement to enrich collective understanding of marine transportation decarbonization challenges, opportunities, and barriers in Canada.

7. Review marine-focused post-secondary curriculum in NL to ensure appropriate inclusion of marine transportation decarbonization concepts.

8. Undertake research to more concretely outline Indigenous Nations' participation in commercial fisheries, shipping, and ferry services in NL. These are areas which feature Indigenous interests and require better characterization in terms of emissions reduction opportunities. This research would inform future workforce development initiatives.

9. Indigenous Nations have an opportunity to play a catalytic role in the advancement in the research, development, piloting, and adoption of marine decarbonization technologies. For example, as owners of both vessels and dockyards, Indigenous groups could undertake retrofits and build training and workforce development programming around these efforts. This would position Indigenous groups as leaders in marine transportation decarbonization in NL, aligning with priorities Indigenous Nations have around climate change, the environment, and the green economy. Respect for Mother Earth is inherent in Indigenous ways of knowing, being, and doing.

While most of these recommendations are meant to be specific to NL, most (if not all) have potential to be applied throughout Canada.

Conclusion

NL will not be able to achieve its goal of net zero by the year 2050 without addressing GHGs that stem from marine transportation.

The availability of new data has enabled a more in-depth analysis of the specific sources of GHGs in various marine transportation categories. This has allowed for the prioritization of certain vessel segments and an improved understanding of what technologies are most probable to be adopted in each setting.

Indigenous Nations in NL are actively involved in marine transportation in the province through the commercial fishery, the ownership of a variety of different types of vessels and participating in ocean industry supply chain and services. Indigenous Nations, therefore, have the potential to play an important role in marine transportation decarbonization in NL – a prospect aligns with their respective views on climate change, the environment, and the green economy.

There is an evident gap in the provision of training and workforce development programming in Canada specific to marine transportation decarbonization. There is an opportunity to develop and deliver programs – in collaboration with Indigenous groups – which catalyze marine transportation decarbonization action and help NL meet its net zero objectives.

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