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IMPLICATIONS FOR ATLANTIC CANADA'S ECONOMY IN THE PURSUIT OF NET-ZERO EMISSIONS

The Long Haul to Clean Commercial Transportation

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Highlights

- > Reaching net-zero emissions requires reducing emissions from freight transportation, which represents 10% of our region's total emissions. Trucks, marine vessels, trains, and planes are harder to decarbonize than light-duty vehicles. Medium- and heavy-duty vehicle emissions were down across the region in 2023 compared to 2005, but this seems to be mainly due to fewer kilometres driven rather than cleaner fuels usage or electrification.
- > Commercial goods transport is vital to Atlantic Canada's economy. Its direct contribution to the region's total economic output was about 3% in 2023. However, the sector's economic importance is much bigger as it facilitates the movement of all goods. Climate policies targeting transportation must be carefully managed to avoid economic disruptions.
- > Greater adoption of cleaner fuels is currently the main solution to reduce emissions in this sector. Some options include biofuels, renewable natural gas and hydrogen. However, the high cost of these fuels and their limited availability are slowing the transition. Many transport assets are capital-intensive with long lifespans, making early fleet replacement costly. Electrification is presently infeasible for most long-haul modes due to battery weight, limited range and sparse charging infrastructure..
- > Innovative projects are underway in Canada to advance cleaner freight transportation. Many of these are in the early development stages. We highlight a few initiatives including an electric lobster fishing vessel, hydrogen locomotives, airport hydrogen hubs and electric hybrid trucks. Governments should assess whether support for innovation in zero-emission commercial transport technologies is sufficient, strengthening financial incentives and partnerships where gaps exist.

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The Atlantic Economic Council is the source for independent research, providing the insights and ideas that are vital to supporting a healthy, inclusive and sustainable Atlantic Canadian economy.

Introduction

Freight transportation accounts for about 10% of total emissions regionally and 7% nationally. These modes include trucks, marine vessels, trains, and planes. They are much harder to electrify at scale than light-duty vehicles. Battery-electric trucks are becoming a viable option for short to medium routes but are not yet practical for longer routes due to weight, range limitations and charging time. Long-haul ships, trains and planes require more energy than current battery technology can store.

Cleaner fuels are currently the most viable option for reducing freight transport emissions in Canada given electrification challenges. Some of these fuels include biofuels, renewable natural gas and hydrogen. However, shifting to cleaner fuels presents its own challenges. A limited fuel supply, high fuel costs and inadequate technological readiness are a few key hurdles.

The regulatory framework plays a crucial role in decarbonizing freight transportation. Businesses need confidence that climate regulations will remain consistent over time to justify high-cost, long-term investments in greening their fleets. This consistency is also necessary between jurisdictions, as many companies operate across borders. Major climate policy actions must be carefully managed to avoid economic disruptions.

This report is part of the Atlantic Economic Council's [net-zero series](#), which examines the economic opportunities, challenges and risks during this transition. It highlights the importance of the commercial transport sector to the Atlantic economy and key obstacles to reducing emissions within it. Our focus is primarily on medium and heavy-duty transportation modes that carry goods, rather than passengers. A previous report explored the climate policies and economics of electric [light-duty vehicles](#).



Economic importance of the transportation sector

Atlantic Canada’s diverse transportation network is essential to its economy and connectivity. Major ports like Halifax, Saint John, Belledune, and St. John’s, handle significant cargo volumes. Halifax is Canada’s fourth busiest port in terms of container cargo, while Port of Saint John ranks third by volume. The region’s seven National Airport System airports support air cargo operations. Canadian National Railway provides key freight services, including a dedicated corridor linking Labrador’s iron ore mines to the Quebec’s Port of Sept-Îles. Canadian Pacific Kansas City connects the Port of Saint John to North American markets via its partnership with New Brunswick Southern Railway.

The transportation sector directly contributed nearly \$3.4 billion, or 3%, of the region’s Gross Domestic Product (GDP) in 2023. Its share of GDP is up 0.2 percentage points from 2022 but remains 0.5 percentage points below the 2019 level. The transport and warehousing sector employed over 55,000 Atlantic Canadians, up by 4,000 from 2022.

However, these numbers understate the economic importance of this sector. Transportation plays a key role in supporting all sectors by facilitating the movement of all goods, whether raw materials, inputs and intermediate products, or final goods. It thereby enables two-way trade, connecting our region to suppliers and customers across Canada and around the world. Atlantic Canada’s interprovincial and international import and export of goods totaled \$126 billion in 2023.

New Brunswick has the region’s highest transport GDP share, while Newfoundland and Labrador leads in job share 2023

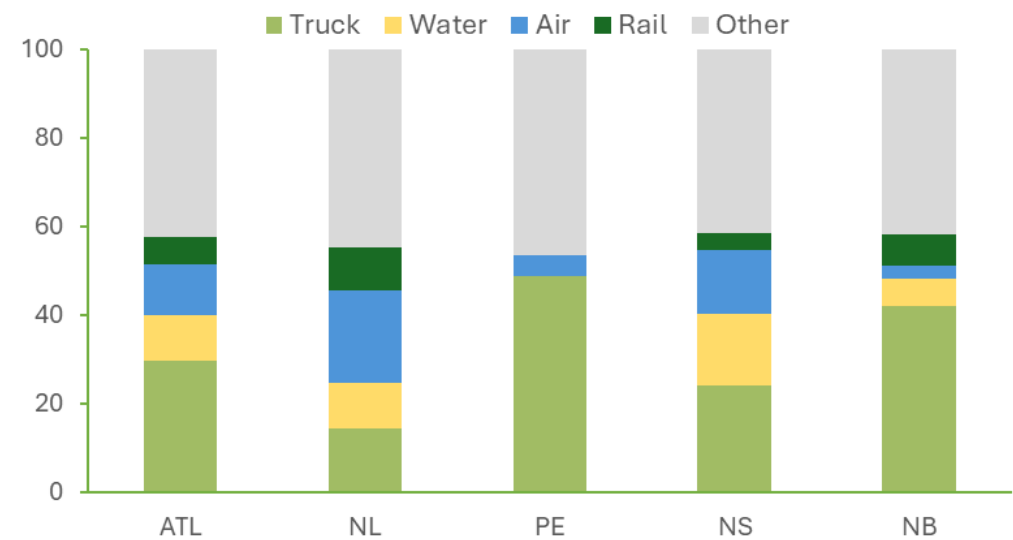
	Transportation	Transportation and warehousing	
	Share of real GDP (%)	Employed	Share of total jobs (%)
NB	3.7	19,000	4.9
NS	2.7	21,900	4.3
NL	2.7	12,900	5.4
PE	1.8	2,500	2.8
ATL	2.9	56,300	4.6

Sources: Statistics Canada: GDP at basic prices, Statistics Canada: Labour force characteristics by industry

Trucking is the dominant transport GDP and employment driver. It contributed 30% of the sector’s GDP regionally in 2023. Transport truck driver was the largest occupation in the sector, employing 10,400 Atlantic workers in 2023 and representing nearly 19% of sectoral employment. Air is the fastest-growing transport sub-sector over the past decade, increasing its GDP share from 7% in 2013 to over 11% in 2023. Aircraft mechanics and inspectors have rapidly expanded, with employment rising 220% regionally over the same decade.

The four primary modes of transport collectively represent over 50% of sectoral economic output

Share of transportation sector’s GDP by mode, 2023 (%)



Note: “Other” combines subsectors that are not the four primary modes of transport, such as transit, pipelines, and scenic transportation.
Source: [Statistics Canada](#)

Trucking is the primary mode of moving consumer products, food, fuel and industrial supplies. It supports deliveries for industries like manufacturing, wholesale and retail. Trucking generated \$4.9 billion in revenue regionally in 2019. All Atlantic provinces saw an increase in real trucking revenue from 2010-2019. Prince Edward Island had the highest growth rate at 32%. Truck crossings between Canada and the US increased 1.3% in 2023 but remain 1.3% below 2019 levels.

Water transport is essential for Atlantic Canada's international trade. It is the main mode for exporting bulk commodities like energy products and minerals, which generate some of the region's highest trade revenues. Boats handled the largest freight volumes compared to air and rail in 2023. Halifax is the region's primary container port, handling almost 550,000 TEUs in 2023, a slight decrease from its peak of 600,000 TEUs in 2022 but still above pre-2020 levels. Port Saint John is Atlantic Canada's largest port by tonnage and the second fastest growing container port on North America's East Coast. It nearly tripled container volume from 57,000 TEUs in 2017 to 154,000 TEUs in 2023, driven by increasing trade activity and port expansion.

Atlantic Canada's reliance on marine and air transport for freight is growing

	Marine			Rail			Air		
	Tonnes (000)	Growth rate (%)		Tonnes (000)	Growth rate (%)		Tonnes (000)	Growth rate (%)	
	2023	2019-23	2022-23	2023	2019-23	2022-23	2023	2019-23	2022-23
CA	351,100	0.9	3.4	119,350	-7.8	-1.8	1,430	4.2	-2.6
ATL	41,200	8.7	1.7	2,750	-0.1	-7.1	46	26.2	4.7
NL	1,400	-18	0	x	x	x	12	10.4	-9.5
PE	x	x	x	x	x	x	0.1	-52	27
NS	9,900	15	2.1	1,030	-2.4	-14	34	34	11
NB	29,900	8.3	1.7	1,720	1.4	-2.3	x	x	x

Note: x = data are suppressed or non-existent. Atlantic totals are sum of available provincial data. Trucking tonnage data are unavailable.

Sources: Air cargo traffic at Canadian airports, Cargo Tonnage Handled by Canada Port Authorities (CPAs), Volume of Rail Exports and Imports.

Air transport is the fastest way to move cargo over long distances. It is vital in exporting high-value and perishable goods. Our seafood exports, like live lobster, depend on air transport for rapid delivery outside of North America. Air transport also facilitates the export of industrial machinery, aircraft parts and electronic components. These goods rely on just-in-time supply chains and contribute to high-margin trade that strengthens our region's competitiveness.

Rail is key for cost-effective bulk shipping. It supports industries that rely on long-distance, high-volume logistics, such as forestry, energy and agriculture. It plays a crucial role in moving raw materials to processing facilities and ports.

Emissions snapshot

Transportation is Atlantic Canada’s largest emissions source at about 35% of overall emissions in 2023. This includes freight and passenger emissions together. Light-duty vehicles represent the bulk of emissions in this sector. Medium- and heavy-duty vehicles are the second largest source of transportation emissions in the Maritime provinces. Marine vessels rank second in Newfoundland and Labrador.

Emissions from medium- and heavy-duty vehicles are down in all four provinces from 2005 to 2023. Lower kilometers driven seems to be primarily driving this trend rather than cleaner fuels. Hardly any heavy trucks are electric nationwide. The direction of change in marine, aviation and rail emissions since 2005 vary by province.

All Atlantic provinces have larger shares of freight transportation emissions than nationally

Transportation sector emissions, 2023

	CA	ATL	NL	PE	NS	NB
Share of total emissions (%)						
Light-duty vehicles	12	20	20	30	22	16
Medium- and heavy-duty vehicles	5.8	5.9	5.7	5.7	6.8	5.2
Marine	0.5	3.9	7.8	4.4	3.0	2.1
Aviation	1.2	1.9	3.4	1.9	2.0	0.9
Railways	0.9	0.6	1.3	0	0.3	0.7
Freight transportation						
Megatonnes of CO ₂ e	48	3.5	1.2	0.2	1.3	0.9
Share of total emissions (%)	6.9	10	15	11	10	7.6
Change in emissions from 2005 (%)	0.6	-25	-23	9.1	-17	-40

Notes: The individual modes include passenger and freight emissions collectively. Freight transportation includes medium- and heavy-duty trucks, rail, aviation and marine. Emissions from off-road and pipeline transportation are excluded from this table as they are not a focus of our report.

Source: [Environment and Climate Change Canada: National Inventory Report](#).

Challenges in decarbonizing commercial transport

Transportation is a costly and difficult sector to decarbonize. Internationally, the sector is not on track to meet the International Energy Agency's (IEA) net-zero by 2050 scenario. Road freight, shipping, and aviation are among the hardest modes to decarbonize mainly due to slow technology deployment and high energy demands. Rail is the most electrified transport subsector globally with electric trains account for 55% of rail freight movements.

Canada does not have any electric freight trains in service. Our rail network covers long distances with low population density, making full electrification expensive and logistically challenging. Zero-emission medium- and heavy-duty trucks are in early adoption stages worldwide. Zero-emission vessels are mainly in pilot and demonstration phases. Deployment of electric or hydrogen aircrafts is unlikely at large scale for the foreseeable future.

Industry and policymakers are currently targeting greater use of cleaner fuels to reduce the carbon footprint of commercial transport. The federal government's Clean Fuel Regulations mandate fuel suppliers to gradually lower the carbon intensity of gas and diesel. We explain these regulations in an earlier net-zero report. Continuing to fill tanks with fuels, other than hydrogen and its derivatives, will not eliminate transportation emissions. Maintenance capacity issues also need to be addressed to support the transition to cleaner transport solutions, including the availability of equipment and personnel.

High costs and limited availability of clean technologies are key decarbonization challenges across all modes. Businesses are reluctant to replace fleets early as many transport assets are capital-intensive and have long lifespans. A locomotive, for example, can cost several million dollars and operate for about 40 years. The average shipping vessel lifespan is 30 years.

Cleaner fuel alternatives remain expensive and, in many cases, not widely available. Sustainable aviation fuels are 1.2 to 7 times costlier than conventional jet fuel. Most hydrogen production projects are in the testing phase. Low emissions fuels are not expanding fast enough to meet the IEA's net-zero scenario.

Reducing emissions from commercial transport requires big investments in fuelling and charging networks. Canada only has six operational [hydrogen refuelling stations](#) with none in Atlantic Canada. The federal government is supporting [green shipping corridors](#), including investments in refuelling and charging infrastructure. However, these efforts are in early stages.

The [Port of Halifax](#) received funding under this program to accelerate development of the Halifax–Hamburg green shipping corridor. [EverWind Fuels](#) also obtained funding from the program to support infrastructure for green ammonia fueling and transport.

The shift to cleaner fuels and electrification in commercial transportation comes with many challenges

Heavy trucking	Marine	Aviation	Railways
<ul style="list-style-type: none"> > Limited availability of zero emission long-haul trucks > Impracticality of electric trucks for longer routes due to weight, range limits and charging times > Difficulty scaling up biodiesel while the supply potential of renewable natural gas requires further investigation > Operational limitations of biodiesel and renewable diesel at temperatures below -20°C > High cost of hydrogen fuel-cell trucks and fuel > Lack of charging and natural gas/hydrogen fuelling stations 	<ul style="list-style-type: none"> > Limited availability and high costs of low- and zero-emission fuels such as biogas, biofuels and hydrogen derivatives > High cost of retrofitting or buying vessels to use cleaner fuels > Limited port infrastructure for zero-emission fuel storage and refuelling > Logistical hurdles of getting zero-emission fuels from production sites to ports > Low energy storage capacity and recharging time constraints the viability of battery-electric long-haul ships 	<ul style="list-style-type: none"> > Sustainable aviation fuel (SAF) is much more expensive to produce than conventional fuels > SAF scalability is limited by feedstock availability and technology readiness > Battery weight makes electrifying large planes impractical > Hydrogen-powered planes are in early development stages 	<ul style="list-style-type: none"> > Natural gas use requires major modifications to diesel locomotives > Hydrogenation-derived renewable diesel is costly and in limited supply > Biofuels must be blended with petroleum due to supply limits, engine compatibility and cold weather performance > Catenary electric systems have high infrastructure costs > Hydrogen fuel cell and battery electric trains have low energy storage capacity and high costs

Note: The table includes examples of current challenges. It is not intended to be a comprehensive list of challenges now and into the future. These issues may evolve over time due to factors such as technology advancements, government policy changes and market dynamics.

Sources: [Pembina](#), [Freightera](#), [World Economic Forum](#) and [Boston Consulting Group](#), [Gray](#), [McDonagh et al.](#), [World Economic Forum](#) and [Kearney](#), [World Economic Forum](#) and [McKinsey & Company](#), [University of Pennsylvania](#), [Delphi Group](#) and [Pollution Probe](#).

Projects aiming to shape the future of clean transportation

Innovative projects are advancing across Canada to decarbonize transportation, despite challenges with clean fuels and electrification for medium- to long-haul routes. Some companies focus on energy efficiency, such as [MDS Coating](#). Others are advancing the use of clean fuels or electricity. For example, [Redrock Power Systems](#) is developing and commercializing hydrogen solutions for various transport types. We share several Canadian initiatives below that are working to drive clean fuels and electrification in commercial transportation.



[AKA Energy Systems – Hybrid fishing boat:](#) AKA Energy Systems in Prince Edward Island developed a hybrid fishing vessel, "Hybrid 1," which uses both electric power and diesel fuel. The boat was delivered to Passamaquoddy First Nation in New Brunswick in 2023. Hybrid 1 is a testament to AKA's expertise in hybrid propulsion systems, having previously designed larger hybrid vessels utilized worldwide. This vessel will be used for scientific research and fishing purposes.

[Oceans North – Electric lobster fishing vessel:](#) Oceans North, in partnership with Membertou, Allswater, and BlueGrid, is developing Canada's first all-electric lobster fishing vessel, the L'Ektrikel Walipotl. The boat will operate in Nova Scotia's waters. The provincial government committed \$250,000 to the project. The design phase is complete and construction will begin soon.

[Atlantic Towing - Vessel battery storage system:](#) Atlantic Towing, part of J.D. Irving, outfitted a multi-function platform supply vessel (MFPSV) with a battery system. The vessel now has a diesel electric hybrid system with battery integration. MFPSVs transport goods, crew and equipment to offshore platforms. The vessel's battery system could reduce 800 tonnes of emissions annually during operations in Newfoundland and Labrador. After successfully completing trials off Newfoundland's coast in 2022, Atlantic Towing is exploring pilot projects to operate MFPSVs solely on battery power.

Our net-zero report on [emerging clean technologies](#) highlights a few battery projects being developed in Atlantic Canada for marine use.



[Duxion Motors – eJet Motor:](#) Duxion Motors, based in Newfoundland and Labrador, patented an electric jet motor ("eJet Motor") designed to make high-speed electric aviation possible. It successfully completed a ground test of the motor, including low and high speeds. Duxion signed a \$500 million agreement with Dymond Aerospace to supply 200 eJet motors for cargo aircrafts.

Airbus Canada, P&WC and SAF+ Consortium – Sustainable aviation fuel (SAF): Airbus Canada, Pratt & Whitney Canada, and SAF+ Consortium are collaborating on a SAF project. The initiative aims to validate 100% SAF compatibility for an Airbus aircraft with Pratt & Whitney GTF™ engines and explore the feasibility of an e-SAF plant in Quebec. e-SAF is made using renewable energy, captured CO₂, and green hydrogen. The goal for the plant is an annual output of up to 100 million liters by 2028. Airbus is working toward its aircrafts being able to operate with 100% SAF by 2030.

H2CanFly, a federal non-profit launched in 2024, aims to position Canada as a global leader in hydrogen aviation. It unites industry, academia and government to advance hydrogen and electrification technologies, airport infrastructure and certification pathways.



CPKC – Hydrogen locomotives: CPKC is retrofitting diesel-electric freight locomotives with hydrogen fuel cells and batteries. It developed North America's first hydrogen-powered freight train, which made its first revenue move in 2022. It currently has three models in its hydrogen fleet. The two low horsepower models are in regular service in Alberta. The high horsepower locomotive is undergoing testing.

CN – Medium horsepower hybrid locomotive: CN, in partnership with Knoxville Locomotive Works, has launched a pilot project for a medium horsepower hybrid electric locomotive. It has a battery-diesel engine that is biofuel compatible. Testing began in January 2025 in the US, with plans to expand to Western Canada for cold-weather trials later this year. CN will evaluate fuel savings, emissions reductions and operational performance over the next 12 months. It may scale this technology for wider deployment if the project is successful.



Edison Motors – Electric hybrid trucks: Edison Motors, based in British Columbia, is manufacturing hybrid diesel-electric trucks designed for industries like logging and construction. The company has built two prototypes and is starting to scale up production. Edison plans to manufacture 10 new trucks in 2025 and a hybrid snowplow. It is also developing pickup truck retrofit kits, which it aims to sell to the general market at scale by end of 2025.

Unilia (Canada) Fuel Cells Inc. – Low-carbon hydrogen trucks: Unilia (Canada) in British Columbia is developing a hydrogen fuel cell-powered heavy-duty truck. The truck features a 500-kilometre range and less than 20-minute refueling time. The project is in final stages with road testing underway.

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info@atlanticeconomiccouncil.ca
www.atlanticeconomiccouncil.ca
X: @atl_econcouncil

Key takeaways

Governments

- > Work with the transportation industry to address technological, regulatory and economic challenges in transitioning to net-zero emissions by 2050, focusing on minimizing disruption in this important sector.
- > Assess whether support for innovation in zero-emission commercial transport technologies is sufficient, strengthening financial incentives and partnerships where gaps exist.
- > Facilitate the deployment of clean refuelling and charging infrastructure for freight through investments and partnerships with fuel providers, users and logistics operators.

Businesses

- > Engage with suppliers and logistics partners to assess how shifting to lower-carbon transport options would affect costs and supply chain efficiency.
- > Consider long-term fleet investment strategies that balance operational costs, emissions reduction goals and infrastructure availability.
- > Consult with your industry association to learn about government programs that can help your business transition to lower-emission fleet options.