Plugging In to Leadership:

Comparing Canadian Ports to Global Leaders in Shore Power Implementation

Prepared for:

OCEANS NORTH

September 2025

Project Overview

Oceans North is a non-profit organization supporting climate action and marine conservation. **Oceans North advances marine decarbonization across Canada,** which includes a strong focus on port electrification and the **adoption of shore power**.

Shore power enables vessels to shut down their auxiliary engines while at berth and draw electricity from port-side power supplies (typically the local electrical grid) to operate onboard systems such as lighting, ventilation, pumps, cargo handling equipment, and refrigeration. By replacing fossil-fuel combustion with cleaner electricity, shore power significantly reduces greenhouse gas (GHG) emissions and air pollutants.

Oceans North commissioned Dunsky Energy + Climate Advisors ("Dunsky") to conduct a **Shore Power Ecosystem Study** to identify key priorities for Canadian ports, the Federal government, utilities and other stakeholders to accelerate shore power implementation.

We are doing this work now to inform investments to support Canadian ports to develop new trade and passenger routes and provide a more globally competitive service. Jurisdictions that are equipped with effective shore power services will attract fleets that are compliant with forthcoming regulations by the International Maritime Organization (IMO) as well as commitments by the Cruise Lines International Association (CLIA), the world's largest cruise industry trade association. Beyond attracting ships, increasing shore power services and uptake will improve local air quality and reduce GHG emissions.

The report below summarizes the first phase of this project, **benchmarking Canada's five busiest ports with five international leaders in shore power deployment**. Later in 2025, a broader *Shore*

Power Ecosystem Study report will be released. This work will: forecast emissions reduction potential and the electrical power capacity requirements for shore power; feature case studies of Canadian ports; and provide recommendations to catalyze the transition to near-universal adoption of shore power at Canadian ports by 2035.

Context

- **Shore power offers a powerful emissions reduction tool, capable of eliminating vessels' air pollutant and GHG emissions at berth.** Using shore power significantly reduces emissions compared to conventional on-vessel power supplies. In the future, ships using zero and near-zero (ZNZ) fuels will benefit from the cost-savings and in some cases air pollution reductions associated with renewable electricity vs. ZNZ fuels.
- **Shore power demand is poised to grow pursuant to the International Maritime Organization (IMO's) 2023 *Strategy on Reduction of GHG Emissions from Ships* ("*IMO GHG Strategy*") and the forthcoming *IMO Net-Zero Framework* regulations.** The *IMO GHG Strategy* targets a 40% reduction in the average carbon intensity of international shipping by 2030, as well as a total GHG emissions reduction of 70% by 2040 and net zero by 2050. As of 2023, ships must report their Energy Efficiency Existing Ship Index (EEXI) score and their annual operational carbon intensity indicator (CII) rating. In April 2025, the IMO's Marine Environment Protection Committee adopted the *IMO Net-Zero Framework*, with proposed regulations including a declining GHG Fuel Intensity (GFI) standard and a global pricing mechanism for GHG emissions. These measures are anticipated to be formally adopted in October 2025 and enter into force in 2027. **This regulatory framework will increasingly reward ships that connect to shore power at berth, and in turn drive demand for shore power at Canadian ports to ensure long-term competitiveness.**
- **Canadian ports have set important climate targets**. Most have committed to achieving net-zero emissions by 2050 and acknowledge shore power as a key lever to achieve this goal.
- **Canadian ports' activities are significant on the world stage.** The Port of Vancouver is particularly prominent. Vancouver handles more cargo annually than the next four largest Canadian ports combined; surpasses major international hubs such as the Port of Long Beach and the Port of Hamburg in total cargo handled; and matches the Port of Shanghai (the largest port in the world) in cruise passenger numbers. Keeping pace with shore power deployment amongst these global leaders is essential to maintaining competitiveness in the context of growing demand for shore power.
- **To date, only 4 of the 17 Canada Port Authorities** – Vancouver, Prince Rupert, Montreal, and Halifax – **have implemented high voltage shore power systems**. Shore power is available at cruise terminals at the ports of Vancouver, Montreal and Halifax. Only the Port of Vancouver and Prince Rupert have implemented shore power at container handling terminals, covering four of the 18 total container berths, and three of the five container terminals at these ports. No Canadian ports have implemented shore power for non-containerized cargo – e.g. for the bulk, break bulk, Ro/Ro ("roll on, roll off") sectors. While targets have been set, **no Canadian port has a detailed strategy to deploy shore power across its terminals.**
- In contrast, **the Ports of Long Beach, Hamburg, and Shanghai have near-universal coverage for shore power at cruise and container terminals**, with sufficient connection points to support nearly all vessels berthing at these ports annually. The ports of Brooklyn and Rotterdam likewise have full shore power coverage for cruise terminals and have published plans or targets to provide

full shore power coverage for container terminals. International ports have also begun to deploy shore power for non-containerized cargo.

- **Initial progress implementing shore power at Canadian ports has been supported by targeted federal programs**, including Transport Canada's Shore Power Technology for Ports and the Green Shipping Corridor initiative. However, overall funding levels remain modest compared to leading U.S. and European counterparts.

Findings – Lessons from Canadian Ports and Global Leaders

Our interjurisdictional scan confirms that strong regulations and funding support, at the national and/or sub-national level, are the key enabling factors distinguishing global shore power leaders. A summary of key insights is provided below, with further information in *Attachment A*.

1. Strong Regulations Drive Shore Power Adoption

- The EU, California and China have introduced requirements for vessels to eliminate emissions at port (typically via shore power) and for ports to implement shore power. Vessel connection requirements and clear compliance timelines have driven large-scale shore power adoption.
- Canada lacks equivalent mandates, relying instead on voluntary efforts and limited public funding.
- Canadian ports have adopted modest financial incentives (e.g., discounted harbour dues), but these are not sufficient to drive meaningful retrofit of vessel systems to feature shore power.

2. Leaders Complement Regulations with Investment in Shore Power Infrastructure

- Leading international ports benefited from substantial public investment to reduce costs and de-risk shore power investment.
- Canada has pre-existing funding programs (such as Transport Canada's Green Shipping Corridor Program) that, if sufficiently capitalized, would help build out shore power.

3. Grid Readiness and Clean Supply Must Go Hand-in-Hand

- Most Canadian provinces benefit from electrical grids that are already relatively clean, which strengthens the emissions reduction benefits for shore power. This can assist vessel operators with meeting IMO regulations.
- Proactive planning for utility distribution grid extensions to serve shore power must begin as soon as possible. To enable large-scale shore power deployment, ports and utilities must coordinate to anticipate demand and invest in the necessary electrical infrastructure ahead of time.

4. Stronger Oversight and Reporting Are Essential

- There is a need for consistent, publicly available information on the number of shore power connections at Canadian ports, and the number of vessels that visit Canadian ports that can accept shore power.
- Even in advanced jurisdictions, data on actual shore power uptake rates is sparse or inconsistently reported – limiting the ability to measure real-world performance and benefits. Canada can lead in transparent reporting on shore power connections.

ATTACHMENT A: INTERNATIONAL PORTS COMPARISON

	Canada					US		Europe		Asia
City / Port, Province / State / Country	**Vancouver,** British Columbia	**Prince Rupert,** British Columbia	**Montreal,** Quebec	**Halifax,** Nova Scotia	**Saint John,** New Brunswick	**Long Beach,** California	**Brooklyn,** New York	**Hamburg,** Germany	**Rotterdam,** The Netherlands	**Shanghai,** China
Operator	Vancouver Fraser Port Authority	Prince Rupert Port Authority	Administration Portuaire de Montréal	Halifax Port Authority	Saint John Port Authority	City of Long Beach Harbor Department	Ports America	Hamburg Port Authority	Port of Rotterdam Authority	Shanghai International Port Group
Port Statistics	Busiest port in Canada by cargo handled	4th busiest port in Canada by cargo handled	2nd busiest port in Canada by cargo handled	5th busiest port in Canada by cargo handled	3rd busiest port in Canada by cargo handled	2nd busiest container port in the US	1st East Coast US cruise terminal to install shore power	3rd busiest container port in Europe	Busiest container port in Europe	Busiest container port in the world
Cargo Handled	158 million metric tonnes (2024)	23.1 million metric tonnes (2024)	35.4 million metric tonnes (2024)	4.8 million metric tonnes (2024)	27.9 million metric tonnes (2023)	90 million metric tonnes (average)	Not publicly available	78.7 million metric tonnes (2024)	436 million metric tonnes (2024)	727 million metric tonnes (2022)
Container Throughput	3.5 million TEUs (2024)	1.6 milion TEUs (annual average)	1.5 million TEUs (2024)	509,000 TEUs (2024)	153,000 TEUs (2023)	9.6 million TEUs (2024)	Approximately 135,000 TEUs (annual average)	7.8 million TEUs (2024)	13.8 million TEUs (2024)	50 million TEUs (2024)
Cruise Passengers	1.3 million (2024)	59,400 (2024)	50,000 (2024)	360,000 (2024)	174,000 (2023)	700,000 (2019)	250,000 (annual average)	1.3 million (2024)	545,000 (2024)	1.4 million (2024)
SHORE POWER DRIVERS										
Shore Power Regulations	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓
	No shore power regulations in Canada	No shore power regulations in Canada	No shore power regulations in Canada	No shore power regulations in Canada	No shore power regulations in Canada	California Air Resources Board (CARB) updated its *At Berth Regulation* in 2020 and requires 100% of ocean-going vessels to use shore power or another Emission Control Strategy while at berth (e.g. capture and control systems). Violation of CARB At Berth Regulations may result in financial penalties up to $38,000 USD ($52,000) per action violated. Vessels included are container, cruise, and reefers from 2023 onwards. From 2025 onwards, tankers and Ro/Ros apply.	The New York City Council passed legislation *Int-4A* in 2024 which requires the use of shore power for cruise ships provided that: 1. Shore power is available; 2. The vessel Is equipped with shore power infrastructure; 3. The use of shore power is safe and practical.	The EU's *FuelEU Maritime Regulation* was adopted in 2023 and requires the use of shore power (or alternative zero-emission technologies) from 2030 onward at core "Trans-European Transport Network" ports (includes Hamburg). The Regulation also requires reductions in vessels' total (including at sea) GHG intensity, ratcheting down every five years to achieve 80% reductions in 2050. Vessels above 5,000 gross tonnes are included.	The EU's *FuelEU Maritime Regulation* was adopted in 2023 and requires the use of shore power (or alternative zero-emission technologies) from 2030 onward at core "Trans-European Transport Network" ports (includes Rotterdam). The Regulation also requires reductions in vessels' total (including at sea) GHG intensity, ratcheting down every five years to achieve 80% reductions in 2050. Vessels above 5,000 gross tonnes are included.	The People's Republic of China *Marine Environmental Protection Law* was amended in 2024 and requires the usage of shore power. Non-compliant vessels face fines of 10,000-500,000 CNY ($1,900-$97,000). Vessels included are container and passenger ships greater than 3,000 gross tonnes and bulk carriers greater than 50,000 gross tonnes built after 2019.

	Canada					US		Europe		Asia
City / Port, Province / State / Country	**Vancouver**, British Columbia	**Prince Rupert**, British Columbia	**Montreal**, Quebec	**Halifax**, Nova Scotia	**Saint John**, New Brunswick	**Long Beach**, California	**Brooklyn**, New York	**Hamburg**, Germany	**Rotterdam**, The Netherlands	**Shanghai**, China
Port's GHG Reduction and Shore Power Deployment Goals Current	**GHG Reduction Goals** Net zero by 2050, which was announced in the *Northwest Ports Clean Air Strategy* in 2020 (also includes the Ports of Seattle and Tacoma).	**GHG Reduction Goals** 30% reduction in GHG intensity by 2030 and carbon neutral by 2050, as referenced in the *2022 Sustainability Report*.	**GHG Reduction Goals** Reaching carbon neutrality for Scope 1 and 2 emissions by 2035, and Scope 3 emissions by 2050, as published in the Port of Montreal's *Sustainable Development Plan 2023-2027* in 2023.	**GHG Reduction Goals** Reduce Scope 1 and 2 emissions by 40% by 2030 compared to 2022 baseline and reach net zero by 2050. Reduce Scope 3 emissions by 30% by 2030 and 90% by 2050 (note: Scope 3 encompasses vessel emissions and is impacted by shore power). These targets were announced in the Port of Halifax's *Sustainability Strategy 2024-2030*, published in 2024.	**GHG Reduction Goals** Reaching carbon neutrality for Scope 1 and 2 emissions by 2040, and Scope 3 emissions by 2050, as referenced in Port of Saint John's *Emissions & Energy* webpage. (note: Scope 3 encompasses vessel emissions and is impacted by shore power).	**GHG Reduction Goals** 40% reduction below 1990 levels by 2030 and 80% reduction by 2050, as announced in The Ports of Long Beach and Los Angeles joint updated *Clean Air Action Plan* (*CAAP*) in 2017.	**GHG Reduction Goals** New York City Economic Development Corporation's (NYCEDC) *Vision for Brooklyn Marine Terminal* published in 2025 includes commitments to decarbonize the port (has not received formal approval, awaiting a vote), as part of broader mixed use development plan.	**GHG Reduction Goals** Reduce direct carbon emissions by 50% by 2025 compared to a baseline of 2012, and achieving carbon neutrality by 2040, as referenced in HPA's *2020 Sustainability Report*.	**GHG Reduction Goals** Climate neutral by 2050 (includes CO2 and other GHGs such as methane, nitrous oxide and ozone), as referenced in the *Climate Targets 2030* report.	**GHG Reduction Goals** The Port of Shanghai reports that it aligns with the Chinese government and Shanghai's goals of being carbon neutral by 2060.
	Shore Power Specific Goals Where deemed feasible by the port, install shore power at all major cruise and container berths by 2030.	**Shore Power Specific Goals** None	**Shore Power Specific Goals** None	**Shore Power Specific Goals** None	**Shore Power Specific Goals** None	**Shore Power Specific Goals** The Ports of Long Beach and Los Angeles' initial *CAAP* (adopted in 2006) included commitments regarding shore power. Later versions of the *CAAP* adopted in subsequent years continued to add targets, policies, actions and funding commitments to deploy shore power and enable early compliance with the CARB *At Berth Regulation* (noted above). The Port's latest shore power commitments include expansion to liquid bulk and auto carrier vessels, as outlined in the Port's *Green Port Progress Report* in 2025.	**Shore Power Specific Goals** Fully electrify port with expanded shore power, as outlined in the *Vision* document.	**Shore Power Specific Goals** Equip all major berths with the necessary shore power infrastructure by 2030, achieving complete coverage by 2040.	**Shore Power Specific Goals** By 2030, shore power used for at least 90% of visits of roll on/roll off, offshore, ferry, and cruise vessels and at least 50% of visits from largest container vessels (>10,000 TEU), as set out in the *Strategy for Shore Power in the Port of Rotterdam* published in 2021.	**Shore Power Specific Goals** Not publicly available.

	Canada					US		Europe		Asia
City / Port, Province / State / Country	**Vancouver,** British Columbia	**Prince Rupert,** British Columbia	**Montreal,** Quebec	**Halifax,** Nova Scotia	**Saint John,** New Brunswick	**Long Beach,** California	**Brooklyn,** New York	**Hamburg,** Germany	**Rotterdam,** The Netherlands	**Shanghai,** China
SHORE POWER IMPLEMENTATION STATUS										
High Voltage Shore Power Connection Points Total number of shore power connection points (i.e. berths where vessels can connect to shore power).*	**Cruise** 2 connections at 1 of 1 terminals **Container** 3 connections at 2 of 4 terminals	**Container** 1 connection at 1 of 1 terminals	**Cruise** 1 connection at 1 of 3 terminals	**Cruise** 1 connection at 1 of 2 cruise terminals	None	**Cruise** 1 connection at 1 of 1 terminals **Container** 15 connections at 6 of 6 terminals **Tanker** 1 connection at 1 of 5 terminals **Ro/Ro** 1 connection at 1 of 1 terminals	**Cruise** 1 connection at 1 of 1 terminals	**Cruise** 4 connections at 3 of 4 terminals **Container** 10 connections at 4 of 4 dedicated container terminals (6 multi-purpose terminals also process containers and other cargo; they do not yet feature shore power connections).	**Cruise** 1 connection at 1 of 1 terminals **Container** 1 connection at 1 of 14 terminals **Offshore Supply** 2 connections at 1 of 22 general cargo terminals **Ro/Ro** 2 connections at 1 of 5 terminals **Ro/Ro Passenger Ferry** 2 connections at 1 terminal	**Cruise** 1 connection at 1 of 3 terminals **Container** Number of connections not available. Claims "full shore power coverage" across all 43 container terminals.
Inaugural Year of Shore Power Connection Cruise / Container	**2009** (Cruise) **2017** (Container) 1st in Canada and 3rd in the world to offer shore power for cruise ships.	**2014** (Cruise) **2022** (Container) Equipment was upgraded in 2022.	**2017** (Cruise) Quebec's first shore power project.	**2014** (Cruise) 1st port on the East Coast of North America to provide shore power to cruise vessels.	N/A	**2009** (Cruise) **2011** (Container) 1st tanker shore power connection in the world.	**2017** (Cruise) 1st shore power system for cruise ships installed on the East Coast of the United States and remains the only shore power capable terminal on the US East Coast.	**2016** (Cruise) **2023** (Container) 1st port in Europe to offer shore power for both container and cruise vessels.	**2025** (Cruise) Year of connection for other vessel types not publicly available. 1st shore power system in Netherlands.	**2015** (Cruise) **2015** (Container) Shore power at the cruise terminal was developed in partnership with the Port of Los Angeles, sharing expertise on standards and incentives.
Annual Number of Shore Power-Enabled Vessel Calls Number of times a vessel connected to shore power. Reported for years where available.	**130** cruise and container connections in 2023, 157 in 2024.	**7** container ship connections in 2023, 1 in 2024.	**9** cruise ship connections in 2023, 14 in 2024.	**43** cruise ship connections in 2023, 27 in 2024.	N/A	Not publicly available.	**17** cruise ship connections in 2023, 5 in 2024.	Not publicly available.	Not publicly available.	**582** connections in 2023.

*Reported in terms of total connection points, and proportion of terminals that feature at least one connection point, for cargo types where shore power is available. Connection points per total number of berths not reported due to lack of consistent data across international jurisdictions.

	Canada					US		Europe		Asia
City / Port, Province / State / Country	**Vancouver,** British Columbia	**Prince Rupert,** British Columbia	**Montreal,** Quebec	**Halifax,** Nova Scotia	**Saint John,** New Brunswick	**Long Beach,** California	**Brooklyn,** New York	**Hamburg,** Germany	**Rotterdam,** The Netherlands	**Shanghai,** China
POWER SUPPLY CHARACTERISTICS										
Grid Carbon Intensity Regional Level, in gCO2eq / kWh	14	14	1.2	660	330	191	222	381	268	582
Electricity Procurement e.g. Power Purchase Agreements, On-Site Generation	Provided by utility grid.	Provided by utility grid.	Provided by utility grid.	Provided by utility grid.	Energy from cruise terminals, corporate offices, and port operated cargo terminals are 100% credited via Renewable Energy Credits (RECs), purchased from Saint John Energy through the Burchill wind project.	Provided by utility grid.	Provided by utility grid.	Provided by utility grid.	As of 2023, the port has installed approximately 330 MW of wind capacity and 90 MWp of solar capacity.	Not publicly available.
SHORE POWER FUNDING AND PORT LEVEL INCENTIVES										
Public Funding Contributions Received Non-exhaustive	**$20M** **$6M** Various government sources. For the cruise terminal shore power connections built in 2009 (date undisclosed). **$7.4M** Transport Canada Shore Power Technology for Ports Program (SPTP). For Centerm and Deltaport shore power projects and shore power upgrades at Canada Place cruise terminal (2015). **$6.6M** Green Shipping Corridor Program. To upgrade shore power infrastructure at Canada Place cruise terminal (2025).	**$4.9M** **$0.7M** Western Economic Diversification Canada. For Fairview terminal shore power infrastructure (2010). **$0.2M** Government of British Columbia. For Fairview terminal shore power infrastructure (2010). **$1.8M** Transport Canada Marine Shore Power Program. For Fairview terminal shore power infrastructure (2010). **$2.2M** ECCC Low Carbon Economy Challenge Fund (date undisclosed).	**$8M** **$5M** Transport Canada SPTP. For high voltage shore power at Alexandra Pier and wintering connections (2015). **$3M** Government of Quebec. For high voltage shore power at Alexandra Pier and wintering connections (2015).	**$7.5M** **$5M** Transport Canada SPTP. For shore power infrastructure at cruise terminal (2013). **$2.5M** Government of Nova Scotia. For shore power infrastructure at cruise terminal (2013).	N/A	**$41M** **$41M** ($30M USD) State of California's Proposition 1B Goods Movement Emission Reduction Program. For installation of shore power at 12 berths (2010). UNDISCLOSED AMOUNT US EPA Clean Ports Program (undisclosed date). UNDISCLOSED AMOUNT State of California's Port and Freight Infrastructure Program (undisclosed date).	**$9.8M** **$3.9M** ($2.9M USD) US EPA National Clean Diesel Funding Assistance Program. For cruise terminal shore power infrastructure (2009). **$5.9M** ($4.3M USD) Empire State Development Corp. For cruise terminal shore power infrastructure (2012).	**$67.8M** **$67.8M** (€42.4M) German Ministry of Economics and Energy via Energy and Climate Fund. For expansion of shore power at container and cruise terminals (2020).	**$144M** **$144M** (€90M) European Investment Bank. For expansion of shore power to deep sea container terminals (2025). UNDISCLOSED AMOUNT Ministry of Infrastructure and Water Management. To expand shore power at several terminals (2023).	Not publicly available.

	Canada					US		Europe		Asia
City / Port, Province / State / Country	**Vancouver**, British Columbia	**Prince Rupert**, British Columbia	**Montreal**, Quebec	**Halifax**, Nova Scotia	**Saint John**, New Brunswick	**Long Beach**, California	**Brooklyn**, New York	**Hamburg**, Germany	**Rotterdam**, The Netherlands	**Shanghai**, China
Port-Level Incentives	Discounted harbour dues are available through the EcoAction Program for vessels adopting environmental measures. Shore power qualifies for a "Gold" award, providing a 47% discount, equivalent to $0.029/GT. For example, a 100,000 GT cruise ship would save approximately $2,900 per call.	Discounted harbour dues through Green Wave program for vessels adopting emission reduction measures. Shore power qualifies a "Tier 3" measure, which provides a 50% discount, which is equivalent to $0.055/GT. For example, a 100,000 GT cruise ship would save approximately $5,500 per call.	None	None	None	Rewards vessel owners for deploying green initiatives through its Green Ship Incentive Program between $600 - $6,000 USD ($830 - $8,300) (shore power amount not specified). Vessels are penalized for not using shore power through CARB regulations, creating both a financial reward for compliance and a cost for non-compliance.	None	Discounted harbour dues based on environmental performance, up to €1,000 ($1,700) per ship via the Environmental Ship Index (ESI) (shore power amount not specified).	Discounted harbour dues through Green Award program for vessels adopting environmental measures. Up to 70% discount based on measures adopted (shore power amount not specified), equivalent to €0.0393/GT ($0.063/GT). For example, a 100,000 GT cruise ship would save approximately €3,900 ($6,300).	Not publicly available.

Data presented in this report was collected through a desktop scan. Information for international ports has not been verified by the port authority.

All monetary values are in CAD unless otherwise specified.