

WATERSIDE MARITIME ACTIVITY



Strategies

OGV1

Install shore power at all major cruise berths by 2030

OGV2

Support domestic and international efforts to phase out emissions from ocean-going vessels

OGV3

Support continual advancements in equipment efficiency and emission reduction from ocean-going vessels

HV1

Provide infrastructure to enable adoption of zero-emission harbor vessels by 2030

HV2

Support accelerated turnover of harbor vessels to zero emissions models by 2050

HV3

Support continual advancement in vessel efficiency and emission reduction for harbor vessels

Emissions: Scope 3

% of Port Maritime GHG 2019 emissions:

Ocean-going vessels 74%

Harbor vessels 14%

% of Port Maritime DPM 2019 emissions:

Ocean-going vessels 83%

Harbor vessels 11%

211

Cruise sailings from the Port in 2019

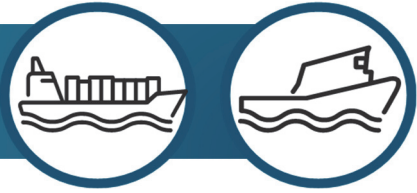
58

Grain vessel shipments from the Port in 2019

Ocean-going vessels include grain and cruise ships that call at Port terminals. Harbor vessels include tugboats that assist ocean carriers, as well as commercial fishing vessels and recreational vessels that moor at Port marinas.

WATERSIDE MARITIME ACTIVITY SECTORS

OCEAN-GOING & HARBOR VESSELS



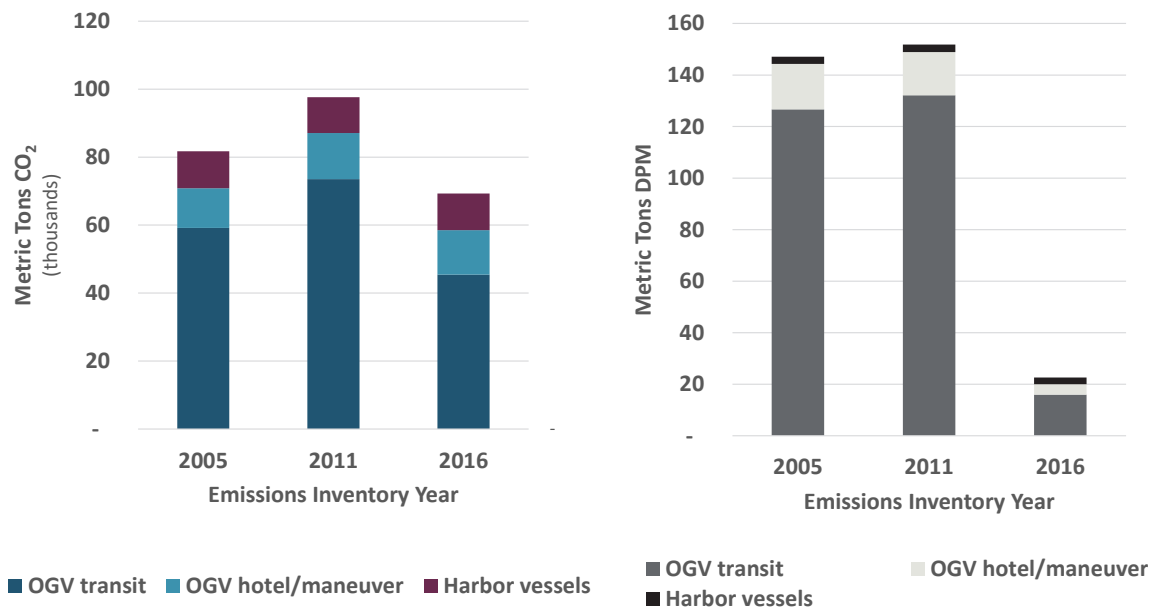
Context

Ocean-going vessels calling at the Port include grain ships (bulk carriers) and cruise ships powered by diesel engines. Port emission inventories include the emissions generated while ships transit Puget Sound from the mouth of the Straits of Juan de Fuca to the Port, while maneuvering, at anchor, and while generating power at berth (hoteling). While hoteling, ships run diesel engines to meet energy needs unless they can connect to shore power and the berth is shore power equipped. To use shore power, both landside and on-ship infrastructure is needed. Many cruise ships are shore power-capable, but virtually no bulk carriers are so equipped.

Harbor vessels addressed in the Plan include tugboats that assist grain ships, as well as commercial fishing vessels and recreational vessels moored at Port marinas. Tugs, fishing vessels, and some recreational vessels are powered by diesel engines. Shore power is available at all the Port's commercial and recreational marinas and is widely used.

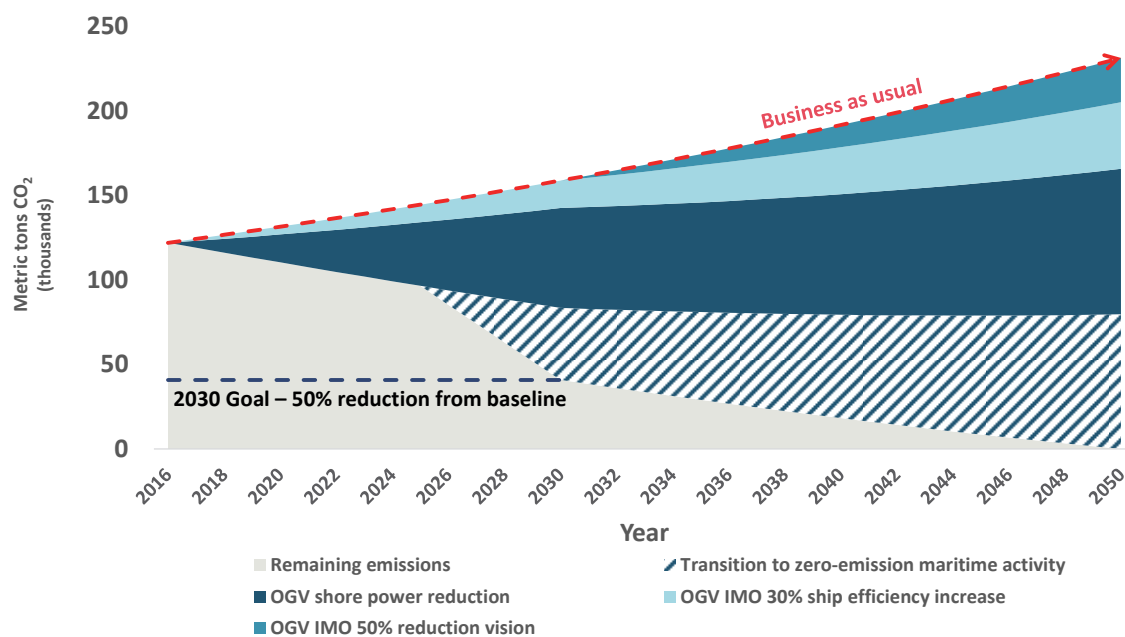
GHG emissions from waterside sectors were higher in 2011 than in 2005 due to a higher number of vessel calls. In 2016, GHG emissions from ocean-going vessels decreased due to more efficient, larger-capacity cruise ships and fewer grain calls. DPM emissions from waterside sectors declined steeply in 2016 due to use of shore power by some cruise ships at berth, regulatory changes requiring ocean-going vessels and large harbor vessels to burn low sulfur fuel, and far more advanced pollution controls on new vessel engines. These fuel and engine standards target air pollutants and have a minimal impact on GHG emissions.



Figure 20. Annual GHG and DPM emissions from Maritime Activity waterside sources 2005 – 2016

Emissions were inventoried in the Puget Sound Maritime Air Emissions Inventories for years 2005, 2011, and 2016.

Strategies to 2030

Figure 21. Annual GHG emissions from Maritime Activity waterside sectors projected to 2050

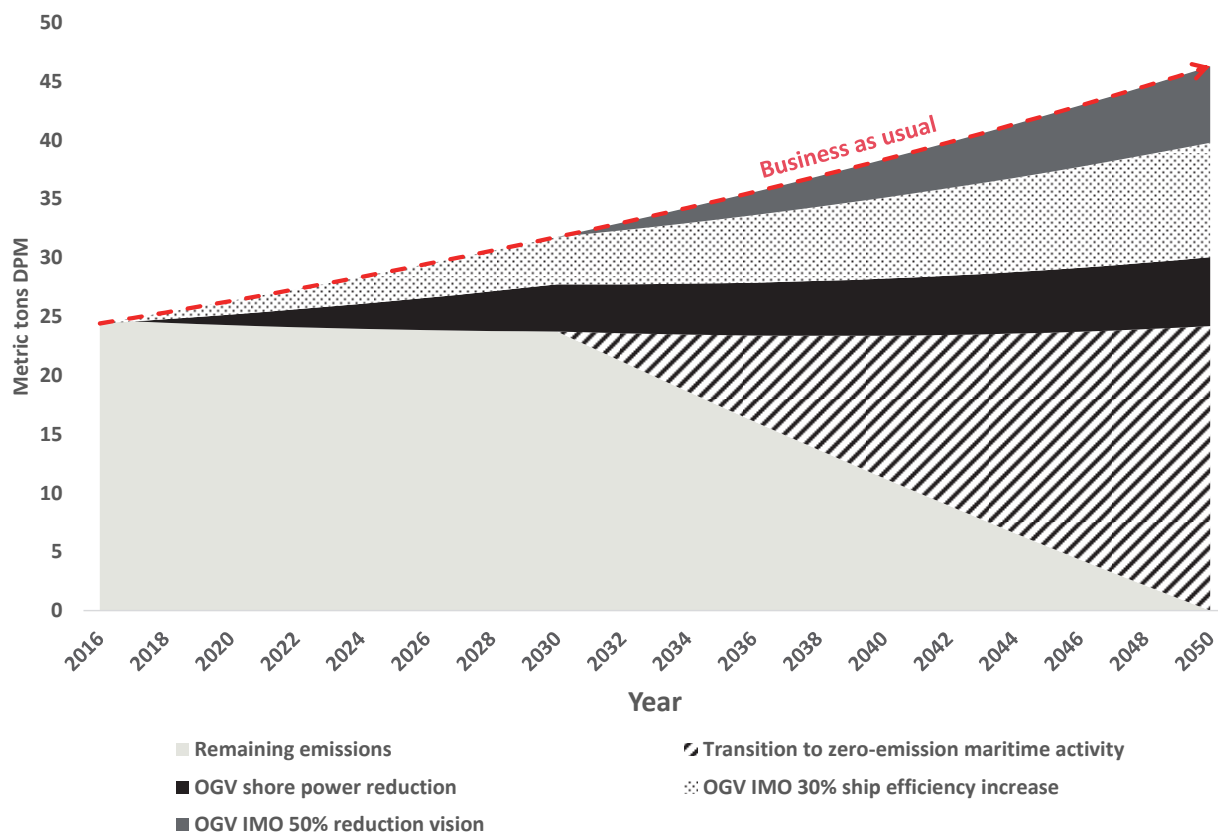
Annual emissions will continue increasing through 2030 under a business-as-usual scenario that includes projected growth and assumes that no further emission reduction actions are taken. Mandated vessel efficiency improvements and additional shore power will reduce emissions. Transition to zero-emission maritime activity represents reductions from strategies in this plan that are not quantified, and new/innovative technologies that will be required to meet the 2050 Northwest Ports Clean Air Strategy vision.

Success Story: Shore Power

Since 2005, the Port has provided cruise ships with shore power and in 2009, became the first cruise port in the world to provide shore power at two cruise berths. In 2019, 89 percent of shore power-capable ships (85 total calls) plugged into shore power at the Smith Cove Cruise Terminal at Terminal 91, which eliminated over 600 hours of onboard diesel engine use and an estimated 2,900 MT of CO₂ in just one season.



Figure 22. Annual DPM emissions from Maritime Activity waterside sectors projected to 2050



Annual emissions will continue increasing through 2030 under a business-as-usual scenario that includes projected growth and assumes that no further emission reduction actions are taken. Mandated vessel efficiency improvements and additional shore power will reduce emissions. Transition to zero-emission maritime activity represents reductions from strategies in this plan that are not quantified, and new/innovative technologies that will be required to meet the 2050 Northwest Ports Clean Air Strategy vision.

OCEAN-GOING VESSELS

OGV1

Install shore power at all major cruise berths by 2030. Shore power minimizes both GHG and DPM emissions and is currently the only zero-emission technology available for ships at berth. An increasing portion of cruise ships are equipped with shore power capability. As of 2020, the single berth facility at Pier 66's Bell Street Pier Cruise Terminal does not have shore power for cruise vessels, but the Port plans to install a shore power connection by the 2023 cruise season.

Emissions Reduced Annually by 2030

**Approximately
13,000 MT CO₂ and 8 MT DPM
per year**
by installing additional shore power and
maximizing connections

Actions

By 2025

- ◆ Install shore power at Pier 66 Cruise Terminal by 2023 and pursue funding to offset infrastructure costs
- ◆ Require shore power use by shore power-equipped homeport cruise ships at Terminal 91²²
- ◆ Require shore power use by shore power-equipped homeport cruise ships at Pier 66 and any future cruise berths upon installation and commissioning of new shore power system(s)
- ◆ Evaluate shore power delivery options and rate structure at Port facilities, working with cruise lines and utility providers

By 2030

- ◆ Collaborate with cruise lines to increase the number of annual shore power equipped calls at the Port with a goal to reach 100 percent shore power-equipped homeport calls and a 100 percent connection rate by 2030
- ◆ Evaluate feasibility, cost, and benefit of adding a second shore power connection to the west berth of Terminal 91 to increase opportunity of ships to plug in regardless of orientation

Ongoing

- ◆ Collaborate with cruise lines annually to report on shore power utilization, best practices, and avoided emissions

²² The shore power requirement applies to shore power-equipped ships unless they are unable to connect (e.g., adverse weather conditions that would make the connection unsafe).

OGV2

Support domestic and international efforts to phase out emissions from ocean-going vessels. The Port will advocate to strengthen standards and policies at national and international levels to support the development sustainable maritime fuels and the transition to zero-emission vessel technologies. International policy engagement activities would be complemented by partnerships to support planning and research, market assessments focused on the Pacific Northwest, and pilot projects with industry partners.

By 2025

- Actions**
- ◆ Develop a national and international engagement strategy to advocate for strengthened standards, sustainable fuels, and the transition to zero-emission ocean-going vessels
 - ◆ Evaluate and align with international decarbonization initiatives
 - ◆ Identify partnerships for policy alignment and amplification, including with industry and other ports
 - ◆ Conduct a maritime zero carbon energy source assessment to evaluate the status of supply and delivery options, off-takers, policy and economic drivers, Port roles and other considerations to advance deployment of energy sources to replace fossil fuels for cruise ships in the Pacific Northwest
 - ◆ Implement the International Association of Ports and Harbors' Cruise Emissions Reporting Project at the Port and collaborate with cruise lines to maximize participation

By 2030

- ◆ Support development of a zero-emission ocean-going vessel demonstration by 2030, working with governments, industry, and non-government organizations

OGV3

Support continual advancements in equipment efficiency and emission reduction from ocean-going vessels. Until zero-emission vessels are developed, continuous improvement in vessel efficiency is the best strategy to reduce GHG and DPM emissions. Ship efficiency gains may occur through improved ship design and operational practices such as slow steaming. The Port will also coordinate with cruise lines to evaluate a carbon offset program for cruise passengers.

By 2025

- Actions**
- ◆ Complete Port-specific cruise ship emission research and develop recommendations
 - ◆ Continue to evaluate opportunities to decrease emissions from cruise ships underway
 - ◆ Evaluate the cost and benefits of environmental incentive programs for cruise ships
 - ◆ Develop a cross-media (e.g., air, noise, water quality, and human health) cruise environmental strategy for the Port, in partnership with the cruise lines, and implement early actions
 - ◆ Evaluate an optional carbon offset or "Good Traveler" type program for Seattle's homeport cruise passengers, in coordination with cruise lines
 - ◆ Evaluate emissions impact of slow steaming with the Quiet Sound program (once implemented)

By 2030

- ◆ Continue implementing the cruise environmental strategy

HARBOR VESSELS**HV1**

Provide infrastructure to enable adoption of zero-emission harbor vessels by 2030. Although the Port's commercial marinas offer shore power at most berths, shore power can be added in a few locations to accommodate tugboats. Upgraded utility infrastructure is needed to enable hybrid or zero-emission harbor vessels.

By 2025

- ◆ Install new shore power capacity for tugs at Harbor Island Marina E Dock
- ◆ Evaluate new shore power capability, charging, and fueling needs for harbor vessels at Pier 17, Pier 28, and Pier 46 North, and berths 6 and 8 at Terminal 91
- ◆ Improve tracking and reporting of usage rates with a goal of reporting usage annually

By 2030

- ◆ Upgrade utility infrastructure to enable hybrid or zero-emission technology or alternative fuels for harbor vessels at Port-owned berths

HV2

Support accelerated turnover of harbor vessels to zero-emission models by 2050. Zero-emission technologies such as battery electric, hydrogen fuel cells and alternative liquid fuels are being developed for some types of harbor vessels. The Port will demonstrate zero-emission outboard engines in Port-owned vessels.

By 2025

- ◆ Demonstrate zero-emission outboard engines in Port-owned vessel fleets and communicate results
- ◆ Engage commercial fishing fleets and industry to identify barriers and opportunities to transition to zero-emission fishing vessels

By 2030

- ◆ Support development of a zero-emission harbor vessel, working with governments, industry, and non-government organizations

HV3

Support continual advancements in vessel efficiency and emission reduction from harbor vessels. Until zero-emission harbor vessels are widely adopted, the Port will promote use of low carbon fuels and efficiency improvements for assist tugs, commercial fishing vessels, and recreational vessels.

Actions**By 2025**

- ◆ Engage harbor vessel fuel providers to discuss opportunities and barriers to supplying low-carbon fuels
- ◆ Evaluate incentive programs to accelerate use of low carbon fuels and the transition to zero-emission harbor vessels

By 2030

- ◆ Support demonstration and educational events to encourage zero-emission technologies for recreational, fishing, and workboats in partnership with Puget Sound Clean Air Agency, NWSA, and others

Success Story: Maritime Innovation

Washington Maritime Blue, the Port, and WeWork Labs have partnered to launch Washington's first maritime accelerator to help maritime companies innovate and grow, establish Washington as a global leader in maritime innovation, and increase the sustainability of maritime businesses.



Performance Metrics

Sector	Metrics	Targets/Objectives
OGV	Percent of vessel calls with Tier 3 marine engines, cleaner fuel, or other emission-reduction technologies while underway	Continuous improvement
	Percent of major cruise and container berths with shore power installed	100 percent by 2030
	Percent of shore-power-capable ships that plug in and percent of total ships that plug in to shore power	Continuous improvement
HV	Percent of tugs by tier level	Information only
	Percent of commercial vessels with hybrid engines or using renewable fuels	Information only
	Percent of zero-emissions commercial vessels	100 percent by 2050
	Total cost of ownership of zero-emissions tug relative to diesel tug	Information only