

LANDSIDE MARITIME ACTIVITY



Strategies

- CHE1** Provide infrastructure to enable zero-emission CHE by 2030
- CHE2** Support adoption of zero emissions CHE by 2050
- CHE3** Support continual advancements in equipment efficiency and emission reduction from CHE equipment
- TR1** Provide infrastructure to enable adoption of zero-emission trucks by 2030
- TR2** Support adoption of zero-emission truck equipment by 2050
- TR3** Support continual advancements in vehicle efficiency and emission reductions from trucks
- RR1** Provide infrastructure to enable adoption of zero-emission on-terminal rail by 2030
- RR2** Support adoption of zero-emission rail by 2050
- RR3** Support continual advancements in equipment efficiency and emission reductions from rail

Emissions: Scope 3

% of Port Maritime GHG 2019 emissions:
Cargo-handling equipment <1%
Trucks <1%
Rail 6%

% of Port Maritime DPM 2019 emissions:
Cargo-handling equipment <1%
Trucks <1%
Rail 6%

2

On-terminal switcher locomotives

90

Cargo-handling equipment (CHE) units

Cargo-handling equipment is used on port terminals. Grain cargo is shipped over land by rail, using line-haul and on-terminal locomotives. The truck category has only measured shuttle vans on cruise terminals in the past but will be expanded to include medium- and heavy-duty trucks and buses supporting cruise operations.

LANDSIDE MARITIME ACTIVITY SECTORS CARGO-HANDLING EQUIPMENT, TRUCKS, & RAIL



Context

Landside Maritime Activity sectors support operations at the Port's cruise terminals, grain terminal, and commercial marinas. **Cargo-handling equipment (CHE)** is used to lift and move goods to and from storage areas, ships, trucks, and railcars. The Port's cruise terminals use many electric and propane-powered pieces of CHE. Larger CHE, such as mobile cranes, are diesel-powered.

The **truck** sector includes heavy-duty vehicles. To date, the Port has only included shuttle vans used on cruise terminals in this category. This Plan includes strategies to expand the truck sector to buses that transport passengers to and from cruise terminals and trucks that serve cruise ships and fishing fleets. Container trucks moving cargo to and from marine terminal are excluded because they are managed by the NWSA.

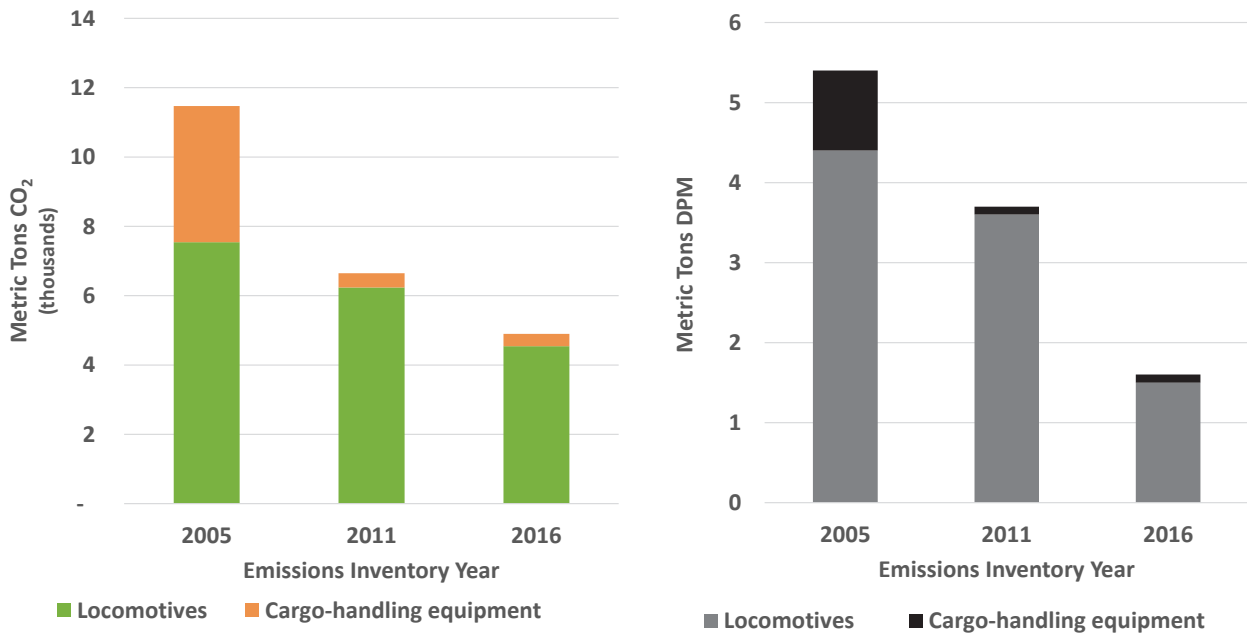
The **rail** sector includes locomotives serving the grain operations. "Line-haul" locomotives are those that pull train cars on travel off-terminal to deliver grain shipments and "switcher" locomotives are used to move railcars within the grain terminal. Line haul locomotives travel throughout the airshed and account for 98 percent of the grain-related rail emissions.

GHG emissions from landside sectors declined from 2005 to 2016. Cargo-handling equipment turned over to more electric units. Rail emissions were lower in 2016 due to lower grain throughput.

DPM emissions from landside sectors declined in 2016 due to the use of more electric cargo-handling equipment, lower grain throughput which reduced rail emissions, and regulatory changes requiring use of low sulfur fuel.



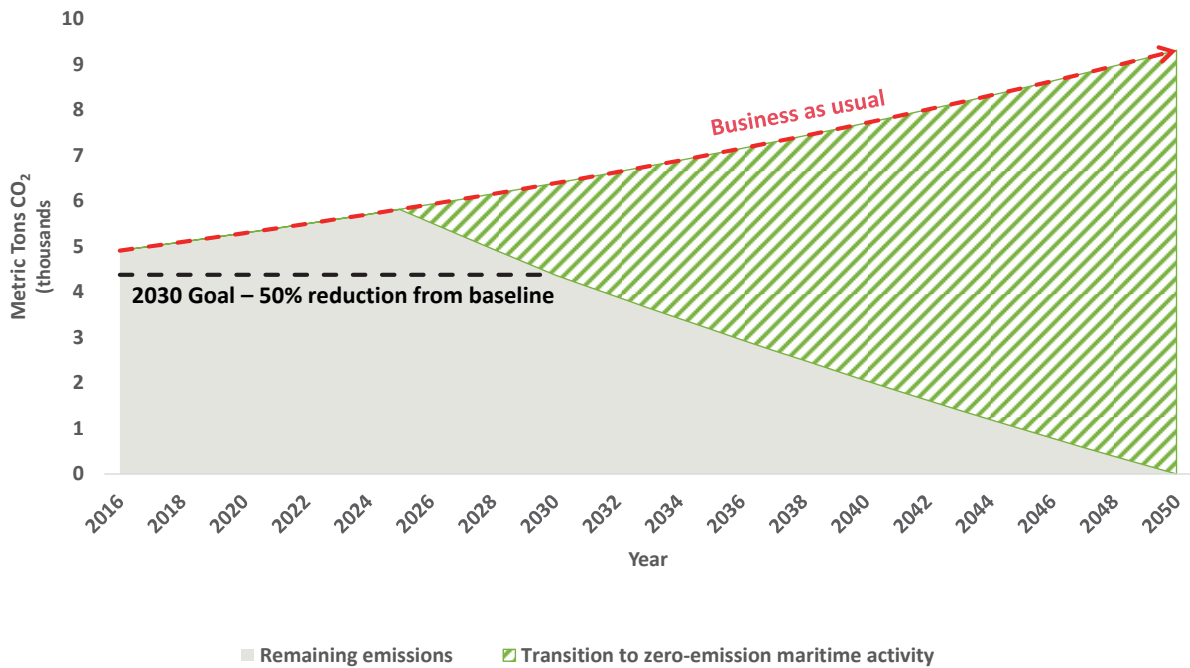
Figure 23. Annual GHG and DPM emissions from Maritime Activity landside sources 2005 – 2016



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

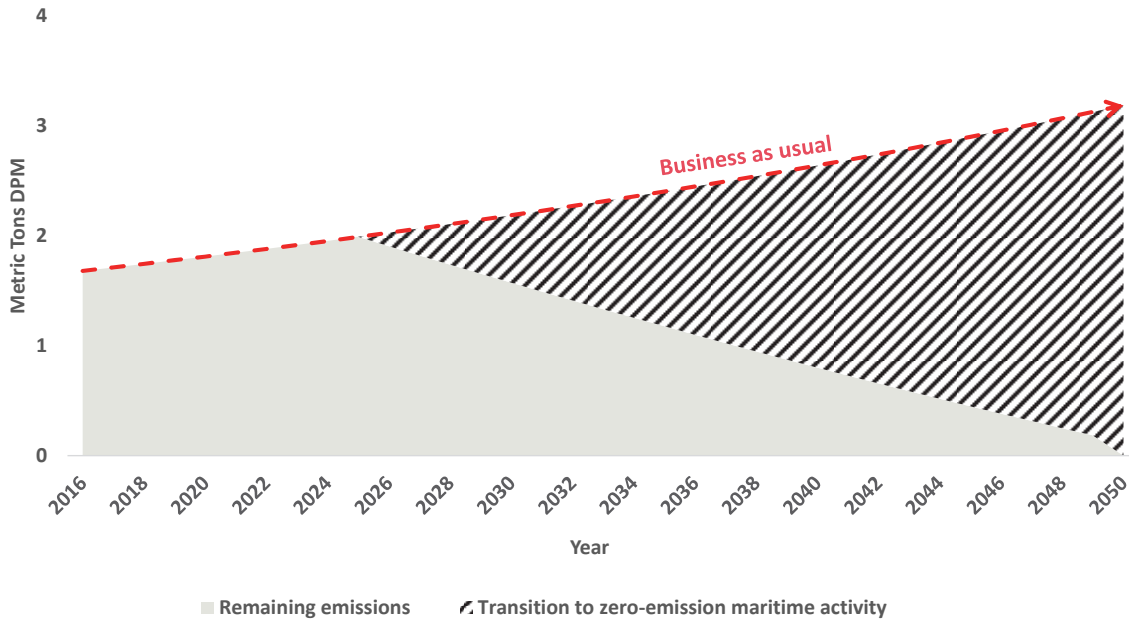
Strategies to 2030

Figure 24. Annual GHG emissions from Maritime Activity landside 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.

Figure 25. Annual DPM emissions from Maritime Activity landside 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.

CARGO-HANDLING EQUIPMENT

CHE1

Provide infrastructure to enable zero-emission CHE by 2030. Infrastructure needed will be identified in the Seattle Waterfront Clean Energy Strategy (Maritime Activity strategy XS1.)

Actions	By 2025
	<ul style="list-style-type: none"> ◆ As part of SWCES process, engage Port tenants to begin planning and designing infrastructure to support zero-emission CHE at Terminal 91, Pier 66, and Fishermen’s Terminal, and pursue funding for installing such infrastructure
	By 2030
	<ul style="list-style-type: none"> ◆ Complete planning design and install necessary infrastructure for zero-emission CHE
	Ongoing
	<ul style="list-style-type: none"> ◆ Advocate for standardization and interoperability of CHE fueling infrastructure in partnership with ports, partners, and industry

CHE2

Support adoption of zero-emission CHE by 2050. This strategy will focus on replacement of diesel- powered units. This strategy overlaps with Fleet Vehicles and Equipment strategies FV1 and FV2 for Port-owned units and Maritime Activity strategy XS1.

- Actions**
- By 2025**
- ◆ Collaborate with terminal operators (e.g., cruise, cargo) and fishing operations to assess and demonstrate the feasibility of zero-emission equipment, including conducting and sharing lessons from pilot projects on port-owned equipment

CHE3

Support continual advancements in equipment efficiency and emission reduction from CHE equipment. The Port will promote fuel efficiency, low carbon fuels and early replacement of diesel and propane-powered cargo-handling equipment

- Actions**
- By 2025**
- ◆ Collaborate with terminal operators (e.g., cruise, cargo, fishing operations) to update and formalize data sharing on equipment inventories, replacement plans, and fuel efficiency plans
- Within 5 years**
- ◆ Evaluate environmental incentive programs to accelerate Port tenant and customer CHE upgrades or low carbon fuel use

**Success Story:
Alternative Fuels**

Switcher locomotives at the Port's grain terminal use biodiesel and are equipped with anti-idling equipment which reduces fuel consumption by up to 50 percent.

In 2019, 85 percent of the cargo-handling equipment of CHE at Port of Seattle marine terminals used electricity or propane as fuel.



TRUCKS

TR1

Provide infrastructure to enable adoption of zero-emission supply trucks and buses by 2030. Zero-emission technology is becoming increasingly available for some classes of trucks, but the cost and complexity of charging or fueling infrastructure can impede adoption. The Port will demonstrate new infrastructure.

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|---------|--|
| Actions | By 2025 |
| | <ul style="list-style-type: none"> ◆ Evaluate opportunities to demonstrate zero-emission infrastructure for supply trucks that could serve the port's cruise ships or fishing fleets ◆ Evaluate opportunities to demonstrate zero-emission infrastructure for buses that transport passengers to cruise terminals in collaboration with cruise lines and bus companies |

TR2

Support adoption of zero-emission supply truck and bus equipment by 2050. As zero-emission trucks and buses are developed, the Port will collaborate to demonstrate new technology. Technologies under development include battery electric and hydrogen fuel cells.

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|---------|--|
| Actions | By 2025 |
| | <ul style="list-style-type: none"> ◆ Evaluate opportunities to demonstrate zero-emission truck technology that could serve the port's cruise ships and fishing fleets ◆ Evaluate opportunities to demonstrate low- or zero-emission bus technology for buses that transport passengers to cruise terminals in collaboration with cruise lines and local bus companies ◆ With other ports and partners, advocate for policies and business models that make zero-emission trucks more cost competitive |

TR3

Support continual advancements in vehicle efficiency and emission reduction from trucks and buses. Until zero-emission technology is adopted, vehicle efficiency measures such as idle-reduction and use of low carbon fuels can help reduce DPM and GHG emissions.

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|---------|---|
| Actions | By 2025 |
| | <ul style="list-style-type: none"> ◆ Evaluate how to capture emissions associated with cruise truck deliveries and ground transportation in future Puget Sound Maritime Air Emissions Inventories ◆ Engage commercial fishing and cruise trucking contacts to discuss truck and bus fleet needs and opportunities for alternative fuels or zero-emission technology ◆ Engage cruise lines and bus companies to explore opportunities for alternative fuels or low- or zero-emission technology buses that transport passengers to cruise terminals |
| | By 2030 |
| | <ul style="list-style-type: none"> ◆ Research and develop strategies to reduce emissions from passenger ground transportation serving cruise terminals ◆ Evaluate installation of electricity connections to replace fossil fuel-powered refrigerated containers at Terminal 91 |

RAIL

RR1

Provide infrastructure to enable adoption of zero-emission on-terminal rail by 2030. Zero-emission technologies for locomotives are still under development. Options will be evaluated as part of Maritime Activity strategy XS1 – Seattle Waterfront Clean Energy Strategy.

- Actions** **By 2025**
- ◆ As part of SWCES process, engage Port tenants to begin planning and installing necessary infrastructure to support near- or zero-emission locomotives for switching and delivering cargo to Port terminals

RR2

Support adoption of zero-emission rail by 2050. The Port has limited influence over railroad companies but will advocate for state and federal regulatory changes to reduce emissions. This will be one element of XS3.

- Actions** **By 2030**
- ◆ Explore opportunities to advocate for regulatory changes that reduce emissions from Class I Railroads

RR3

Support continual advancements in equipment efficiency and emission reductions from rail. Locomotives have long life spans and older engines lack modern emission controls. Until zero-emission technology is developed and adopted, the Port will promote replacement of older, unregulated locomotives with cleaner alternatives to reduce DPM emissions.

- Actions** **By 2025**
- ◆ Engage Class I Railroads, in collaboration with ports and partners, to identify emission reduction opportunities in Washington
- By 2030**
- ◆ Work with Port tenants to accelerate replacement of unregulated switcher locomotives for near or zero-emission alternatives

Performance Metrics

Sector	Metrics	Targets/Objectives
CHE	Percent of zero-emission CHE adopted	100 percent by 2050
	Total cost of ownership of zero-emission CHE relative to diesel CHE	Information only
Trucks	Percent of zero-emission trucks adopted	100 percent by 2050
	Total cost of ownership of zero-emission trucks relative to diesel trucks	Information only
Rail	Percent of unregulated engines known to be upgraded	20 percent are upgraded by 2020, relative to 2013
	Percent of switcher engines that use renewable fuels	Information only
	Percent of zero-emissions switcher engines adopted	100 percent by 2050