



NORTHWEST PORTS
CLEAN AIR STRATEGY

IMPLEMENTATION REPORT

2019



Executive Summary

In 2013, the Port of Seattle (POS), Port of Tacoma (POT), and Port of Vancouver (VFPA) collaborated to create an updated Northwest Ports Clean Air Strategy (Strategy) with three objectives: reducing port-related air quality impacts of diesel particulate matter (DPM), reducing greenhouse gas (GHG) emissions, and helping meet air quality standards and objectives for the airshed.¹ The Strategy is being implemented in partnership with several agencies, including the U.S. Environmental Protection Agency, the Washington State Department of Ecology (Ecology), the Puget Sound Clean Air Agency, Environment Canada, BC Ministry of Environment and Climate Change Strategy, and Metro Vancouver (strategy partners). This 2019 Implementation Report summarizes the progress made toward the goals and performance targets identified in the 2013 updated Strategy, building on the progress outlined in the annual reports from 2014 through 2018. This report also highlights key demonstration projects and pilot studies undertaken by the Ports in 2019 that support the Strategy goals and provides a summary of initiatives underway in 2020.

The 2019 Implementation Report is the sixth to report performance against the 2013 Strategy goals. In July 2018, the Ports commenced a process to renew the strategy. This is expected to be completed by the end of 2020 and adopted by the Ports in early 2021. Implementation reports will continue to use the 2013 Strategy framework until the new strategy is fully adopted.

The strategy renewal process includes a review of the opportunities and challenges of this collaborative program, an updated future direction including a new vision and guiding principles, updated shared objectives, new port-specific implementation plans and a defined approach for reporting progress during implementation.

Progress Toward Strategy Goals

The Ports conduct air emission inventories every five years, and these are used to track progress on the two strategy goals. Based on the 2015/2016 inventories, the ports collectively met the 2020 DPM and the 2020 GHG goals by the end of 2016.

Goal 1: Reduce DPM emissions per metric ton of cargo by 80% by 2020, relative to 2005

☒ DPM emissions per metric ton of cargo were reduced by **80%** between 2005 and 2015/2016.

Goal 2: Reduce GHG emissions per metric ton of cargo by 15% by 2020, relative to 2005

☒ GHG emissions per metric ton of cargo were reduced by **17%** between 2005 and 2015/2016.

¹ In August 2015, POS and POT formed The Northwest Seaport Alliance (NWSA) to jointly manage their marine cargo facilities and business. Since 2015 the NWSA has participated as a port partner in implementing the Strategy. For this report, the NWSA, and the ports of Seattle, Tacoma and Vancouver will be collectively referred to as “the Ports”.

Performance Target Status for 2019

Performance targets are organized into six sectors: ocean-going vessels (OGV), harbor vessels, cargo-handling equipment (CHE), trucks, locomotives and rail transport, and port administration. Table E-1 summarizes the progress toward the 2020 (and 2017 for drayage trucks) performance targets. Further details about this progress are included in the report.

Demonstration Projects and Pilot Studies in 2019

The Ports and their partners undertook pilot studies and demonstration projects in 2019. This report highlights project undertaken at the ports in 2019, as follows:




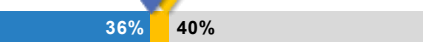







- Port of Vancouver: International Collaboration on Ship Emission Reductions Initiative
- Port of Seattle: Renewable Diesel Pilot
- Port of Tacoma: Composting and Waste Centralization Pilot Program
- NWSA: Electric Yard Truck Demonstration

Key Initiatives for 2020

The Ports have numerous initiatives planned and/or underway for 2020, including updating GHG emission inventories; further international collaboration on emission reduction; pursuing funding for new shore power terminals; continuing support for electrification projects; on-going air quality and climate action initiatives; and many others outlined in Section 10.

In 2018, the Ports and strategy partners commenced a renewal of this Strategy with the intention to publish an updated Strategy by early 2021. The renewed Strategy will chart a course toward zero-emission seaport operations, building on the strong collaboration established among the participants over the last decade. The Ports are committed to continuing to promote emission reductions of both DPM and GHGs and to encouraging sustainable port operations.

Table E-1. Status of 2017 and 2020 Performance Targets for 2019

Sector		2020 Performance Targets*	Results	Status
	Ocean-Going Vessels	OGV 1: Ports track number of vessel calls with Tier 3 marine engines, shore power use, cleaner fuel, or other emission-reducing technologies	4 of 4 Ports track these vessels, and 6% of vessel calls met this standard at the 4 ports	target met
		OGV 2: A: Ports participate in third-party certification programs B: 40% vessel calls participate in Port-designed or third-party certification programs that promote continuous efficiency improvements	A: 3 of 4 Ports participated in Green Marine B: 	A: not yet meeting B: ✓ target met
	Harbor Vessels	Harbor 1: A: Partners conduct outreach B: 90% of harbor vessel companies report best practices and engine upgrades	A: All ports conducted outreach events B: 28% of companies reported; 44% performed engine upgrades and best practices	A: ✓ target met B: not yet meeting
		Harbor 2: A: Ports participate in third-party certification programs B: 40% vessels participate in Port-designed or third-party certification programs	A: 3 of 4 Ports participated in Green Marine B: 	A: not yet meeting B: not yet meeting
	Cargo-Handling Equipment	CHE 1: 80% of CHE meets Tier 4 interim (T4i) emission standards or equivalent		not yet meeting
		CHE 2: A: Ports have fuel-efficiency plans for CHE B: 100% of terminals have fuel-efficiency plans for CHE	A: 2 of 3 Ports with CHE have plans B: 	A: not yet meeting B: not yet meeting
	Trucks	Truck 1: 100% of trucks meet or surpass EPA emission standards for model year 2007, by 2017		not yet meeting (2017 target)
		Truck 2: A: Ports and terminals have fuel-efficiency plans for trucks B: 50% truck companies have fuel-efficiency plans	A: 0 of 2 Ports with trucks and 2 of 10 terminals at 1 of the ports had fuel-efficiency plans for trucks B: 23% of truck companies participated in SmartWay at 1 port	not yet meeting
	Rail	Rail 1: 100% of switcher locomotive owners/operators achieve performance measures of chosen fuel-efficiency program	1 owner/operator was known to achieve performance measures of chosen program	not yet meeting
		Rail 2: 20% of unregulated switcher locomotive engines are upgraded or replaced to Tier 2 or better	6% unregulated engines were known to be upgraded or replaced since December 31, 2013 at 3 of the ports	not yet meeting
	Port Administration	Admin 1: Ports increase use of cleaner vehicles and equipment	A: 2 Ports slightly increased the size of fleets, one decreased fleet size B: 26% on-road vehicles and 50% non-road vehicles use non-conventional fuels C: 12% of fuel used in fleets was non-conventional D: 2 of 3 Ports have fuel efficiency plans in place	in progress
		Admin 2: Ports apply clean construction practices for Port-led construction projects including idle-reduction requirements and enact a plan to address Tier 4 engine emission requirements	3 of 3 Ports have clean construction practices for Port-led projects, but 0 of 3 Ports require Tier 4 non-road engines	not yet meeting
		Admin 3: Each Port completes 3 energy conservation projects	3 of 3 Ports have completed at least 3 projects since 2013	target met

* Partners are striving to meet targets by December 31st of the target year. Note that 2017 is the target year for Trucks.




 2019 Progress to target
 Strategy target for 2017, 2020
 Target has been achieved

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List of Acronyms

AESS	Automatic engine stop start
CHE	Cargo-handling equipment
CNG	Compressed natural gas
DERA	EPA Diesel Emission Reduction Act
DPM	Diesel particulate matter
ECA	Emission control area
Ecology	Washington State Department of Ecology
EGCS	Exhaust Gas Cleaning System
EPA	U.S. Environmental Protection Agency
ESI	Environmental Shipping Index
FRATIS	Port of Tacoma Freight Advanced Traveler Information Systems
GHG	Greenhouse gas
HC	Hydrocarbon
IMO	International Marine Organization
LNG	Liquefied natural gas
NO _x	Nitrogen oxides
NRDE	Port of Vancouver Non-Road Diesel Emissions program
NWSA	The Northwest Seaport Alliance
OGV	Ocean-going vessel
POS	Port of Seattle
POT	Port of Tacoma
PSCAA	Puget Sound Clean Air Agency
RNG	Renewable Natural Gas
RTG	Rubber-tired gantry crane
ScRAPs	NWSA Seaport Scrappage and Replacements for Air in Puget Sound
SO _x	Sulfur oxides
TLS	Port of Vancouver Truck Licensing System
ULSD	Ultra-low-sulfur diesel
VFPA	Vancouver Fraser Port Authority

1. Introduction

The Northwest Ports Clean Air Strategy (Strategy) is a collaboration, established by the ports of Seattle (POS), Tacoma (POT) and Vancouver, with the aim of reducing air emissions from seaport-related activities that affect air quality and contribute to climate change. The formation of The Northwest Seaport Alliance (NWSA) in 2015, a marine cargo operating partnership of the ports of Tacoma and Seattle, added a fourth port partner to the Strategy.

Several government agencies work in partnership with the Ports to support implementation of the Strategy, including the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), the Puget Sound Clean Air Agency (Clean Air Agency), Environment Canada, BC Ministry of Environment and Climate Change Strategy, and Metro Vancouver (strategy partners).

The Strategy, originally developed in 2007, was updated in 2013 based on new data, and on lessons learned from the first six years of implementation, advances in emission-reduction technology, and changes in the regulatory landscape. The Ports and strategy partners issue annual implementation reports that summarize progress toward the goals and targets identified in the 2013 Strategy. *This 2019 Implementation Report is the sixth to report progress against the 2013 Strategy.*

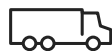
In July 2018, the Ports commenced a process to renew the strategy. This process is expected to be completed by late 2020, and the Ports anticipate adopting a renewed strategy in early 2021. The 2020 Implementation Report is expected to be the final report using the 2013 Strategy framework. After this, reporting will follow the new framework defined in the 2020 Strategy. Where relevant, key performance targets in the 2013 Strategy that have not been met will continue to be reported under the 2020 Strategy.

The strategy renewal process includes a review of the opportunities and challenges of this collaborative program, an updated future direction including a new vision that charts a course to zero-emission seaport operations, new port-specific implementation plans, and an updated framework for reporting progress during implementation. The renewal process has included several opportunities for engagement from industry, government, and community representatives to inform the new strategy.

The Strategy is organized by these six sectors:



Ocean-going vessels (OGV)



Trucks



Harbor vessels (Harbor)



Locomotives and rail transport (Rail)



Cargo-handling equipment (CHE)



Port administration (Admin)

Strategy Objectives, Goals and Targets

The 2013 Strategy has three primary objectives:

1. Reduce port-related air quality impacts from diesel particulate matter (DPM) emissions to decrease immediate and long-term effects on human health, the economy, and the environment in the Georgia Basin-Puget Sound airshed.
2. Reduce greenhouse gas (GHG) emissions to limit contributions to climate change and reduce associated environmental, health, and economic impacts.
3. Help meet air quality standards and objectives for the Georgia Basin-Puget Sound airshed.

To track progress on these objectives, the Ports report on two airshed-wide goals – one for DPM emissions and one for GHG emissions (see Section 2 for progress towards these goals) – as well as several sector targets, and pilot projects undertaken annually.

Several targets were also defined in the Strategy within each of the sectors identified above. The strategy partners work with stakeholders to meet targets by the end of the stated calendar year—that is, the achievement date for 2020 targets is December 31, 2020. This report focuses on the progress made toward the 2020 (and December 31, 2017 for trucks) performance targets. The Ports continue to work toward achieving both the 2015 and 2020 targets where they have not yet met the 2015 performance targets.

Summary of the Participating Pacific Northwest Ports

In 2019, the ports collectively moved approximately 181 million metric tons of cargo and 2.2 million cruise passengers. Each port has a unique operating context, including the amount and type of cargo moved annually, the number of terminals and other operations, and the types of business sectors served (see Table 1 for a summary of these by port). Despite different operating contexts, by working together Ports have demonstrated greater overall impact on reducing port-related air emissions in the Georgia Basin-Puget Sound airshed, and the value of this partnership has led to continued commitment by all ports to the Northwest Ports Clean Air Strategy.

Table 1. Summary of terminals, cargo and passengers moved, and business sectors served at each port

Port	Total tonnage of cargo moved in 2019 (metric tons)	Number of Passengers	Number of Terminals	Types of business sectors served
Northwest Seaport Alliance	29,982,608	n/a	15	Automobile / Roll-on Roll-off Breakbulk Bulk Container
Seattle	3,403,661	1,208,590	3	Bulk Cruise Commercial/Recreational Marinas
Tacoma	3,308,246	n/a	1	Bulk
Vancouver	144,225,630	1,070,915	27	Automobile / Roll-on Roll-off Breakbulk Bulk Container Cruise Other

How this Report is Organized

This report is organized according to the following key elements from the 2013 Strategy:

- **Goals** for reducing port-related emissions in the Georgia Basin–Puget Sound airshed that focus on DPM and GHGs. (*Report Section 2*)
- **Performance targets** for 2017 and 2020 for reducing emissions in each of the six sectors. (*Report Sections 3 to 8*)
- Port commitments to undertake **pilot studies and demonstration projects** designed to advance emission-reduction technologies that can help meet the emission-reduction goals. (*Report Section 9*)

2. Clean Air Strategy Goals

The actions in the Strategy are intended to complement regulations and, together with the regulations, help to achieve the following emission reductions:

DPM Goal: *Reduce diesel particulate matter emissions per metric ton of cargo by 80% by 2020, to decrease immediate and long-term health effects on adjacent communities, relative to 2005.*

GHG Goal: *Reduce greenhouse gas emissions per metric ton of cargo by 15% by 2020, to limit contributions to climate change and reduce associated environmental, health, and economic impacts, relative to 2005.*

The Strategy goals focus on reducing the intensity of emissions that result from port activities (i.e. reducing the amount of emissions per metric ton of goods that are moved), relative to the baseline intensity of emissions in 2005. Tracking emissions intensity provides a mechanism for reporting progress even when the ports experience different rates of growth in economic activity.

2005 Baseline

In 2005, a total of 137.6 million metric tons of cargo² were moved through the four ports, and port-related activities resulted in the emission of 2,002 metric tons of DPM and 1.67 million metric tons of GHG emissions in the airshed.³ The 2005 baseline intensity emissions were:

- 0.15 metric tons of DPM emissions / 10,000 metric tons of cargo moved.
- 121 metric tons of GHG emissions / 10,000 metric tons of cargo moved.⁴

Progress Toward Goals (2005 to 2015/2016)

Based on the 2015/16⁵ inventories, a total of 174.8 million metric tons of cargo were moved through the four ports, and port-related activities resulted in the emission of 501 metric tons of DPM and 1.75 million metric tons of GHG emissions.⁶ As a result, **the ports met the DPM and GHG goals for 2020 by the end of 2016**. The average change in emission intensity for 2015/2016 across the four ports was (also shown in Figure 1 and by port in Table 2):

- ☒ DPM emissions / 10,000 metric ton of cargo moved: **80% lower in 2015/16**, compared to 2005.
- ☒ GHG emissions / 10,000 metric ton of cargo moved: **17% lower in 2015/16**, compared to 2005.

² 2005 cargo volumes were updated for Port of Seattle to reflect the 2016 Puget Sound Air Emissions Inventory report data. Past POT and NWSA cargo data were incorrectly reported due to unit conversion error.

³ Emissions are estimated for the "airshed" scale, which includes all emissions related to port activity released in the airshed (note that boundaries are defined differently in the Port of Vancouver inventory compared to the Puget Sound inventory). Emissions were obtained from the 2016 Puget Sound Maritime Air Emission Inventory (Starcrest, October 2018) and the Port of Vancouver 2015 Port Emissions Inventory (VFPA, 2017). For the Port of Vancouver, fine particulate matter is reported for DPM because DPM was not quantified separately in past inventories.

⁴ The 2005 baseline intensity data in this report is different than previous reports, because the 2005 emissions were adjusted with an updated methodology in the 2015 and 2016 emission inventories.

⁵ Inventories were completed in 2015 for Port of Vancouver and 2016 for U.S. Ports.

⁶ 2015 Port of Vancouver Emissions Inventory and 2016 Puget Sound Maritime Air Emission Inventory.

The significant reductions in DPM emissions are primarily the result of regulatory changes requiring the use of low sulfur fuels for ships, in addition to cleaner engine standards in new vehicles and equipment. The reductions in the intensity of GHG emissions demonstrate an overall increase in efficiency of vehicles, equipment and operations over time. Although ports achieved these goals early, demonstrating a reduction in the intensity of DPM and GHG emissions, absolute GHG emissions rose over the same period of time by 5% (relative to an increase of 27% of cargo moved).

Figure 1: Changes in emission intensity between 2005 and 2015/16, relative to 2020 targets

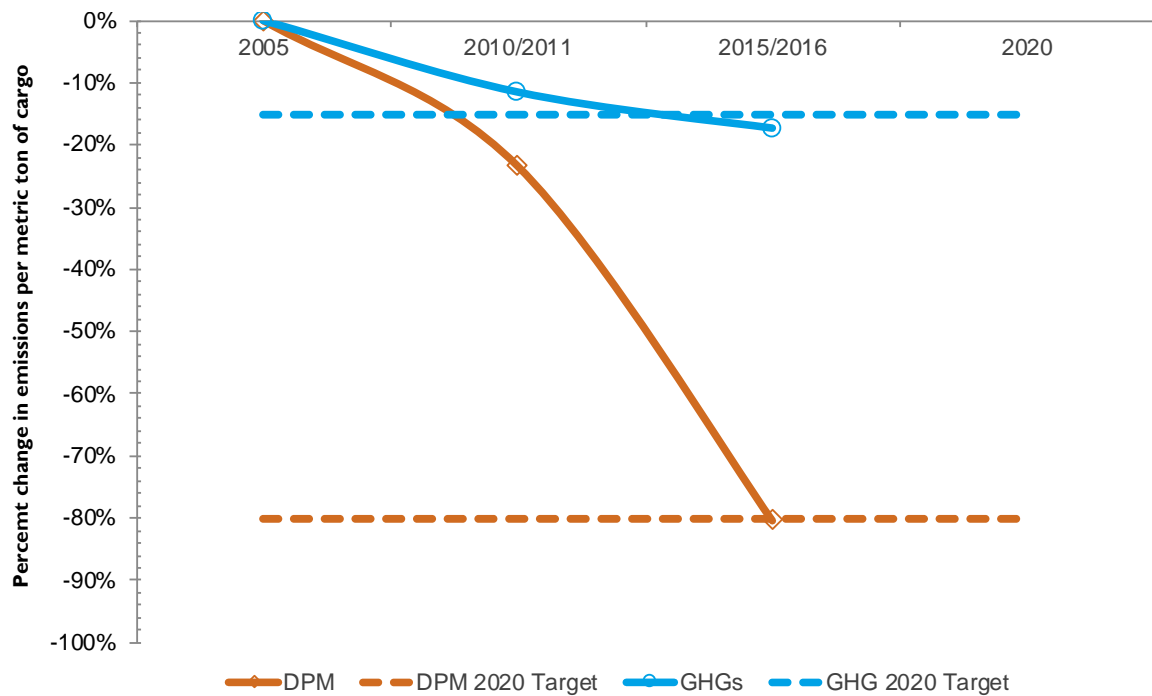


Table 2. Changes in emissions intensity between 2005 and 2015/16, by port

Port	Change in DPM emissions intensity in 2015/16, relative to 2005	Change in GHG emissions intensity in 2015/16, relative to 2005
Northwest Seaport Alliance ⁷	-80%	-19%
Seattle	-79%	-8%
Tacoma	-77%	-22%
Vancouver	-78%	-10%

Table note: Emissions intensity based on cargo throughput is an imperfect measure. While NWSA and POT deal exclusively with cargo, VFPA and POS have different lines of business. The volume of cruise activity (VFPA and POS) and marina activity (POS) are not reflected in this metric. This accounts for the difference in emission intensity reductions shown above.

⁷ Prior to formation of the Northwest Seaport Alliance in 2015, emissions were assigned to the ports of Seattle and Tacoma. The 2016 Puget Sound Maritime Emissions Inventory re-apportioned 2005 and 2011 emissions to align with each port's current operating scope.



3. Ocean-Going Vessels

Ocean-going vessels (OGV) include container ships, cruise ships, tanker ships, bulk cargo ships and breakbulk cargo ships. Performance reporting focuses on the types of engines and fuel being used, and participation in Port-designed or third-party rating programs.

Context

Based on the 2015/16 emission inventories, OGVs produced approximately 46% of DPM emissions and approximately 50% of GHG emissions from activities related to the ports within the airshed. Table 3 summarizes the number of unique vessels and the total number of calls made by those vessels.

On August 1, 2012, the International Maritime Organization designated waters off North American coasts as an Emissions Control Area (ECA), with increasingly stringent restrictions that went into effect between 2012 and 2015. These standards dramatically reduce air pollution from ships and deliver substantial air quality and public health benefits that extend hundreds of miles inland. By 2020, emissions from ships operating in the North American ECA are expected to be reduced by 90,000 metric tons for PM_{2.5} and 920,000 metric tons for SO_x annually (74%, and 86%, respectively, below predicted levels in 2020 absent the ECA).⁸ NO_x emissions are also anticipated to reduce as the number of Tier 3 vessels operating in the region increases over time.

⁸ <https://westcoastcollaborative.org/files/sector-marine/the-north-american-eca-1.pdf>

Table 3. Number of ocean-going vessels and vessel calls at the Ports in 2019

Port	Number of vessels	Number of vessel calls
Northwest Seaport Alliance	410	1,774
Seattle	65	269
Tacoma	45	47
Vancouver	1,706	3,102

Performance Targets

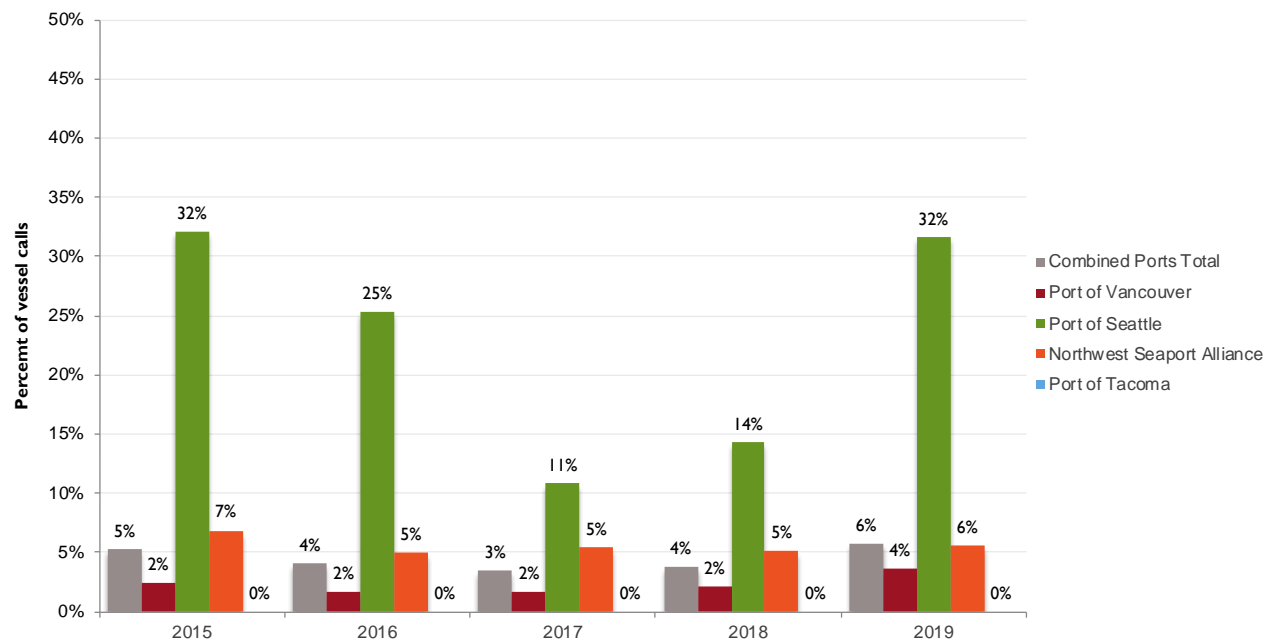
OGV-1: Vessels surpass Emission Control Area requirements

<i>2015 Target</i>	<i>Early compliance with 2015 ECA 0.1% fuel-sulfur level (or equivalent) while hoteling</i> ☑ TARGET COMPLETE
2020 Target	By 2020, Ports track number of vessel calls with Tier 3 marine engines, shore power use, cleaner fuel, or other emission-reduction technologies⁹
What is being measured?	This measure reports the number of vessel calls to the Ports that have Tier 3 marine engines, and/or use shore power, cleaner fuel (liquefied natural gas), or other emission-reduction technologies, to the best of the Ports' knowledge.
Why is this important?	The Ports created this performance target to recognize the importance of supporting shipping lines in adopting fuels or technologies that reduce emissions beyond those required by the 2015 ECA.
How did we do?	In 2019, 6% of vessel calls had Tier 3 engines, used shore power, and/or used cleaner alternative fuel, compared to 4% in 2018. The number of vessel calls that met this measure increased from 201 calls in 2018 to 298 calls in 2019. ¹⁰
Definition of terms	<i>Emission Control Area (ECA):</i> The North American ECA is a geographic boundary that extends approximately 200 nautical miles off the coast of the Pacific and Atlantic/Gulf coasts (excluding Mexico). Under the IMO rules, different standards apply to ships while operating outside emission control areas versus those operating in established ECAs.

⁹ The OGV-1 2020 target was first reported in the 2015 Report based on the number of vessels, rather than the number of vessel calls. Since the 2016 report onwards, data is presented based on vessel calls for all years, and includes vessel calls that were known to use shore power, or vessels that have a "keel laid date" on or after January 1, 2016 (which are presumed to have Tier 3 engines). The ports have determined this greater reflects actual exposure of communities to emissions.

¹⁰ VFPA had two vessel calls from vessels that used battery assist and wind-assist. These are included in this total.

Figure 2: OGV-1. Percent of vessel calls with known Tier 3 marine engines, shore power use, cleaner fuel (better than ECA regulations), or other emission reduction technologies, 2019¹¹



Note: The majority of calls to POS are cruise vessels which have higher shore power use rates than other vessel types. 85 cruise calls plugged into shore power in 2019 cruise season out of 211 total cruise calls compared to 41 out of 216 cruise calls in 2018. One grain vessel is equipped for shore power but did not plug in (T86 does not have a connection). None of the grain vessels had keel laid dates for Tier 3 standard (all pre-Jan 1, 2016).

OGV-2: Ports and vessels participate in Port-designed or third-party programs that promote continuous improvement

2015 Target By 2015, Ports and 10% of vessel calls participate in Port-designed or third-party programs that promote continuous efficiency improvements

☒ **TARGET COMPLETE**

2020 Target By 2020, Ports and 40% of vessel calls participate in Port-designed or third-party programs that promote continuous efficiency improvements

☒ **TARGET EXCEEDED**

What is being measured?

This measure reports whether the Ports participated in third-party programs. This measure also reports the percentage of calls to the four ports that are from vessels that participate in a Port-designed or a third-party program that promotes continuous improvement, to the best of the Ports' knowledge.

Why is this indicator important?

The Ports have the greatest influence over vessels when they are in port, at anchor, at dock, or maneuvering. Ports can encourage vessel operators to reduce emissions by incentivizing emission reductions through alternative fuels and technologies, or through participation in continuous improvement programs. This measure captures the level of participation in these programs.

How did we do?

In 2019, **3 out of the 4 Ports** participated in the Green Marine program as ports. **66% of vessel calls** to the ports were made by vessels participating in at least one continuous improvement program, as shown below, compared to 62% in 2018.

¹¹ Prior to 2017, POS did not have accurate data on shore power calls and past data has overestimated actual plug-in rates.

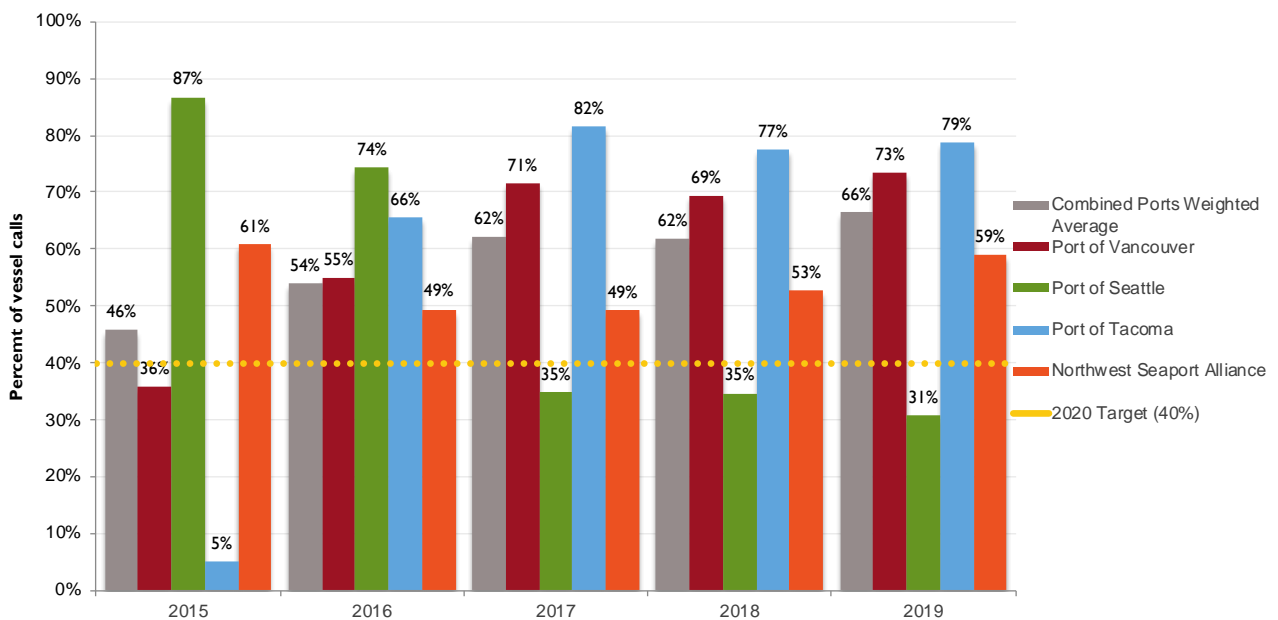
**Definition
of terms**

Port-designed programs: This includes the Port of Vancouver EcoAction Program, which helps to promote continuous improvement.

Third-party programs: Programs included are the Environmental Ship Index (ESI), Green Award, RightShip, Clean Shipping Index (Port of Vancouver ships only), or Green Marine. Note that only RightShip participants that have verified Existing Vessel Design Index data are included.

Port participation in third-party certification programs: This included Ports that participated in the Green Marine Program. For all other programs, Ports were considered to participate if they incentivized participation in the program (e.g. provided discounts to visiting vessels that participate in the program).

Figure 3: OGV-2: Percent of vessel calls participating in Port-designed or third-party certification programs



Implementation Efforts in 2019 by Port: OGV

Port:	Port of Vancouver
How is the Port of Vancouver doing?	<p>OGV-1: In 2019, 114 total calls were made by vessels that surpass ECA requirements. 108 calls were made by 20 cruise and container vessels that connected to shore power, and four calls were made by four different vessels with Tier 3 engines, based on keel laid date only. In addition, VFPA had one call by a vessel with battery assist and one call by a vessel with wind assist. Combined, this represents 4% of calls, and 1.4% of vessels. In 2019, the use of shore power at the Canada Place Cruise Terminal and Centerm Terminal reduced emissions of GHGs by 4,403 tonnes, and particulate matter by 1.5 tonnes.</p> <p>OGV-2: In 2019, VFPA participated in the Green Marine Program as a port. VFPA also participated in ESI, Green Award, RightShip, Clean Shipping Index, Clean Cargo Working Group and Green Marine by offering discounts to vessels that participate in the programs.</p> <p>73% of calls were made by vessels participating in one or more of VFPA's EcoAction Program, ESI, Green Award, RightShip, Clean Shipping Index, Clean Cargo Working Group or Green Marine. This represents 2,279 out of 3,102 calls for the year.</p>
Program for OGVs:	<p>In 2019, the EcoAction program continued to recognize and reward vessels that go beyond regulatory requirements to reduce air emissions (considering both air quality pollutants and greenhouse gases). Eligible options for discount through the EcoAction Program include acceptable scores in third-party environmental rating systems, and cleaner fuels and technologies.</p> <p>24 shipping lines received the Blue Circle Award for 2019. The award is given to those lines with the greatest proportion of participation in the EcoAction Program.</p>
Other initiatives:	<p>VFPA is leading the development of an international collaboration on vessel emission reductions. In partnership with other ports and industry stakeholders, the intention is to develop an approach that aims to increase participation in vessel incentive programs and use of environmental infrastructure such as shore power, supporting further reduction of impacts from international shipping.</p> <p>After joining the World Ports Climate Action Program in 2018, the VFPA has taken on a team lead role for both the Policy and Sustainable Marine Fuels work groups in this international initiative. VFPA also actively participates in the Power-to-Ship and Decarbonization of Cargo Handling Facilities work groups. In 2019, action plans for each work group over the next 3-5 years were developed and finalized, and action on a number of deliverables was initiated.</p> <p>In September 2019, VFPA joined the Getting to Zero Coalition, an international collaboration focused on decarbonization, including having commercially viable zero emission vessels operating along deep sea trade routes by 2030.</p>

Port:	Port of Seattle
How is the Port of Seattle doing?	<p>OGV-1: In 2019, 32% of vessel calls (85 of 269 calls) at Port of Seattle were made by either a Tier 3 vessel and/or a ship that connected to shore power. Eighty-five cruise calls successfully connected to shore power at the port's two shore power-equipped berths at Terminal 91, which represented an 89% connection rate for all shore power-capable calls, a significant increase over the 63% connection rate observed in 2018.</p> <p>Pier 66 does not currently have shore power for cruise vessels, but the Port has plans to install shore power by 2023.</p> <p>OGV-2: In 2019, the Port continued participation in Green Marine as a port authority and demonstrated "excellence and leadership," the highest score, in five of the six categories. 83 vessel calls (31%) were made by vessels participating in at least one third-party certification program, including ESI or RightShip (verified data only). The percentage of calls participating in a certification program decreased by 4% from 2018, when 35% of calls participated in third-party certification program.</p>
Program for OGVs:	None to report for 2019.
Other initiatives:	<ul style="list-style-type: none"> Initiated a partnership with Seattle City Light to develop the Seattle Waterfront Clean Energy Strategic Plan, which will chart a path to deliver cost-effective, resilient, reliable clean energy to decarbonize Seattle's waterfront maritime industries. This planning effort will include grid modernization planning and policy related to shore power systems for cruise and container terminals and for shoreside maritime operations like cargo handling. Also in partnership with Seattle City Light, completed a system impact study in September 2019 to evaluate the feasibility and power requirements to install shore power at Pier 66. Expanded cruise partnerships and environmental agreements to include weekly data sharing on shore power use and developed an environmental strategy for cruise environmental programs. In 2019, prepared for new requirement that will prohibit all exhaust gas cleaning system (EGCS) wash water discharges from cruise ships at berth starting January 1, 2020. See more information in Section 10 of this report under Port of Seattle. Joined the International Association of Ports and Harbors (IAPH) at-berth cruise emission reporting initiative and attended the kick-off workshop in Hamburg Germany.
Port:	Port of Tacoma
How is the Port of Tacoma doing?	<p>OGV-1: In 2019, none of the 47 ship calls to Port of Tacoma had Tier 3 engines, used shore power or implemented other emission-reducing technologies.</p> <p>OGV-2: The Port of Tacoma is not participating in a third-party certification program. 37 of the 47 ship calls to POT (79%) participated in at least one third-party certification program, including ESI and RightShip (where data is verified only). This is a slight increase from 2018 when 77% of calls participated in third party certification programs.</p>
Program for OGVs:	None to report for 2019.
Other initiatives:	None to report for 2019.

Port:	The Northwest Seaport Alliance
How is the Northwest Seaport Alliance doing?	<p>OGV-1: In 2019, 99 (6%) of container ship calls to NWSA terminals used shore power at TOTE terminal in NWSA's South Harbor. No calls were made to any NWSA terminals by vessels with Tier 3 engines or cleaner fuels.</p> <p>OGV-2: In 2019, the NWSA continued to participate in Green Marine, a third-party environmental certification program for ports in North America.</p> <p>In 2019, 59% of vessel calls (1,049 of 1,774 total calls) were from vessels participating in at least one third-party certification program, including ESI and RightShip (where data is verified only). This is an increase over 2018 (53% of total calls).</p>
Program for OGVs:	In 2019, the NWSA Shore Power Program was established. The program's main goals are to install shore power infrastructure at the NWSA's five major international container terminals by 2030 and maximize usage. As of late 2019, the NWSA had begun installation of shore power at one of these terminals.
Other initiatives:	During 2019, the NWSA was awarded a \$1 million grant from the EPA's Diesel Emissions Reduction Act (DERA) Funding program as well as a \$1 million grant from the TransAlta Coal Transition program to support installation of shore power at Pier 3 and Pier 4 in Tacoma, with design expected to begin in 2020. The NWSA also began installation of shore power at Terminal 5 in Seattle in 2019.



4. Harbor Vessels

Harbor vessels include harbor and ocean tugs; there are approximately 126 such vessels providing service at the ports. There are other types of harbor vessels operating near ports (e.g. ferry vessels, excursion vessels and government vessels) and Port of Seattle has commercial fishing fleets and recreational vessels moored at marinas operated by the port. These vessels are not directly related to port activity and are not included in the scope of this report. Performance is tracked based on reporting best practices and engine upgrades, and participation in programs that promote continuous improvement.

Context


Port-related harbor vessels account for approximately 8% of DPM emissions and 8% of GHG emissions from activities related to the ports, based on the 2015/16 emission inventories. Since 2012, regulations have required the use of ultra-low sulfur diesel (ULSD) fuel, resulting in significant reductions in emissions from harbor vessels. Table 4 summarizes the number of harbor vessel companies and vessels at each port. Because the tug fleet for NWSA, POS and POT are the same companies operating in the same waters of Puget Sound, harbor vessel data for NWSA, POS and POT are reported together.

Table 4. Number of harbor vessel companies and vessels at the ports in 2019

Port	Number of harbor vessel companies	Number of harbor vessels
POS, POT & NWSA	2	14
Vancouver	16	112

Performance Targets

Harbor-1: Strategy partners conduct annual outreach to port-related harbor vessel companies and recognize best practices and engine upgrades

2015 Target	By 2015, partners conduct outreach and 50% of harbor vessel companies report best practices and engine upgrades  WORKING TOWARDS TARGET
2020 Target	By 2020, partners conduct outreach and 90% of harbor vessel companies report best practices and engine upgrades
What is being measured?	<p>In the 2013 Strategy, Ports and Strategy partners committed to identifying activities that increase fuel efficiency and reduce emissions, and to share this information with harbor vessel owners and operators. This measure reports whether partners conducted outreach with these owners and operators during 2019, including workshops, brown bag sessions, and meetings to discuss efficiency ideas, practices or projects.</p> <p>To support this measure, Ports and Strategy partners collect data directly from harbor vessel companies, or from relevant continuous improvement programs. The percentage of harbor vessel companies that reported and the percentage that undertook engine upgrades and best practices during 2019 are also reported.</p>
Why is this important?	<p>One way to reduce emissions from harbor vessels is to replace the vessels or repower them (replace their engines), but these efforts are expensive and beyond the control of the Ports. The Strategy partners believe promoting increased vessel fuel efficiency and best practices is the best way to work with this sector. Through annual outreach the Ports and Strategy partners will help keep harbor vessel owners and operators informed of best practices that reduce emissions.</p> <p>Tracking what companies are doing to incorporate best practices and upgrade or replace their engines provides an annual snapshot of emission reduction activities.</p>
How did we do?	<p><i>Partners conduct outreach:</i> In 2019, one Port hosted five outreach sessions, while the PSCAA worked on replacing marine engines. Replacements occurred for harbor vessels, but not with tug assist companies.</p> <p><i>Harbor vessel companies report on best practices and engine upgrades:</i> 28% (five) companies reported their progress through participation in EcoAction, through submissions to Green Marine or through communication with Strategy partners. Fewer harbor vessel companies reported their progress this year, compared to 50% in 2018.</p> <p><i>Companies undertook best practices and engine upgrades:</i> 44% (eight of 18) companies undertook best practices or engine upgrades. One company implemented a strategy around running speed, currents, and timing to run at eco-speed and positioning to reduce fuel burn.</p>
Definition of terms	<p><i>Best practices:</i> Participation in Green Marine or in EcoAction, implementing fuel-efficiency strategies, or using shore power are counted as following best practices.</p> <p><i>Engine upgrades:</i> This includes replacing the engine (also known as “repowering” the vessel), replacing the auxiliary engine, or installing a kit that reduces emissions by 25% (called a 1042 kit). Installing a 1042 kit is not counted as a best practice if the harbor vessel owner is required to install it (i.e. in the U.S. a kit is required if the owner is overhauling the engine, if the old engine was manufactured on or after 1973, and if the engine is greater than 800 horsepower).</p>

Harbor-2: Ports and harbor vessels participate in Port-designed or third-party certification programs that promote continuous improvement

2015 Target	<p>By 2015, Ports and 10% of harbor vessels participate in Port-designed or third-party certification programs that promote continuous improvement</p> <p><input checked="" type="checkbox"/> TARGET COMPLETE</p>
2020 Target	<p>By 2020, Ports and 40% of harbor vessels participate in Port-designed or third-party certification program that promote continuous improvement</p> <p><input type="checkbox"/> WORKING TOWARDS TARGET</p>
What is being measured?	<p>This measure identifies whether the Ports participate in the Green Marine program (currently the only third-party certification program available for tugs) with respect to providing incentives to tug operators.</p> <p>This measure also reports the percentage of harbor vessels that participate in the Port of Vancouver EcoAction Program or in the third-party Green Marine Program, which both promote continuous improvement for harbor vessels.</p>
Why is this important?	<p>Programs that promote continuous improvement provide a consistent framework for companies to report progress on achieving various environmental measures. Participants either get higher scores for or must go beyond regulatory compliance in these programs.</p> <p>Although the Ports have little to no control over harbor vessel engines and fuel-efficiency practices, the Ports can influence these measures by providing incentives to companies that join and annually participate in third party certification programs, or by developing their own program to promote continuous improvement.</p>
How did we do?	<p>In 2019, three of the four Ports (Northwest Seaport Alliance, Seattle and Vancouver) participated in the Green Marine program. VFPA also provided discounted harbor dues to those tugs operated by companies who are Green Marine certified, or that have shore power. POS, POT and NWSA did not offer incentives to tug companies, and no tug companies in Puget Sound were Green Marine certified.</p> <p>36% of harbor vessels participated in third-party certification programs. No harbor vessel company reported engine upgrades in 2019.</p>
Definition of terms	<p><i>Certification programs:</i> Includes programs applicable to ports and harbor vessel companies that promote continuous improvement, either Port-designed or by a third party. The Port of Vancouver currently offers the Port-designed EcoAction program for harbor vessels.</p> <p><i>Third-Party Certification:</i> Currently Green Marine offers the only third-party environmental certification program for harbor vessels.</p>

Implementation Efforts in 2019 by Port: Harbor Vessels

Port:	Port of Vancouver
How is the Port of Vancouver doing?	<p>Harbor-1: VFPA hosted five outreach events in 2019:</p> <ul style="list-style-type: none"> One Port Environmental Managers Breakfast Session and one Climate and Air Action workshop for tenants, including tug companies. These are forums for sharing information on environmental best practices and evolving regulations; and Three sessions for Climate Smart Program participants. <p>2019 marked the fifth year that VFPA partnered with Climate Smart to offer training to tenants, including tug companies, on measuring, managing and communicating reductions in GHG emissions. Training was offered as a three-part series.</p> <p>Harbor-2: VFPA participated in Green Marine as a port, and offered discounted fees to harbor vessels through its EcoAction Program. The primary harbor vessel companies at VFPA reported on air emission and other best practices in 2019 through Green Marine. 40% of tugs operating within the Port of Vancouver participated in Green Marine, with 3 of 16 companies representing 45 of 112 tugs being members (Seaspan, Saam Smit and North Arm Transportation).</p>
Other initiatives:	<p>Three tug companies received the Blue Circle Award for 2019, for their continuous leadership in air emissions reduction and environmental performance. Seven tug companies reported using shore power with their vessels.</p>
Port:	Port of Seattle
	Port of Tacoma
	The Northwest Seaport Alliance
How are the ports doing?	<p>Harbor-1: PSCAA works with harbor vessel companies and operators to pursue grant funding for engine replacements. No replacements were made for tug assist vessels in 2019. Both tug assist harbor vessel companies reported information to PSCAA:</p> <p>Harbor-2: Port of Seattle achieved another year of Green Marine status in 2019.</p>
Other initiatives:	<p>After receiving a grant in late 2018, PSCAA requested applications and awarded 3 sub-grants to harbor companies to replace old engines with newer cleaner engines. The grant funding of \$811,000 was provided by Environmental Protection Agency and Washington Department of Ecology.</p> <p>PSCAA continued work on a 2017 grant from EPA to replace up to 16 marine engines on eight harbor craft. This project was 90% complete in 2019.</p> <p>One company undertook best practices by implementing a strategy around running speed, currents, and timing to reduce fuel consumption. One tug assist company that operates six vessels is ISO 14000 Certified.</p>



5. Cargo-Handling Equipment

Cargo-handling equipment (CHE) moves goods on marine terminals between ships, railcars, and trucks. Examples of CHE include: straddle carriers, rubber-tired gantry (RTG) cranes, reach stackers, top and side picks, forklifts, skid loaders, yard tractors / yard trucks, etc. Performance targets focus on achieving more stringent engine emission standards, recognizing the conversion of equipment to cleaner engines and improving fuel-efficiency practices.

Context

The CHE sector contributes 8% of DPM emissions and 6% of GHGs from activities related to the four ports, as summarized in the 2015/16 inventories. Table 5 summarizes the number of terminals operating CHE, and the total number of equipment at each port. Note that all CHE that was previously operated at POT is now accounted for under NWSA, as well as most POS CHE.

Table 5. Number of terminals with CHE, and number of units in 2019

Port	Number of CHE ¹²	Number of terminals with CHE	Total number of terminals
NWSA	774	13	15
Seattle	103	3	3
Tacoma	0	0	1
Vancouver	1,495	27	27 and other operations

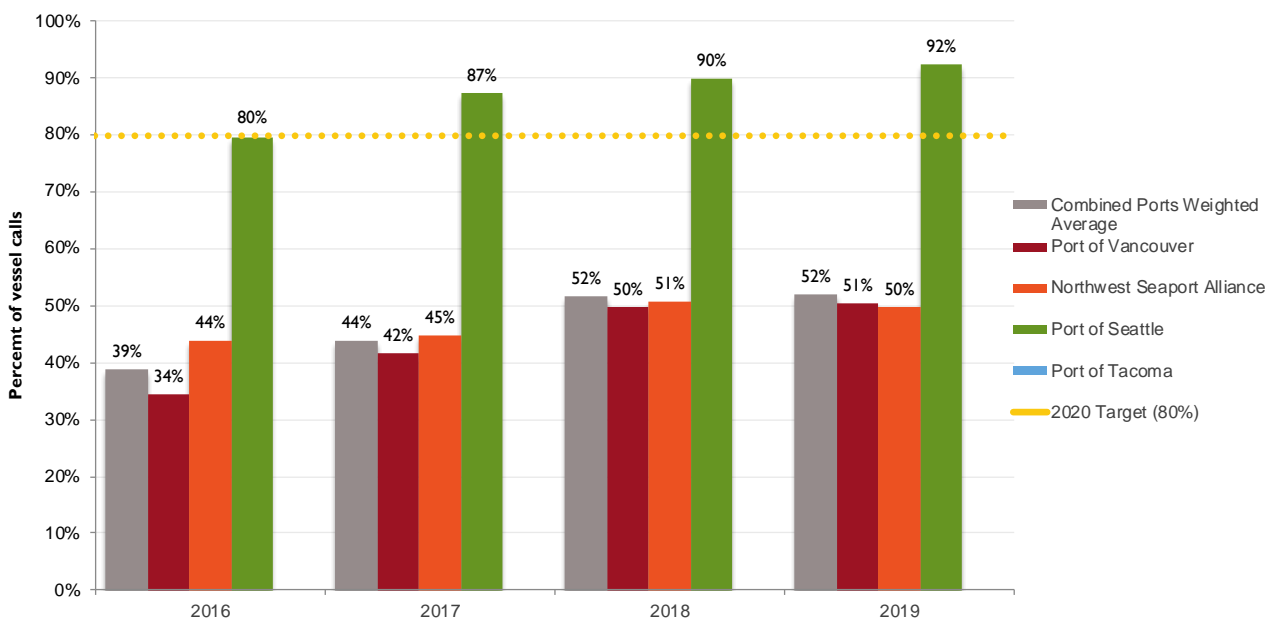
¹² Number of CHE excludes equipment that is exclusively electric (e.g. conveyor belts and ship-to-shore cranes) but includes electric equipment that could operate on other fuels. Note that Vancouver data includes other non-road equipment.

Performance Targets

CHE-1: CHE meets Tier 4 interim (T4i) emission standards or equivalent

2015 Target	By 2015, 50% of CHE meets Tier 4 Interim <input checked="" type="checkbox"/> TARGET COMPLETE
2020 Target	By 2020, 80% of CHE meets Tier 4 Interim
What is being measured?	This performance target tracks the percentage of CHE that has Tier 4i or better engines on a port-wide basis, regardless of terminal size or type of operation. This target recognizes engines with retrofits or repowers that result in Tier 4i equivalent PM emission rates and replacement of equipment (for example, replacing diesel with electric, gasoline, propane or natural gas-fueled equipment). Where emission reduction technology has been installed that reduces emissions but does not achieve Tier 4i emission levels, partial credit is given (for example, Diesel Oxidation Catalysts or Diesel Particulate Filters on older equipment).
Why is this important?	Older diesel equipment, especially non-road engines, generate significantly more emissions per volume of fuel used. This target tracks the proportion of the fleet that meets Tier 4 Interim emission levels or better. It includes emission reductions achieved through retrofits or engine replacements.
How did we do?	52% of CHE met Tier 4 Interim across all ports (see chart below) in 2019, which is the same as 2018. The ports collectively achieved the 2015 target of 50% in 2018, and continue to work toward the 2020 target of 80%. One port met the 2020 target.
Definition of terms	<i>Tier 4 Interim or T4i:</i> The Tier 4 Interim emissions standards required lower PM emissions prior to final Tier 4 standards that also required lower NO _x /HC emissions.

Figure 4. CHE-1: Percent of CHE meeting Tier 4 interim emission standards or equivalent¹³



¹³ Since 2015, POT has not operated any terminals with CHE.

CHE-2: Ports and terminals have fuel-efficiency plans in place that promote continuous improvement

2015 Target	By 2015, Ports and 50% of terminals have fuel-efficiency plans <input type="checkbox"/> WORKING TOWARDS TARGET
2020 Target	By 2020, Ports and 100% of terminals have fuel-efficiency plans
What is being measured?	This measure reports on whether each of the Ports had plans in place to address fuel efficiency of CHE. The measure also reports the percent of terminals that had fuel-efficiency plans for CHE, to the best of the Ports' knowledge.
Why is this important?	Significant emission reductions come from replacement, repowering or exhaust retrofits, however these can be expensive, have limited available options, and can increase other operating and maintenance costs. Implementing fuel-efficiency plans promotes emission reductions in all equipment, including older equipment.
How did we do?	In 2019, two of three ports with CHE had fuel-efficiency plans in place. The Ports facilitated fuel efficiency in relation to CHE in the following ways: VFPA runs a program that requires tenants to have fuel-efficiency plans to be eligible for fee rebates; NWSA aims to reduce fuel consumption through updated leases which require the use of newer, cleaner equipment by NWSA tenants. 23% of terminals (10 out of 43) had a known fuel-efficiency plan for CHE in place, the same as 2018.
Definition of terms	<i>Fuel-efficiency plans:</i> A fuel-efficiency plan sets out goals or objectives to increase operational efficiency, reduce use of fuels, and/or seek alternative sources of fuel that improve efficiency and reduce emissions from equipment operating on port land. The plan may also identify policies or actions that will be put into place to achieve the goals or objectives.

Implementation Efforts in 2019 by Port: CHE

Port:	Port of Vancouver
How is the Port of Vancouver doing?	CHE-1: In 2019, 51% of non-road equipment within the Port of Vancouver met Tier 4i equivalent standards or better. CHE-2: VFPA does not have operational control over CHE. As a result, its approach is to address fuel efficiency in this sector through the Non-Road Diesel Emissions (NRDE) Program. 30% (8 of 27 terminals) plus 1 shipyard had known fuel-efficiency plans in place, based on participation in Green Marine.
Program for CHE:	<u>Non-Road Diesel Emissions (NRDE) Program</u> VFPA's NRDE Program, in place since 2015, requires tenants to pay fees for operating Tier 1 and older non-road diesel equipment. The program also includes requirements around reporting, labelling, opacity and auditing. In order to be eligible for fee rebates of up to 80% when the equipment is upgraded, retired or replaced with a Tier 2 or newer or equivalent engine, tenants are required to maintain a fuel efficiency plan.

Other initiatives:	<p>For the fifth year in a row, VFPA partnered with Climate Smart Businesses Inc. to offer training to tenants on measuring, managing and communicating reductions in GHG emissions. Training is offered as a three-part series, with an additional information and follow-up session. Since VFPA started offering the program in 2015, 24 tenants have participated and have recorded a reduction of 11,241 tonnes of carbon dioxide equivalent.</p> <p>VFPA also hosted a Climate and Air Action workshop for tenants.</p>
Port:	Port of Seattle
How is the Port of Seattle doing?	<p>CHE-1: In 2019, 92% of CHE at POS terminals met Tier 4i equivalent standards or better; with 89% using electricity or propane as fuel, exceeding the target.</p> <p>CHE-2: Port of Seattle terminal operators did not have fuel efficiency plans in place for CHE in 2019.</p>
Program for CHE:	None to report in 2019.
Other initiatives:	None to report in 2019.
Port:	Port of Tacoma
How is the Port of Tacoma doing?	CHE is accounted for under NWSA below. The only terminal remaining under the POT umbrella is a grain terminal, which has no CHE.
Port:	The Northwest Seaport Alliance
How is the Northwest Seaport Alliance doing?	<p>CHE-1: In 2019, 50% of CHE at NWSA terminals met Tier 4i equivalent standards or better. The overall fleet size of CHE at NWSA terminals increased in size during 2019 from 752 pieces of equipment in 2018 to 774 in 2019. As NWSA leases are updated, these require the use of newer, cleaner equipment by NWSA tenants.</p> <p>CHE-2: Two of 13 terminals have a fuel efficiency plan in place.</p>
Program for CHE:	None to report for 2019.
Other initiatives:	In summer 2019, the NWSA hosted a demonstration of BYD electric yard tractors on terminals in both the North and South Harbors. This allowed the electric cargo-handling equipment to be used in real-world operations by NWSA tenants.



6. Trucks

The truck sector covers on-road heavy-duty container trucks that move cargo to and from marine terminals. Performance is reported through the age of the fleet of container trucks serving port activities, and the prevalence of fuel-efficiency plans. Since 2015, trucks hauling containers are reported for the Port of Vancouver and the Northwest Seaport Alliance only (containerized cargo of Ports of Seattle and Tacoma is now managed by the NWSA).

Context

Trucks account for 17% of DPM emissions and 20% of GHGs from activities related to the four ports, as summarized in the 2015/16 inventories. Table 6 summarizes the number of container terminals, and the total number of container truck companies and trucks operating at the Port of Vancouver and the Northwest Seaport Alliance terminals.

Table 6. Number of container terminals, truck companies, trucks in 2019

Port	Number of container terminals	Number of truck companies	Number of trucks
Northwest Seaport Alliance	10	141	3,666
Vancouver	4	99	1,858

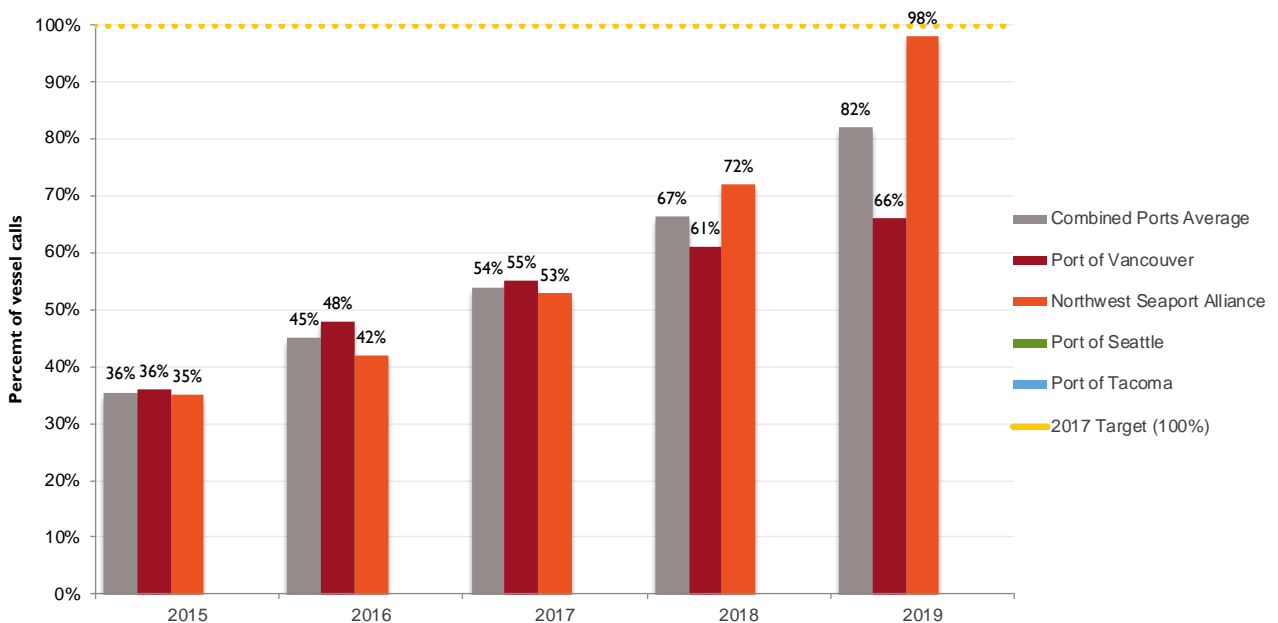
Table note: Ports of Seattle and Tacoma do not operate container terminals and therefore are not included here.

Performance Targets


Truck-1: Trucks meet or surpass EPA emission standards or equivalent for model year 2007

2017 Target	By 2017, 100% of trucks meet or surpass 2007 EPA emission standards <input type="checkbox"/> WORKING TOWARDS TARGET
What is being measured?	This measure tracks the percentage of trucks that have engines that meet the equivalent PM emission standard of a 2007 or newer engine, including engines with retrofits or repowers that result in equivalent emission rates or lower.
Why is this important?	Newer truck engines generate significantly lower emissions due to more stringent federal vehicle standards. Model year 2007 engines are 10 times cleaner than 1994 to 2006 truck engines for PM emissions. This measure tracks how many trucks are being replaced with those that have newer, low-emission engines and associated emission controls. It also recognizes emission reductions achieved through retrofits or engine replacements.
How did we do?	In 2019, 82% of trucks met the target combined across ports (see chart below), which has increased annually since it was first reported for 2011 (when it was 15%). One port has met the 2017 target.
Definition of terms	<i>2007 emission requirements:</i> The U.S. and Canadian federal governments set emission standards for heavy-duty diesel engines. In 2007, the allowed PM emissions dropped to 0.01 grams/brake horsepower-hour, 1/10 th of the 1994 to 2006 standard for PM emissions.

Figure 5. Truck-1: Percent of trucks that meet or surpass U.S. EPA emission standards or equivalent for model year 2007



Truck-2: Ports, terminals, and truck companies have fuel-efficiency plans in place that promote continuous improvement¹⁴

2015 Target	By 2015, Ports have fuel-efficiency plans  WORKING TOWARDS TARGET
2020 Target	By 2020, Ports, terminals, and 50% of truck companies have fuel-efficiency plans
What is being measured?	This measure reports on whether each of the Ports and truck companies has adopted fuel-efficiency plans, based on participation in the EPA SmartWay Program. Port programs that facilitate fuel efficiency in trucks are also highlighted.
Why is this important?	Effective methods of reducing DPM emissions are to replace vehicles or repower them with engines (and corresponding emission controls) that are model year 2007 or newer, or to install exhaust retrofits. However, emission standards addressing GHGs did not take effect for new vehicles until 2014. Since trucks contribute almost 20% of the port-related GHG emissions, another way of reducing these emissions is to adopt fuel-efficiency practices.
How did we do?	<p>In 2019, none of the Ports had fuel-efficiency plans in place. However, the Ports facilitated fuel efficiency in trucks through the following initiatives: The Truck Licensing System and Smart Fleet Initiative at the Port of Vancouver, and the Northwest Seaport Alliance expanded RFID program and data visibility in truck queues.</p> <p>In 2019, 23% of trucking companies that service NWSA terminals participated in EPA's SmartWay Program, which has a focus on fuel efficiency.</p>
Definition of Terms	<i>Fuel-efficiency plan:</i> A fuel-efficiency plan sets out goals or objectives to increase operational efficiency, reduce use of fuels, and/or seek alternative sources of fuel that improve efficiency and reduce emissions from equipment operating on port or terminal land. The plan may also identify policies or actions that will be put into place to achieve the goals or objectives.

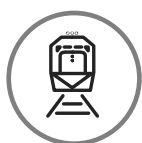
¹⁴ In the 2013 Strategy, Truck-2 states that the number of trucks with fuel-efficiency plans will be tracked. Due to the difficulty of tracking individual trucks, the Ports will track the number of truck companies that have fuel-efficiency plans.

Implementation Efforts in 2019 by Port: Trucks

Port:	Port of Vancouver
How is the Port of Vancouver doing?	<p>Truck-1: At the end of 2019, 66% of the entire drayage fleet met particulate matter engine emission limits of a 2007 or newer engine, based on trucks of model year 2008 or newer.</p> <p>Truck-2: VFPA does not have operational control over container trucks. Its approach to addressing fuel efficiency in this sector is to continue to implement a program that moves the fleet toward newer, cleaner models, coupled with good maintenance and idling limits.</p>
Program for Trucks:	<p><u>Truck Licensing System (TLS)</u></p> <p>VFPA continued to implement increasingly stringent environmental requirements on drayage trucks accessing the port through the TLS Program. Requirements in 2019 included:</p> <ul style="list-style-type: none"> • 2006 and older model year trucks and 2007 model year trucks with 2006 engines need to have an eligible emission reduction measure (e.g. diesel oxidation catalyst) installed, applicable to those trucks already in the TLS. 2005 and older trucks were previously required to install similar measures. • Trucks new to the TLS need to be 2014 or newer. • 10-year and older trucks need to be tested and pass 20% opacity limit. • All trucks are not to exceed maximum three consecutive minutes idling in any 60-minute period.
Other Initiatives:	<p>VFPA, in collaboration with the Province of British Columbia and TransLink, has proposed a new initiative to explore alternative fuel source container trucks with the participation of the container trucking community who will be invited to drive the alternative fuel source container trucks. The program will explore and trial new technologies, and the accompanying infrastructure, to support the evolution of the industry and the future of the gateway.</p>

Port:	The Northwest Seaport Alliance
How is the Northwest Seaport Alliance doing?	<p>Truck-1: At the end of 2019, 98% of the 3,741 drayage trucks that entered NWSA domestic and international container terminals had 2007 or newer engines, or equivalent.</p> <p>As of January 1, 2019, all trucks entering NWSA international container terminals in both Harbors have a 2007 engine or newer, or a certified equivalent emission control system. Trucks only accessing domestic terminals were exempt from this program. In 2020, NWSA offered a limited number of scrapping bonuses to drivers who still operate a pre-2007 engine truck at NWSA international or domestic container terminals.</p> <p>Truck-2: NWSA did not have a fuel-efficiency plan in place for trucks in 2019. NWSA does not have direct operational control over drayage trucks and has focused on upgrading the truck fleet to newer, cleaner engines, and reducing idling through improved terminal efficiencies.</p> <p>Two of the 13 terminals have fuel-efficiency plans that include drayage trucks. 23% of listed NWSA drayage providers participate in EPA's SmartWay program as truck carrier partners. EPA's SmartWay is a voluntary program that reduces freight-transportation-related emissions by accelerating the use of advanced fuel-saving technologies, and provides a comprehensive and well-recognized system for tracking, documenting and sharing information about fuel use and freight emissions across supply chains.</p>

Port:	The Northwest Seaport Alliance
Program for Trucks:	<p><u>RFID program</u></p> <p>RFID (radio frequency identification) technology has been installed at international container terminals in both the North and South Harbors, to ensure the Clean Truck Program requirements are enforced uniformly gateway-wide, using one technology. RFID infrastructure has also been installed at the out-gate at each terminal (North and South Harbor) to collect data on on-terminal turn times (in-gate to out-gate), providing NWSA further visibility on terminal efficiency. During 2019, further RFID readers were installed at the entrance to the truck staging lot in the South Harbor to provide visibility to whole truck queue times, and are displayed in real-time on the NWSA website. Many NWSA terminal operators have used the online platform to establish an appointment system for collecting import/export containers, in order to manage queue, wait times and improve terminal efficiency.</p> <p><u>Drayage truck registry</u></p> <p>In 2019, the NWSA continued to register drayage trucks serving the international container terminals at both the ports of Seattle and Tacoma. The drayage truck registry is the reference database to verify the age of a truck. The door stickers provided to drivers act as a visual back-up for compliance with the requirements of the Clean Truck Program in case of any failure in the RFID system.</p>
	<hr/> <p><u>Clean Truck Fund</u></p> <p>In Spring 2018, NWSA Managing Members authorized for the NWSA to establish a Clean Truck Fund and to partner with certified Community Development Financial Institutions (CDFIs) to ensure all drivers have access to fair and affordable financing in the additional time to purchase a compliant truck. The NWSA partnered with WA Department of Ecology, PSCAA and the City of Seattle to provide a Loan Loss Reserve (LLR) to CDFIs to administer higher-risk loans to truck owners, and additional 'scrap bonuses' of \$6,000 to truck owners willing to scrap their non-compliant truck, as a down-payment for their truck loan. The Clean Truck Fund was designed by the port to help drivers avoid predatory lending practices as the Clean Truck deadline approached. The NWSA continued to administer the Clean Truck Fund into spring 2019.</p> <p><u>Operations Service Center</u></p> <p>A dedicated NWSA team works with port users daily to improve efficiency, including measures to reduce truck idling. After discontinuing the DrayQ app at the end of 2017, the service center turned its attention to research alternative technologies that can track port traffic and improve turn times.</p> <hr/>



7. Locomotives and Rail Transport

The port-related rail sector consists of locomotives that move railcars within a rail yard (switching or yard locomotives, also known as "switchers") or move trains across the airshed and beyond (line-haul locomotives). Performance is reported through the prevalence of fuel-efficiency programs among owners or operators, and the rate of upgrade or replacement of unregulated engines.

Context


Locomotive emissions contribute approximately 20% of DPM emissions and 14% of GHGs from activities related to the four ports, as summarized in the 2015/16 inventories. Since 2012, regulations have required the use of ULSD fuel and this has resulted in significant reductions in emissions from locomotives. Table 7 summarizes the number of locomotive operators and switcher locomotives operating at each port.

Table 7. Number of switcher locomotive operators and switcher locomotives in 2019


Port	Number of switcher locomotive operators	Number of switcher locomotives
NWSA	4	45
Seattle	1	2
Tacoma	1	3
Vancouver	16	22

Performance Targets

Rail-1: Switcher locomotive owners/operators participate in a fuel-efficiency program

2015 Target	By 2015, 100% of owners/operators participate in a fuel-efficiency program  WORKING TOWARDS TARGET
2020 Target	By 2020, 100% of owners/operators achieve performance measures of chosen program
What is being measured?	As stated in the 2013 Strategy, Strategy partners will focus on reducing emissions from locally managed switcher locomotives operating at ports. This measure identifies the percent of owners/operators of switcher locomotives that participate in a fuel-efficiency program. Operators that publish fuel-efficiency programs, including goals/objectives, actions, and progress on their websites are considered to participate in a fuel-efficiency program.
Why is this important?	Locomotives require significant investment to replace or upgrade the engines. Fuel-efficiency programs are useful for reducing emissions from both older engines that have not yet been replaced and newer engines.
How did we do?	In 2019, one owner/operator at U.S. ports is known to have participated in a fuel-efficiency program with published goals and results, and two owners/operators at the Port of Vancouver had known fuel-efficiency plans in place based on participation in Green Marine.
Definition of Terms	<p><i>Automatic Engine Stop Start (AESS) technology:</i> This technology enables the engines to be safely shut down when not in use by ensuring engines do not freeze, charging batteries, and maintaining air pressure at 90 psi or greater.</p> <p><i>Fuel-efficiency program:</i> A fuel-efficiency program sets goals or objectives for improving fuel-efficiency, undertakes actions that achieve those, and reports progress. Examples of fuel-efficiency actions include: idle-reduction policies, equipping locomotives with AESS technology, installing Eco-Tip fuel injectors, engaging or training employees on fuel-efficiency practices, and improving maintenance practices.</p> <p><i>Class 1 Railroads:</i> Class 1 Railroads are the largest railroads in the industry including BNSF, UP, CN and Canadian Pacific.</p>

Rail-2: Switcher locomotive owners/operators upgrade or replace unregulated engines (engine replacement will be Tier 2 or better)

2015 Target	By 2015, 10% of unregulated locomotive engines are replaced with Tier 2 or better engines  WORKING TOWARDS TARGET
2020 Target	By 2020, 20% of unregulated locomotive engines are replaced with Tier 2 or better engines
What is being measured?	This measure reports the percentage of unregulated locomotive engines that were present in fleets as of December 31, 2013 (when the 2013 Strategy came into effect) that are replaced with Tier 2 or better engines.
Why is this important?	Many locomotives in operation have old engines (pre-1973) that are exempt from emission standards and from requirements to install engine upgrade kits when overhauling engines. Older engines have a life expectancy of 10 to 50 years. Retiring or upgrading engines to Tier 2 or better significantly reduces emissions.

How did we do?	<p>Two unregulated locomotive engines have been repowered since 2013, both by Tacoma Rail (one in 2015 and one in 2016).</p> <p>Of the 72 port-related switcher locomotives operating at or near the four Ports, 31 are known to be unregulated, 21 are Tier 0 or Tier 1, and 13 are known to be Tier 2 or better. The remainder are unknown Tiers.</p> <p>Note that the Vancouver Fraser Port Authority does not have information about the Class 1 railroads.</p>
Definition of Terms	<p><i>Unregulated locomotive engine:</i> An engine that was manufactured before the first set of U.S. EPA Emissions Standards for Locomotives were in effect (1973). Tier 0 standards apply to equipment manufactured from 1973 through 2001, Tier 1 standards apply to engines manufactured from 2002 through 2004, Tier 2 standards apply to 2005 through 2010, and Tier 3 apply to 2011 through 2014.</p> <p><i>Class 1 Railroads:</i> Class 1 Railroads are the largest railroads in the industry including BNSF, UP, CN, and Canadian Pacific.</p>

Implementation Efforts in 2019 by Port: Rail

Port:	Port of Vancouver
Rail initiatives:	<p>Rail-1: Effective 2015, all terminal operators are required to conform to the NRDE Program, which includes reporting, fees, labelling, opacity and auditing. It also includes a requirement to maintain a fuel-efficiency plan applicable to non-road diesel equipment including switcher locomotives, in order to be eligible for fee rebates. Additionally, two terminal operators with locomotives were participants in Green Marine, which includes a fuel efficiency component for the terminal.</p> <p>Rail-2: No new engine replacements to report. VFPA does not have data for Class 1 operated locomotives, however, for the 16 tenant-owned/operated locomotives, eight are estimated to be unregulated (pre-tier) and the remaining are made up of one Tier 2, and seven Tier 3 multi-gen sets. In addition, there are four VFPA tenant owned/operated pushers that do the work of switcher locomotives but with a much smaller engine thereby reducing emissions. Of the four pushers, two are estimated to be unregulated with the remaining two being Tier 1 and Tier 2.</p> <p>Other: The six tenant-owned Tier 3 multi-genset locomotives are very fuel efficient in that they bring on only the number of engines (power) needed for the work at hand. Many also have automatic start-stop systems. VFPA is participating in the Gateway Transportation Collaboration Forum (GCTF), a collaborative effort focused on the development and delivery of critical gateway related infrastructure projects of national significance. Working with the GTCF, the port authority has applied for and received over \$200 million in federal funding commitments through the National Trade Corridors Fund, which will allow for the development and delivery of projects that are beneficial to local communities and overall gateway sustainability.</p>
Port:	Port of Seattle
Rail initiatives:	<p>Rail-1: The rail companies did not have fuel-efficiency plans in place in 2019. However, the terminal operator that uses switcher locomotives reported that both locomotives have anti-idle devices installed.</p> <p>Rail-2: Both switcher locomotives in use in 2019 were unregulated. There were no engine replacements to report.</p> <p>Other: One rail company uses anti-idling technology and a 20-percent biodiesel/diesel blend (B20) in their switcher locomotives.</p>

Port:	Port of Tacoma
Rail initiatives:	Rail-1: The rail company does not have a fuel-efficiency plan.
	Rail-2: All three locomotives' engines are unregulated. No new engine replacements to report.
	Other: The rail company employs idle-reduction technology on their switcher locomotives.
Port:	The Northwest Seaport Alliance
Rail Initiatives:	Rail-1: One Class 1 rail company has published goals and met the goals for 2019.
	Rail-2: It is estimated that 18 of the 45 locomotives are unregulated. The Class 1 rail companies move around their locomotives so the NWSA can only estimate what is typical. No new engine replacements to report.
	Other: All of the rail companies employ idle-reduction technology on their switcher locomotives.



8. Port Administration

The administration sector encompasses the Ports' own sources such as Port-owned or leased vehicles and vessels, office buildings, support facilities and employee functions that are needed for the administration of port activities. The associated activity-related emissions include fleet fuel use, facility energy consumption, employee commuting, materials use, waste management and maintenance and construction projects.

Context

The proportion of DPM and GHG emissions associated with port administration have not been fully quantified independently of the other sectors, however, they are a very small portion of total port-related emissions (e.g. fleet vehicles accounted for 0.1% of DPM and 0.7% of GHG in the 2015/16 port emissions inventories). Table 8 outlines the number of vehicles and equipment by type in each Port's administrative fleet. Each Port has different operational and service models with different fleet needs. Table 9 provides a summary of the quantity of fuel used in each Port's administration. Because NWSA operated out of POT and POS facilities and utilized their vehicle fleets, NWSA operated no vehicles and accounted for no fuel consumption.

Table 8. Admin-1: Number of engines used in Port operations by equipment and fuel type

Port	Marine vessels		On-road vehicles						Non-road equipment						
	D	G	D	B20	G	C	H	E	D	B20	G	C	H	P	E
Seattle	0	22	0	46	182	1	38	11	0	42	26	3	1	9	7
Tacoma	0	1	1	0	111	0	9	0	27	0	17	0	0	7	0
Vancouver	5	2	4	0	12	0	5	0	2	0	5	0	0	8	0

D=diesel, B20=20% biodiesel; G=gasoline, C=compressed natural gas, H=hybrid gasoline-electric, E=electric, P=propane

Table 9. Admin-1: Quantity of fuels used in equipment for Port operations by fuel type

Port	Diesel (gal) ^[A, D]	Biodiesel 20 (gal)	R99 diesel (gal) ^[B]	Gasoline (gal) ^[C]	Propane (gal)	CNG or LNG (gal)	Electricity
Seattle	11,286	20,049	571	63,898	996	60	Unknown
Tacoma	15,031	0	0	54,838	2,470	0	0
Vancouver	25,603	0	0	4,194	114	0	0

[A] Diesel fuel sold in Washington State and British Columbia contained an average 2% and 4% renewable fuel, respectively

[B] Port of Seattle began piloting renewable diesel (R99) in port-owned vehicles and equipment in 2019.

[C] Gasoline sold in Washington State and British Columbia contained an average of 2% and 5% renewable fuel, respectively

[D] This includes diesel from VFPA's marine vessels. Historically, it has not been included.

Performance Targets

Admin-1: Ports own and operate cleaner vehicles and equipment and have fuel-efficiency plans in place that promote continuous improvement

2015 Target	By 2015, Ports report cleaner vehicles and equipment and other relevant information
	<input checked="" type="checkbox"/> TARGET COMPLETE
2020 Target	By 2020, Ports increase use of cleaner vehicles and equipment
What is being measured?	<p>This measure reports how the Port fleets are incorporating use of cleaner vehicles and equipment over time. "Cleaner" means that the PM and/or GHG emissions per distance traveled are lower for the same activity, measured as follows:</p> <ul style="list-style-type: none"> (a) replacement or modification of vehicles, equipment or procedures to increase use of cleaner vehicles and equipment, (b) percentage of vehicles and equipment that use non-conventional fuels (fuels other than diesel or gasoline), (c) proportion of total fuel used that is non-conventional (alternative), and (d) fuel-efficiency plans and other efficiency measures in place.
Why is this important?	Reducing emissions from vehicles and equipment contributes to improving air quality and reducing contributions to climate change. These actions also illustrate the Ports' commitment to achieving the Strategy goals.
How did we do?	<ul style="list-style-type: none"> (a) Overall fleet size decreased at POT, through the retirement of old equipment. VFPA upgraded two vehicles in the on-road fleet, retired four non-road propane vehicles, and added two gasoline vehicles to the non-road fleet. POS added 14 new fleet assets in 2019, including four new electric vehicles. (b) The percentage of vehicles and equipment that use alternative fuels across all Port fleets increased moderately between 2018 and 2019 from 21% to 26% for on-road, and from 48% to 50% for non-road. (c) The proportion of total fuel used that is non-conventional (i.e. not gasoline or conventional diesel) decreased from 13% to 12% between 2018 and 2019. (d) Two of three Ports who own vehicles and equipment have fuel-efficiency plans in place for their fleets.
Definition of Terms	<i>Port-owned and operated vehicles and equipment:</i> The scope of equipment reported includes all equipment (on and non-road) that is owned, rented or leased

and operated by the Ports. At the Port of Vancouver, non-mobile equipment is included in the non-road category. Starting in 2017, the Ports of Seattle and Tacoma included non-mobile equipment in the non-road category.¹⁵

Cleaner vehicles and equipment: Vehicles and equipment are considered "cleaner" under a few circumstances: (1) the vehicle or equipment is altered or replaced to use a fuel that is cleaner than the previous fuel used; (2) the vehicle or equipment is replaced with a new unit that is cleaner; (3) the Port puts in place measures to prioritize use of cleaner vehicles and equipment. Examples of cleaner vehicles and equipment include:

- Switching to use of B20 diesel to replace standard diesel fuel
- Replacing a gasoline vehicle with a hybrid or electric vehicle
- Replacing a Tier 1 diesel engine with a higher Tier engine
- Installing a diesel particulate filter on an engine
- Creating a fleet management system that prioritizes use of electric vehicles before gasoline or diesel vehicles

Fuel-efficiency plan: A fuel-efficiency plan sets out goals or objectives to increase operational efficiency, reduce use of fuels, and/or seek alternative sources of fuel that improve efficiency and reduce emissions from equipment operating on port or terminal land. The plan may also identify policies or actions that will be put into place to achieve the goals or objectives.

Admin-2: Ports apply clean construction standards to engines used on Port-led construction projects

2015 Target	By 2015, Ports adopt clean construction practices for Port-led construction projects including idle-reduction requirements and enact a plan to address Tier 2 engine emission requirements ☑ TARGET COMPLETE
2020 Target	By 2020, Ports continue to apply clean construction practices for Port-led construction projects including idle-reduction requirements and enact a plan to address Tier 4 engine emission requirements
What is being measured?	This measure captures efforts to reduce emissions from equipment used in Port-led construction projects. The Ports identify whether clean construction practices have been adopted, including idle-reduction requirements and requirements for the use of Tier 4 engines.
Why is this important?	Ports can directly support the Strategy goals through appropriate clean construction practices and requirements.
How did we do?	All Ports have adopted clean construction practices in various forms, including: sustainable procurement guidelines, use of the Envision Sustainable Infrastructure rating system, and the West Coast Ports Sustainable Design Checklist. All the Ports have requirements for Tier 2 non-road equipment in contracts (at least for major projects), but none of the Ports have a plan to require Tier 4 non-road engines in contracts currently.
Definition of Terms	<i>Clean construction standards:</i> For example, American Association of Port Authorities Sustainability Checklist, EPA Best Practices for Clean Diesel Construction, Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (prepared for Environment Canada), or equivalent best management practices.

¹⁵ The 2016 Puget Sound Emissions Inventory included non-mobile equipment such as compressors, welders, and pressure washers in the non-road category of equipment.

Admin-3: Ports facilitate energy studies and conservation projects at Port operations or tenant facilities to identify and address energy conservation opportunities in building systems, operations, and yard lighting

2015 Target	By 2015, each Port conducts 3 energy studies <input checked="" type="checkbox"/> TARGET COMPLETE
2020 Target	By 2020, each Port completes 3 energy conservation projects <input checked="" type="checkbox"/> TARGET COMPLETE
What is being measured?	This measure includes energy conservation projects resulting in reduced energy use for Port or tenant operations.
Why is this important?	Reducing energy use in facilities can contribute to reducing GHG and air quality emissions.
How did we do?	Ports previously met this target, and continue to complete more projects annually. In 2019, the Ports collectively completed 20 energy studies and 8 energy conservation projects for Port or tenant facilities.
Definition of Terms	<i>Energy study:</i> A study that identifies a facility's current energy use and opportunities for reducing energy use in future through conservation activities and technologies, or through alternative energy technologies. <i>Energy conservation project:</i> A project that implements identified opportunities for reducing energy consumption in a Port or tenant facility. Facilities may include building systems, operations, or yard lighting.

Implementation Efforts in 2019 by Port: Port Administration

Port:	Port of Vancouver
How is the Port of Vancouver doing?	<p>Admin-1: Two vehicles were upgraded in the on-road fleet, one gasoline-fueled vehicle and one diesel-fueled vehicle. The non-road fleet added two gasoline engines. The proportion of the on-road fleet using alternative fuels decreased slightly to 24%, the non-road fleet decreased to 53%. VFPA does not currently have a fuel efficiency plan in place for its fleet.</p> <p>Admin-2: For 2019, VFPA continued to apply Green Infrastructure Guidelines to Port-led infrastructure projects, giving consideration to the economic, environmental and social impacts that the projects may impart. In 2019, there were three Port-led projects valued at greater than \$500k, for which metrics were recorded and reported via the Corporate Balanced Scorecard. For these three projects, 88% of the applicable Green Infrastructure Guidelines were implemented.</p> <p>Admin-3: For the fifth year in a row, VFPA partnered with Climate Smart Businesses Inc. to offer training to tenants on measuring, managing and communicating reductions in GHG emissions. Training is offered as a three-part series, with an additional information and follow-up session. Since VFPA started offering the program in 2015, 24 tenants have participated and have recorded a reduction of 11,241 tonnes of carbon dioxide equivalent.</p> <p>VFPA also hosted a Climate and Air Action workshop for tenants.</p>

Port:	Port of Vancouver
Other initiatives:	<p>VFPA has reported corporate energy consumption and associated GHG emissions annually since 2010 in accordance with the ISO 14064-Part 1 standard for reporting GHG emissions and the Global Reporting Initiative's G4 Sustainability Reporting Guidelines, core.</p> <p>Since 2010, VFPA has purchased carbon offsets to render its operations carbon neutral, with emissions assertions assured by Ernst & Young and KPMG. This captures the use of fleet vehicles, patrol vessels, and other equipment, electricity and heating at facilities, employee commuting, paper consumption, waste, and air and other travel. Progress toward targets for waste and sustainable commuting is also tracked, reported to staff, and integrated into individual incentive plans.</p> <p>VFPA continued to participate in the Green Marine Program as a port authority, and also participated in the Green Marine West Coast Advisory Committee.</p> <p>In 2019, 31% of employees took part in a Commuter Challenge to encourage sustainable commuting.</p> <p>VFPA continued its SortSmart waste management program in 2019, which includes organic waste composting and recycling of paper, glass, metal, plastics and cardboard. Collection and recycling of binders, pens, markers, batteries and ink cartridges is also conducted through its stationary supplier. In 2019, VFPA achieved an overall 85% waste diversion rate.</p>
Port:	Port of Seattle
How is the Port of Seattle doing?	<p>Admin-1: The Port continued to improve its fleet data quality and tracking in 2019 and hired a new Marine Fleet Coordinator. The Port added 14 new fleet assets, including 4 new electric vehicles: three Polaris GEM vehicles and one Nissan Leaf.</p> <p>The Port has a fleet management policy, created in 2008 and updated in 2013, that establishes procedures and policies for fleet operations and a Green Fleet Policy. The Port is in the process of developing a Sustainable Fleet Plan and conducted an initial analysis of fleet emission reduction strategies in 2019 to inform the plan.</p> <p>The proportion of the on-road fleet using alternative fuels increased to 35% from 27% in 2019, while the non-road fleet decreased use of alternatives fuels to 70% from 79%. Renewable diesel (R99) is included in 2019 renewable fuels total.</p> <p>Admin-2: In 2019, the Port began development of a Sustainable Evaluation Framework Policy Directive and applied the Framework to several pilot projects. Port Commission intends to adopt the Framework in January 2020. The Sustainable Evaluation Framework will apply to all capital projects and key operational decisions to advance the Port's sustainability goals and other social objectives. It will also improve transparency of decisions to the public, Commission, and staff. The Framework criteria include: (1) reduce GHG emissions, (2) increase resilience, (3) protect health and the environment, (4) support local economic development, (5) advance innovation, (6) leverage partnerships, and (7) advance equity.</p> <p>Admin-3: Port of Seattle completed 2 LED lighting projects, 1 HVAC project, and 1 building energy audit in 2019. These included:</p> <ul style="list-style-type: none"> • Installed LED lighting retrofits at Terminal 102, and Pier 2 Jack Block Park that are expected to save 50,000 kWh of energy annually. • Upgraded the Shilshole Bay Marina boiler to a more energy efficient model, which is expected to increase efficiency by 15% compared to the previous system. • Completed an investment grade energy audit at World Trade Center West. • Began transitioning to LED lighting at the Port of Seattle's Pier 69 Headquarters and installing LED lighting with advanced controls at Bell Street Garage.

Port:	Port of Seattle
Other initiatives:	<ul style="list-style-type: none"> Developed a draft strategy to reduce GHG emissions from port-controlled operations, including building energy use, Port fleet vehicles, solid waste, and employee commuting in 2019 and expect to release a final GHG reduction strategy in 2020. Completed an annual emissions inventory for the year 2018 to measure the Port's scope one, two and three emissions. Produced nearly 100,000 kWh of renewable energy across two solar installations on Port buildings in 2019. Completed the PORTfolio Carbon Sequestration Assessment to estimate the carbon sequestration benefits of 19 potential habitat restoration sites within the Port's PORTfolio Restoration Plan. The sites total over 90 acres of habitat and have the potential to offset 124 metric tons of CO2 emitted per year. Supported the development of a report called "Developing an Internal Carbon Price for the Port of Seattle" The Port Commission approved Resolution 3767 in December 2019, the Duwamish Valley Community Benefits Commitment. The Resolution is the first policy at a U.S. port that approaches community engagement through an environmental justice lens. Completed waste audits at Port of Seattle Maritime facilities to develop recommendations to increase waste diversion and create site-specific implementation plans. The Port completed audits at 8 of 13 facilities as of the end of 2019.
Port:	Port of Tacoma
How is the Port of Tacoma doing?	<p>Admin-1: The size of the administrative fleet, especially the non-road diesel and gasoline fleets, decreased at Port of Tacoma during 2019, achieved predominantly through retiring and scrapping old equipment.</p> <p>Admin-2: The Port of Tacoma uses standard contract language that requires a minimum emission standard of Tier 2 equipment for Port construction contracts.</p> <p>Admin-3: In 2019, the Port of Tacoma undertook two energy studies and conservation projects on its industrial real estate properties. This led to energy efficient lighting upgrades at a property on Thorne Road and Ross Way in Tacoma.</p>
Other initiatives:	<p>The POT Corporate Social Responsibility team (Green Team), made up of members from across the Port, meets monthly and hosts information sessions on topics ranging from electric vehicles to recycling.</p> <p>POT encourages telecommuting and van and car pools under its Commuter Trip Reduction program. Employees are incentivized to share trips by logging trips on 'Pierce Trips' to enter a monthly prize draw. POT uses GPS tracking to reduce vehicle idling and improve efficient use of POT-owned and operated vehicles.</p> <p>Since 2008, the Port maintains an agreement with Tacoma Power to purchase 100% green power for the administrative services facility. Tacoma Power's Evergreen Options service plan allows the Port to buy electricity produced from renewable energy sources, including non-polluting wind or solar generators in the Northwest.</p>
Port:	The Northwest Seaport Alliance
How is the NWSA doing?	Not applicable because NWSA operated out of Port of Seattle and Port of Tacoma offices and facilities.

9. Pilot Studies and Demonstration Projects in 2019

Pilot studies and demonstration projects are important for advancing new and existing emission-reduction technology for the maritime industry. In the 2013 Strategy, each Port committed to evaluating or engaging in at least one pilot study or demonstration project each year to advance knowledge. The Ports also committed to convening workshops, webinars, or meetings among relevant stakeholders to share information and results. Findings from pilot studies and demonstration projects that took place in 2019 are summarized in this section.

Pilot studies refer to preliminary desktop studies that evaluate feasibility, time, cost, adverse events, and other factors prior to engaging in a full-scale project. **Demonstration projects** are small-scale implementation projects that test feasibility and effectiveness of a technology or change in operation in a real-world application. Overall, four pilot studies were undertaken at the ports in 2019.

Port of Vancouver: International Collaboration on Ship Emission Reductions Initiative

Vancouver Fraser Port Authority is leading an International Collaboration on Ship Emission Reductions (ICSER) to make it easier to learn about, access and administer ship incentive programs available at global ports, to better promote an increase in voluntary environmental performance in marine shipping. The initiative also aims to better facilitate customer access to information on environmental infrastructure such as shore power and alternative fueling at ports around the world.

Through this collaboration, VFPA aims to build an international tool to increase shipping companies' participation in global environmental incentive programs by making it easier for marine carriers and their agents to see all available programs worldwide.

In 2019, VFPA undertook the first phase of this initiative, with guidance from an international project team made up of the Port of Gothenburg, Port of Los Angeles, Port of Long Beach, Natural Resources Defense Council (China), China Waterborne Transport Research Institute, United States Environmental Protection Agency Green Ports and Vessel Program and Transport Canada. The first phase focused on broad, global stakeholder engagement to validate and refine the proposed approach, and input was received from a wide range of stakeholders, including ports, marine carriers, non-government organizations, government agencies, engine manufacturers, rating providers, etc.

Outcomes from the first phase validated the proposed approach of a joint web-based aggregation platform, which could act as a one-window portal for marine carriers, ports and other industry representatives.

Based on the positive outcome from the first phase of engagement, ICSER is looking to proceed with a second phase of engagement in 2020 in partnership with other interested stakeholders.

Port of Seattle: Renewable Diesel Pilot

In December 2019, Port of Seattle began piloting the use of renewable diesel to fuel port-owned fleet vehicles and diesel equipment. The first gallons of renewable diesel were delivered to the Horton Street Fueling Island at the POS Marine Maintenance facility on December 4, 2019. The POS Maritime Fleet Manager will monitor performance of vehicles using the renewable fuel. The Port anticipates continuing to use renewable diesel as a strategy to reduce greenhouse gas emissions from its diesel fleet and will track the availability, price and emission reduction potential of other renewable fuel options available.

Port of Tacoma: Composting and Waste Centralization Pilot Program

The Port of Tacoma conducted a composting and waste receptacle centralization pilot program at the Administration Building in 2019, an action that grew from the 2018 waste audit. The results of the waste audit (detailed in the 2018 Implementation Report) indicated that 48% of the waste that was sent to the landfill was compostable, and 23% of the non compostable waste was plastic garbage bags, suggesting that implementing methods to compost organic waste and reduce the number of trash receptacles would significantly reduce the landfill waste stream.

Port of Tacoma purchased composting receptacles that were located in the kitchen spaces to collect compostable waste along with educational signage. Individual waste bins were removed from desks and replaced with communal waste bins in each building quadrant to reduce the number of trash bags used each day. Early qualitative observations indicated that staff were consistently using the compost bins. The pilot program continued into 2020 (currently on hold due to COVID-19 work from home procedures).

Northwest Seaport Alliance: Electric Yard Truck Demonstration

The NWSA worked with one electric yard truck manufacturer, BYD, to facilitate a demonstration of zero-emission cargo-handling equipment technology in the Pacific Northwest in summer 2019. No electric yard trucks are currently owned or operated at NWSA facilities – this was a chance to show the technology can work successfully in the Northwest. The electric yard truck was in real-life operations in the North and South Harbors, allowing our terminal operators to see this technology in action. The new, battery electric Class 8 BYD trucks have zero tailpipe emissions, can operate for 10 hours on a single charge, and are currently operating at BNSF rail yards in Southern California.

10. Port Initiatives for 2020

The key air initiatives that are planned by the Ports for 2020 include:

Port of Vancouver

- Continue collaborative work with the Port of Seattle, Port of Tacoma and Northwest Seaport Alliance, to complete a 2020 update to the Northwest Ports Clean Air Strategy to define actions for 2025, 2030, and beyond, including measures to phase out emissions from ocean-going vessels as soon as possible this century.
- Initiate the 2020 Port emission inventory.
- Feasibility study into expanding shore power capabilities at Canada Place.
- Provide support for potential hydrogen yard truck pilot with Zen Energy, Ballard, Powertech, HTEC, Capacity (REV Group) and others, pending funding application approval.
- Provide support for potential electric yard truck pilot by Seaspan Ferries.
- Complete annual corporate GHG emission inventory and purchase carbon offsets and implement a corporate GHG emissions reduction plan to target 40% reduction by 2030.
- Undertake a sixth year of partnering with Climate Smart Businesses Inc. to support tenants in tracking their GHG emissions, implementing emission reductions, and communicating successes to stakeholders.
- Complete the sixth year of the Non-Road Diesel Emissions Program and update the program for beyond 2020.
- Review and update eligible criteria for vessel incentives under the EcoAction Program, ensuring the continued recognition of the most progressive vessels at reducing air emissions and underwater noise.
- International Collaboration on Ship Emission Reductions (ICSER) Initiative – Explore opportunities to move the initiative into implementation in partnership with other stakeholders, either as a stand-alone effort or as part of a larger collaboration.
- World Ports Climate Action Program action plan implementation and additional deliverables
 - Continue to lead the Sustainable Fuels Work Group.
 - Continue to lead the Policy Work Group until handing off mid-2020 and transitioning to an active work group member role.
 - Continue to participate in and support the Power-2-Ship and Decarbonization of Cargo Handling Facilities work groups.
- Continue to participate in the DNV-GL led Maritime Hydrogen Safety Joint Development Project, to develop guidance in support of approval for hydrogen fueled ocean going vessels.
- Continue working with the Getting to Zero Coalition, to support having commercially viable zero emission ocean going vessels in use and scalable fueling infrastructure in place.

- Partner with FortisBC Energy Inc. to support the use of natural gas for international marine carriers, domestic fleet operators and the heavy class 8 trucking drayage sectors operating at the Port of Vancouver.

Port of Seattle

- Continue collaborative work with Port of Tacoma, Northwest Seaport Alliance and Vancouver Fraser Port Authority to complete a 2020 update to the Northwest Ports Clean Air Strategy to define actions for 2025, 2030, and beyond, including measures to phase out emissions from ocean-going vessels as soon as possible this century.
- As part of the Port's climate strategy, provide an NWPCAS implementation plan that identifies port-specific actions toward the updated Northwest Ports Clean Air Strategy vision.
- Continue partnership with and participation in the Duwamish Valley Clean Air Stakeholder group.
- Pursue applicable federal, state, and regional funding opportunities to offset the costs of installing shore power at the Bell Street Cruise Terminal at Pier 66.
- Continue collaborative work with cruise lines through the Cruise MOU and cruise environmental program to improve environmental performance and promote shore power usage.
- Starting January 1, 2020, the Port will prohibit all exhaust gas cleaning system (EGCS) wash water discharges from cruise ships at berth, a precautionary measure to aid in preservation of Puget Sound's sensitive marine environments. EGCS are installed on some ships as a way to continue use of higher sulfur diesel fuel while meeting compliance with the IMO sulfur rules. EGCS mix engine exhaust with either seawater or pH adjusted freshwater to create a chemical reaction that significantly reduces sulfur oxides in exhaust emissions. However, while the "wash water" used to treat exhaust is a legal form of overboard discharge, some studies have shown it may at times contain potentially harmful levels of pollutants or pH levels.
- Complete an annual Emissions Inventory of Maritime, Economic Development, and Corporate (Maritime) greenhouse gas emissions (GHG) associated with port authority operations and tenant facilities for the year 2019. The Emissions Inventory covers scope 1, 2, and 3 GHG emissions¹⁶ from mobile fleet fuel use, stationary electricity, stationary natural gas, solid waste disposal, employee commuting, business air travel, and the maritime supply chain. (Note: While emissions from the Maritime Supply Chain are included in the annual inventory, the emissions data is updated only every five years through the Puget Sound Maritime Air

¹⁶ The Greenhouse Gas Protocol breaks down emissions by source into three categories. Scope 1 emissions include direct emissions from an organization or under its control; Scope 2 emissions are indirect emissions from purchased electricity; and Scope 3 emissions include all other indirect emissions related to the activities of the organization, occurring from sources that the organization does not own or control. Emissions associated with business travel, procurement and waste are in this category. For more information visit GHG Protocol: <https://ghgprotocol.org/calculation-tools-faq>.

Emissions Inventory (PSEI). Data from the 2016 PSEI is used as a proxy in the 2019 inventory year).

- Upgrade shore power infrastructure at Harbor Island Marina's "E-Dock" to enable tugboats and other vessels to connect.
- Adopt the Sustainable Evaluation Framework policy directive and hire a new staff member to implement the Framework across port projects.
- Begin development of a Seattle Waterfront Clean Energy Strategic Plan with Seattle City Light and others and execute a consultant contract to provide technical support and hire a new staff member to lead the joint planning process.
- Finalize a climate strategy focused on reducing greenhouse gas emissions from Port of Seattle Maritime, Economic Development, and Corporate activities. The Port developed an interim draft in late 2019 and the final version will identify targets, strategies, and specific actions to reduce port-controlled and influenced emissions from port authority operations and tenant facilities.
- Finalize a port-wide Sustainable Fleet Plan. Supporting the ongoing work of fleet managers to reduce emissions and cost from Port fleet operations, the Sustainable Fleet Plan will evaluate the Port of Seattle maritime, corporate, and aviation fleet vehicles and assets and recommend efficient and cost-effective strategies to reduce carbon emissions and maintain effective service.
- Seek design and construction funding to begin a high-efficiency HVAC upgrade at the Port's World Trade Center West building.
- Complete analysis and document a plan to phase out natural gas use for heating and cooling in port-owned buildings.
- Accelerate the pace of ongoing LED lighting retrofit work across Port buildings and facilities and work with utilities to capture incentive dollars based on energy savings.
- Continue planning and budgeting for electric vehicle charging stations to support future EV fleets at Port properties. Complete installation of 8 charging stations at the Ports' Shilshole Bay Marina
- Complete construction of new marina tenant restrooms at Shilshole Bay Marina. Restroom upgrades include solar panels, electric clothes dryers, LED lighting and air source heat-pumps, which eliminate natural gas from the buildings.
- Comply with City of Seattle's Building Tune-Up ordinance by completing or supporting tune-up audits at three facilities (Pier 66, Pier 69 and Terminal 91 Smith Cove Cruise Terminal), conducting benchmarking at all buildings and facilities over 20,000 square feet, and identifying low cost/no cost operational improvements to improve building energy efficiency.
- Conduct additional waste audits to identify waste management infrastructure improvements and support development of best management practices for building and facilities.

- Continue updating the Port's Commute Trip Reduction program to improve first and last mile connections to transit, reduce roadway congestion, and enable alternative work arrangements to reduce Port employee commute times and drive-alone rates.
- Begin implementation of the Port's Sustainable Evaluation Framework.
- Continue to participate in and advance the International Association of Ports and Harbors' Cruise Emissions Reporting Project.
- Join the Ocean Acidification Alliance and become the first global port to do so.
- Hire a Senior Environmental Management Specialist to support and advance the Ports climate change and air quality programs.
- Hire two post-graduate fellows for a one-year internship to support implementation of the NWPCAS, Port-led habitat restoration projects, and engagement with community groups on environmental topics.

Port of Tacoma

- Continue collaborative work with Port of Seattle, Northwest Seaport Alliance and Vancouver Fraser Port Authority to complete a 2020 update to the Northwest Ports Clean Air Strategy to define actions for 2025, 2030, and beyond, including measures to phase out emissions from ocean-going vessels as soon as possible this century.
- Partner with Tacoma Public Utilities to identify suitable facilities and implement LED lighting upgrades.
- Assess results of 2020 Composting and Waste Centralization Pilot Program.
- Apply for grant funding to replace old diesel cargo-handling equipment at EB-1 terminal.

Northwest Seaport Alliance

- Continue collaborative work with Port of Seattle, Port of Tacoma and Vancouver Fraser Port Authority to complete a 2020 update to the Northwest Ports Clean Air Strategy to define actions for 2025, 2030, and beyond, including measures to phase out emissions from ocean-going vessels as soon as possible this century.
- Continue to implement the NWSA Clean Truck Program requirements at all international container terminals.
- Monitor domestic Clean Truck Program compliance rates.
- Launch domestic truck scrapping program using grant funds from the Department of Ecology.
- Partner with PSCAA on DPF Maintenance education program.
- Finalize Terminal 5 Air Quality Management Program.
- Begin engineering design of shore power system at Pier 3 and Pier 4.

- Pursue grant funding for shore power infrastructure at NWSA major international container terminals.
- Conduct second third-party verification of NWSA operations to maintain Green Marine certification.
- Start South Harbor Electrification Roadmap planning effort - focused on infrastructure needs in Tacoma for electrification of facilities.
- Participate in development of Seattle Waterfront Clean Energy Strategic Plan, led by Port of Seattle; a planning effort to assess infrastructure requirements for implementing zero emission technology.
- Develop a NWSA international engagement strategy.
- Review and update NWSA lease language in any new leases to include requirements for Tier 4 cargo-handling equipment.
- Apply for grant funding to support electrification of terminal tractors at the South Intermodal Yard.

Collectively, the Ports are in the process of renewing this Strategy, building on the strong collaboration established among the Ports and strategy partners over the last decade. As part of this process, the Ports are identifying opportunities for measuring, tracking, and reducing sources of air pollution and contributions to climate change (GHG emissions and black carbon, recognizing the increasing importance of black carbon and its potential impacts on air quality and climate change).

After twelve years of collaboration on reducing port-related air emissions in the Northwest, the Ports are committed to continued and renewed efforts to invest in studies, projects, programs, and other efforts that result in improved air quality and reduced contributions to climate change.

Acknowledgements

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