



# NORTHWEST PORTS CLEAN AIR STRATEGY

2012 Implementation Report

July 8, 2013





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## List of Acronyms

<b>ABC Fuels</b>	At-Berth Clean Fuels Vessel Incentive Program
<b>BC Ferries</b>	British Columbia Ferries
<b>BNSF</b>	Burlington Northern Santa Fe Railway
<b>CHE</b>	Cargo-Handling Equipment
<b>CNG</b>	Compressed Natural Gas
<b>PSCAA</b>	Puget Sound Clean Air Agency
<b>DERA</b>	Diesel Emission Reduction Act
<b>DOC</b>	Diesel Oxidation Catalyst
<b>DPM</b>	Diesel Particulate Matter
<b>Ecology</b>	Washington State Department of Ecology
<b>ECA</b>	Emission Control Area
<b>EPA</b>	United States Environmental Protection Agency
<b>GHG</b>	Greenhouse Gasses
<b>IMO</b>	International Maritime Organization
<b>LNG</b>	Liquefied Natural Gas
<b>NO<sub>x</sub></b>	Nitrogen Oxides
<b>OGV</b>	Ocean-Going Vessel
<b>PM</b>	Particulate Matter
<b>PM<sub>2.5</sub></b>	Particulate Matter with diameter $\leq 2.5 \mu\text{m}$ in diameter
<b>PMV</b>	Port Metro Vancouver
<b>POS</b>	Port of Seattle
<b>POT</b>	Port of Tacoma
<b>RFID</b>	Radio Frequency Identification
<b>RTG</b>	Rubber-tired Gantry
<b>ScRAPs</b>	Scrapage and Retrofits for Air in Puget Sound
<b>Seaspan</b>	Seaspan Marine Corporation
<b>SO<sub>x</sub></b>	Sulfur Oxides
<b>TLS</b>	Truck Licensing System
<b>ULSD</b>	Ultra-Low Sulfur Diesel (15 ppm or 0.0015% Sulfur)
<b>U.S.</b>	United States
<b>WSF</b>	Washington State Ferries



## Executive Summary

The Northwest Ports Clean Air Strategy (“the Strategy”) was developed in 2007 as a collaboration between Port Metro Vancouver, the Port of Seattle, and the Port of Tacoma. Supporting the Ports through the development and/or implementation of the strategy are regulatory agencies including Environment Canada, Metro Vancouver, the Puget Sound Clean Air Agency, the Washington State Department of Ecology, and the United States Environmental Protection Agency<sup>1</sup>. Collectively, the ports and government agencies are referred to as the Strategy partners.

Reporting on implementation of the Strategy occurs on an annual basis with previous implementation reports published in 2009, 2010, 2011, and 2012. The purpose of the implementation report is to measure the progress toward the 2010 and 2015 performance measures established in the original 2007 Northwest Ports Clean Air Strategy. This report focuses on progress made in 2012. The Partners are currently developing an updated Strategy document and future annual implementation reports will reflect progress toward revised and new measures established in the Strategy update.

**Table i – Summary of Status and Implementation Efforts in 2012 for Each Sector<sup>2</sup>**

Sector	2010 Performance Measure from 2007 Strategy	2010 Performance Measure Status	2015 Performance Measure from 2007 Strategy	2015 Performance Measure Status
Ocean-Going Vessels	<ul style="list-style-type: none"> <li>0.5% S Fuel Auxiliary Engines Hoteling</li> <li>1.5% S Fuel Main Engines Hoteling</li> </ul>	<ul style="list-style-type: none"> <li>40% met or surpassed</li> </ul>	<ul style="list-style-type: none"> <li>Compliance with IMO</li> </ul>	<ul style="list-style-type: none"> <li>No data available</li> </ul>
Cargo-Handling Equipment	<ul style="list-style-type: none"> <li>Port-wide Tier 2 or 3 equivalent engines</li> <li>All CHE use ULSD or equivalent</li> <li>New equipment meets highest standards as practicable</li> </ul>	<ul style="list-style-type: none"> <li>74% Tier 2 or better</li> <li>100% ULSD</li> <li>100% New Equipment</li> </ul>	<ul style="list-style-type: none"> <li>Port-wide Tier 4 equivalent engines for 80% of equipment</li> </ul>	<ul style="list-style-type: none"> <li>38% met or surpassed</li> </ul>
Trucks	<ul style="list-style-type: none"> <li>1994 or newer truck engines</li> </ul>	<ul style="list-style-type: none"> <li>100% met or surpassed</li> </ul>	<ul style="list-style-type: none"> <li>80% of heavy duty trucks have 2007 or newer engines</li> </ul>	<ul style="list-style-type: none"> <li>22% met or surpassed</li> </ul>
Rail	<ul style="list-style-type: none"> <li>Expedite the implementation of the SmartWay Partner commitment (US)</li> <li>Develop workgroup to collaborate on ways to reduce emissions (CA)</li> </ul>	<ul style="list-style-type: none"> <li>60% of US and 50% if Canadian rail participate in SmartWay</li> <li>NA*</li> </ul>	Compliance with the US EPA Proposed 2007 Locomotive and Marine Diesel Engine Rule *	NA*
Harbor Craft	No defined performance measure for this sector	NA*	2015 performance measure to be established in the 2013 strategy update	Continue emission reduction initiatives
Port Administration	No defined performance measure for this sector	NA*	2015 performance measure to be established in the 2013 strategy update	Continue emission reduction initiatives

\* Efforts have been made towards reducing emissions in sectors that do not have specific performance measures.

<sup>1</sup> The British Columbia Ministry of Environment and the American Recovery and Reinvestment Act provided additional technical and financial support toward emission-reduction initiatives related to the Northwest Ports Clean Air Strategy.

<sup>2</sup> Note: Measures are not verbatim from the Strategy document.



## Introduction

The Northwest Ports Clean Air Strategy has three primary emission reduction objectives:

- 1) Reduce maritime and port-related air quality impacts on human health, the environment, and the economy.
- 2) Reduce contribution to climate change through co-benefits associated with reducing air quality impacts.
- 3) Help the Georgia Basin – Puget Sound airshed continue to meet air quality standards and objectives.

To meet the primary objectives listed above, the Strategy includes specific performance measures (discussed below) and focuses on the reduction of DPM, with co-benefits that reduce GHG.

The Strategy targets emission sources from the following six sectors: ocean-going vessels, cargo-handling equipment, trucks, rail, harbor craft, and port administration.

The Ports and their partners have made progress towards achieving the 2010 performance measures, but have not yet met all of them. The Ports are continuing to work to achieve 2010 performance measures while also pursuing progress towards 2015 performance measures. As such, this 2012 Implementation Report describes progress towards both the 2010 and 2015 performance measures.



## Ocean-Going Vessels

Ocean-going vessels (OGV) include container ships, cruise ships, tanker ships, and bulk cargo ships. The 2007 Strategy has primarily focused on reducing emissions from frequent-calling vessels during hotelling and transiting. Frequently calling vessels are those that make at least five calls per year to the port. The OGV performance measures established in the 2007 Strategy are included in Table 1.

**Table 1 – OGV Performance Measures**

2010	<ul style="list-style-type: none"> <li>Using distillate fuels with a maximum sulfur content of 0.5% for hotelling auxiliary engines</li> <li>Use of fuels with a maximum sulfur content of 1.5% or equivalent PM reduction measures, for all hotelling main or diesel electric engine operations.</li> </ul>
2015	<ul style="list-style-type: none"> <li>Compliance with IMO rules and in accordance with the IMO schedule.</li> </ul>

On March 26, 2010, the IMO officially designated the North American Emission Control Area (ECA). For this area, all vessels within 200 nautical miles of the coast must burn low-sulfur fuel or achieve an equivalent emission reduction with exhaust gas after-treatment or other methods as follows:

- Starting August 2012, the maximum fuel sulfur limit is 1%.
- Beginning January 2015, the maximum sulfur limit is lowered to 0.1%.
- Beginning in 2016, NO<sub>x</sub> after-treatment requirements become applicable for newly manufactured engines.

In 2012, 40% of frequent callers to the Ports met or surpassed the 2010 performance measure. The level of achievement of the 2010 performance measure by the Ports is summarized below.

**Progress towards the 2007 Strategy’s 2010 Performance Measures:** Table 2, below, shows both the percentage of vessel calls and the number of calls meeting or exceeding the 2010 performance measure for each of the past implementation reports, starting in 2008 and concluding with the 2012 report.

**Table 2 – Progress Towards the 2007 Strategy’s 2010 Performance Measures for OGVs**

Port	2008		2009		2010		2011		2012	
	% of Calls	# of Calls	% of Calls	# of Calls	% of Calls	# of Calls	% of Calls	# of Calls	% of Calls	# of Calls
Port Metro Vancouver	7%	79	1.6%	12	25%	199	18%	180	23%	212
Port of Seattle	29%	219	64%	454	72%	601	73%	579	57%	457
Port of Tacoma	57%	433	50%	336	35%	188	50%	261	42%	262
<b>Overall Weighted Average Percentage/Total</b>	<b>28%</b>	<b>731</b>	<b>38%</b>	<b>802</b>	<b>46%</b>	<b>988</b>	<b>44%</b>	<b>1,020</b>	<b>40%</b>	<b>931</b>



**Progress towards the 2007 Strategy's 2015 Performance Measures:** The 2015 performance measure is compliance with the promulgated IMO regulations. The low-sulfur fuel requirements for ships traveling within the ECA took effect in August of 2012 and are enforced by the U.S. and Canadian Coast Guard. The Ports were unable to measure performance toward the 2015 performance measure because the status of ships' compliance with the ECA low-sulfur fuel regulations was not available to them. The next annual progress report will reflect the updated 2015 OGV performance measure contained in the 2013 Strategy Update.

## **Summary of Implementation Efforts in 2012**

### Port of Seattle

In 2012 the At-Berth Clean Fuels Vessel Incentive Program (ABC Fuels completed its fourth year in providing financial incentives to frequently calling vessels that burn 0.5% (or less) sulfur fuels in auxiliary engines and boilers while at berth. The program was again administered by the Puget Sound Clean Air Agency. During 2012, new incentive levels were set for 2013 to provide a tiered incentive payout, depending on the volume of fuel burned while at berth for early adoption of 2015 ECA levels (burning fuel with  $\leq 0.1\%$  sulfur content while at berth).

During calendar year 2012, vessels made a total of 264 calls to the Port of Seattle under the ABC Fuels program. By burning low-sulfur fuel (0.5% sulfur or less) while at-berth, these vessels reduced SO<sub>2</sub> emissions by an estimated 166 tons.

In 2012, 64% of the vessels participating in the ABC Fuels program (a total of 168 vessels) burned fuel at berth that was less than or equal to 0.1% sulfur. These vessels demonstrated early compliance with the 2015 ECA low-sulfur fuel requirement.

The majority of cruise ships that call at the Port of Seattle plug into shore power. Prior to the August 1, 2012 effective date of the ECA, cruise ships not using shore power were required by Port of Seattle tariff to burn fuel with a maximum 1.5% sulfur content while at berth. Several cruise lines that do not plug into shore power participated in the ABC Fuels program and burn fuel with sulfur content at or below 0.5% at berth.

For a third year, the Port of Seattle provided cruise and container lines the opportunity to apply for a Port of Seattle Green Gateway Partners Award, which was awarded to nine cruise and container lines for their 2012 actions. In order to be eligible for an award, applicants must either participate in the ABC Fuels program or plug into shore power, and demonstrate environmental stewardship initiatives above and beyond existing regulations.

Several carriers that participated in the At-Berth Clean Fuels Program stopped calling at the Port of Seattle in mid-2012, and one container carrier dropped out of the program when the ECA limits for sulfur fuels went into effect in August 2012. Both of these events reduced the percentage of participation Port's progress towards meeting the 2010 Performance Measure for OGVs.





### Port of Tacoma

TOTEM Ocean Trailer Express (TOTE) continued to use shore power at berth, greatly reducing particulate and greenhouse gas emissions from two container ships servicing Alaska. TOTE also announced its plans to convert both vessels from diesel-powered engines to LNG -powered engines, further reducing greenhouse gases and eliminating DPM emissions. Ship conversions are scheduled to be completed by 2016.

Three frequent-calling vessel lines continued to burn low-sulfur fuel (0.5% sulfur or less) in 2012, going beyond the current ECA fuel sulfur standard of 1.0%.

### Port Metro Vancouver

Through its EcoAction Program, PMV continued to offer reduced harbor fees to recognize and encourage vessels that went beyond the existing requirements to reduce emissions. Vessels are eligible to participate through a variety of options such as shore power, use of lower-sulfur fuel, alternative fuels/technologies, or by having acceptable environmental designations from classification societies or other programs. Results of the program for 2012 include:

- 2,266 tonne and 3.5 tonne reduction in GHGs and DPM (PM2.5) respectively from cruise vessels connecting to shore power at Canada Place
- 10% reduction in SOx emissions over the entire OGV sector

PMV's Blue Circle Award recognizes marine carriers with the highest participation in the EcoAction Program.

Recipients in 2012 included:

- APL (Canada)
- Grieg Star Shipping (Canada) Ltd.
- Hapag-Lloyd (Canada) Inc.
- Holland America Line
- "K" Line
- Maersk Line
- Princess Cruises
- Silversea Cruises
- Westwood Shipping Lines

In 2012, PMV completed the EcoAction Program Improvement Project. The improvements are scheduled to take effect beginning in January of 2013 and include the following:

- Further emission reductions and increased vessel participation.
- Preparation for the IMO's North American ECA.
- Improvement of the administrative processes and technology interface.



## Cargo-Handling Equipment

The CHE sector addressed in this report includes equipment used to handle cargo. Examples include straddle carriers, RTG cranes, reach stackers, top and side picks, forklifts, skid loaders, yard tractors/trucks, wharf cranes, and conveyor belts. The CHE performance measures set in the 2007 Strategy are included in Table 3.

**Table 3 –2007 CHE Performance Measures**

<b>2010</b>	<ul style="list-style-type: none"> <li>Reach the port-wide equivalent PM reduction of Tier 2 or Tier 3 engines (0.15 g/hp-hr for most CHE) operating with ultra-low sulfur diesel (ULSD) or a biodiesel blend of an equivalent sulfur level (15 ppm sulfur), and promote early implementation of the requirements between now and 2010.</li> <li>All new terminals will be equipped with new CHE equipment meeting the highest standards that are practicable for the anticipated use at the time of purchase.</li> </ul>
<b>2015</b>	<ul style="list-style-type: none"> <li>Reach a port-wide equivalent of Tier 4 engines, for 80% of equipment.</li> <li>Retrofit the remainder of equipment with best available verified retrofit technologies.</li> <li>Purchase the cleanest available CHE that is practicable for the anticipated use at the time of scheduled capital upgrades.</li> </ul>

**Progress toward the 2007 Strategy’s 2010 Performance Measures:** In 2012, 74% of CHE met or surpassed Tier 2 or Tier 3 engine standards. All CHE have used ULSD fuels or biofuel with equivalent sulfur levels since 2008 at the Port of Seattle and Port of Tacoma, and since 2010 at Port Metro Vancouver.<sup>3</sup>

**Table 4 – Progress towards the 2007 Strategy’s 2010 Performance Measures for CHE (Percent of CHE with Tier 2 Equivalent or Better Engines)**

Port	2008	2009	2010	2011	2012
Port Metro Vancouver	29%	32%	53%	69% <sup>4</sup>	72%
Port of Seattle	9%	68%	55%	58%	79%
Port of Tacoma	47%	70%	77%	68%	71%
<b>Average</b>	28%	57%	62%	63%	74%

**Progress towards the 2007 Strategy’s 2015 Performance Measures:** As the CHE fleet has implemented a variety of emission reduction activities, the ports have investigated the best way to express the progress towards a “port-wide equivalent of Tier 4 engines.” Retrofitting older equipment can have significant air quality benefits even if the retrofitted equipment doesn’t meet Tier 4 engine standards. The ports have developed a new way to show progress towards the 2015 goals by calculating the percent progress in DPM reductions towards a Tier 4-equivalent engine. Table 5 shows the method for determining the port-wide percent of Tier 4 equivalent CHE.

<sup>3</sup> Note ULSD was a regulatory requirement for off-road engines in 2010 for both Canada and the U.S. At Port Metro Vancouver, 55% of CHE used ULSD and/or biodiesel blends in advance of the regulatory requirement (as reported in the 2009 Implementation Report)

<sup>4</sup> Port Metro Vancouver % for 2011 has been recalculated to include equipment powered by electricity or other non-diesel fuel, consistent with calculation for 2012. As a result 2011 and 2012 data cannot be compared with 2008-2010 which included only diesel-powered equipment.



Example of Tier 4 Equivalency Calculation:

Installing a diesel oxidation catalyst (DOC) retrofit on CHE with a Tier 2 engine would provide 30% of the emission reductions that would result from replacing a Tier 2 engine with a Tier 4 engine. If a terminal installed DOCs on ten CHE with Tier 2 engines, the emissions reductions would be equivalent to replacing three CHE that have Tier 2 engines with three CHE that have Tier 4 engines.

*Equation 1: Equivalent Number of CHE = Actual Number of CHE \* Percent Progress from Tier 2 to Tier 4*

*Equation 2: Percent of Tier 4 equivalent engines = Equivalent Number of Tier 4 CHE/Total Number of CHE*

**Table 5. Methodology & Calculations to Determine the Percent of Port-Wide Tier 4 Equivalency**

CHE engine category	Percent Progress from Tier 2 toward Tier 4	PMV		POS		POT	
		Actual Number of CHE	Equivalent Number of Tier 4 CHE	Actual Number of CHE	Equivalent Number of Tier 4 CHE	Actual Number of CHE	Equivalent Number of Tier 4 CHE
Tier 0-1	0%	478	0	85	0	152	0
Tier 2-3	0%	514	0	75	0	149	0
Tier 2-3 with DOC	30%	0	0	116	35	50	15
Tier 0-1 with DPF	65%	0	0	0	0	11	7
Tier 2-3 with DPF	100%	0	0	31	31	42	42
Tier 4 or Onroad		141	141	10	10	68	68
Electric		0	0	9	9	3	3
Gasoline		56	56	8	8	1	1
Propane		401	401	62	62	43	43
CNG/LNG	92	92	0	0	0	0	
<b>Total</b>		<b>1682</b>	<b>690</b>	<b>396</b>	<b>155</b>	<b>519</b>	<b>179</b>

In 2012, 38% of CHE were equivalent to Tier 4 engines as shown in Table 6.

**Table 6 – Progress towards the 2007 Strategy’s 2015 Performance Measures for CHE (Percent Tier 4 equivalent engines)**

Port	2011 <sup>5</sup>	2012
Port Metro Vancouver	37%	41%
Port of Seattle	38%	39%
Port of Tacoma	28%	35%
<b>Average</b>	<b>34%</b>	<b>38%</b>

<sup>5</sup> The 2011 performance numbers have been adjusted based on the new equivalency calculation method described for Table 5



## Summary of Implementation Efforts in 2012

### Port of Seattle

Under an EPA DERA grant, the Puget Sound Clean Air Agency replaced 12 Tier 0 yard trucks with 10 new 2011 yard trucks equipped with Tier 4 equivalent on-road engines. In March 2012, the Washington Department of Ecology awarded the Clean Air Agency a grant to install idle-reduction technologies on CHE used at the Port of Seattle, as well as other retrofit devices that will improve the longevity of exhaust control retrofits the Agency has previously installed using other funding sources. The total grant award was \$287,200. The Agency entered into agreements with some Port of Seattle terminal operators in 2012 and will begin installing idle-reduction equipment on CHE in 2013.

Under Ecology Clean Diesel grants, two CHE were retrofitted with diesel oxidation catalysts (25% PM reduction) and 17 CHE were retrofitted with diesel particulate filters (85% PM reduction).

### Port of Tacoma

In March 2012, Ecology awarded the Clean Air Agency a grant to install idle-reduction technologies on CHE used at the Port of Tacoma. The total grant award was \$228,150. The Agency entered into agreements with some Port of Tacoma terminal operators in 2012 and will begin installing idle-reduction equipment on CHE in 2013.

Under Ecology Clean Diesel grants, 35 CHE were retrofitted with diesel oxidation catalysts (25% PM reduction) and three CHE were retrofitted with diesel particulate filters (85% PM reduction). Six CHE with Tier 0 engines were repowered with Tier 3 engines in 2011, but this project was not reported in the 2011 implementation report. Ecology also funded an idle-reduction demonstration project at one terminal, which led to the larger idle-reduction projects mentioned above.

Ecology also funded the purchase of two DPF filter-cleaning machines and DPF filter-cleaning services in support of DPF retrofit projects.

### Port Metro Vancouver

Two PMV tenants participated in the “Terminals and Shipyards” category of the Green Marine Program in 2012, including Seaspan Marine Corporation and Neptune Bulk Terminals (Canada) Ltd. Green Marine is a voluntary program through which Canadian and American ship owners, terminals, shipyards and ports track and report improvements to environmental performance.

In 2012 PMV began planning a program to further reduce particulate matter emissions associated with cargo handling equipment. The program will expand anti-idling policies, encourage newer equipment, and promote innovation and alternative energy. The program is intended to become effective in 2014.



## Trucks

Drayage (or container) trucks are primarily diesel-fueled, heavy-duty trucks that transport containers and bulk cargo to and from ports and rail yards. The Strategy calls for all trucks operating at the Ports to meet specific PM emissions levels. The trucks performance measures set in the 2007 Strategy are included in Table 7.

**Table 7 – 2007 Trucks Performance Measures**

<b>2010</b>	<ul style="list-style-type: none"> <li>Reach the equivalent PM emissions level of 1994 or newer heavy-duty truck engine model year through vehicle purchase or by using approved retrofit packages.</li> </ul>
<b>2015</b>	<ul style="list-style-type: none"> <li>Eighty percent of heavy-duty drayage trucks will reach the equivalent PM emissions level of 2007 or newer engine model year through vehicle purchase or by using approved retrofit packages. This is an interim objective on the way to the goal of 100% of heavy-duty drayage trucks by 2017.</li> <li>All gates will have an automated system using best available technology to reduce truck waiting times.</li> </ul>

Table 8 shows that all ports have successfully met the 2010 truck performance measure.

**Table 8 – Progress towards the 2007 Strategy’s 2010 Performance Measures for Trucks**

Port	2008	2009	2010	2011	2012
Port Metro Vancouver	95%	100%	100%	100%	100%
Port of Seattle	76%	77%	100%	100%	100%
Port of Tacoma	86%	90%	94%	99%	99%
<b>Average</b>	<b>86%</b>	<b>89%</b>	<b>98%</b>	<b>100%</b>	<b>100%</b>

Table 9 shows the ports’ progress towards achieving the 2015 performance measures from the 2007 Strategy.

**Table 9 – Progress towards the 2007 Strategy’s 2015 Performance Measures for Trucks  
(Percentage of trucks meeting 2007 Engine Standards)**

Port	2011	2012
Port Metro Vancouver	26%	35%
Port of Seattle	10%	15%
Port of Tacoma	20%	17%
<b>Average</b>	<b>19%</b>	<b>22%</b>

## Summary of Implementation Efforts in 2012

### Port of Seattle

The Port of Seattle continued its plans to replace its clean truck sticker program with RFID tags. This will allow the Port to better track the number and frequency of truck trips and age of trucks to help plan more effectively to meet future program goals. In 2012, RFID readers were installed at the in-gates of container terminals, and the Port conducted outreach to roll-out initial distribution of RFID tags to trucks servicing those terminals. The program’s “soft start” launched in September 2012; and by April 2013 all container trucks were required to have an RFID to access a terminal.



In December 2012, the Puget Sound Regional Council approved federal Congestion Mitigation and Air Quality funding for a Port of Seattle proposal to provide financial incentives for drayage truck owners to scrap or retrofit older trucks and replace them with model year 2007 or newer engines, similar to the Scrappage and Retrofits for Air in Puget Sound (ScRAPs) program conducted in 2009-2011. The new incentive program will begin in late 2013 or early 2014.

#### Port of Tacoma

The Tacoma ScRAPs program launched by the City of Tacoma in collaboration with the Port of Tacoma, Puget Sound Clean Air Agency and Ecology concluded in 2012. The program replaced pre-1997 trucks with low-emission trucks. A Federal Highways Administration Congestion Mitigation and Air Quality grant, Ecology's Clean Diesel Grant program, and truck owners provided the funding for this project. The program scrapped and replaced a total of 132 trucks<sup>6</sup>, resulting in total annual emission reductions of 10 tons of particulate matter.

#### Port Metro Vancouver

Through its Truck Licensing System (TLS), PMV continued to implement increasingly stringent requirements on drayage trucks accessing port terminals. Requirements include mandatory age limits and/or exhaust gas retrofits as well as opacity and idling limits. In 2012 PMV implemented the following drayage truck requirements:

- Trucks new to the TLS had to be 2007 or newer.
- Trucks 1998 and older already in the TLS were required to have an approved age exception, such as an exhaust gas treatment device (e.g. .DOC).
- Trucks 2002 and older had to be tested and pass a 20% opacity limit.
- Maximum 3 minutes continuous idling in any 60-minute period on port property.

In 2012 PMV also:

- Participated in a collaborative study with Metro Vancouver and other partners to explore the potential for remote sensing technology on heavy-duty vehicles. This study provided greater insight into the PMV drayage truck fleet's emissions and the technology that may inform future emissions management programs in the region.
- Undertook extensive industry and stakeholder engagement with the drayage truck sector, leading up to the development of the Smart Fleet Trucking Strategy. One component of the strategy completed in 2012 included the Container Truck Efficiency Pilot Program, a successful six month Global Positioning System (GPS) communication pilot to further improve efficiency and reliability. 700 additional GPS units will be rolled out in 2013 to cover 50% of the PMV drayage fleet, in partnership with Transport Canada under the Clean Transportation Initiative, and with the Ministry of Transportation and Infrastructure.

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<sup>6</sup> Total trucks scrapped include some near-port class 7 & 8 trucks operating in Pierce County that may not enter major port terminals.



## Rail

Within the Ports, emissions from rail yard activities occur from both line-haul and switch locomotives. Line-haul locomotives typically move across the country whereas switch locomotives are used for building and breaking apart trains on-site and moving rail cars or built trains from the marine terminals to rail yards for long distance transportation. Due to the limited ability of the Ports to influence this sector, the performance measures promote both supporting and working with railways and with regulatory agencies to implement emission reduction techniques.

The Strategy outlined the following performance measures.

**Table 10 – 2007 Rail Performance Measures**

<b>2010</b>	<ul style="list-style-type: none"> <li>• At the Ports of Tacoma and Seattle, expedite the implementation of the SmartWay Partner commitments at intermodal facilities where BNSF, Union Pacific, and Tacoma Rail have operations in the Puget Sound region.</li> <li>• At Vancouver Port Authority [now Port Metro Vancouver]<sup>7</sup>, work with the industry and regulatory agencies to develop a British Columbia Locomotive and Rail Air Quality Work Group in 2008, through which collaborative efforts to reduce emissions from the rail sector will be developed.</li> </ul>
<b>2015</b>	<ul style="list-style-type: none"> <li>• Compliance with the EPA [then-proposed] 2007 Locomotive and Marine Diesel Engine Rule to reduce PM emissions from all new locomotive engines by 90%.</li> </ul>

**2012 Progress Toward the 2010 Performance Measure:** The 2010 performance measure was achieved in 2008. At the Port of Tacoma and Port of Seattle, Burlington Northern Santa Fe Railway (BNSF), Union Pacific, and Tacoma Rail became partners in the EPA SmartWay program in 2008. Likewise, Port Metro Vancouver took part in the creation of the British Columbia Locomotive and Rail Air Quality Work Group in 2008. Canadian National and Canadian Pacific are currently Smartway members.

**2012 Progress Toward the 2015 Performance Measure:** So far, data is not available to the Ports to determine the railways' progress towards meeting the U.S. EPA's Inland Marine and Locomotive Rule, issued in March of 2008. The Ports and Strategy partners will propose updates to the rail sector 2015 performance measure in the Draft 2013 Strategy Update.

### Summary of Implementation Efforts in 2012

#### Port of Seattle

No changes to switcher engines in 2012; no data available on line-haul locomotives.

#### Port of Tacoma

No changes to switcher engines in 2012; no data available on line-haul locomotives.

<sup>7</sup> Vancouver Port Authority amalgamated with the Fraser River Port Authority and the North Fraser Port Authority in 2008, creating Port Metro Vancouver.



Port Metro Vancouver

PMV tenants including Viterra Grain Terminal, Alliance Grain Terminal, Neptune Bulk Terminals and Petro Canada Terminals continued to operate low-emission multi-genset switch locomotives, including two with automatic idle shutdown. Additionally, Fraser Surrey Docks' hybrid electric 'Green Kid' locomotive has been in operation since 2004, and by design does not idle.

The collaborative supply chain agreement between PMV and Canadian National Railway (CN) in 2010 continued to result in improved operational efficiencies including reduced dwell time in 2012.

PMV continued to invest in infrastructure to improve rail flow, with construction completed on the Lynn Creek/Brooks Bank Rail Bridge Project and construction started on the South Shore Corridor Project. Infrastructure improvements will help to mitigate impacts to communities and facilitate less movement (switching) in rail yards among other efficiencies, and will enable sustainable growth in the gateway.





## Harbor Craft

The harbor craft sector includes non-ocean-going vessels such as ferries, fishing vessels, commercial vessels, tugs, tour boats, U.S. Coast Guard vessels, work boats, barges, and pleasure craft. The 2007 Strategy does not identify specific performance measures for harbor craft. However, performance measures are proposed in the Draft 2013 Strategy Update.

Key initiatives by government agencies and local operators in 2012 included:

- PSCAA secured federal funding for two tugboat repowers in the Puget Sound region, including a \$650,000 EPA grant with, \$100,000 in matching funds provided by an Ecology Clean Diesel grant and a first-of-its-kind \$400,000 US Department of Transportation Maritime Administration (MARAD) grant.
- Approximately 50% of the fuel used by WSF in 2012 was a blend of ULSD and 5% biodiesel (B5). As of March 2013, 100% of the fuel used by the WSF will be ULSD and 5% biodiesel.
- WSF completed engine upgrades by installing two (2) EMD 1042 UL (ultra-low lube oil) kits on the MV *Klahowya* and two (2) EMD 1042 UL kits on the MV *Tillicum* in 2012. WSF has rebuilt twenty-two (22) engines with EPA 1042 emission reduction kits funded by a 2010 Federal Transit Authority (FTA) grant over the past few years. WSF compared lube oil consumption for one month before and after the engine rebuilds on the MV *Spokane* and found greater than 60 percent reductions (150 gallons) for each engine.
- WSF installed a basic fuel monitoring system on the MV *Walla Walla*. The Krill fuel monitoring system was installed in 2012. It will monitor fuel savings from operational changes that have not been implemented yet.
- WSF approved plans to convert one of its Super-class vessels, the MV *Hyak*, to a hybrid ferry. Work is planned to begin in the fall of 2014, with the vessel resuming service in 2015.
- WSF is studying the feasibility of converting six (6) of its Issaquah-class vessels to liquefied natural gas (LNG) fuel. The Safety, Security, and Navigational Risk Assessment, required by the US Coast Guard, will be complete in the spring or summer of 2013.
- Kitsap Transit completed the installation of two DOCs on the *Admiral Pete I* passenger ferry in 2012. The Puget Sound Clean Air Agency provided partial funding for these emission-reducing devices.
- Kitsap Transit Ferries completed the installation of two DPFs on the passenger ferry the *Rich Passage* in 2010, with partial funding from Ecology. This project was not reported in previous implementation reports.
- A number of companies that operate a variety of harbor craft in and around PMV participated in the Green Marine Program in 2012 including Island Tug and Barge Ltd., Seaspan Marine Corporation and SMIT Marine Canada Inc. Green Marine is a voluntary program through which Canadian and American ship owners, terminals, shipyards and ports track and report improvements to environmental performance.
- BC Ferries is investigating the feasibility of using of LNG in its fleet.



- BC Ferries used low-sulfur fuel on all its vessels, and is committed to using cleaner fuels than required by legislation.
- All BC Ferries vessels and terminals where the vessels berth at night are equipped with shore power.
- BC Ferries continually investigates opportunities for fuel consumption reduction, has an engine upgrade/replacement program, and promotes anti-idling.
- BC Ferries purchased electric vehicles to replace gasoline-powered vehicles at major terminals.



## Port Administration

Emissions from port administration are mainly associated with vehicle, vessel, and other equipment use, handling of waste, as well as with electricity and gas consumption in port buildings. There is currently no performance measure for the port administration sector; however, implementation initiatives include best management practices related to electric or hybrid vehicle use, energy use, and handling waste. The ongoing and new initiatives are highlighted in Table 10. Performance measures for Port Administration have been proposed in the Draft 2013 Strategy Update.

**Table 11 – Port Administration Initiatives**

Environmental Program	Port Metro	Port of Seattle	Port of Tacoma
Corporate emissions inventory & reporting	√	√	
Energy audits	√	√	√
Sustainable procurement	√	√	
Vehicle fleet fuel efficiency upgrades	√	√	√
Energy and/or carbon offsets purchased	√		√
Recycle construction waste	√		√
Reduced commutes with alternate office locations and/or flex time schedules. Promoted sustainable forms of transportation commuting	√	√	√
Collaborate with Western Washington Clean Cities Coalition on clean vehicle fleet initiatives	N/A	√	√
Composting and/or recycling	√	√	√
Energy conservation measures, such as yard lighting retrofits, upgrades to heating systems, ventilation, and/or air conditioning controls, and employee awareness programs	√	√	√
Carbon neutral operations for administration	√		

## Summary of Implementation Efforts in 2012

### Port of Seattle

- Through membership in the Western Washington Clean Cities Coalition, the Port of Seattle is promoting cleaner air, minimizing greenhouse gas emissions, and reducing fuel consumption through smart and efficient fleet management practices. A member of the Port’s Marine Maintenance staff is on the steering committee of the Western Washington Clean Cities Coalition.
- In the light-duty vehicle category, the Port has 42 CNG vehicles, 38 hybrid vehicles, and 1 electric vehicle, and 54 biodiesel-capable vehicles in its fleet.
- In the medium- and heavy-duty vehicle category, the Port has 45 CNG vehicles and 18 biodiesel-capable vehicles. Most diesel engines are powered with 20% biodiesel fuel.



### Port of Tacoma

- The Port of Tacoma recycled 8,000-9000 tons of material from demolition and deconstruction projects including 80-120 tons of steel.
- The Port of Tacoma continues to work with Tacoma Power to implement lighting retrofits under the Bright Rebates Program that will conserve energy. Terminal operators replaced high-pressure sodium lights in 2012 with newer metal halide pulse-start fixtures (approximately 250 lamps) to reduce electrical consumption by 23%.
- Diesel CHE owned and operated by the Port of Tacoma is powered by 5% biodiesel.
- Telecommuting, flexible work schedules, van and car pools under the Port's Commuter Trip Reduction program saved more than 8,600 gallons of fuel in 2012.
- In 2012 the Port participated in the "EverGreen Option" of Tacoma Power's green power program. By purchasing green power off-sets, the Port supports electricity generated by sustainable, renewable wind-power sources in the Pacific Northwest.

### Port Metro Vancouver

- Port Metro Vancouver participated in the Green Marine Program. Green Marine is a voluntary program through which Canadian and American ship owners, terminals, shipyards and ports track and report improvements to environmental performance.
- PMV's primary energy sources are electricity and natural gas at its offices, and the fuel used by its five harbor patrol vessels and 21 fleet vehicles. In 2012, PMV exceeded its energy reduction target, reducing electricity consumption at Portits facilities by 6 percent (66 MWh). Since the 2009 baseline year, PMVPMV has reduced electricity consumption at its facilities by 16 percent (211 MWh).
- The PortPMV encourages employees to commute sustainably and provide services to support this, including secure bike storage, shower facilities and participation in the TransLink Employer Pass Program. PMV was recognized as one of the leading participants in the 2012 BEST Commuter Challenge, and 49 percent of employees participated in our annual Commuter Challenge in September 2012.
- A group of sustainable commuters known as ECOmmuters was developed. The ECOmmuters group held information and brainstorming sessions on active transportation opportunities as well as contests to recognize leading participants.
- During 2012, PMV employees travelled a total of 81,785 kilometres in the Port's fuel-efficient hybrid fleet vehicles, saving 3,028 litres of fuel and 7.1 tCO<sub>2</sub>e of greenhouse gas emissions when compared with travelling the same distance in equivalent standard vehicles.
- PMV's environmental footprint performance is measured through its Corporate Scorecard, which contributes towards the annual Corporate Performance Award for employees.



- In April 2012, PMV was named one of Aon Hewitt's Green 30. This award recognizes the top 30 Canadian organizations whose employees are the most positive about their record on environmental stewardship and their efforts to consider long-term social, environmental and economic impacts when making decisions.
- PMV's operations were carbon neutral for a third consecutive year through purchasing BC-based carbon offsets from the Pacific Carbon Trust.
- PMV's comprehensive SortSmart waste management program includes organic waste composting and recycling of paper, glass, metals, plastics and cardboard. In February 2012, PMV implemented new color-coded bins, and improved signage and recycling facilities for film and foil plastics, to further reduce waste to local landfills. Since 2010, the amount of organic waste composted at Port facilities has nearly tripled and the landfill waste per employee has decreased by 35 percent.
- In 2012, PMV completed the development of sustainable procurement guidelines for Port's administrative operations, which will be rolled out across the organization in 2013. These guidelines are designed to assist employees in integrating sustainability factors into product selection, enabling economic, environmental and social impacts to be considered. As part of this process, PMV changed its corporate stationery supplier to work with a local business that shares PMV's sustainability commitment and values. They are the first carbon-neutral stationery supplier in Vancouver, using electric vehicles for all their deliveries.



## Conclusion

Since the adoption of the Strategy in 2007, the Ports, stakeholders, and partners have achieved considerable progress toward the performance measures in the OGV, CHE, and truck sectors, and have completed several emission reduction actions in the rail, harbor craft, and port administration sectors. The majority of the emissions sources are outside the Ports’ direct functional control. Most of the diesel-powered equipment is owned or operated by other parties such as port tenants, trucking companies, and shipping lines, and few of their activities are regulated by air agencies. Nonetheless, the Ports and Strategy partners have made consistent progress considering their boundaries of influence. Table 12 illustrates this progress.

**Table 12 – Summary of Status and Implementation Efforts in 2012 for Each Sector**

Sector	2010 Performance Measure from 2007 Strategy	2010 Performance Measure Status	2015 Performance Measure from 2007 Strategy	2015 Performance Measure Status
Ocean-Going Vessels	<ul style="list-style-type: none"> <li>0.5% S Fuel Auxiliary Engines Hoteling</li> <li>1.5% S Fuel Main Engines Hoteling</li> </ul>	<ul style="list-style-type: none"> <li>40% met or surpassed</li> </ul>	<ul style="list-style-type: none"> <li>Compliance with IMO</li> </ul>	<ul style="list-style-type: none"> <li>No data available</li> </ul>
Cargo-Handling Equipment	<ul style="list-style-type: none"> <li>Port-wide Tier 2 or 3 equivalent engines</li> <li>All CHE use ULSD or equivalent</li> <li>New equipment meets highest standards as practicable</li> </ul>	<ul style="list-style-type: none"> <li>74% Tier 2 or better</li> <li>100% ULSD</li> <li>100% New Equipment</li> </ul>	<ul style="list-style-type: none"> <li>Tier 4 equivalent engines for 80% of equipment</li> </ul>	<ul style="list-style-type: none"> <li>38% met or surpassed</li> </ul>
Trucks	<ul style="list-style-type: none"> <li>1994 or newer truck engines</li> </ul>	<ul style="list-style-type: none"> <li>100% met or surpassed</li> </ul>	<ul style="list-style-type: none"> <li>80% of heavy duty trucks have 2007 or newer engines</li> </ul>	<ul style="list-style-type: none"> <li>22% met or surpassed</li> </ul>
Rail	<ul style="list-style-type: none"> <li>Expedite the implementation of the SmartWay Partner commitment (US)</li> <li>Develop workgroup to collaborate on ways to reduce emissions</li> </ul>	<ul style="list-style-type: none"> <li>60% of US and 50% if CA rail participate in SmartWay</li> <li>NA</li> </ul>	Compliance with the US EPA Proposed 2007 Locomotive and Marine Diesel Engine Rule *	NA*
Harbor Craft	No defined performance measure for this sector	NA*	2015 performance measure to be established in the 2013 strategy update	Continue emission reduction initiatives
Port Administration	No defined performance measure for this sector	NA*	2015 performance measure to be established in the 2013 strategy update	Continue emission reduction initiatives

The Ports recognize the need to adjust the Strategy periodically to reflect new regulatory standards, technological advancements, air emissions inventory data, and evolving climate change policy. The Ports and partner agencies are currently undertaking a review and update of the Strategy in light of the developments listed below.



- **Updated Emissions Inventory** - Port Metro Vancouver updated its Landside Emissions Inventory in 2010 and Environment Canada created the National Marine Emissions Inventory for Canada also in 2010. The ports of Seattle and Tacoma updated their emissions inventory in 2011 (as part of the Puget Sound Maritime Air Emissions Inventory). The emission inventories offer an objective benchmark in measuring progress and refining the Strategy. This updated information helps to identify where the Ports should focus their emission reduction efforts and justify further investment in emission reduction programs.
- **New Regulations** - Two important regulations that affect port-related sources were adopted since the Strategy was developed in 2007: the IMO's North American ECA with fuel standards that are applicable to OGVs within 200 nautical miles of shore; and EPA's Locomotive and Inland Marine Rule, applicable to U.S. locomotives and small marine engines (harbor craft). Performance measures and potential emission reduction actions are being adjusted to complement and/or supplement these new rules.
- **Milestone Elapsed** - The Strategy's near-term milestone year (i.e. 2010) has elapsed.

The Strategy update will incorporate revisions to the overall objectives and 2015 performance measures where appropriate. New long-term emission reduction goals will leverage maturing technologies and likely pursue energy efficiency enhancements.

The Ports will continue to encourage the spirit of collaboration and cooperation among the Ports and their partners, to promote the proactive engagement of stakeholders, to try innovative approaches for reducing emissions, and to pursue federal and state/provincial funding programs and grants.

