



# **NORTHWEST PORTS CLEAN AIR STRATEGY**

## **2010 Implementation Report**

DRAFT 1 – April 8, 2011





## TABLE OF CONTENTS

<b>Executive Summary</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>1</b>
<b>Ocean-Going Vessels: Sector Overview and Goals</b> .....	<b>3</b>
2010 Progress, Ocean-Going Vessels .....	4
Progress Summary, Ocean-Going Vessels .....	7
<b>Cargo Handling Equipment: Sector Overview and Goals</b> .....	<b>9</b>
2010 Progress, Cargo Handling Equipment .....	9
Progress Summary, Cargo Handling Equipment .....	12
<b>Trucks: Sector Overview and Goals</b> .....	<b>13</b>
2010 Progress, Trucks .....	14
Progress Summary, Trucks .....	18
<b>Rail: Sector Overview and Goals</b> .....	<b>19</b>
2010 Progress, Rail .....	20
Progress Summary, Rail .....	22
<b>Harbor Craft: Sector Overview and Goals</b> .....	<b>23</b>
2010 Progress, Harbor Craft .....	23
Progress Summary, Harbor Craft .....	26
<b>Port Administration: Sector Overview and Goals</b> .....	<b>27</b>
2010 Progress, Port Administration .....	27
Progress Summary, Port Administration .....	31
<b>Progress Overview</b> .....	<b>32</b>
<b>2011 and Beyond</b> .....	<b>34</b>
<b>Conclusion</b> .....	<b>36</b>



**List of Tables**

Table 1	Port Metro Vancouver EcoAction Incentive Structure.....	5
Table 2	Incentive Structure to Promote <0.5% Sulfur Fuel Usage at Berth (Port of Seattle).....	6
Table 3	Ocean-Going Vessel Calls that Met or Exceeded Performance Measure.....	8
Table 4	Cargo Handling Equipment Sector Progress Summary .....	12
Table 5	Truck Sector Progress Summary.....	18
Table 6	Rail Sector Progress Summary.....	22
Table 7	Port Administration Sector Progress Summary .....	31
Table 8	Summary of Progress (2008-2010).....	33

**List of Appendices**

Appendix A	Data Methodology and Calculations
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## LIST OF ACRONYMS

ABC	At-Berth Clean Fuels Vessel Incentive Program
BC	British Columbia
BNSF	Burlington Northern Santa Fe Railway
CARB	California Air Resources Board
CHE	Cargo Handling Equipment
CMAQ	Congestion Mitigation and Air Quality
CNG	Compressed Natural Gas
CSS	Cascade Sierra Solutions
DERA	Diesel Emission Reduction Act
DMF	Diesel Multistage Filter
DTR	Drayage Truck Registry
DOC	Diesel Oxidation Catalyst
ECA	Emission Control Area (North American Context)
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
GRT	Gross Register Tonnage
HEV	Hybrid-Electric Vehicle
IMO	International Maritime Organization
LED	Light Emitting Diodes
LNG	Liquefied Natural Gas
MT	Metric Tons (tonne)
MTO	Marine Terminal Operator
MY	Model Year
NWPCAS	Northwest Ports Clean Air Strategy
OCR	Optical Character Recognition
OGVs	Ocean-Going Vessels
PM	Particulate Matter
PRS	Positive Restraint System
PSCCC	Puget Sound Clean Cities Coalition
RFID	Radio Frequency Identification
RO/RO	Roll-on/Roll-off
RTG	Rubber-Tired Gantries
ScRAPs	Scrapage and Retrofits for Air in Puget Sound Program
TLS	Truck Licensing System
ULSD	Ultra-Low Sulfur Diesel
U.S.	United States
WSF	Washington State Ferries



## Executive Summary

Recognizing that port operations contribute to air quality in local and regional airsheds, Port Metro Vancouver, the Port of Seattle, and the Port of Tacoma ('the Ports') have partnered with regulatory agencies to identify ways to reduce air emissions from all aspects of port operations. The Northwest Ports Clean Air Strategy ('the Strategy') was developed in 2007 as a collaboration between the Ports and regulatory agencies including Environment Canada, the Puget Sound Clean Air Agency, the Washington State Department of Ecology, and the United States Environmental Protection Agency. Reporting on implementation of the Strategy occurs on an annual basis; previous implementation reports were published for 2008 and 2009.

The Strategy defines specific performance measures for the reduction of port-related air quality impacts on human health, the environment, climate change, and the economy. The focus of the Strategy is on emission reductions in six sectors of port operations, and performance measures are quantitative or qualitative, depending on the sector. The Strategy includes two milestones; a set of near term performance measures for 2010, and a set of longer term performance measures for 2015.

2010 marks the completion of the first milestone of the Strategy, and the Ports and Strategy partners have made significant progress toward achieving the 2010 performance measures over the last three years. In some cases, the performance measures were met or even exceeded. Some highlights of the 2010 emission reduction progress and initiatives at the three ports are shown in the table below.

Sector	2010 Progress and Initiatives
Ocean Going Vessels	<ul style="list-style-type: none"> <li>44% of calls made by frequent calling vessels met the performance measure through the use of low-sulfur fuels or electrical shore power connections for vessels during hotelling operations.</li> </ul>
Cargo Handling Equipment	<ul style="list-style-type: none"> <li>62% of diesel powered equipment met the performance measure through engine retrofits, equipment replacement, or use of low-sulfur fuels.</li> </ul>
Trucks	<ul style="list-style-type: none"> <li>98% of drayage trucks met the performance measure through engine retrofits and scrap- and-replace incentive programs.</li> </ul>
Rail	<ul style="list-style-type: none"> <li>Progress was made through application of idle-reduction and friction-reduction technologies, engine replacements, and operational efficiencies to reduce fuel consumption.</li> </ul>
Harbor Vessels	<ul style="list-style-type: none"> <li>Progress was made through use of alternative and low sulfur fuels, engine replacement, shore power, and resurfacing vessel hulls.</li> </ul>
Port Administration	<ul style="list-style-type: none"> <li>Progress was made through programs focusing on areas such as energy conservation, hybrid vehicle fleets, and sustainable employee commuting.</li> </ul>



The Ports and their partners have made significant progress, reducing emissions in ways that reflect the unique operations and conditions associated with each of the Ports. The successful implementation of the Strategy has been facilitated by:

- collaboration among Strategy partners including the Ports and regulatory agencies;
- efforts of key tenants, service providers, and port users to make investments in their infrastructure and operations that result in reduction in air emissions; and
- access to governmental funding programs and grants.

Implementation of the strategy has also encountered challenges, and the 2010 performance measures were not met in some cases. Common factors that challenged the successful implementation of some elements of the Strategy include:

- The incomplete regulatory framework and the lack of quantitative performance measures for some sectors, such as rail and harbor craft;
- Challenges with the application of new emission reduction technologies, such as technologies not performing as anticipated; and
- Limitations of data collection and management systems

The Ports and partners will incorporate the lessons learned from this first phase as they continue toward achieving the 2015 performance measures. The Ports also recognize the need to review and adjust the Strategy on a regular basis in light of new standards, technology, air emissions data and evolving climate change policy frameworks. A major review of the Strategy is planned to occur in 2012, incorporating these external changes and other lessons learned. In the revised strategy, 2015 performance measures will become short-term goals and new 2020 performance measures will be set for port related emissions reduction in the Pacific Northwest.



## Introduction

Air quality in the Pacific Northwest is influenced by a diverse range of human activities including transportation, operation of commercial and residential buildings, manufacturing, and other commercial and industrial activities. As the population of the Pacific Northwest has grown, air emissions associated with different human activities have also grown. As a result, governments, industry, and residents are all being called upon to find ways to reduce air emissions in order to protect air quality and avoid impacts on human health and the environment.

The Northwest Ports Clean Air Strategy (“the Strategy”) was developed collaboratively by Port Metro Vancouver<sup>1</sup>, Port of Seattle and Port of Tacoma (collectively, “the Ports”) and several government agencies in 2007. The Strategy has three primary objectives:

- Reducing maritime and port-related air quality impacts on human health, the environment, and the economy
- Reducing maritime and port-related contribution to climate change
- Helping the Georgia Basin – Puget Sound airshed to continue to meet air quality standards and objectives

The Strategy was also developed in cooperation with the following agencies:

- Environment Canada
- Puget Sound Clean Air Agency (Clean Air Agency)
- Washington State Department of Ecology (Department of Ecology)
- United States Environmental Protection Agency (U.S. EPA)

Additional technical and financial support toward emission reduction initiatives related to the Northwest Ports Clean Air Strategy was provided by British Columbia Ministry of Environment and the American Recovery and Reinvestment Act.

The actions undertaken by the Ports are primarily voluntary, driven by the Ports’ unique and collaborative relationships with industry, agencies and other stakeholders, and are designed to achieve early reductions in advance of, and complementary to, applicable regulations. The Strategy is also a conduit for the Northwest Ports to provide environmental management leadership to the industry while also incorporating best practices from other successful regional programs.

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<sup>1</sup> Port Metro Vancouver continued January 1, 2008, through the amalgamation of the Fraser River Port Authority, the North Fraser Port Authority and the Vancouver Port Authority.





The 2010 Implementation Report, the third annual report, provides an update on ongoing actions, and reports on the progress each port has made throughout the calendar year toward achieving 2010 emission reduction targets, corresponding to the performance measures set out in the Strategy. This report is organized by the sources of maritime air emissions associated with the sectors of port operations:

- Ocean-going vessels
- Cargo handling equipment
- Trucks
- Rail
- Harbor craft
- Port administration

Each section includes a brief description of the sector's activities, and provides the performance measure that has been established as an indicator for emission reduction, combined with the 2010 target set for each performance measure. For each port and sector, the 2010 performance reporting includes:

- A summary of the emission reduction activities that met or exceeded the 2010 performance measure;
- A description of how the performance measure was met, either using the methods described in the strategy or alternative methods developed by the ports and/or its stakeholders;
- A description of highlights or initiatives that resulted in emission reductions that exceeded the performance measure, which may have been achieved by methods other than those described in the performance measure; and
- A description of other activities that made progress toward the 2010 performance measure, in that emissions were reduced, but did not meet the criteria of the 2010 performance measure.

The 2011 implementation plans of each port are also described, and each section concludes with a summary of the overall progress made in the sector in 2010, compared with results from previous years.

Where possible, a consistent set of data collection methods has been used across all ports. However, a meaningful comparison between ports is not possible in some cases due to differences in the way that data is collected and reported, as well as differences in the type of maritime activity at each port. The Ports will continue to work towards adopting consistent methods for data collection and reporting in future years of Strategy implementation. A detailed accounting of the methodologies used to calculate each port's 2010 progress toward the 2010 performance measures can be found in **Appendix A**.





## Ocean-Going Vessels: Sector Overview and Goals



Ocean-going vessels (OGV) represent a significant source of emissions in port operations due to the use of fuels at berth and at anchor. Potential actions identified in the Strategy for reducing emissions in this sector include, but are not limited to:

- Using alternative or cleaner fuels;
- Identifying opportunities for cleaner engines or after-treatment technologies' and
- Evaluating efficiency and conservation programs.

Other activities described in the strategy include:

- Investigating incentive programs such as discounted harbor dues and fuel rebates; and
- Collaborating with relevant stakeholders to take part in policy issues such as the adoption of amendments to MARPOL (Marine Pollution) Annex VI and the implementation of a North American Emission Control Area (ECA). See the '**North American Emission Control Area**' highlight box for more details.

**The 2010 performance measure for the OGV Sector is to:**

- By 2010: Reach the equivalent PM reduction of using distillate fuels with a maximum sulfur content of 0.5% for all hotelling auxiliary engine operations.<sup>2 3</sup> Use of fuels with a maximum sulfur content of 1.5%, or use of equivalent PM reduction measures for all hotelling main or diesel electric engine operations.<sup>4</sup>

### North American Emission Control Area



In 2009, Canada and the U.S. submitted a proposal to the International Marine Organization (IMO) for a North American Emission Control Area (ECA).

Under the ECA, which was adopted in March, 2010, all vessels within 200 nautical miles of the coast will be required to burn fuel with 1% sulfur content or less beginning in August 2012, and 0.1% in January 2015.

<sup>2</sup> It has been demonstrated that up to a 70% per vessel reduction in fine particulate can be achieved by switching from bunker to distillate fuels.

<sup>3</sup> Note there may be some ships with specific technical circumstances that would not be able to comply until 2012.

<sup>4</sup> Except during active docking and departure, during which non-hotelling engine operations are running.



## 2010 Progress, Ocean-Going Vessels



### Port Metro Vancouver

24.8% of frequent OGV<sup>5</sup> calls made to the Burrard Inlet, Roberts Bank and Fraser River areas of Port Metro Vancouver met or exceeded the 2010 performance measure. The Port had a total of 2,849 OGV calls in 2010, 804 of which were made by 104 frequently-calling vessels.

- 16.7% (134) of calls were directly verified.
- It is conservatively estimated that an additional 65 frequent OGV calls met or exceeded the 2010 performance measure. Including these estimates, 24.8% of frequent OGV calls met or exceeded the 2010 performance measure (see Appendix A for more detail).

Frequently-calling vessels that met or exceeded the 2010 performance measure did so by using:

- ≤1.5% sulfur fuel while using main engines to provide hotelling power demand (generally cruise ships);
- ≤0.5% sulfur fuel while using auxiliary engines at anchor and at dock; or
- Shore power connections, allowing engines to shut down completely. See the '**Shore Power**' highlight box for more details.

In 2010, Port Metro Vancouver hosted 58 vessel calls that were capable of connecting to shore power; 44 of these calls successfully connected to shore power. Some calls were not able to connect when there were more vessels at berth than there were physical shore power connections available.

#### Shore Power at Port Metro Vancouver



2010 was the first full year of Shore Power availability for cruise ships visiting the East and West berths at Canada Place. Shore Power electrification allows cruise ships to completely shut down hotelling engines, and in 2010 this resulted in the direct emissions reductions of:

- 1,500 tonnes of net CO<sub>2</sub>e emissions;
- 30 tonnes of NO<sub>x</sub> emissions; and
- 2.4 tonnes of PM<sub>2.5</sub> emissions.

Port Metro Vancouver continues to work with Princess Cruise Lines, Holland America Line, BC Hydro, the Province of BC and the Government of Canada on this initiative.

<sup>5</sup> Frequent callers are defined as vessels (including cargo and cruise) in regularly-scheduled service or strings making five or more calls to any one of the three ports in twelve consecutive months.



To promote the use of <0.5% sulfur fuel, the Port provides financial incentives through the EcoAction Program (previously the Differentiated Harbor Dues program). The EcoAction incentive cost structure for use of <0.5% sulphur fuel provides a rebate to the base harbour dues, and are calculated on the Gross Register Tonnage (GRT) of a vessel (**Table 1**).

**Table 1 Port Metro Vancouver EcoAction Incentive Structure**

Vessel Size (GRT)	Harbor Dues Discount
20,000	\$880
50,000	\$2,200
100,000	\$4,400

### 2011 Implementation Plans

An estimated 57 shore power connections are expected to be made by cruise vessels at Canada Place during the 2011 season with continued reductions in criteria air contaminants and greenhouse gases. In 2011, Port Metro Vancouver will also embark on a strategic initiative to expand shore power capability to the container market through active engagement of key stakeholders, including an existing tenant and shipping line.



PORT METRO  
vancouver

The Port is continuing to use its Blue Circle Award recognition program to increase awareness and participation of Marine Shippers in the EcoAction program. The EcoAction Program is under review with a scheduled upgrade to the existing process to minimize the burden on stakeholders throughout the application process, and realign with upcoming international regulations. This will be completed in step with ongoing IT upgrades.



### Port of Seattle

72.4% of all frequent ocean-going vessel calls (cruise and container ships) met or exceeded the 2010 OGV performance measure. The Port had a total of 1015 OGV calls in 2010, 830 of which were made by frequently-calling vessels.

- 100% of the 223 frequent cruise vessel calls used either shore power or  $\leq 1.5\%$  sulfur fuel.
- 38.6% of all cruise vessels participated in the At-Berth Clean Fuels Program and used <0.5% sulfur fuel while at berth.
- 62% of frequently-calling container vessel calls (378) met the 2010 OGV performance measure by participating in the At-Berth Clean Fuels Program and using  $\leq 0.5\%$  sulfur diesel fuel in auxiliary engines while at berth.



Working towards the 2015 OGV performance measure, in 2010, the Port of Seattle continued to seek funding for providing shore power at Pier 66.

The At-Berth Clean Fuels Vessel Incentive Program (ABC Fuels), launched on January 1, 2009, provides an incentive to frequently-calling vessels that use 0.5% (or less) sulfur fuels in auxiliary engines while at berth. In 2010, the incentive was increased from \$1,500 to \$2,250 per call, with an intention of covering close to 50% of the cost differential of using more expensive fuel. Participation in ABC Fuels requires per call reporting and periodic audits, which in 2009 and 2010 were conducted by Det Norske Veritas and Port staff. In addition, all homeported cruise ships (ships based in Seattle) that call to the Port of Seattle are required, via the tariff, to either plug in to shore power or use 1.5% (or less) sulfur fuels in their diesel electric main engines while at berth.

Building on the success of the ABC Fuels program, in 2010 the Port of Seattle launched the inaugural Green Gateway Partners Awards to recognize the



comprehensive environmental achievements of the Port's cruise and containership operators. Eligible carriers and cruise lines are ABC Fuels program participants, and demonstrated their environmental stewardship initiatives above and beyond existing regulations. The applications are reviewed by a third party, and eligible parties are rewarded with Bronze, Silver and Gold Partnership levels. The Port intends to review award criteria annually to adjust for changes in technology, regulations, or industry standards.

### 2011 Implementation Plans

Port of Seattle will continue to work towards increased participation in the ABC program to achieve further emission reductions in 2011. In 2011, the ABC Fuels Program will contain a tiered incentive (**Table 2**), based on fuel use while in port, to more equitably cover increased fuel costs. These incentives are anticipated to result in higher participation rates in the ABC program.

**Table 2 Incentive Structure to Promote <0.5% Sulfur Fuel Usage at Berth (Port of Seattle)**

Incentive Tier	Volume of <0.5% Sulfur Fuel Burned While At-Berth (Metric Tons)	Incentive
Tier I	1 – 9.99 MT	\$1200
Tier II	10 – 19.99 MT	\$2250
Tier III	20+ MT	\$2850



## Port of Tacoma

35% of frequent ocean-going vessel calls at the Port of Tacoma met or exceeded the 2010 performance measure by using distillate ( $\leq 0.5\%$  sulfur) fuel for hotelling auxiliary engine operation. The Port had a total of 1019 OGV calls in 2009, 537 of which were frequently-calling vessels.

In 2009, two shipping lines consolidated routes moving some cargo from Tacoma to Seattle as part of a vessel-sharing agreement. These ships were considered frequent callers using distillate fuel in hotelling auxiliary engine operations. One line consolidation began in 2009 and was fully implemented in 2010. Vessel line consolidation reduced the percentage of frequently-calling vessels using distillate from 40% in 2009 to 35% in 2010. In addition to the frequently-calling vessels meeting the 2010 performance measure above, there were additional non-frequently-calling OGVs using distillate not counted towards the performance measure listed above.

In September of 2010, the Port of Tacoma completed a project to retrofit two ships and one port terminal for shore power. Emissions at berth from two 840 ft Orca Class roll-on/roll-off (RO/RO) vessels, the *M.V. Midnight Sun* and the *M.V. North Star*, serving Alaska were eliminated. Because this project was completed in late 2010, the percentage of emission reductions counted toward 2010 and 2015 Performance Measure goals will be notably higher in 2011.

### 2011 Implementation Plans

In 2011, the Port will continue to work on educational outreach to shipping lines promoting the air quality benefits and recognition associated with switching to distillate fuel. The Port of Tacoma will continue to investigate alternative measures to reduce emissions from hotelling vessels, such as minimizing vessels' time at berth through terminal efficiency, or providing an alternative to hotelling auxiliary engine operation, such as shore power.

## Progress Summary, Ocean-Going Vessels

In 2010, the Ports achieved further emission reductions in the OGV sector primarily through low-sulfur fuel programs. These programs were delivered through incentives at Port Metro Vancouver and Port of Seattle, and as a voluntary program at Port of Tacoma. All Ports will continue efforts to reduce OGV-related emissions through awareness initiatives and evaluation of and potential refinements to incentive programs.



The table below compares the three Ports' progress of 2010, in terms of the number and percentage of calls made by frequently-calling vessels that met or exceeded the 2010 performance measure (**Table 3**). In 2010 there were 186 more calls than in 2009 that met or exceeded the 2010 target.

**Table 3 Ocean-Going Vessel Calls that Met or Exceeded Performance Measure**

PORT	2008		2009		2010	
	% of Calls	# of Calls	% of Calls	# of calls	% of Calls	# of calls
Port Metro Vancouver	7%	79	1.6%	12	24.8%	134
Port of Seattle	29%	219	63.5%	454	72.4%	601
Port of Tacoma	57%	433	50%	336	35%	188
<b>Average (un-weighted)/Total</b>	<b>31%</b>	<b>731 calls</b>	<b>38%</b>	<b>802 calls</b>	<b>44%</b>	<b>988 calls</b>





## Cargo Handling Equipment: Sector Overview and Goals



Dockside emissions in the cargo handling equipment (CHE) sector addressed in this report are related to diesel powered equipment, such as straddle carriers, rubber-tired gantries (RTG), reach stackers, top and side picks, forklifts and yard tractors. Potential action items for reducing emissions in this sector include, but are not limited to:

- Implementing the use of cleaner engines, through retrofits, engine replacements, or equipment replacements;
- Implementing the use of cleaner fuels such as ultra-low sulphur diesel (ULSD) and/or biofuel; and
- Conducting and evaluating pilot studies on alternative fuel sources for CHE such as electric, diesel hybrid, liquefied natural gas (LNG), compressed natural gas (CNG), or propane.

**The 2010 performance measure for the CHE Sector is to:**

- By 2010: Reach the port-wide equivalent PM reduction of Tier 2 or Tier 3 engines<sup>6</sup> operating with ULSD or a biodiesel blend of an equivalent sulfur level, and promote early implementation of the requirements. 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.

## 2010 Progress, Cargo Handling Equipment



### Port Metro Vancouver

- 53% of CHE for terminal facilities in the Burrard Inlet and Roberts Bank operated at or above the equivalent of Tier 2 or Tier 3 engines.
- 100% of CHE equipment used ULSD

In July 2010, Environment Canada regulations reduced the diesel content for non-road equipment fuel to 15 ppm (equivalent to ULSD). This effectively resulted in 100% of CHE equipment using ULSD after July 2010.

<sup>6</sup> Tier 2 and 3 standards are 0.15 g/hp\*hr for most CHE. See Table 1.1 in US EPA's *Final Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines*, August 1998, available online at: <http://www.epa.gov/nonroad-diesel/frm1998/nr-ria.pdf>, last visited on 12/12/2007.





## 2011 Implementation Plans

Port Metro Vancouver is expecting to complete an update to the 2005 land-based emission inventory for 2010. The emission inventory is expanded to include the Fraser river tenants and capture overall electrical usage. For more details, see the **2011 and Beyond** section later in the report.



## Port of Seattle

- 55% of all CHE at Port of Seattle operated at or above the equivalent of Tier 2 or Tier 3 engines.
- 100% of all CHE used ULSD fuel and/or biodiesel blends.

Using funds from an EPA Diesel Emission Reduction Act (DERA) grant, the Port and the Clean Air Agency, the Agency installed diesel oxidation catalyst (DOC) retrofits on the seven top picks owned by the two terminals.

In late 2010, eighty-one (81) diesel multi-stage filters (DMFs) were removed from Port of Seattle CHE. See the '**Challenge: Adopting New Technologies**' box for more details.

## 2011 Implementation Plans

Port staff members are working with Maritime Terminal Operators (MTOs) to identify alternative emission reduction approaches and technologies, such as evaluating the alternative fuel feasibility of LNG, CNG, hybrid, and electric options, and identifying verified exhaust treatment technologies that will achieve the highest practical PM reductions for existing equipment and integrate those technologies into retrofit projects. In addition, the Port is working with MTOs to identify sources of funding to purchase new CHE to replace older models that cannot be retrofitted with emission reduction devices.

### Challenge: Adopting New Technologies

In 2009, the Washington State Department of Ecology received a \$1.2 million grant from the American Recovery and Reinvestment Act to install pollution-reducing exhaust retrofits on CHE at three ports in the State, including **Port of Seattle and Port of Tacoma**. By the spring of 2010, installation of exhaust retrofits was completed on 218 pieces of CHE.

A combination of exhaust technologies was used. The simplest technology, known as Diesel Oxidation Catalyst (DOC), was installed on 57 CHE at the Ports of Seattle and Tacoma, reducing tail pipe PM emissions by 25% (1,403 lbs/yr). A more advanced technology, known as the Diesel Multi-stage Filter (DMF), was installed on another 161 pieces of CHE at the two ports, reducing tail pipe PM by 50% (7,215 lbs/yr).

The DMF was marketed and warranted as a "no maintenance" device (i.e. no periodic filter cleaning required), nearly impossible to plug and ideally suited for vehicles and equipment with low exhaust temperature such as CHE.

However, by the fall of 2010 a high percentage of the DMFs on CHE had begun to plug up with soot. Subsequent assessment of DMF plugging revealed that exhaust temperature needed to be much higher than originally required for the DMF to perform as warranted. As a result, the manufacturer recommended DMF removal from all CHE. By early 2011, all DMFs had been removed and replaced with acoustical mufflers.

The Washington State Department of Ecology is in the process of claiming full reimbursement of the costs for the failed DMF project. Once reimbursement has been acquired, those funds will be used to support other clean diesel projects, with priority given to port projects.



Using funds from its EPA DERA grant along with matching funds from both the Port and the Clean Air Agency, 14 CHE units that are 15 years old will be replaced with 10 new units with low-emitting on-road engines. The Agency also plans to install up to eight diesel particulate filters (DPF) retrofits on top picks and reach stackers operating at two terminals, and additional DOCs on two reach stackers at one of those terminals. DPF retrofits reduce particulate matter at the tail pipe by approximately 85%, versus 25% for DOC retrofits.



## Port of Tacoma

- 77% of all CHE at Port of Tacoma operated at or above the equivalent of Tier 2 or Tier 3 engines:
  - 7% of all CHE exceeded the 2010 performance measure.
  - 70% of all CHE met the performance measure.
- 100% of all CHE used ULSD fuel and/or biodiesel blends.

The 2010 performance measure was met or exceeded by retrofitting equipment with DPFs, retiring older equipment, and purchasing new EPA tier 2, 3, and 4 low-emission equipment. In addition to the 77% of CHE that met or exceeded the performance measure, the remaining 23% of all CHE made progress toward the 2010 performance measure by using ULSD.

In late 2010, eighty (80) DMFs were removed from Port of Tacoma CHE (see the **Challenge: Adopting New Technologies** box on previous page for details).

### 2011 Implementation Plans

In 2011, the Port of Tacoma will continue CHE retrofits and equipment replacement in collaboration with stakeholders including Port tenants. Equipment owners are slowly replacing older equipment with new low-emission units. The Clean Air Agency and Department of Ecology are managing retrofit projects that utilize EPA's DERA, Washington State Clean Diesel, and Clean Air Agency Diesel Solutions program grants, along with matching funds from the Port. These projects will help make progress toward the Strategy's 2015 performance measure for CHE by retrofitting up to 65 CHE engines with DPFs. Another 40 or more pieces of CHE will be retrofitted with DOCs using EPA DERA funds and matching funds from the Clean Air Agency and the Port. Equipment that cannot be retrofitted because of technical or mechanical restrictions will be considered for replacement through planned terminal equipment purchases or by equipment repowers under existing or future grant programs.



## Progress Summary, Cargo Handling Equipment

In 2010 the Ports and their facility operators made significant progress toward achieving the 2010 performance measure targets. All CHE at the Ports now use ULSD fuels or equivalent. **Table 4** below shows the progress by Port, in terms of the percentage of all CHE units that met or exceeded the 2010 performance measure target. There was an overall increase in the percentage of CHE that met or exceeded the target from 57% in 2009 to 62% in 2010.

**Table 4 Cargo Handling Equipment Sector Progress Summary**

PORT	2008	2009	2010
	Met or Exceeded	Met or Exceeded	Met or Exceeded
Port Metro Vancouver	29%	32%	53%
Port of Seattle	9%	68%	55%
Port of Tacoma	47%	70%	77%
<b>Average (un-weighted)</b>	<b>28%</b>	<b>57%</b>	<b>62%</b>



## Trucks: Sector Overview and Goals



Drayage, or container, trucking is a vital component of goods movement at the Ports. Emissions from drayage<sup>7</sup> trucks include PM from diesel engines. Emission reductions can be achieved through cleaner engines (associated with newer truck models, or achieved through engine exhaust emission control retrofits), cleaner fuels, implementing idle-reduction and decreased congestion programs, and efficiency improvements.

### The 2010 performance measure for the Truck Sector is to:

- By 2010, reach the equivalent PM emissions level of 1994 or newer heavy-duty truck engine<sup>8</sup> model year through vehicle purchase or by using approved retrofit packages, to be identified.

One of the deliverables listed in the Strategy for 2008 was to define a package of retrofits that would sufficiently reduce emissions to meet the 2010 performance measure. In 2009, the U.S. ports and air agencies determined there were no cost-effective retrofits currently available to meet the performance measure, or no technologies suitable for use on trucks performing drayage duty. As such, the Ports have pursued emission reductions through allowance of only trucks with engine years of 1994 or newer. The U.S. ports and air agencies continue to review new technologies for cost effective retrofit solutions. Port Metro Vancouver has pursued emission reductions in this sector through a multi-year program including a defined set of emission reduction measures for trucks, such as engine retrofits, alternative fuels, and engine replacements that, when used with older trucks, will meet the 2010 performance measure.

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<sup>7</sup> To be consistent with the Clean Air Strategy, the term 'drayage' means the following at different ports: At Port Metro Vancouver and Port of Seattle, drayage refers to all container trucks. At Port of Tacoma, drayage refers to all container trucks with the exception of auto transport trailers.

<sup>8</sup> The Clean Air Strategy performance measure for trucks states that progress should be measured by truck engine model year. However this information is not available in many cases; thus the Ports are reporting progress based on truck model year unless engine model year is available.



## 2010 Progress, Trucks



### Port Metro Vancouver

Port Metro Vancouver met the 2010 performance measure in 2009.

Port Metro Vancouver has an established truck licensing program, which requires that drayage truck operators accessing Port terminals must have a valid Container Truck Licensing System (TLS) license or permit in place. Truck operators without a valid TLS license or permit are not granted access to Port property. The TLS license sets out minimum safety and environmental requirements for drayage trucks accessing Port property. Environmental requirements were first introduced to the TLS in 2008 and have been set through 2017, by which point 100% of the fleet will be 2007 or newer or have equivalent PM emissions. In 2009, the 2010 performance measure was met, as all trucks with engines older than 1994 were not granted a TLS license and were prohibited from accessing the Port.

In April of 2010, Port Metro Vancouver opacity limits expanded to include truck model years 2000 and older. The Port also undertook outreach to truck owners/operators, mechanics, and distributors of eligible emission reduction technologies to prepare these stakeholders for the 2011 truck age and PM emission limits, which will apply to all trucks 1998 and older.

### 2011 Implementation Plans

On April 1, 2011, the next phase of the container TLS program came into effect, to reach the equivalent PM emissions level of model year (MY) 1999 or newer heavy-duty truck engines through vehicle purchase or using approved retrofit packages.

Port Metro Vancouver has initiated a 'proof of concept' pilot project for implementing a vehicle tracking system, using an on-board global positioning system for all tractors licensed in the TLS. Phase I of the project focuses on collaboration with industry and key stakeholders. Participants will be part of a working group that will develop a sustainable business model for developing enhancements to the traffic management and optimization of container drayage processes among trucking companies, Port facilities and Port business partners. The Pilot Project target size is approximately 300 tractors. Participation in the Pilot Project will be at no cost for the duration of the project, which is estimated to be approximately nine months.



## Port of Seattle

Based on the Clean Truck Program Drayage Truck Registry:

- 100% of drayage trucks met the 2010 performance measure.

The Port of Seattle partnered with the Clean Air Agency to concentrate on projects to reduce maritime air emissions. The Agency, as part of its programs, contracted with non-profit Cascade Sierra Solutions (CSS) to implement the 'Scrappage and Retrofits for Air in Puget Sound', or ScRAPs program; a buy-back, scrap, and replacement program for pre-1994 MY engine trucks. ScRAPs provides a \$5,000 (or blue-book value, whichever is greater) incentive to scrap pre-1994 MY trucks that perform drayage predominantly at the Port of Seattle. In 2010, ScRAPs successfully removed 249 pre-1994 MY drayage trucks at Port of Seattle. Using funds from the Port and the Department of Ecology, the ScRAPs Program also provided DOC retrofits on replacement trucks to further reduce emissions, although most of these DOC installations will take place in 2011.

As of January 1, 2011, all drayage trucks that enter the Port of Seattle container terminals have engines that are MY 1994 or newer. Non-compliant trucks are not allowed access to the container terminals, which is a requirement of the lease agreements between the Port of Seattle and the marine terminal operators.

The Port of Seattle Drayage Truck Registry (DTR) is the mechanism by which trucks entering the container terminals are determined to be compliant with the Clean Truck Program and allowed access. See the '**Drayage Truck Registry Outreach Initiative**' highlight box for



### Drayage Truck Registry Outreach Initiative

In 2010 The Port of Seattle engaged in significant education and outreach efforts with stakeholders (truckers, community and environmental groups, rail, marine terminal operators, shipping lines, shippers, labor, regulatory agencies, and elected officials). The Port developed and implemented a Drayage Truck Registry outreach initiative aimed at ensuring all drayage truck drivers and companies were informed of the Clean Truck Program requirements and to help register compliant trucks. This outreach initiative included:

- Program notification fliers and establishment of countdown signage at the terminal gates.
- Registration follow-up calls, and events such as Drayage trucker BBQ.
- Trucker Resource Fairs with information on financing, insurance, and business resources
- Partnerships with the African Chamber of Commerce and Port Jobs Employment Assistance to reach out to truckers and provide resources.
- Program updates via e-mail and presentations to community and environmental groups.





more details. The DTR is a web-based system, [www.portseattledtr.org](http://www.portseattledtr.org) that collects detailed information on each truck. Compliance is determined via an automatic verification of the VIN number and of the truck license plate number. If compliant, the DTR generates a receipt of registration and each truck is issued a DTR sticker, which is printed with identification information that can be used for audit purposes. Truckers are required to display the DTR sticker on the driver's side door for terminal access.

In order to confirm that a MY 1994 truck had a MY 1994 engine, all MY 1994 trucks that registered with the DTR were placed on the pending list and required to have a physical inspection of the engine. The Port of Seattle arranged for CSS to provide this physical inspection at no cost to the truckers.

### 2011 Implementation Plans

In January 2011, the Port of Seattle Commission instructed staff to develop a proposal to accelerate implementation of the Strategy long-term truck performance measures, with a focus on achieving 100% compliance by the end of 2015. Port staff will be working with stakeholders to develop this proposal, which is due to the Commission in mid-2012.



### Port of Tacoma

- 94% of drayage trucks met the 2010 performance measure.

The Port of Tacoma's Drayage Truck Emission Improvement Program is a market-based approach to reducing emissions that promotes a healthy partnership with the trucking community and shipping industry. The program has three components: 1) promoting clean truck fleets to existing and prospective Port businesses; 2) working with terminal operators to improve terminal and gate efficiency; and 3) assisting the trucking community to improve their truck fleet. The program demonstrated significant progress in 2010.



As part of this market-based approach, the Port of Tacoma implemented a clean truck sticker program identifying trucks compliant with clean truck program standards and a Best Management Practice List recognizing trucking companies that meet or exceed the 2010 standards and/or are [EPA SmartWay](#) program partners. Using this approach, the Port of Tacoma has enlisted 30 truck companies for early compliance with Port standards and issued over 6,000 stickers for compliance identification. Yellow stickers were issued to trucks meeting the 2010 but not the 2015 strategy goals, printed with a 2015 expiration date. Green stickers were issued to the cleanest trucks meeting the 2015 strategy goals, printed with an expiration date of 2025.





In 2010, Port of Tacoma Terminal operators were enlisted to support the Clean Truck Program and assist the Port with truck data collection, program development, program communication, and program enforcement. Terminal operators have assisted Port enforcement of the Clean Truck Program by monitoring and notifying drayage trucks not properly stickered.

Port of Tacoma conducted a 2010 Port Drayage Truck Fleet study to provide current drayage truck age profiles. The 2010 study updated truck age information and examined the changes between the 2008, 2009 and 2010 study. The study showed that the overall number of trucks serving the Port has not changed significantly and those older pre-1994 trucks were being replaced by newer trucks.



It is important to note that the 2010 study presents data prior to the Drayage Truck Program's first compliance deadline of December 31, 2010. Port Staff are aware of truck owners upgrading their trucks mid-year to meet the Drayage Truck Program Standards by year end. Data collected for this study included older trucks ultimately upgraded or retired by year end. This would suggest much better compliance performance after the compliance deadline. A subsequent drayage truck compliance audit performed at terminal gates on February 4, 2011, indicated nearly 100% compliance with the 2010 performance measure.

To maintain communication with the trucking community and promote the clean truck program, the Port continues to operate a dedicated website to provide the trucking community with information about the program objectives, truck engine age standards and resources for vehicle replacement.

### **2011 Implementation Plans**

As of December 31, 2010, the 2010 Strategy goals have now become the minimum standards for drayage trucks serving the Port of Tacoma. The Port will use the existing Best Management Practice list of pre-qualified drayage trucking companies to highlight and promote those who meet the Strategy's 2015 performance measure and have EPA SmartWay certification. As part of the overall clean truck program, the Port will monitor Port drayage fleet and report progress towards the 2015 drayage truck performance measures.

The City of Tacoma has been awarded a \$2.5 million Congestion Mitigation and Air Quality (CMAQ) grant to scrap and replace port drayage trucks and other Tacoma area trucks with newer cleaner vehicles. Under this program, first priority will be given to port drayage trucks serving the Port of Tacoma. Replacement trucks will also be retrofitted to further reduce emissions. The Washington State Department of Ecology provided another \$400,000 as a match to the CMAQ grant. In 2011, the Port will work with the City of Tacoma to focus funds and effort on replacing the remaining trucks that do not meet the 2010 performance standard. The Clean Air Agency and the Department of Ecology will provide technical assistance to the City.



## Progress Summary, Trucks

In 2010, Port Metro Vancouver and Port of Seattle met the 2010 performance measure, and the Port of Tacoma reported nearly 100% of CHE meeting the performance measure by the beginning of 2011.

**Table 5** details the percentage of trucks accessing the port that met the performance measure in 2009 and 2010.

**Table 5 Truck Sector Progress Summary**

PORT	2009	2010
	Met Performance Measure	Met Performance Measure
Metro Vancouver	100%	100%
Seattle	77.4%	100%
Tacoma	90%	94%
<b>Average (unweighted)</b>	<b>89%</b>	<b>98%</b>



## Rail: Sector Overview and Goals



Switching locomotives move rail cars from the ports to rail yards for long distance transportation, in addition to other activities such as building and breaking apart trains onsite. Emission reduction options for the rail sector include:

- Implementing cleaner engines and fuels for the switching locomotives; and
- Implementing idle-reduction and other energy efficiency programs.

The 2010 performance measures for the rail sector also require a commitment by the Ports to actively work with railways and terminal operators who own or lease locomotives in a joint effort to:

- Implement currently available, cost-effective technologies;
- Explore new technologies as they become available; and
- Work to increase operational efficiencies, especially as port throughput volume increases.

Railways in the U.S. and Canada operate under different regulatory structures; thus, separate approaches may be required to achieve emissions reductions in this sector.

### **The 2010 performance measure for the Rail Sector is to:**

- By 2010: At the Ports of Tacoma and Seattle, expedite the implementation of the SmartWay Partner commitments<sup>9</sup> at intermodal facilities where Burlington Northern Santa Fe Railway (BNSF), Union Pacific, and Tacoma Rail have operations in the Puget Sound region. At Port Metro Vancouver, 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.

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<sup>9</sup> SmartWay is a voluntary program of U.S. EPA that establishes incentives for freight industry sectors to achieve fuel efficiency improvements and greenhouse gas emissions reductions. The three primary components of the program are to create partnerships, reduce all unnecessary engine idling, and increase the efficiency and use of rail and intermodal operations. See: U.S. EPA SmartWay, <http://www.epa.gov/smartway/index.htm>, last visited on 12/12/2007.



## 2010 Progress, Rail



### Port Metro Vancouver

Port Metro Vancouver met the 2010 performance measure in 2008.

#### 2011 Implementation Plans

The BC Locomotive and Rail Air Quality Work Group will continue to meet in 2011, working toward its objectives of advancing emission reductions in the rail sector. Port Metro Vancouver will support these efforts. See the **'Port Metro Vancouver Tenant Locomotive Initiatives'** highlight box for more details.

#### Port Metro Vancouver Tenant Locomotive Initiatives

Several Port Metro Vancouver Tenants now operate with new lower-emission locomotives. Viterro Grain Terminal, Alliance Grain Terminal, Neptune Bulk Terminals and Petro Canada Terminals are operating low-emission multi-genset switch locomotives, including two with automatic idle shutdown. In addition, Fraser Surrey Docks has been operating a hybrid electric 'Green Kid' locomotive since the spring of 2004, which does not idle by design.



### Port of Seattle

In 2010, the Port of Seattle reached its 2010 performance measure of supporting the local rail companies in adopting US EPA SmartWay standards. In the first quarter of 2010, idle-reduction equipment was installed on two Louis Dreyfus locomotives at Terminal 86 Grain Facility with grant funding support from the Clean Air Agency.

#### 2011 Implementation Plans

In 2011, the Port of Seattle and the Clean Air Agency will continue to support the EPA SmartWay commitments made by BNSF Railway and Union Pacific. The Port and the Clean Air Agency will continue to pursue grant opportunities with their rail partners to secure additional investments to further reduce emissions.



## Port of Tacoma

The Port of Tacoma reached its 2010 performance measure of supporting rail operators' participation in SmartWay.

Port of Tacoma worked closely with its three rail operators, Tacoma Rail, TEMCO, and Pacific Rail Service, all of which are making strides to reduce emissions. All three rail partners are currently using ULSD.

- Tacoma Rail is continually improving its fuel efficiency through better locomotive technology. The Clean Air Agency assisted Tacoma Rail to secure a Federal DERA grant in 2010 for repowering locomotives with new ultra low emission engines. Tacoma Rail has participated in the EPA SmartWay Transportation Partnership.
- Pacific Rail has reduced its locomotive fuel use in 2010 by approximately 20% by improving intermodal rail yard efficiency. Inbound train rail cars were delivered and staged to minimize the use of switching locomotives.
- In 2010, TEMCO began using diesel fuel additives to improve fuel efficiency and lower emissions. The benefits were difficult to measure, however, TEMCO had decided to continue the trial through 2011.

### 2011 Implementation Plans

The rail sector has been identified by the Port and Port rail partners as an opportunity for future particulate emission reduction projects such as additional idle reduction equipment installation, engine repower or diesel exhaust emission control equipment retrofits.

In 2011 the Port of Tacoma will continue to support stakeholder participation in the SmartWay program and the commitments and progress made by Tacoma Rail, TEMCO and Pacific Rail Service. Through a partnership with the Washington State Department of Ecology and EPA, TEMCO has committed to installing automatic idle reduction systems on three switch locomotives.

In late 2010, EPA approved a request by the Clean Air Agency to redirect a DERA grant received by the Agency in 2009 to repower three area locomotives owned by a private company, and instead use the funds to support locomotive improvements at publicly

#### Tacoma Rail Locomotive Improvements

It is estimated that by replacing three locomotive engines with new and advanced technologies, Tacoma Rail can reduce fine particulate including toxic diesel emissions from these locomotives by 75% or 2 tons per year.

In addition, this project will deploy onboard lubrication technology on the three locomotives as well as on five other switcher locomotives that operate within the PM 2.5 non-attainment area. The lubrication technology (lubrication "sticks") apply lubrication between the rail and the wheel flange which decreases track resistance and results in smoother operations and a two to five percent fuel savings.



operated Tacoma Rail. In 2011, Tacoma Rail will use these federal funds and their own matching funds to repower or replace three locomotives operating within the Wapato Hills/Puyallup River Valley non-attainment area for fine particulate matter (PM 2.5) in the Puget Sound region.

Port staff will explore new and emerging locomotive emission reduction technology and work with other Port and Strategy Partners to provide retrofitting opportunities for viable technology. See the ‘**Tacoma Rail Locomotive Initiatives**’ highlight box for details. The Port of Tacoma, Washington State Department of Ecology and the PSCAA will continue to seek state and federal grant funds to further reduce locomotive emissions.

## Progress Summary, Rail

All three Ports had reached their 2010 performance measures for the rail sector in 2009, and continued to work towards further emission reductions in 2010. Port of Tacoma and Port of Seattle continued to support local rail operators in meeting their SmartWay commitments. The Ports were also supportive of rail emission reduction technologies and retrofits. **Table 6** summarizes the programs and initiatives supported by the Ports in 2010 towards achieving emissions reductions related to the rail sector.

**Table 6 Rail Sector Progress Summary**

Programs	Port Metro Vancouver	Port of Seattle	Port of Tacoma
BC Locomotive and Rail Air Quality Work Group	√		
Idle-reduction Retrofits		√	√
EPA SmartWay		√	√



## Harbor Craft: Sector Overview and Goals



Harbor vessels include non-ocean-going vessels such as ferries, fishing vessels, commercial vessels, tugs, and pleasure craft. The operations of harbor vessels, specifically the combustion of diesel fuels, generate air emissions that influence marine air quality. Emission reduction measures for harbor vessels include the use of ULSD or alternative fuels, as well as increasing fuel efficiencies. Since the Ports have limited jurisdiction over harbor craft, governmental agencies have assumed responsibility for developing and implementing the Strategy's

harbor craft performance measures.

There is currently no performance measure for the harbor craft sector. Performance measures specific to each type of harbor craft will be developed by the NWPCAS partners in the upcoming Strategy update. The regulation of emissions from harbor craft is at different stages of development in the U.S. and Canada. Both countries have regulated fuel sulfur content, but emissions standards for engines are not yet in place in Canada. Therefore, the focus of activities varies between Canada and the US, with outreach in Canada in the near future to focus on regulatory development and readiness. Transport Canada expects to amend the relevant regulations by 2012. In the Strategy, the Ports and agencies proposed to work with major harbor vessel owners and operators to annually report on the number and tier of vessel engines, emission-related retrofits, and alternative fuel use. This has not taken place yet and will now become part of 2010/11 emissions inventory efforts.

## 2010 Progress, Harbor Craft

### Georgia Basin

Strategy supporters Environment Canada and Transport Canada are working with their partners to reduce criteria air contaminant and GHG emissions in the Georgia Basin region by reducing emissions from harbor craft.

There are a variety of organizations that own and operate harbour craft in the Georgia Basin area, including Seaspan Marine Corporation (Seaspan) and BC Ferries. Seaspan operates a wide variety of vessels in and around Port Metro Vancouver. Seaspan's tug division is comprised of a combination of conventional tugs used for local, coastal, and ocean-going tows, as well as specialized ship assist tugs used for ship-docking and tanker escorts within Vancouver Harbor and the Georgia Basin. Seaspan Ferries Corporation also operates a fleet of five intermodal ferries servicing rail customers, and the truck and trailer industry.





Seaspan has maintained a corporate greenhouse gas (GHG) emissions inventory for all of their marine fleet and land-based shipyard operations since their baseline year of 2006, including implementing intensity-based GHG emission metrics to track progress within the Seaspan tug fleet. To date, emissions reduction initiatives for the Seaspan tug fleet include targeting onboard control of speed and voyage planning, operator education, an engine replacement program, installation of fuel monitoring equipment and overall journey and dispatch management for optimal fleet efficiency. Seaspan policies also exist to limit exhaust and unnecessary fuel consumption and emissions while at the dock during crew change-outs and loading. This includes using shore power for the tug and ferry fleet where possible.

In addition, British Columbia (BC) Ferries is taking steps to reduce its greenhouse gas and air pollutant emissions. Since 2003, BC Ferries has reduced its annual fuel consumption through a variety of measures, including resurfacing vessel hulls, installing new fuel-efficient engines on some vessels and fuel monitoring systems on others. BC Ferries has implemented B5 blend biodiesel use in most of its fleet, while the remaining petroleum diesel continues to be low-sulfur. Shore power is available at all terminals where ferries berth overnight, allowing vessels to shut engines down and hook up to hydroelectric power.

### **2011 Implementation Plans**

As part of Seaspan's externally verified ISO 14001 Environmental Management System (EMS), Environmental Action Plans are developed to track performance of annual objectives and targets. A new initiative for Seaspan in 2011 includes becoming the first major West Coast vessel owner to join the Green Marine environmental program. As a participant, Seaspan is required to evaluate their environmental performance each year on a one-to-five scale from regulatory compliance to achieving excellence. Performance is evaluated on criteria air contaminants (SO<sub>x</sub> and NO<sub>x</sub>), greenhouse gas emissions, and other key environmental indicators common to the marine industry. All results are independently verified by a third party and shared publicly to demonstrate participants' environmental commitment. This new initiative is another example of how Seaspan demonstrates one of their core values, care for the environment.

BC Ferries will continue its efforts to reduce air emissions and explore new emissions reduction technologies.



## Puget Sound

The Puget Sound Clean Air Agency is working with its partners to reduce criteria air contaminant and GHG emissions in the Puget Sound region by reducing emissions from harbor craft.

The Clean Air Agency is promoting ULSD fuel and new technologies in all harbor craft with a focus on tugs and ferries. The Clean Air Agency and the ports continue working with tug companies and marine fuel distributors to increase the use of ULSD and with engine manufacturers to promote cleaner technology. Washington State Ferries (WSF) is using ULSD (15 ppm) or low-sulfur diesel fuel in all of its vessels. WSF has been conducting an on-going evaluation of the use of biodiesel fuel in its vessels to determine the best course of action.

In 2010, three promising projects in Puget Sound were unsuccessful. See the '**Challenges: Unsuccessful Projects**' box for details.

### Challenges: Unsuccessful Projects

- A project to install a scrubber unit on a local dinner cruise vessel was canceled in early 2011 due to technical support and schedule concerns.
- A tugboat DOC retrofit project was canceled when it was determined that DOCs would unacceptably increase engine back pressure.
- A positive restraint system (PRS) project for the Pt. Defiance/Tahlequah Washington State Ferry run was canceled when sea trials of the vessel indicated that PRS was not well matched for the class of vessel used on this run.

WSF received a \$3 million CMAQ grant in 2009 and began implementation in 2010 to upgrade engines on several ferries in its fleet. The Clean Air Agency provided a small portion of the match required by CMAQ.

In 2009, the Clean Air Agency and its partner, Caterpillar Corporation completed a U.S. EPA Diesel Emission Reduction Act (DERA) grant project to upgrade the engines on a Seattle-based fishing vessel, Fierce Allegiance, as part of EPA's Emerging Technology Program. This kit reduced PM emissions by approximately 25% from the Fierce Allegiance and significantly improved fuel economy. Once certified by the U.S. EPA, the engine upgrade kit will become mandatory for this engine model under the EPA's Inland Marine and Locomotive Rule. In 2010, Caterpillar Corporation continued pursuing final EPA certification of the upgrade kit. EPA has yet to issue certification for the kit, but is expected to do so in 2011.



### **2011 Implementation Plans**

Early in 2011, the Clean Air Agency submitted an additional DERA grant application to EPA to repower a tug boat owned and operated by Harley Marine. Partial matching funds were committed by the Washington State Department of Ecology, with Harley Marine providing the balance of the required matching funds. EPA will announce the selected projects for this round of highly competitive DERA funding later in 2011.

In 2011 the Clean Air Agency will implement projects funded in 2010, and continue to pursue additional state and federal funding opportunities that will reduce harbor craft emissions. In addition, the Agency is planning to host a workshop in late 2011 or early 2012 on fuel efficiency technologies and practices for area harbor craft fleet owners. Reducing fuel usage both saves the owner money and reduces emissions into the airshed.

## **Progress Summary, Harbor Craft**

While there is no quantitative performance measure or target for this sector, efforts to reduce harbor craft related emissions are moving forward. Initiatives from government agencies and their industry partners have promoted the use of cleaner fuels in harbor craft and engine replacement and retrofits. The agencies and Ports continue to encourage and support implementation of emission management initiatives and work to secure funding for them. In addition, they recognize the efforts of industry leaders such as Seaspan, BC Ferries and Washington State Ferries and encourage the continuation of their emission management actions.



## Port Administration: Sector Overview and Goals

Emissions from port administration are associated with vehicle use, and electricity and gas consumption for daily port operations. These emissions can be reduced through the use of cleaner technology or alternative fueled vehicles, employee programs to facilitate sustainable commuting options, adoption of green building practices such as LEED®, and implementation of energy efficiency improvements. Performance measures have not yet been established for the port administration sector, and as such the Ports have taken a variety of approaches to reduce emissions at each port. This section includes a summary of the initiatives the Ports have implemented to reduce administration related emissions in 2010, as well as a summary of ongoing programs designed to reduce each port's overall environmental footprint.

## 2010 Progress, Port Administration



### Port Metro Vancouver

As part of the goal to reduce administrative emissions and reduce environmental impacts, Port Metro Vancouver accomplished the following in 2010:

- Developed Port Metro Vancouver's first Sustainability Report in accordance with the Global Reporting Initiative Sustainability Reporting Guidelines. Port Metro Vancouver retained an independent third party to provide assurance on performance indicators and targeted a GRI B+ reporting level.
- Implemented energy conservation measures, reducing electricity consumption at the Canada Place Port Metro Vancouver office by 13% (133,938 kWh).
- Almost all office paper consumed at Port Metro Vancouver in 2010 contained 30% post-consumer recycled content.
- Implemented a 'Sort Smart' waste management program at the Canada Place Port Metro Vancouver office, including a recycling program for paper, glass, metals and plastics.
- Implemented a composting service for organic waste, diverting 2,970 kg of organic waste from the landfill over 8 months.
- Introduced the "Guaranteed Ride Home" program, assuring a free ride home for employees who commute using sustainable forms of transportation when they are required to work late or in the event of an emergency.
- Participated in the Vancouver Commuter Challenge, where 43% of our employees committed to using sustainable forms of transportation three days a week for at least a month.



Actions and achievements associated with Port Metro Vancouver’s ongoing efforts to reduce air emissions associated with administrative activities include the following:

- Completed Port Metro Vancouver’s second Corporate Emissions Inventory and had the results independently verified using the ISO 14064 Standard.
- Emissions from energy use at the Port Metro Vancouver head office were reduced through energy conservation measures, while emissions from vehicle use were reduced through the use of hybrid fleet vehicles.
- Remaining operations emissions were offset through the purchase of 1,265 tonnes of BC-based carbon offsets from the Pacific Carbon Trust, resulting in carbon-neutral Port Metro Vancouver operations for 2010.

### 2011 Implementation Plans

In 2011, Port Metro Vancouver aims to:

- Transition to office paper containing 100% post-consumer recycled content.
- Implement a ‘Sort Smart’ waste management program for the Port Metro Vancouver Maintenance Facility.
- Conduct an energy study of the Canada Place office to determine operational changes and capital upgrades in order to further reduce energy consumption.
- Participate in the 2011 Vancouver Commuter Challenge.



### Port of Seattle

As part of the goal to reduce administrative emissions and reduce environmental impacts, the Port of Seattle accomplished the following in 2010:

- The Port is a member of “Evergreen Fleets,” a program co-administered by the Clean Air Agency and the Puget Sound Clean Cities Coalition (PSCCC). See the ‘**Puget Sound Clean Cities Coalition**’ highlight box for details. Through this program, the Port replaced two of its large maintenance vehicles with energy-efficient Fort Transit Connect Vans.
- The Port of Seattle Fleet was ranked #20 in top 100 Government Green Fleets in 2010 (Government Fleet Magazine).

#### Puget Sound Clean Cities Coalition

PSCCC promotes cleaner air, minimizing greenhouse gas emissions, and reducing fuel consumption through smart and efficient fleet management practices. It is an organization with public and private members supporting energy security and economic development by promoting policies and practices that reduce petroleum consumption. PSCCC members work within the US Department of Energy’s Clean Cities Program – a larger national program. PSCCC provides education, technical assistance, access to grant funds and other services to assist in the implementation of the Coalition’s strategies.



- Removed 5 pieces of equipment from the fleet and did not replace them; 1983 backhoe, 1999 truck, 1997 car, 1989 hydro-blaster and 1979 forklift
- Replaced the 1995 Marine Maintenance Dump Truck with one that has 2010 emission standards
- Replaced Marine Maintenance boiler with better air quality compliant boiler
- Increased the frequency of filter changes in the paint booth to quarterly
- Increased bulk purchasing of cleaners and lubricants to reduce exposure
- Started to purchase more latex and non-lead based sealers and paints instead of oil based products

Actions and achievements associated with the Port of Seattle's ongoing efforts to reduce air emissions associated with administrative activities include the following:

- A member of the Marine Maintenance staff was appointed to the governance board of the Vehicle Maintenance Management Conference
- Implementation of Office Communicator and Computer screen cameras, reducing the need to travel to meetings by participating via teleconferencing
- Increased Flex schedules and more people working from home in 2010
- Increased use of plug-in hybrid cars

### 2011 Implementation Plans

In 2011, the Port of Seattle will continue to purchase hybrid or alternative-fuel vehicles when replacing fleet vehicles. The Port will also work to increase recycling efforts and reduce water and electricity consumption at all Port facilities.



As part of the goal to reduce administrative emissions and reduce environmental impacts, the Port of Tacoma accomplished the following in 2010:

- As a member of the "Evergreen Fleets" organization, the Port replaced three of its large maintenance vehicles with energy efficient Ford Transit Connect Vans. This represents a fuel savings of over 7,000 gallons per year.
- As part of the overall fleet efficiency effort, the Port retired 11 older, inefficient vehicles and did not replace them.
- The Port revised environmental policies and procedures to more efficiently integrate waste minimization and energy conservation into Port business practices and project development processes. In 2010, the Port recycled approximately 6,000 tons of asphalt and 500 tons of concrete pavement from demolition and construction projects.



- The Port has completed energy audits and has recommendations for certain Port owned or operated buildings, rail yard compressors and general yard lighting. Recommendations include energy saving measures that result in a relatively short payback period for any purchased capital equipment.
- Terminal operators have also performed an energy audit and are currently reviewing recommendations for improved yard lighting efficiency and electrical power conditioning equipment to improve energy efficiency at their terminal.

Actions and achievements associated with the Port of Tacoma's ongoing efforts to reduce air emissions associated with administrative activities include the following:

- Continued requirement that all construction equipment used in Port development projects use ULSD fuel.
- Continued participation in Tacoma Power's Evergreen Option at the 11% level. The Evergreen Option is offered by Tacoma Power as a means to purchase electrical power generated by wind or solar sources. Tacoma Power supplies 89% of its power from renewable hydroelectric. By purchasing 11% of its power from wind or solar sources, Port of Tacoma has offset the non-renewable portion of its power purchases to become a 100% renewable energy consumer.
- Continued office waste reduction and recycling practices by providing paper recycling collection bins at all employee desks and paper, plastic and aluminum recycling bins in kitchen areas. The Port continues to purchase post-consumer recycled paper products for photocopy machines.
- Continued office energy efficiency practices through compact fluorescent bulb and T8 fluorescent tube usage in overhead fixtures.
- Continued preferential use of hybrid vehicles for longer-distance travel outside the Port, reducing fuel consumption.
- Continued participation by Port employees in the commuter trip reduction program. In 2010, 32 employees participated by reducing their fuel usage by nearly 4,000 gallons.

### **2011 Implementation Plans**

In 2011, the Port will join the PSCCC. Port of Tacoma supports PSCCC's promotion of alternative fuels and vehicles, fuel blends, fuel economy, hybrid electric vehicles (HEVs) and idle reduction strategies. The Port will draw on their collective knowledge and resources to facilitate additional improvements in energy efficiency, the use of alternative energy, improvements in fleet fuel efficiency and fleet vehicle electrification.





## Progress Summary, Port Administration

The Ports have taken a variety of approaches to reducing emissions from several aspects of port administration, and have also implemented initiatives to reduce their broader environmental impacts. A summary of the Ports' new and ongoing achievements in this area is provided below (**Table 7**).

**Table 7 Port Administration Sector Progress Summary**

Environmental Programs	Port Metro Vancouver	Port of Seattle	Port of Tacoma
Corporate Emissions Inventory	√	√	
Energy Audits		√	√
Sustainable Procurement Policy	√	√	
Solid Waste reduction	√	√	√
Vehicle Fuel Efficiency/Clean Fuels	√	√	√
Offset Purchasing	√		√



## Progress Overview

### 2010 Progress

In 2010, progress was made in each of the sectors, most notably with respect to trucks. Nearly all trucks visiting the three Ports met the 2010 performance measure, an achievement reached through proactive stakeholder engagement and a variety of incentive-based and mandatory programs. Challenges were encountered in implementing the Strategy for the CHE sector, as a diesel exhaust filter technology did not perform as anticipated, and the manufacturer recommended the filters be removed from cargo handling equipment at the Ports of Seattle and Tacoma.

### 2008 to 2010 Progress

The Ports have now completed three years of strategy implementation toward the 2010 performance measures. Collectively, the efforts of the Ports, agencies, and stakeholders have resulted in significant progress toward meeting or exceeding the 2010 performance measure in each sector. **Table 8** summarizes the collective performance in 2010, as well as in the previous two years toward achieving the 2010 performance measures. A summary of the progress over the last three years is provided in the table below.



**Table 8 Summary of Progress (2008-2010)**

Sector	2010 Performance Measure	2008 Progress	2009 Progress	2010 Progress
Ocean Going Vessels	<ul style="list-style-type: none"> <li>Equivalent PM reduction of fuels with maximum sulfur content of 0.5% for hotelling auxiliary engine operations.</li> <li>Fuels with maximum sulfur content of 1.5%, or</li> <li>Equivalent PM reduction measures for all hotelling main or diesel electric engine operations.</li> </ul>	31%	38%	44%
Cargo Handling Equipment	<ul style="list-style-type: none"> <li>Equivalent PM reduction of Tier 2 or Tier 3 engines<sup>10</sup> operating with ULSD or a biodiesel blend of an equivalent sulfur level.</li> </ul>	28%	57%	62%
Trucks	<ul style="list-style-type: none"> <li>Equivalent PM emissions level of 1994 or newer heavy-duty truck engine model year.</li> </ul>	86%	89%	98%
Rail	<ul style="list-style-type: none"> <li>Ports of Tacoma and Seattle: expedite the implementation of the SmartWay Partner commitments at intermodal facilities</li> <li>Port Metro Vancouver: develop a British Columbia Locomotive and Rail Air Quality Work Group, to develop sector specific efforts.</li> </ul>			
Harbor Craft	<ul style="list-style-type: none"> <li>No quantitative performance measures for 2010.</li> <li>The Ports and agencies proposed to work with major harbor vessel owners and operators to annually report on the number and tier of vessel engines, emission-related retrofits, and alternative fuel use.</li> <li>Quantitative 2015 performance measures will be set in 2012.</li> </ul>	<ul style="list-style-type: none"> <li>Promotion of ULSD fuel and other clean fuels</li> <li>Harbor Dues discounts and rebates</li> <li>Harbor craft engine upgrades</li> <li>Ferry usage of ULSD and biodiesel</li> <li>Implementation of fuel efficiency programs by ferries</li> <li>Use of shore power for ferries</li> <li>Ferry engine upgrades</li> </ul>		
Port Administration	<ul style="list-style-type: none"> <li>No quantitative performance measures for 2010</li> <li>The Ports have committed to energy, waste and emissions reduction initiatives.</li> <li>2015 performance measures will be set in 2012.</li> </ul>	<ul style="list-style-type: none"> <li>Replacement of gasoline vehicles with gasoline-electric hybrid vehicles</li> <li>Equipment fleet efficiency programs, biodiesel usage</li> <li>Energy efficiency programs</li> <li>Low carbon electricity sourcing</li> <li>Sustainable commuting initiatives</li> <li>Corporate emission inventories</li> <li>Set Corporate Social Responsibility targets</li> <li>Waste management programs</li> <li>Sustainability reporting</li> <li>Carbon offset purchases</li> <li>Green procurement policies</li> </ul>		

<sup>10</sup> Tier 2 and 3 standards are 0.15 g/hp\*hr for most CHE. See Table 1.1 in US EPA's *Final Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines*, August 1998, available online at: <http://www.epa.gov/nonroad-diesel/frm1998/nr-ria.pdf>, last visited on 12/12/2007.



## 2011 and Beyond

### Strategy Review and Update

Even at the time of development in 2007, the Ports recognized that the Strategy would be a living document that would need to be regularly updated and revised in light of new standards, evolving technologies, and evolving air quality and climate change policy frameworks. See the **'Regulatory Driver for Strategy Update'** box for an example. In addition, the Ports now have three years of experience and "lessons learned" in implementing air quality initiatives, as well as new information from emission inventories and enhanced data management systems to inform the next phase of implementation.

A major review of the Strategy is planned to occur in 2012, incorporating these external changes and internal lessons learned. In the revised strategy, 2015 performance measures will become short-term goals and 2020 performance measures will become the new mid-term goals. Key questions for the review will include what the Strategy's mid-term 2020 performance measures should be, and to what extent they should address system efficiencies, greenhouse gases, and climate change thus expanding the scope.

The strategy update will:

- Define quantitative 2015 performance measures for the rail and harbor craft sectors;
- Fully address the implication of ECA on the OGV sector; and
- Incorporate new information and regulations to adjust existing 2015 performance measures.

Starting in 2011, the Ports will begin working towards achieving the 2015 performance measures outlined in the original Strategy, continuing to support ongoing emission reductions in the Puget Sound and Georgia Basin airshed. The Ports will continue to report annually on their emission reduction activities, highlighting successes and challenges with implementation. Air emission inventories will also be conducted on a regular basis by the Ports in order to measure the actual results of emission reduction activities. Strategies, implementation reports and emission inventories are all available online at each of the Ports' websites.

### Regulatory Driver for Strategy Update

In light of North American ECA regulations that will come into effect in August 2012, some short-term refinements for the OGV sector will need to be made to reflect the new regulatory environment. For the overall strategy to remain relevant, the revised goals for 2015 will require significant engagement with stakeholders in order to define appropriate goals and metrics for 2015.

As a transitional step leading towards the major review in 2012, the Ports plan on working together, and with customers, in preparation for the pending implementation of ECA. This transitional step during 2011 is necessary to fully roll out programs prior to the enforcement of ECA regulations, allowing marine carriers time to adapt.



### Canadian Land-based Emissions Inventory

Port Metro Vancouver is currently leading a collaborative effort with Environment Canada and Transport Canada to update the 2005 land-based emission inventory for 2010. This complements ongoing efforts led by both the British Columbia Chamber of Shipping (for marine sources) and Metro Vancouver (for regional emission sources). The 2010 assessment of Port-specific emission sources will also include:

- Quantification of emission reduction measures already in place and expected in the future;
- Forecasting of emissions through 2025 in five year increments;
- Examination of the incremental impact from Port-related truck and rail activity throughout the Lower Fraser Valley; and
- Inclusion of energy-related emissions, specifically indirect emissions due to electricity consumption.

### Puget Sound Marine Emissions Inventory

In 2005, the partners in the Puget Sound Maritime Air Forum, including the Port of Seattle, Port of Tacoma, Washington State Ferries, Puget Sound Clean Air Agency and others, collaborated on the development of a baseline Puget Sound Marine Emissions Inventory (PSEI). The baseline 2005 PSEI formed the basis of the Northwest Ports Clean Air Strategy.

A new PSEI is being developed in 2011 that includes the same Puget Sound Airshed boundary delineated in the 2005 PSEI. Once developed, quantitative results will be evaluated against the 2005 baseline emission inventory to assess the effectiveness of the emission reduction and air quality improvement programs since January 2006, including the Northwest Ports Clean Air Strategy. The 2011 PSEI will also provide the benchmark for future emission reduction efforts by the Ports, the marine industry, and regulatory agencies, and furthermore will support the next version of the Strategy and performance measures.



## Conclusion

The Ports and partners have made significant progress in reducing emissions in ways that reflect the unique operations and conditions associated with each of the Ports. The successful implementation of the Strategy was supported by some key drivers, including the spirit of collaboration, cooperation, and entrepreneurship that exists among the Ports. The Ports all invested significant effort and resources to try new approaches to emission reduction, taking voluntary action to improve their performance beyond air regulatory requirements. These efforts were supported in many cases by federal and state funding programs and grants, helping implementation to move forward during an economic downturn. The Ports have made consistent progress considering their boundaries of influence; the majority of emission sources are outside of their direct control because they are owned by other bodies such as port tenants, trucking companies, and shipping lines. Proactive stakeholder engagement was therefore a crucial factor in successful implementation, ensuring that those directly affected by, or responsible for, emission reduction requirements had the opportunity to understand and buy into the various programs. The economic downturn also contributed to interest in energy efficiency programs, since costs savings were available through reduced fuel consumption.

The 2010 performance measures were not met in all cases, highlighting the influence of some barriers to implementation. For some sectors, quantitative performance measures have not yet been set, or regulatory frameworks do not yet exist; it can be difficult to prioritize an investment in emission reduction programs without a defined objective or benchmark against which to measure progress. The availability of data and data collection mechanisms was another challenge to implementation; without clarity on the baseline conditions, it can be difficult to implement a program to achieve the desired target. Accordingly, improving data collection systems was a key focus over the three years of implementation. The Ports were also faced with challenges associated with technical solutions. Although new emission reduction technologies are emerging constantly, in some cases there were no approved technologies that could achieve the required emission reductions. In other cases, technologies did not perform as anticipated. The economic downturn meant the Ports faced budget constraints, and external funding opportunities were reduced. Equipment turnover was also lower than it might have been in a prosperous year, as private operators were not updating their fleets.

The Ports will draw on the lessons learned from these successes and challenges as they enter the next phase of Strategy implementation toward 2015 performance measures.



## Appendix A: Data Methodology and Calculations

### Ocean-Going Vessels

#### Port Metro Vancouver

Due to the nature of how the EcoAction program, previously known as the Differentiated Harbour Dues, is administered only the first 5 calls by a vessel are directly tracked for air emission reduction actions. All calls under the EcoAction program have been directly verified by Port Metro Vancouver boat crews. These verified calls are the reported numbers towards meeting the strategy goals. In addition to the verified calls, conservative estimates are provided through experience with shipping lines known to be consistent in policy and can reasonably be expected to continue to utilize air reduction measures.

The conservative estimate is based upon scaling the behavior of the first five calls to the total number of calls by a vessel as long as the vessel met the following conditions:

- 3 out of the 5 visits met the requirements (applications were not always entered for the first 5 visits)
- The vessel was not denied an EcoAction level on any of the visits

#### Port of Seattle

The Port of Seattle used At-Berth Clean Fuels reporting forms from participating carriers and a database of all Port vessel calls at each of its terminals. In addition, two vessels from each participating carrier were audited to validate the reporting forms. This was done primarily through reviewing bunker fuel receipts and oil logs.

#### Port of Tacoma

The Port of Tacoma relied primarily on written verification from shipping lines as a record. In 2010, the Port requested bunker delivery notes directly from one international shipping line call that was randomly selected and without prior notice. The Port also conducted two vessel boardings to review each vessel's operation and fuel usage.





## Cargo Handling Equipment

### Port Metro Vancouver

Port Metro Vancouver's progress toward the 2010 CHE performance measure is based on forecasting cargo handling equipment to 2010, from the 2005 baseline, consistent with methodologies outlined in the Port Metro Vancouver Landside Air Emissions Inventory Phase I: Burrard Inlet and Roberts Bank. Fraser River data was not available and so is not included. The forecast includes planned changes by tenants and an estimated equipment changeover rate (e.g. if 10% of the fleet in 2005 was 5 years old, it assumes 10% of the fleet in 2010 is 5 years old). The inventory assumed U.S. engine tier timelines as much of the equipment is from U.S. manufacturers. PM<sub>2.5</sub> emission reductions of ≥63% from Tier 1 equipment only were included as equivalent to or exceeding Tier 2 or Tier 3. All other emission reductions formed part of the estimate for progress toward the 2010 performance measure

### Port of Seattle

The Port of Seattle reviewed 2010 data from terminal operators managing cargo handling retrofit projects at the Port, as well as comprehensive CHE lists prepared by the Washington State Department of Ecology and the Puget Sound Clean Air Agency. Data included vehicle model year, recognition of on-road engines and control device installation. Information from retrofit projects was checked against the terminal-provided information. Information was compared against published U.S. EPA standards for model year and engine power.

### Port of Tacoma

The Port of Tacoma reviewed 2010 data collected from terminal operators and agencies managing cargo handling retrofit projects at the Port. Data included vehicle model year, recognition of on-road engines and control device installation. Information from retrofit projects was checked against the terminal-provided information. Information was compared against published U.S. EPA standards for model year and engine power.

## Rail

### Port Metro Vancouver

Information was gathered by Port Metro Vancouver.

### Port of Seattle

Data was obtained from the Puget Sound Clean Air Agency and Louis Dreyfus.



## Port of Tacoma

Data was gathered from review of public information posted on the Tacoma Rail website and communication with TEMCO and Pacific Rail Services. Data and general information was gathered from Puget Sound Clean Air Agency regarding their DERA grant application that had been reprogrammed to Tacoma Rail's repower project.

## Trucks

The Strategy performance measure for trucks states that progress should be measured by truck engine model year. However this information was not available in many cases; thus the Ports are reporting progress based on truck model year, unless engine model year is available.

The following definitions and assumptions are included in the calculation of progress toward the 2010 performance measure:

- Drayage trucks are defined as container trucks that serve the Port terminals. The existing reporting systems for trucks – Port Metro Vancouver Truck Licensing System, Port of Seattle Radio Frequency Identification (RFID) Program, and the Port of Tacoma semi-annual truck fleet surveys – rely on the best available data.
- Port of Seattle and Port of Tacoma will continue to work to accurately identify the full inventory of the truck population calling the ports – approximately 80% of the population is known, and the other 20% are assumed from the state-wide inventory. Port Metro Vancouver has an accurate inventory based on their truck licensing program.

### Port Metro Vancouver

Drayage truck fleet age distribution data was collected via the Port Metro Vancouver Container Truck Licensing System.

### Port of Seattle

Through Cascade Sierra Solutions, the Port has been tracking the number of pre-1994 trucks that have been scrapped, and in many cases replaced and retrofitted, as part of the ScRAPs Program administered by the Clean Air Agency with grant funds from the Port and the Department of Ecology. The Port of Seattle DTR is the mechanism by which trucks entering the container terminals are determined to be compliant with the Clean Truck Program and allowed access.



### **Port of Tacoma**

Data was collected from two sources: terminal operators and drayage trucking companies. Three terminal operators were able to provide data from gate security and efficiency operations. Gate data sources include trucking companies that serve the terminal and license plate information gathered by optical character recognition (OCR) systems. Two terminal operators had OCR systems recording truck license plate information.

As part of the Port of Tacoma Clean Truck Sticker program, truck age information was obtained from over 6,000 trucks requesting or receiving identification stickers.

Washington Department of Licensing provided truck model year in exchange for license plate information captured by terminal OCR systems and provided by truck owners as part of the sticker program.

Port staff performed an on-site terminal audit in February 2011 to measure compliance with the clean truck program standards. Data was gathered at the end of the first quarter 2011 from terminal OCR systems to supplement and confirm the onsite terminal audit results.

## **Harbor Craft**

### **Georgia Basin**

Information on harbor craft was provided by Seaspan Marine Corporation and BC Ferries.

### **Puget Sound**

Information on harbor craft was provided by Puget Sound Clean Air Agency, the Department of Ecology and Washington State Ferries.

## **Port Administration**

### **Port Metro Vancouver**

Information was gathered by Port Metro Vancouver.

### **Port of Seattle**

Port Administration data was gathered from reporting of internal actions that represent reductions directly or indirectly of criteria air pollutants and greenhouse gas emissions.

### **Port of Tacoma**

Data was gathered by Port of Tacoma on administrative and operational activities to reduce, directly and indirectly, criteria air pollutants and greenhouse gas emissions.