PORT OF LOS ANGELES
EMISSIONS INVENTORY HIGHLIGHTS - 2012

THE PORT OF LOS ANGELES

ADP#121011-529
July 2013

Prepared by:
STARCREST CONSULTING GROUP, LLC

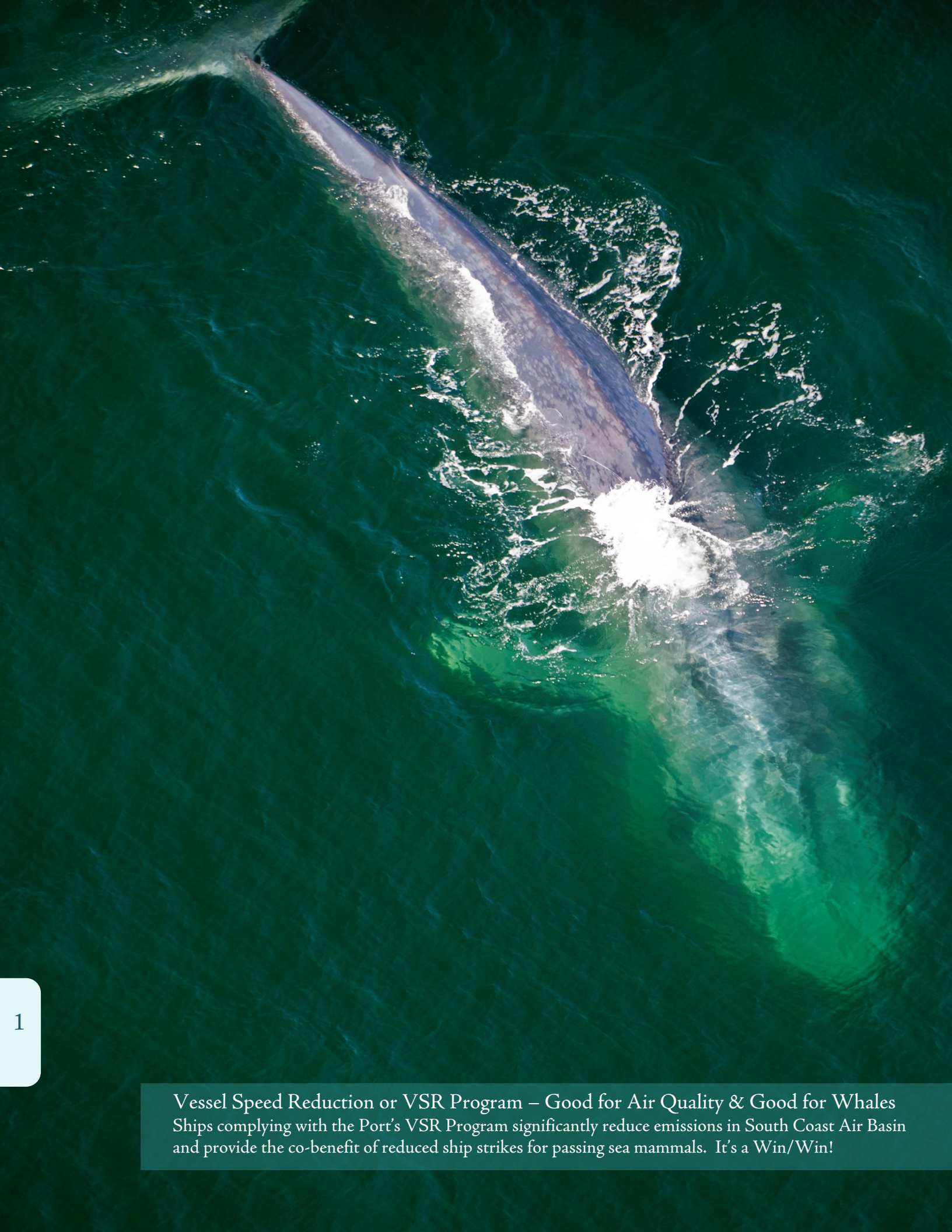
FOREWORD

This document provides an overview of the air quality improvement efforts associated with the Port of Los Angeles (POLA) in reaching its goals as presented in the San Pedro Bay Ports Clean Air Action Plan (CAAP). This Port of Los Angeles Emissions Inventory Highlights presents 2012 inventory findings, trends in emissions and cargo since 2005, emission reduction measure progress, and upcoming highlights for 2013 and beyond. This document does not replace the detailed annual emissions reports; it draws information from these documents and reports progress in the context of the CAAP goals in a reader-friendly format.
(*www.portoflosangeles.org/environment/studies_reports.asp*)

TABLE OF CONTENTS

Introduction	2
Report Card	4
2012 Emissions Inventory Summary	5
2005 vs 2012 Source Category Contribution Changes	6
2012 Regional Emissions Contribution	7
2005-2012 Activity & Cargo Growth	8
2005-2012 Port-Related Emissions Trends	9
2005 vs 2012 Port-Related Efficiency Trends	10
Source Category Highlights	12
Air Monitoring Highlights	17
Looking Ahead	18

Photos by POLA; Illustrations by Rodolfo Montalvo



Vessel Speed Reduction or VSR Program – Good for Air Quality & Good for Whales

Ships complying with the Port's VSR Program significantly reduce emissions in South Coast Air Basin and provide the co-benefit of reduced ship strikes for passing sea mammals. It's a Win/Win!

INTRODUCTION

This document is the second edition of the Port of Los Angeles (POLA) Emissions Inventory Highlights Reader, which will be published in conjunction with the completion of the annual emissions inventories. This document tracks key elements from the inventories and other programs and compares them with the goals presented in the San Pedro Bay Ports Clean Air Action Plan (CAAP) and the 2010 CAAP Update. The CAAP focuses on emissions of diesel particulate matter (DPM), oxides of nitrogen (NOx), and sulfur oxides (SOx).

In March 2006, a groundbreaking meeting occurred at the highest level between POLA, POLB, and the South Coast Air Quality Management District where all parties expressed the need to work jointly toward solutions to reduce emissions from port-related operations. Shortly thereafter, the Ports also engaged the California Air Resources Board and the United States Environmental Protection Agency Region 9 in the spirit of cooperation to help the Ports develop the original 2006 San Pedro Bay Ports CAAP and subsequently the 2010 CAAP Update.

As part of the 2010 CAAP Update, both POLA and the Port of Long Beach (POLB) developed mass emission and health-risk reduction standards in coordination with the United States Environmental Protection Agency (EPA) Region 9, the California Air Resources Board (CARB), and the South Coast Air Quality Management District (SCAQMD). These emission reduction standards set the bar for performance for port-related emission sources and represent the Ports' "fair share" in reducing emissions in the South Coast Air Basin (the Basin). The standards are compared to 2005 baseline levels.

THE PORT OF LOS ANGELES

The Port of Los Angeles is America's premier port and has a strong commitment to developing innovative strategic and sustainable operations that benefit the economy as well as the quality of life for the region and the nation it serves. As the leading seaport in North America in terms of shipping container volume and cargo value, the Port supports more than 830,000 regional jobs and $35 billion in annual wages and tax revenues. The Port of Los Angeles - A cleaner port. A brighter future.

In addition, the CAAP sets out various measures for ocean-going vessels (OGV), harbor craft (HC), cargo handling equipment (CHE), locomotives, and heavy-duty vehicles (HDV). Additional initiatives, such as the Technology Advancement Program (TAP) and the zero emissions effort, support POLA's progress at attaining and maintaining the standards into the future.

The challenges of the CAAP are not only reaching the most aggressive reduction targets of any port, but maintaining the standards while the Port continues to grow. POLA is leading with solutions and investing today in technologies that will ensure that growth can be accomplished without significant impact on the surrounding communities and environment.

The **San Pedro Bay Standards** are a statement of the Ports' commitments to significantly reduce the air quality impacts from port operations. Achievement of the standards listed below will require coordination with our agency partners, diligent pursuit of all of the existing CAAP measures and aggressive action to seek out further emissions and health risk reductions from port-related sources from strategies that will emerge over time. The standards are relative to 2005 conditions.

Health Risk Reduction Standard - By 2020, reduce the population-weighted residential cancer risk of port-related DPM emissions by 85%.

Mass Emission Reduction Standards -
By 2014, reduce emissions by 72% DPM, 22% NOx, and 93% SOx
By 2023, reduce emissions by 77% DPM, 59% NOx, and 93% SOx

Alternative Maritime Power™ or AMP

The "AMP-Mobile" is a unique solution designed jointly by Port engineers and Cavotec SA to provide a flexible solution providing 6.6 kilovolts (kv) or 11 kv, while providing 100 feet of lateral movement capability. The AMP-Mobile allows for cruise ships to dock in almost any configuration while bridging the distance between the electrical vault and the ship's AMP reception point. The port has three AMP-Mobiles and the entire system can provide up to 40 megawatts of power (20 megawatts at 6.6 kv and 20 megawatts at 11 kv), another world's first!

REPORT CARD

POLA developed a "Report Card" summary in 2009 which helps distill each current-year inventory and compare it to 2005, showing progress toward the CAAP goals. The report card has been effective in communicating a high level understanding of emissions reduction progress to date, describing Port efficiency measured in emissions per twenty-foot equivalent units (TEUs), and showing pollutant emissions for the five emission source categories. Additional relevant information is also provided each year on the report card.

The report cards are posted annually on the POLA website (*www.portoflosangeles.org/environment/studies_reports.asp*)

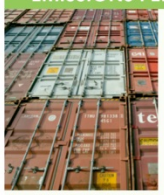
PRIMARY POLLUTANTS DEFINED

DPM = Diesel Particulate Matter
NOx = Oxides of Nitrogen
SOx = Oxides of Sulfur
$PM_{2.5}$ = Particulate Matter less than 2.5 microns in diameter
PM_{10} = Particulate Matter less than 10 microns in diameter
CO_2 = Carbon Dioxide (A Green House Gas contributor)

OVERALL EMISSIONS REDUCTIONS CY 2005-2012

Pollutant	CY 2005-2012 %	CY 2005-2012 tons
DPM	79%	706
$PM_{2.5}$	77%	645
PM_{10}	79%	773
NOx	56%	9,154
SOx	88%	4,675

EMISSIONS PER 10,000 TEU HANDLED



Pollutant	CY 2005-2012 %	CY 2005-2012 tons
DPM	81%	0.96
$PM_{2.5}$	79%	0.88
PM_{10}	81%	1.06
NOx	59%	12.94
SOx	89%	6.31

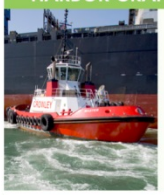
OCEAN-GOING VESSEL EMISSIONS REDUCTIONS

Pollutant	CY 2005-2012 %	CY 2005-2012 tons
DPM	82%	394
$PM_{2.5}$	79%	360
PM_{10}	81%	463
NOx	37%	1,976
SOx	88%	4,530

HEAVY-DUTY VEHICLE/CLEAN TRUCK EMISSIONS REDUCTIONS

Pollutant	CY 2005-2012 %	CY 2005-2012 tons
DPM	94%	229
$PM_{2.5}$	93%	209
PM_{10}	93%	228
NOx	79%	5,029
SOx	90%	38

HARBOR CRAFT EMISSIONS REDUCTIONS



Pollutant	CY 2005-2012 %	CY 2005-2012 tons
DPM	45%	25
$PM_{2.5}$	45%	23
PM_{10}	45%	25
NOx	41%	540
SOx	91%	5.7

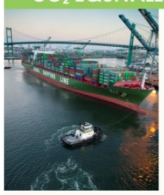
RAIL EMISSIONS REDUCTIONS

Pollutant	CY 2005-2012 %	CY 2005-2012 tons
DPM	43%	25
$PM_{2.5}$	44%	23
PM_{10}	43%	25
NOx	49%	835
SOx	97%	95

CARGO-HANDLING EQUIPMENT EMISSIONS REDUCTIONS

Pollutant	CY 2005-2012 %	CY 2005-2012 tons
DPM	63%	33
$PM_{2.5}$	60%	30
PM_{10}	60%	33
NOx	49%	773
SOx	83%	7

CO_2 EQUIVALENT REDUCTIONS BY SOURCE TYPE



Source Type	CY 2005-2012 %	CY 2005-2012 metric tons
Ocean-Going Vessels	32%	95,525
Harbor Craft	12%	6,869
Cargo Handling Equipment*	- 8%	- 11,094
Rail	15%	12,361
Heavy-Duty Vehicles	19%	89,388
TOTAL		**193,049**

** All percentages reflect a reduction in emissions except cargo handling equipment.*

SAN PEDRO BAY STANDARDS

- The San Pedro Bay Standards establish the long-term emissions-reduction and health risk-reduction goals for the ports of Los Angeles and Long Beach.
- Emission Reduction Standard for DPM, NOx, and SOx have target years of 2014 and 2023 to support state ambient air quality goals.
- Health Risk Reduction Standard has a target year of 2020 to align with CARB's Goods Movement Emission Reduction Plan.

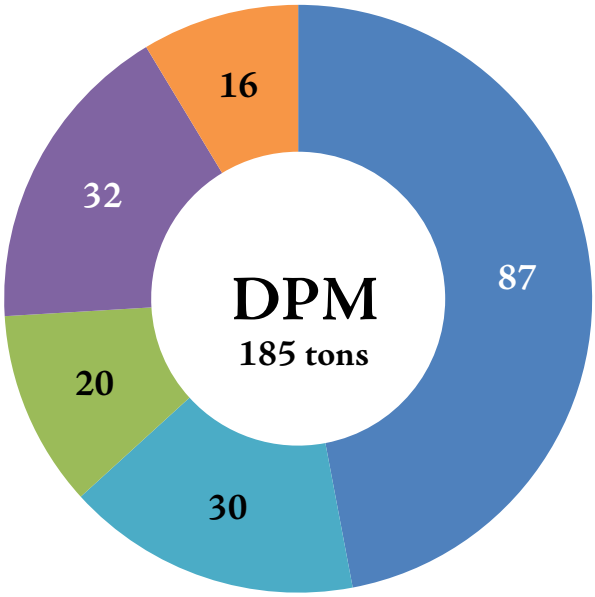
Clean Air Action Plan (CAAP) Goals *(% reduction compared to 2005)*	2014	2023
DPM	72%	77%
NOx	22%	59%
SOx	93%	93%

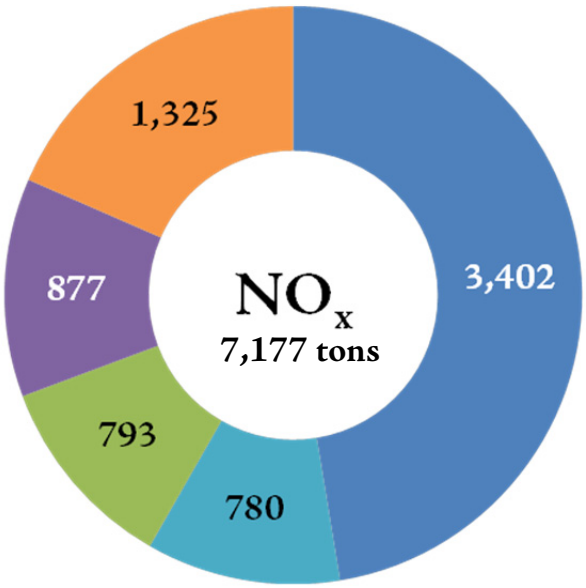
Health Risk Reduction Standard 2020 **85%**
(% reduction in residential cancer risk compared to 2005)

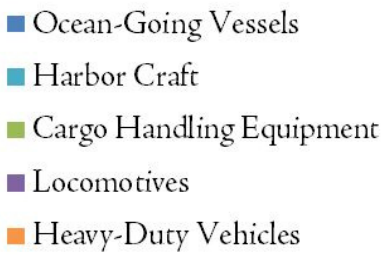
2013-0628_07/13

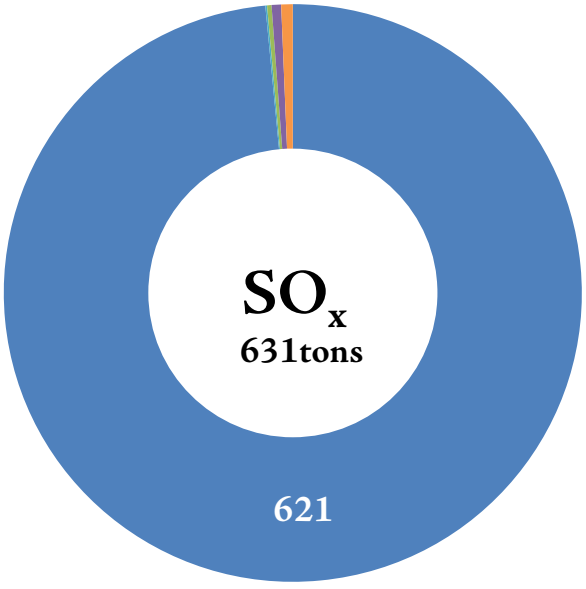
2012 EMISSIONS INVENTORY SUMMARY

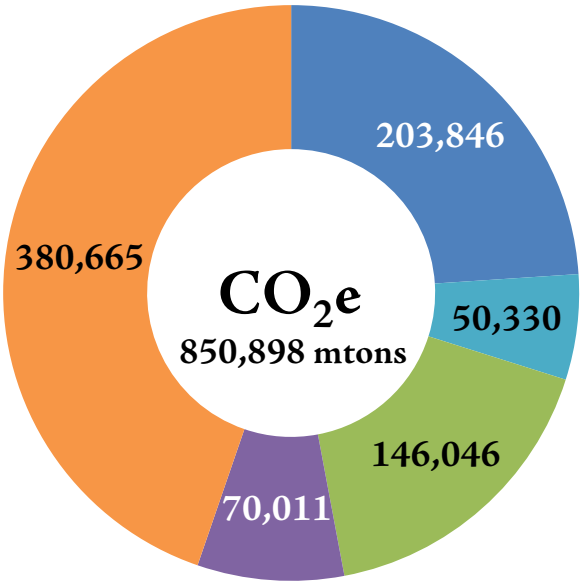
The POLA emissions inventory and CAAP focus on emissions of DPM, NOx, and SOx as well as greenhouse gases. In addition, other pollutants are included in the more detailed technical reports (*www.portoflosangeles.org /environment/studies_reports.asp*). In 2012, the ocean-going vessel source category continues to be the significant driver of DPM, NOx, and SOx emissions. Greenhouse gases, expressed in carbon dioxide equivalents (CO_2e), were dominated by heavy-duty vehicles followed by ocean going vessels and cargo handling equipment. Total emissions for DPM, NOx, and SOx and emissions by source category, are presented in the following figures in tons. CO_2e is presented in metric tons (mtons).









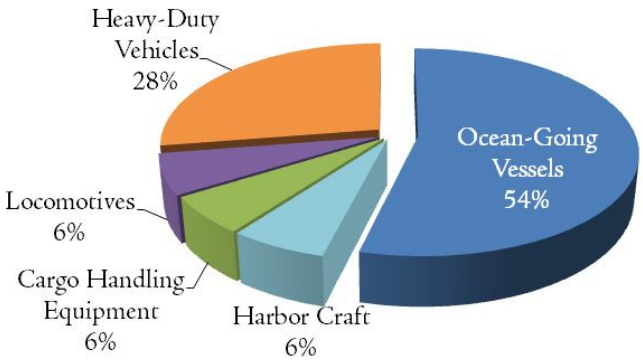


2005 vs 2012 SOURCE CATEGORY CONTRIBUTION CHANGES

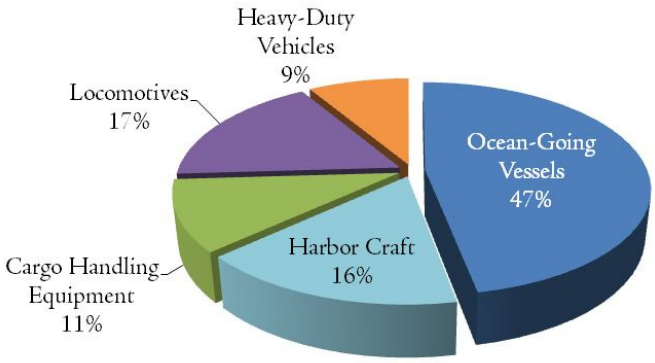
The contribution of each source category to total port-related emissions has changed since 2005 due to the implementation of the CAAP measures, various regulatory requirements that have come into effect for all source categories, and industry efforts to reduce emissions. The following figures illustrate the changes in port-related emissions contribution by source category between 2005 and 2012. Ocean-going vessels continue to make up over 95% of all port-related SOx emissions and therefore are not shown in the figures below.

DPM Emissions Contributions by Source Category

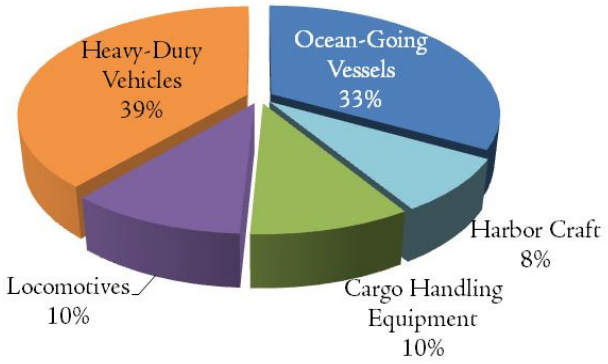
2005

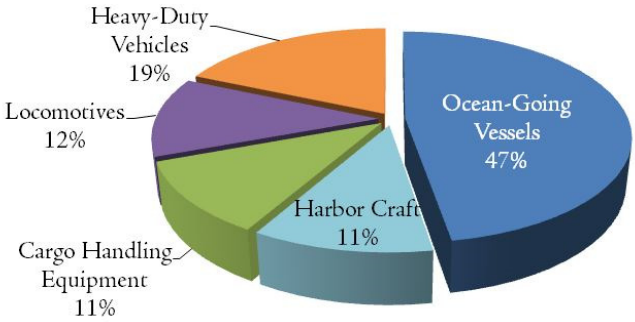


2012

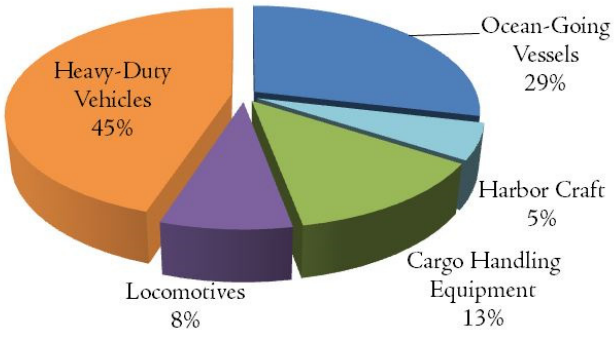


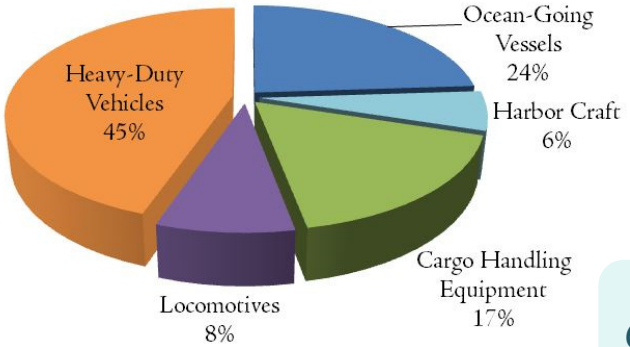
NOx Emissions Contributions by Source Category





CO_2e Emissions Contributions by Source Category

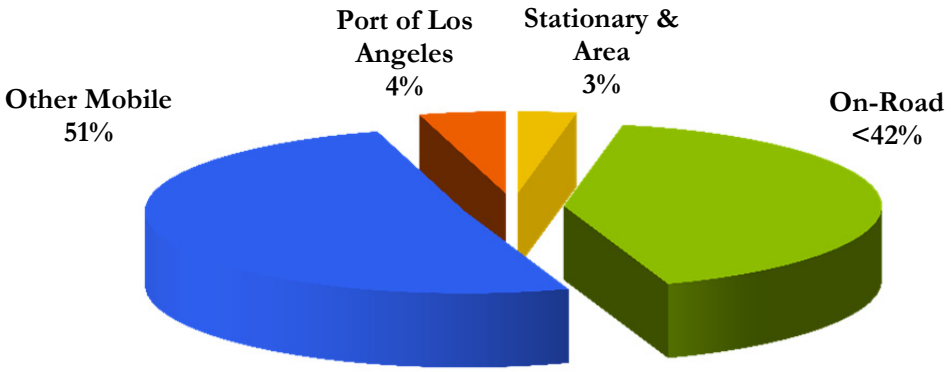




2012 REGIONAL EMISSIONS CONTRIBUTION

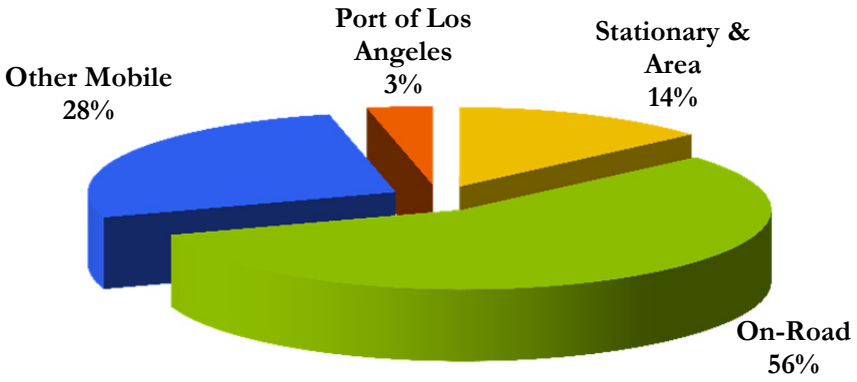
Illustrated below are the 2012 percent pollutant contributions of port-related emissions relative to the total South Coast Air Basin emissions.

DPM



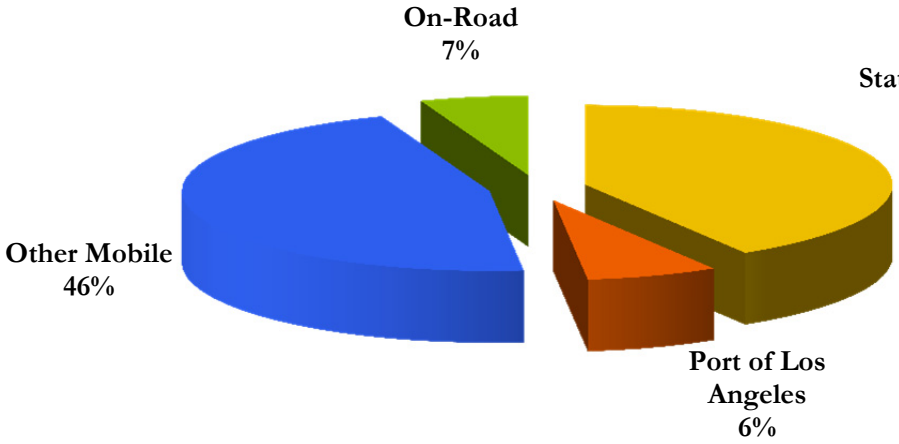
In 2005, port-related emissions contributed 8% of the total basin-wide DPM emissions and 4% contribution in 2012. This represents a 50% reduction in basin-wide DPM contribution since 2005.

NOx



In 2005, port-related emissions contributed 4% of the total basin-wide NOx emissions and 3% contribution in 2012. This represents a 25% reduction in basin-wide NOx contribution since 2005.

SOx

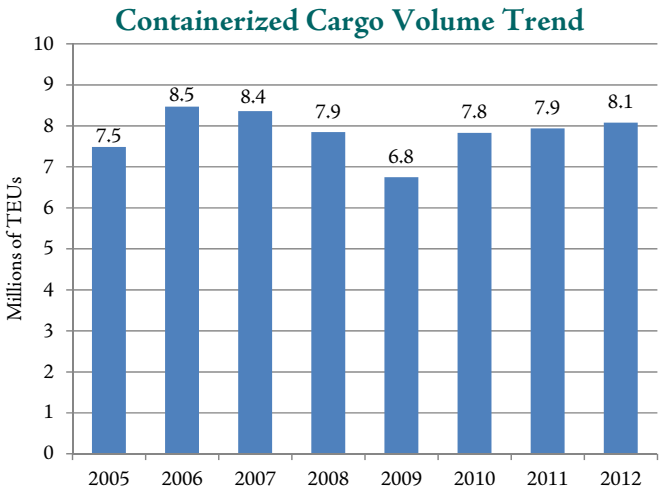


In 2005, port-related emissions were 24% of the total basin-wide SOx emissions and 6% contribution in 2012. This represents a 75% reduction in basin-wide SOx contribution since 2005.

2005-2012 ACTIVITY & CARGO GROWTH

Activity and cargo growth from 2005 to 2012 provide context for the changes in emissions over time. The following figure presents the changes in cargo-related activity from 2005 to 2012 in millions of containers (measured in twenty foot equivalent units or TEUs) annually. As can be seen in the trends figure, cargo peaked in 2006 and then dropped off significantly in the 2008-2009 period. From 2010 to 2012 TEUs recovered beyond 2005 levels.

Over the same period of time, vessel call distributions changed showing a shifting of the deployed fleet over time. Events relating to the financial crisis that began in late 2007 have resulted in significant changes to the fleets calling POLA, as shipping lines adjust their fleets in response to the changes in cargo volumes and box rates. Container ship call data shows definite size-related trends as the fleet transitions; generally the changes have had a positive effect on ship-related emissions.



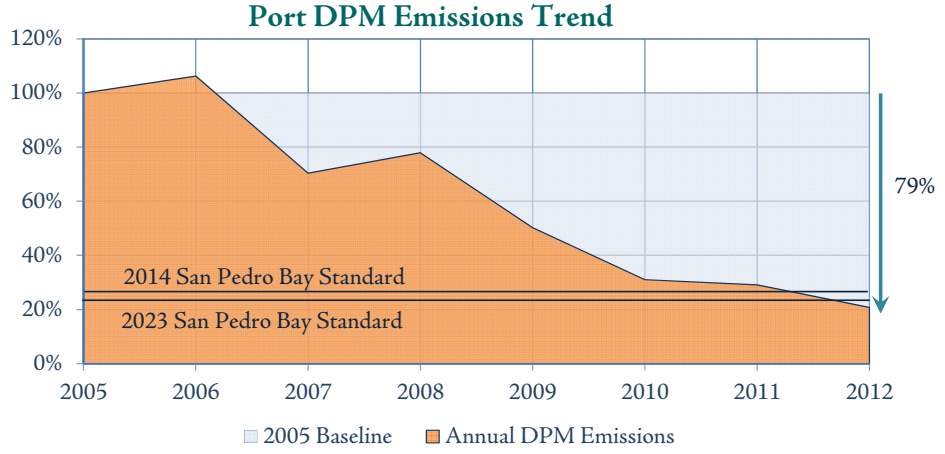
In 2012, the first container ship over 11,000 TEUs called the Port and there were significant increases in the Container 8000 and 9000. The most frequent container classes were Container 2000, 4000, 5000, and 6000.

2005-2012 PORT-RELATED EMISSIONS TRENDS

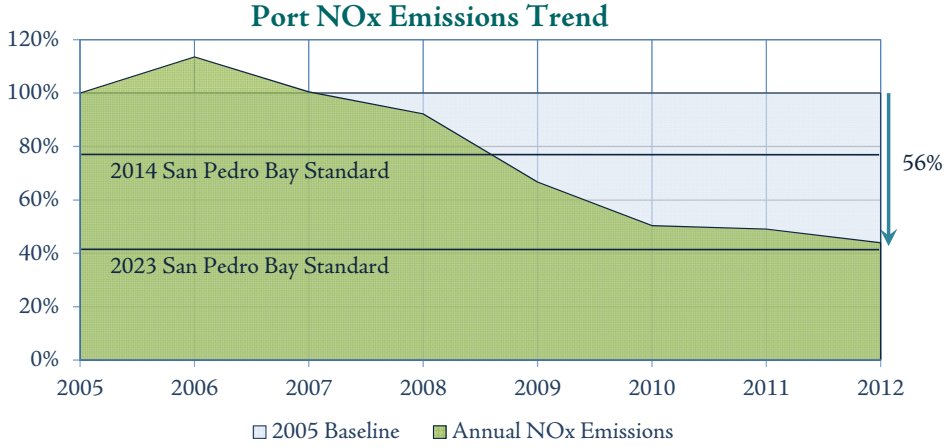
Cargo activities and emissions have diverged paths since 2006 with emissions reductions far exceeding change in cargo volumes. This decoupling occurred due to the implementation of the CAAP and various CARB/EPA regulations. The figures below show the port-related trends for DPM, NOx, SOx, and CO_2e.

Port-related DPM emissions have decreased 79% since 2005. These reductions were led by vessel speed reduction, vessel fuel switching, Alternative Maritime Power™ (AMP), and the Clean Truck Program, which all contributed to significant reductions in DPM emissions through 2012.

Port DPM Emissions Trend



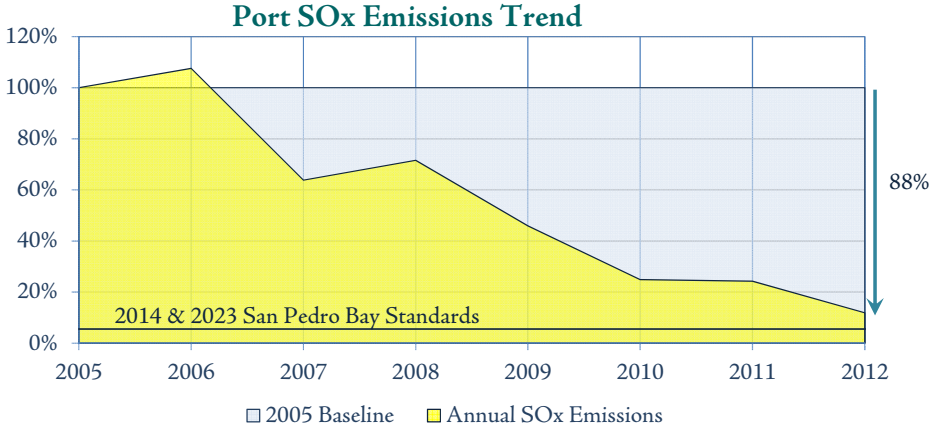
Port NOx Emissions Trend



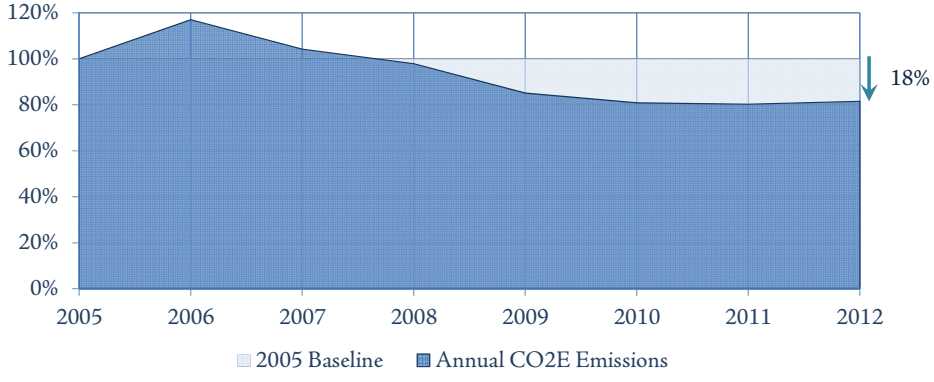
Port-related NOx emissions have decreased 56% since 2005. These reductions were led by the Clean Truck Program, CARB cargo handling equipment-related regulations, vessel speed reduction, AMP, and rail fleet modernization.

Port-related SOx emissions have decreased 88% since 2005. These reductions were led by CARB vessel fuel switching regulation and ultra low sulfur diesel for use by on-road and off-road vehicles, vessel speed reduction, and AMP.

Port SOx Emissions Trend



Port CO_2e Emissions Trend



Since 2005, port-related greenhouse gas emissions have also been reduced as a result of "co-benefits" from the implementation of CAAP measures, such as vessel speed reduction and AMP. There was a slight 1% increase between 2011 and 2012 due to increased activity.

2005 vs 2012 PORT-RELATED EFFICIENCY TRENDS

Port-related efficiency improvements track well with total port-related emissions trends. The following illustrates the efficiency improvements on per 10,000 twenty-foot equivalent units (TEUs) basis. This is an important metric to normalize emissions reductions and accurately present real progress in light of fluctuating cargo volume.

Port-wide DPM efficiencies have continued to improve since 2005 with a 81% reduction from 1.19 to 0.23 tons per 10,000 TEUs.

Port-wide NOx efficiencies have continued to improve since 2005 with a 59% reduction from 21.82 to 8.88 tons per 10,000 TEUs.

Port-wide SOx efficiencies have continued to improve since 2005 with a 89% reduction from 7.09 to 0.78 tons per 10,000 TEUs.

Port-wide CO_2e efficiencies have continued to improve since 2005 with a 24% reduction from 1,395 to 1,053 tons per 10,000 TEUs.

The significant air quality improvements in San Pedro Bay have been possible through the leadership and cooperation of our industry partners-the tenants and customers who operate here. To recognize their clean air initiatives and efforts, the Ports of Los Angeles and Long Beach hold an annual Clean Air Awards Ceremony. Each year, our tenants and customers are eligible to submit award entries which are judged by a panel comprised of port staff and representatives from the South Coast Air Quality Management District, California Air Resources Board, and the U.S. Environmental Protection Agency. We are honored to have recognized the following air quality improvement leaders.

Air Quality Leadership at Corporate Level

- Wallenius Wilhelmsen Logistics, 2013
- OOCL USA, Inc, 2013
- APL, 2012
- Harley Marine Services, Inc, 2012
- SA Recycling, 2012
- Clean Truck Coalition, LLC, 2011
- Ability/Tri-Modal Transportation Services, Inc., 2011
- Evergreen Line, 2011
- Matson Navigation Co, 2010
- California Cartage, 2010
- Yusen Terminals, Inc. 2009
- Pacific Harbor Line, 2009
- ITS, 2009
- AP Moller Maersk, 2008
- FOSS Maritime, 2008

Innovative Air Quality Improvement Technologies

- APL, 2013
- FOSS Maritime, 2013
- Jacobsen Pilot Services, 2010
- Metropolitan Stevedore Co, 2009
- LBCT, 2008
- Yusen Terminals Inc., 2008

Innovative Operations that Improve Air Quality

- Knight Transportation, 2013
- Hamburg Sud, 2011
- Yusen Terminals, 2011
- APL, 2009

Significant Early Action

- BP, 2012
- PHL, 2012
- NYK Line, 2011
- Sause Bros, Inc -2011
- Crowley Marine Services, 2010
- SA Recycling, 2010
- Seaside Transportation Services, Inc. 2009
- TTSI, Inc. 2009
- Mitusbishi Cement Corp, 2009
- Southern Counties Express, 2008

SOURCE CATEGORY HIGHLIGHTS

Ocean-going vessels

Emission trends are illustrated for ships since 2005.

DPM Emission by Year

2005 481 tons | 2006 503 tons

2007 261 tons | 2008 365 tons | 2009 250 tons

2010 156 tons | 2011 149 tons | 2012 87 tons

Ocean-going vessel DPM emissions are 83% lower, NOx emissions are 43% lower, and SOx emissions are 89% lower than in 2005, even with 8% more container throughput. These reductions include larger/more container dense ships making fewer calls, CAAP measures, and CARB regulations.

SOx Emission by Year

2005 5,151 tons | 2006 5,538 tons

2007 3,324 tons | 2008 3,782 tons | 2009 2,422 tons

2010 1,306 tons | 2011 1,276 tons | 2012 621 tons

Ship-related emissions continue to show reductions in 2012 due to successful implementation of CAAP measures and fuel-based regulations. Highlights include:

- High compliance rates with the voluntary vessel speed reduction (VSR) program
  - 94% compliance 20 nautical miles (nm)
  - 79% compliance 20-40 nm
- CARB expanded clean marine fuel regulation
- Increasing use of AMP while at berth

NOx Emission by Year

2005 5,378 tons | 2006 5,875 tons

2007 5,145 tons | 2008 4,846 tons | 2009 4,075 tons

2010 3,904 tons | 2011 3,739 tons | 2012 3,402 tons

Utilizing AMP for one container or cruise ship call reduces ~1 ton of NOx generated onboard the ship. City of Los Angeles' Department of Water & Power generates the same energy at 96% less NOx emissions. The resulting NOx reduction per call is the equivalent of taking 295 cars off the road for a year.

Starting in 2014, CARB's shore-power regulation will require container, reefer, and cruise lines that have more than 25 fleet calls to utilize AMP for 50% of their calls. The regulation increases to 70% in 2017 and 80% in 2020. Further reductions from AMP will be increasing in upcoming emissions inventories.

SOURCE CATEGORY HIGHLIGHTS

Trucks

DPM Emission by Year

2005 245 tons | 2006 262 tons

2007 203 tons | 2008 189 tons | 2009 92 tons

2010 27 tons | 2011 22 tons | 2012 16 tons

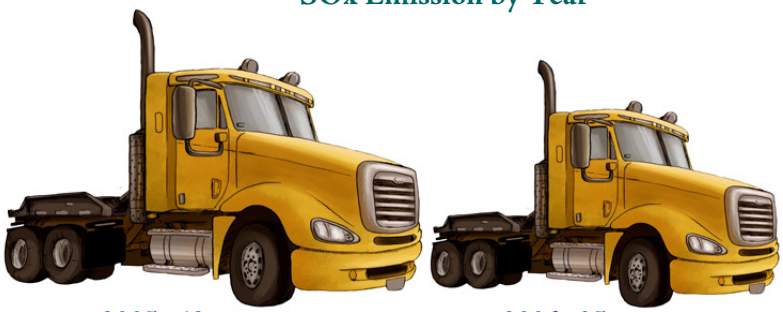
NOx Emission by Year

2005 6,354 tons | 2006 7,329 tons

2007 6,485 tons | 2008 6,381 tons | 2009 3,774 tons

2010 1,417 tons | 2011 1,406 tons | 2012 1,325 tons

SOx Emission by Year



2005 42 tons | 2006 35 tons

The development and implementation of the Clean Truck Program (CTP) is a true success story of the CAAP. The first program of its kind for port-related trucks, it continues to accelerate the benefits from EPA cleaner engine standards by banning older model year trucks from access to port facilities. The illustrations on the left present DPM, NOx, and SOx emissions by year starting with 2005 through 2012. The CARB ULSD rule came into effect in June 2006 which dramatically reduced truck-related SOx emissions.

As part of the CTP implementation, the following three incremental truck model year bans at port facilities have been implemented:

- Ban #1 - October 1, 2008: All pre-1989 trucks were banned
- Ban #2 - January 1, 2010: All 1989-1993 trucks were banned in addition to 1994-2003 trucks that had not been retrofitted
- Ban #3 - January 1, 2012: All trucks not meeting 2007 EPA clean truck standards were banned.

The 2012 ban's full effect resulted in additional reductions in DPM and NOx. Truck emissions reductions not only assist in reaching and maintaining CAAP mass emission reduction standards, but also have a significant effect on reaching the CAAP health-risk reduction standard as trucks operate in close proximity to surrounding communities.

The CTP has been so successful that ports along the West, Gulf, and East coasts are implementing similar versions of the program. Overseas ports are also looking at the CTP as a measure they can employ to reduce port-related emissions.

2007 5 tons | 2008 5 tons | 2009 4 tons

2010 4 tons | 2011 4 tons | 2012 4 tons

In 2005, 99% of the trucks servicing POLA terminals were older than 2004 and 50% of those were older than 1994. In 2012, all the container related trucks calling a port terminal were 2007 or newer.

SOURCE CATEGORY HIGHLIGHTS

Rail

There are two types of railroad services associated with port-related cargo movements: switching and line haul. Switching services are related to the building and organizing of unit trains, railcar pickup and delivery to the various terminals, and related yard work. Class 1 line haul services are related to the interstate movement of trains for nationwide cargo distribution. The illustrations below show how DPM, NOx, and SOx emissions have changed since 2005 for all port-related locomotive emissions.

The Pacific Harbor Line, Inc. (PHL) is the primary company providing switching services at POLA. PHL currently operates 23 locomotives in and around the port areas. In 2005, the PHL switching fleet consisted of locomotives built from the 1950s to the 1970s, which is typical for the industry. Over the past several years, with assistance from POLA, POLB, AQMD, and CARB, PHL has replaced all of their aging locomotives with a modern fleet of advanced low-emission locomotives using Tier 3 or better engines; the full benefit from this latest advancement was seen in 2012.

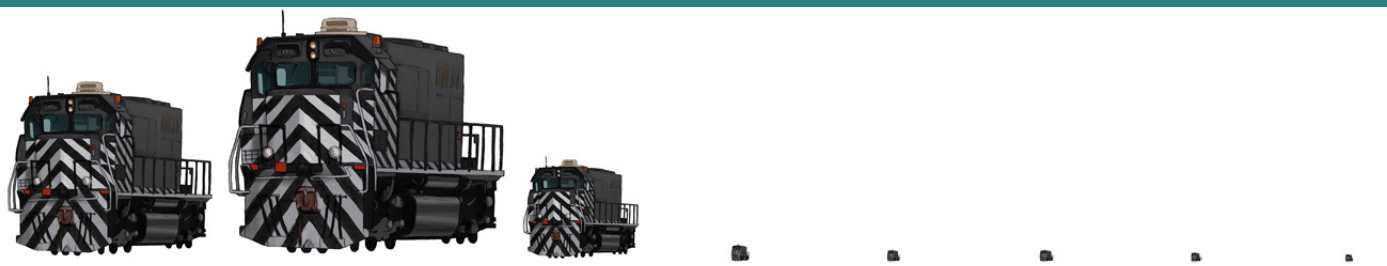
DPM Emission by Year

2005	2006	2007	2008	2009	2010	2011	2012
57 tons	74 tons	61 tons	46 tons	28 tons	30 tons	30 tons	32 tons

NOx Emission by Year

2005	2006	2007	2008	2009	2010	2011	2012
1,712 tons	2,202 tons	1,821 tons	1,246 tons	940 tons	996 tons	1,052 tons	877 tons

SOx Emission by Year



2005	2006	2007	2008	2009	2010	2011	2012
98 tons	132 tons	55 tons	9 tons	7 tons	7 tons	6 tons	3 tons

Since 2005, SOx emissions from locomotives has been nearly eliminated (reduced by 97%) through federal and state rules requiring ultra low sulfur or ULSD fuels, which are capped at less than 10 parts per million sulfur.


ZPMC
上海振华
BROMMA
MOL
MOL
YT-117
YT-131
YT-67
YT-120
COMMODORE

SOURCE CATEGORY HIGHLIGHTS

Cargo Handling Equipment

Efforts to reduce emissions associated with cargo handling equipment (CHE) were among the earliest emission reduction control measures implemented at POLA, including several that predate the CAAP. DPM and NOx emissions have been reduced through a combination of regulations, emissions reduction projects/grants, installation of emissions control devices, and the use of on-road engines in CHE. SOx emissions have been significantly reduced through the CARB ULSD mandate in 2006. The illustrations present the relative change in CHE emissions from 2005 versus 2012.

Cargo handling equipment emissions were significantly reduced since 2005. The combination of terminal efficiency improvements, cleaner engine standards, grant project funding, and efforts by terminal operators to reduce fuel consumption and emissions are the reasons for the reductions in annual emissions.

- DPM has been reduced 63% since 2005
- NOx has been reduced 49% since 2005
- SOx has been reduced 83% since 2005

CHE Emissions 2005 vs 2012

Harbor Craft

Most of the emissions reductions associated with harbor craft have been achieved through grant funding by POLA through AQMIP and AQMD/CARB programs for replacing older vessel engines with newer, cleaner engines. These efforts continue to reduce DPM and NOx annual emissions. SOx was reduced in 2006 by CARB's ULSD fuel rule which significantly reduced the harbor craft contribution to total port-related sulfur emissions.

Since 2006, POLA's Air Quality Mitigation Incentive Program (AQMIP) and CARB's Carl Moyer Program have provided grant co-funding opportunities (50%-85%) for vessel owners to replace their older engines with either Tier 2 or Tier 3 engines. By the end of 2012, 157 propulsion engines and 108 auxiliary engines had been replaced since 2005 by vessel owners using either the grant program or replacing the engines at their own expense. This represents a modernization of over 40% of all harbor craft engines in the inventory.

Harbor craft emissions have decreased significantly since 2005. A combination of engine repowers, CARB regulations, and innovative solutions from vessel owners/operators are responsible for the reductions in annual emissions.

- DPM has been reduced 45% since 2005
- NOx has been reduced 41% since 2005
- SOx has been reduced 91% since 2005

In 2012, Foss retrofitted the *Campbell Foss*, the world's first hybrid conversion assist tug, and joins its sister hybrid tug the *Carolyn Dorothy*, that was co-funded and demonstrated through the Technology Advancement Program. Hybrid tugs reduce DPM emissions by 73%, NOx emissions by 51%, CO_2 emissions by 27% and fuel consumption by 20-30%.

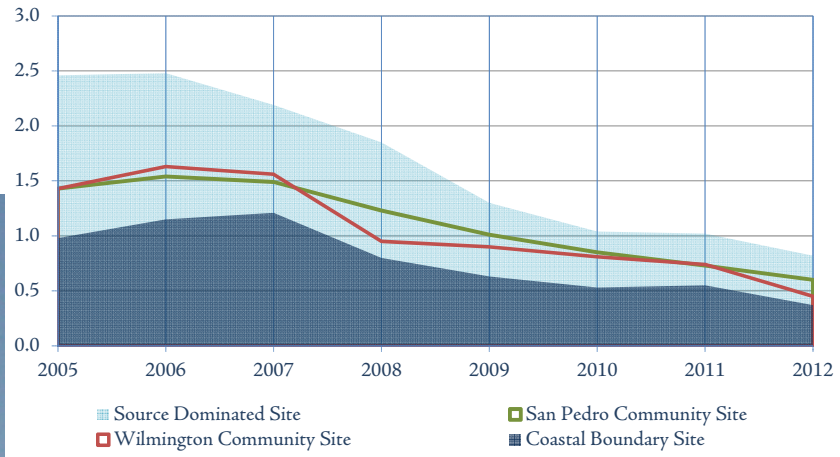
AIR MONITORING HIGHLIGHTS

Air Quality Monitoring Trends

In addition to developing and publishing the annual emissions inventory as a means of tracking progress, the Port operates four air monitoring stations at locations around POLA. Elemental carbon is monitored as a surrogate for diesel-related emissions. The figure shows how the measured annual average elemental carbon concentrations have been reduced by 58-69%, which trends similarly with the DPM emissions inventory numbers over the same period.

Air monitoring provides for another "real world" metric in addition to the inventories to measure the Port's progress in reducing its mass emissions and health-risk related impacts.

2005-2012 Annual Average Elemental Carbon Concentrations (µg/m³)



POLA has four monitoring stations that started to collect elemental carbon data in 2005. These stations consist of the coastal boundary station (typically representing background levels), the Wilmington and San Pedro community sites, and a source dominated site on Terminal Island – in the middle of port-related operations. *(caap.airsis.com/Default.aspx)*

LOOKING AHEAD

2013 & Beyond

With eyes on the future, looking for innovative methods to sustaining emissions reductions while accommodating growth, POLA continues to look for emission reduction and efficiency opportunities. Through the Technology Advancement Program or TAP (*www.cleanairactionplan.org/programs/tap/default.asp*), POLA is evaluating tomorrow's technologies today.

In 2011, both San Pedro Bay ports introduced their Zero-Emissions Technology Roadmap, which is targeted at meeting the challenges of sustained green growth. In 2013, the port started work on its Energy Management Action Plan or EMAP to improve energy efficiency at the port.

In 2013, POLA will continue to focus on reducing ship-related emissions through continuation of the Vessel Speed Reduction program, expansion of AMP calls and infrastructure, the continued implementation of the Environmental Ship Index (ESI) incentive program to reward and recognize the top performing cleanest vessels.

In 2006, POLA started a Pan-Pacific outreach effort known as the Pacific Ports Clean Air Collaborative (PPCAC) to engage regional stake holders from the entire Pacific Region. The PPCAC Conference serves as a venue for ports, shipping lines, terminal operators, equipment manufacturers, regulatory agencies, environmental groups, and others involved in trade along the Pacific Rim to share best practices, exchange ideas, and work together. There have been three conferences to date, including December 2006 in Los Angeles, November 2008 in Shanghai, and February 2012 in Los Angeles. As an example of the cooperative spirit of PPCAC, the Ports of Los Angeles and Shanghai have been sharing their experiences with improving environmental quality in and around the ports since 2006 through technical information and staff exchanges. (*www.ppcac.org/index.htm*)

ESI is an international indexing system for clean ships and was developed under the International Association of Ports & Harbors, World Ports Climate Initiative. POLA was the first Pacific Rim and Western Hemisphere port to join the index. (*esi.wpci.nl/Public/Home*)

POLA is a founding member of the World Port Climate Initiative (WPCI) of the International Association of Ports and Harbors (IAPH). Approximately 60 of the world's key ports, acknowledging their unique capacity as key hubs in global supply chains, have come together in a commitment to reduce their greenhouse gas emissions while continuing their role as transportation and economic centers. POLA hosted the formation of the WPCI in November 2008 and has been the lead port for the IAPH Tool Box and Carbon Footprinting working groups. In 2012, POLA joined the WPCI ESI as it looks to continue to reduce emissions from ships. At the beginning of 2013, there were 1,670 participating ships in the ESI database.
(*wpci.iaphworldports.org/index.html*)

Further advancement in clean technologies and deployment of cleaner equipment is anticipated in 2013. There will be an increasing number of 2010 or newer trucks into the fleet serving POLA, the full effect of the third CTP truck ban, an increase in the use of alternative fuels, and further development and deployment of electric trucks and cargo handling equipment. Use of AMP will increase, participation in the ESI incentive program should remain strong, and continued strong participation in the VSR program will continue to significantly reduce OGV emissions.

NOTES

NOTES

Cruise Terminal Solar Installation – Making Something Out of Previously Unutilized Space

POLA installed 71,500 square feet of solar panels on the roof of its World Cruise Center which has the electrical generation capacity of 1.2 megawatt hours. The installation is the first phase of a broader initiative to install a total generation capacity of 10 megawatt hours over the next five years. That's the same hourly load as large cruise ships!