A CLEAN AIR STRATEGY

for The Port of New York & New Jersey

2014 Update

THE PORT AUTHORITY OF NY & NJ

The Port Authority of New York and New Jersey would like to thank the following entities:

For collaboration in developing this Strategy and their commitment to reducing air emissions

City of New York

For facilitation and drafting

For their valuable input on Strategy drafts and continuing interest in successful Strategy implementation

The Port Authority's tenants and community stakeholders

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Acronyms

CH_4	Methane
CHE	Cargo Handling Equipment
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2 Eq	Carbon Equivalent
DPF	Diesel Particulate Filter
EPA	Environmental Protection Agency
DOC	Diesel Oxidation Catalyst
GHG	Greenhouse Gases
HC	Harbor Craft
LNG	Liquefied Natural Gas
MERP	Marine Vessel Engine Replacement/Retrofit Program
N_2O	Nitrous Oxide
NEDC	Northeast Diesel Collaborative
NJCCC	New Jersey Clean Cities Coalition
NJDEP	New Jersey Department of Environmental Protection
NJTPA	North Jersey Transportation Planning Authority
NO_x	Mono-Nitrogen Oxides NO and NO_2 (Nitric Oxide and Nitrogen Dioxide)
NYCEDC	New York City Economic Development Corporation
NYCDOT	New York City Department of Transportation
NYMTC	New York Metropolitan Transportation Council
NYNJLINA	New York/Northern New Jersey/Long Island Non-Attainment Area
NYSA	New York Shipping Association
NYSDEC	New York State Department of Environmental Conservation
OGV	Ocean-Going Vessels
PM	Particulate Matter
PANYNJ	Port Authority of New York and New Jersey
SCR	Selective Catalytic Reduction
SO_2	Sulfur Dioxide
TEU	Twenty-Foot Equivalent Unit
ULSD	Ultra-Low Sulfur Diesel
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

Introduction

2014 Strategy Objectives and Goals

OVERARCHING OBJECTIVES

In 2009, the Port Authority of New York and New Jersey (Port Authority or PANYNJ) released the initial Clean Air Strategy (Strategy) for the Port of New York and New Jersey (the Port). Its purpose was to define a commitment by the Port Authority and its partners to ensure that air contaminant emissions generated by mobile sources associated with marine terminal operations and activities—covering ocean-going vessels, cargo handling equipment, heavy-duty diesel vehicles, railroad locomotives, and harbor craft—decline even with anticipated future port growth through 2020. The 2009 Strategy was designed as a continuous improvement document and thus, after five years of implementation, the Port Authority, working closely with its partners, has developed this updated Strategy.

Two of the three 2009 primary emissions reduction objectives remain exactly the same in 2014:

1. Reduce maritime-related air quality impacts on human health and the environment from criteria air pollutants, especially those that come from diesel particulate emissions.
2. Reduce maritime-related contribution to greenhouse gas emissions associated with climate change.

This Strategy update amends the third primary emissions reduction objective to account for the change in regional attainment status[1] since the original Strategy was released. The revised objective is:

3. Contribute to the effort to bring the New York/Northern New Jersey/Long Island Non-Attainment Area (NYNJLINA) into attainment *for ozone and to maintain attainment of the fine particulate matter ($PM_{2.5}$) standard.*

Table 1 illustrates the percentage contribution of the Port Authority's maritime emissions in terms of tons per year to the total NYNJLINA criteria emissions from all regional emission sources, as stated in the Port Commerce Department 2012 Emissions Inventory.[2] Contribution varies from a high of 3.5% for SO_2 to a low of 0.12% for CO emissions.

Table 1: Percentage Contribution of Port Authority Maritime Emissions to Total Regional (NYNJLINA) Emissions

Emission Type	PANYNJ Percentage of Emissions
NO_x	2.5%
PM_{10}	0.7%
$PM_{2.5}$	1.2%
VOC	0.16%
CO	0.12%
SO_2	3.5%
CO_2 Eq	0.5%

Although the Port Authority's maritime emissions continue to be a small percentage of

[1] The United States Environmental Protection Agency approved redesignation to attainment for the 1997 annual and 2006 24-hour PM2.5 national ambient air quality standards.
[2] For the full 2012 PANYNJ Port Commerce Department Emissions Inventory, see: http://www.panynj.gov/about/pdf/panynj-multi-facility-ei-report.pdf, last visited on 10/23/14.

total regional emissions, the Port Authority acknowledges the local impacts of maritime activities occurring in and near populated areas and the need for a collaborative effort from every NYNJLINA source category to achieve regional reduction goals. The Port Authority therefore continues to give importance to implementing strategies that reduce emissions from all port-related sources at its maritime facilities.

EMISSIONS REDUCTION GOALS

This Strategy update retains the overarching and annual reduction goals from 2009, with the clarifications that 1) measurement is over 14 years from the 2006 baseline through 2020 and 2) that the rate of decrease is an annual average over that timeframe.

The overarching Strategy goal is an overall decrease of port-related maritime emissions, despite any port growth through 2020. The Strategy puts forth the following emission reduction goals, consistent with regional efforts in New York and New Jersey:

1. An **annual 3% average decrease of each criteria pollutant**,[3] which for purposes of this Strategy equates to a 42% decrease from baseline 2006 levels, despite any port growth through 2020.
2. An **annual 5% average decrease of greenhouse gases** (GHGs),[4] which for purposes of this Strategy equates to a 70% decrease from baseline 2006 levels, despite any port growth through 2020.

These goals will be used as the *minimum acceptable levels of reduction* from which to monitor and measure Strategy success. More detail on the progress toward these goals is discussed in The First Five Years of Implementation (page 7).

2014 Strategy Scope and Process

STRATEGY SCOPE

The scope of this Strategy update includes Port Authority marine terminal facilities within the Port District, which is located within a twenty-five mile radius of the Statue of Liberty. These facilities include the Brooklyn Port Authority and Howland Hook Marine Terminals in New York and the Port Newark, Port Jersey, and Elizabeth Port Authority Marine Terminals in New Jersey. Since the 2009 Strategy was released, Global Marine Terminal, the cross-harbor rail facilities, and the Royal Caribbean Cruise Line Terminal in Port Jersey came under Port Authority jurisdiction. Global Marine terminal was previously privately owned; however, it was (and is) still considered part of the original scope of the Strategy, even though the terminal was not included in the 2006 baseline emissions inventory. Also included in the

[3] "Criteria pollutants" refers to the following pollutants: oxides of nitrogen (NO_x), an ozone precursor; carbon monoxide (CO); particulate matter less than 10 microns in diameter (PM_{10}); particulate matter less than 2.5 microns in diameter ($PM_{2.5}$); volatile organic compounds (VOCs), an ozone precursor; and sulfur dioxide (SO_2).
[4] Greenhouse gas emissions include: carbon dioxide (CO_2); nitrous oxide (N_2O); and methane (CH_4).

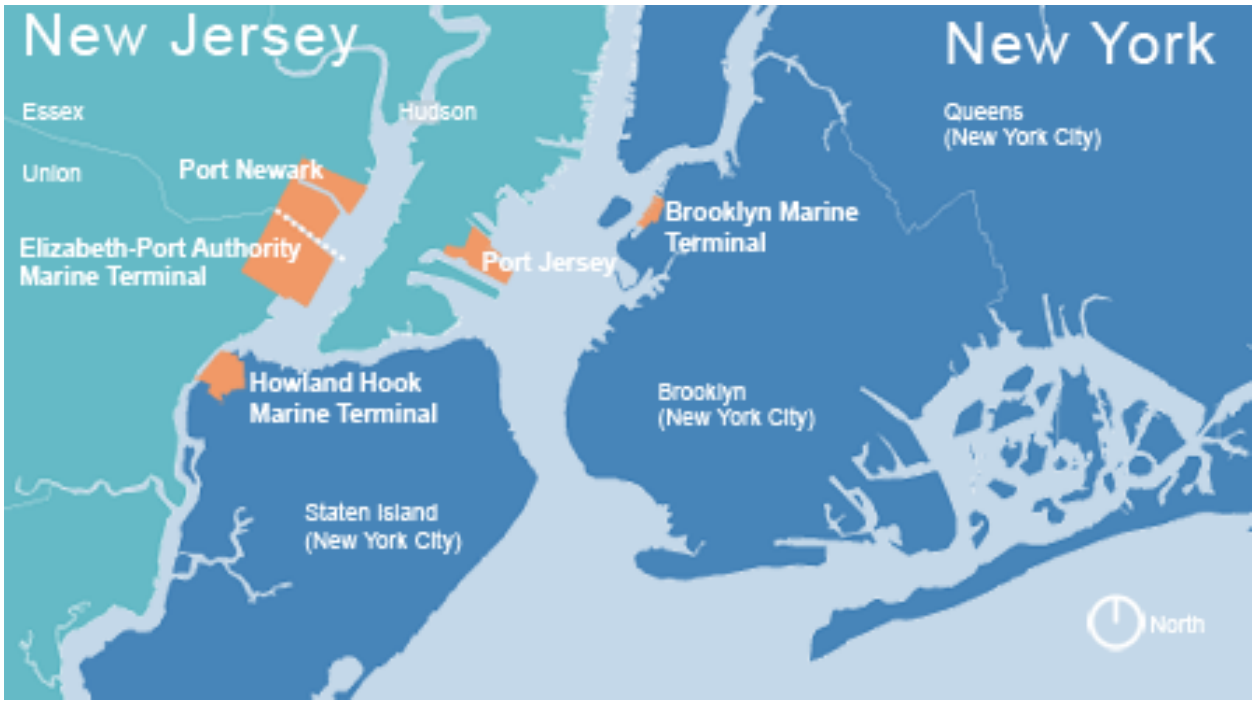
scope are maritime facilities overseen by the Strategy partner, the New York City Economic Development Corporation (NYCEDC), including the Manhattan Cruise Terminal.[5] This Strategy does not cover emissions tied to non-maritime Port Authority facilities, such as airports, bridges, and tunnels, or other marine-related facilities and operations that are not under the aegis of the Port Authority in any way.

As in 2009, this updated Strategy will focus solely on:

- Air emissions generated by mobile sources associated with marine terminal operations and activities, as defined in the geographic scope above; and
- Actions that address those emissions that fall within the group of six criteria pollutants regulated by the United States Environmental Protection Agency (EPA), as well as GHG emissions, per the Strategy goals on the previous page.

Actions for emissions reduction will similarly be listed by source category, or sector of port operations, covering ocean-going vessels, cargo handling equipment, heavy-duty diesel vehicles (trucks), railroad locomotives (rail), and harbor craft.

Figure 1: Port Authority of New York and New Jersey Facilities Map



[5] The Manhattan Cruise Terminal is not included in the Port Authority's emissions inventories since it is owned and operated by New York City.

STRATEGY PROCESS

The original and this updated Strategy were developed via a commitment-based partnership with the following entities, known along with the Port Authority, as the Clean Air Strategy Group (Strategy Group):

- New Jersey Department of Environmental Protection (NJDEP)
- New York State Department of Environmental Conservation (NYSDEC)
- City of New York, Mayor's Office of Long Term Planning and Sustainability
- New York City Department of Transportation (NYCDOT)
- New York City Economic Development Corporation (NYCEDC)
- New York Metropolitan Transportation Council (NYMTC) [6]
- North Jersey Transportation Planning Authority (NJTPA)[7]
- New York Shipping Association (NYSA)
- United States EPA Region 2
- Cities of Bayonne, Elizabeth, and Newark in New Jersey

After the release of the 2009 Strategy, the Strategy Group entities signed a Statement of Intent to share accountability and commitment with respect to supporting implementation of the Strategy. They agreed to work cooperatively to:

- Implement the actions outlined in the Strategy to significantly reduce emissions of port-related criteria air pollutants, and GHGs in the next decade;
- Prioritize the actions outlined in the Strategy based upon their corresponding tons of emissions reduced, cost-effectiveness, available funding, and localized area impacts;
- Engage and maintain regular communication with community, environmental, sector specific and governmental stakeholders in the process of implementing, monitoring and updating the Strategy;
- Develop methods including periodic air emissions inventories to measure progress towards achieving the goals in the Strategy;
- Publicize environmental results and accomplishments; and
- Continue to pursue opportunities to collaborate on ways to enhance port sustainability.

During the first five years of Strategy implementation, Strategy Group partners executed specific actions, supported grant applications submitted by the Port Authority for Strategy actions, and engaged in and conducted general outreach, education, and advocacy activities in support of the Strategy.

[6] NYMTC and NJTPA joined the Strategy Group in 2013 at the request of the other Strategy Group members, and therefore were not involved in the development of the original 2009 Strategy.
[7] Ibid.

The Strategy Group launched the Strategy update in April of 2014 by reviewing the original Strategy actions that had not yet been implemented and determining which should be amended or deleted based on technology and business practice changes, results of pilot projects, and other relevant factors, as well as where new actions were needed to ensure continued progress toward the Strategy objectives and goals. The Strategy Group worked intensively over the remainder of the year to develop the robust sector-based action list contained here. The Strategy Group members collectively endorse this updated Strategy and agree to continue a collaborative approach to reducing air emissions at the Port.

In developing this updated Strategy, the Port Authority also conducted meetings with environmental and community stakeholders and sector-based stakeholders to obtain their feedback on draft lists of sector-based actions and ensure their concerns were considered during Strategy development.

A round of stakeholder meetings was held with each of the following groups:

- Ocean-going vessel sector
- Cargo-handling equipment sector
- Trucking sector
- Rail sector
- Harbor craft sector
- Environmental and community stakeholders

To complete the comprehensive outreach efforts, the Port Authority also held a public meeting prior to finalizing the updated Strategy. In addition, the Port Authority established and committed to continuing to improve an outreach program in 2014 to better communicate information about the process for updating the original Strategy, Strategy implementation and outcomes, and Emissions Inventory results to all port stakeholders.

2014 Strategy Context

GENERAL BACKGROUND

The Port Authority operates as a landlord that leases its marine terminals to private operators in the Port of New York and New Jersey (the Port), which is the largest port on the east coast, the third largest port in the United States, and the twenty-seventh largest port in the world. More than 296,000 jobs are associated with the Port's activity with $18.3 billion[8] in wages and over $6.1 billion in tax revenue annually. In addition, the Port serves an estimated 21 million consumers in the New York-New Jersey Metropolitan Area, and 100 million more within a one-day drive; 80-85% of incoming cargo is destined

[8] All monetary figures in this document are given in United States Dollars.

for the region.[9] The Port provides almost immediate access to one of the country's wealthiest regions and rail and truck access to half the nation.

External factors and business trends contribute to the trajectory of Strategy implementation efforts, and will continue to do so. For example, the 2015 expected completion of the Panama Canal expansion will likely result in larger, more efficient ships servicing the region. Although there may be fewer overall vessel calls since these larger ships can carry more cargo per call, it will also mean cargo will be arriving in bigger bunches, compounding the importance of increasing productivity and efficiency and reducing congestion.

Balancing the Strategy objectives and goals of continued emission reductions despite an anticipated annual port growth of 4% is critical to the economic stability of the region and will continue to drive Strategy implementation efforts. Two of the biggest challenges faced are 1) identifying resources to implement additional initiatives and encourage continued participation in voluntary actions, and 2) identifying actions that continue to reduce emissions in a cost-effective manner after many of the opportunities with the greatest potential for reduction have been addressed by recent implementation efforts. With these challenges in mind, the Port Authority, working in concert with the Strategy Group and its industry and community partners, will seek to remain at the forefront of maritime-related emissions reduction efforts. This partnership will continue to provide the leadership and strategic direction necessary to build both an environmentally and economically sustainable port that benefits the entire region.

THE FIRST FIVE YEARS OF IMPLEMENTATION

As shown in the 2013 Implementation Report,[10] since the original Strategy was released in 2009, the Port Authority and its Strategy Group partners have made tremendous strides toward the emission reduction goals and improving air quality in and around the Port. In the first five years of implementation of the Strategy (October 2009 through October 2014), 80% (27 of 34) of the near-term actions identified in the Strategy across all five sectors of port operations were completed. Implementation efforts focused heavily on trucks and ocean-going vessels due to their potential for local area health impacts, with major programs being developed and implemented in both of

[9] The term "region" in this context means the area within 260 miles of the Port of New York and New Jersey.
[10] The 2013 Implementation Report is available online at http://www.panynj.gov/about/pdf/CAS_Implementation_Report.pdf, last visited on 12/31/14.

these sectors. In addition, as emissions from trucks were (and are) of greatest concern to nearby communities, that is where both a major operational change was made (i.e., the Truck Phase-Out Plan), and where the largest amount of funding was secured for action implementation.

The 2012 Port Commerce Department Emissions Inventory, released in August 2014, shows an average decrease from the 2006 baseline of 33% across criteria air pollutants associated with port operations, despite an 8.6% increase in cargo volume over the same period.[11,12] As shown in Table 2, maritime-related NO_X, PM_{10}, $PM_{2.5}$, and SO_2 emissions decreased at a rate greater than or equal to the 3% annual average reduction goal. However, VOC and CO emissions fell short of the 3% annual average reduction goal for criteria air pollutants: annually on average, VOCs decreased by 1.2% and CO decreased by 2.2%. Similarly, the annual reduction goal of 5% for GHGs was not met, although those emissions did decline from baseline 2006 levels. The intent of the actions in this Strategy update is to ensure the rate of decrease remains, or becomes (where it is not already), equal to or greater than the average annual reduction goals of 3% for criteria pollutants and 5% for GHGs despite any port growth through 2020.

Table 2: Average Annual Rate of Decrease of Maritime-Related Air Emissions from 2006 to 2012

Emission Type	Average Annual Rate of Decrease
NO_x	-3.7%
PM_{10}	-5.7%
$PM_{2.5}$	-5.5%
VOC	-1.2%
CO	-2.2%
SO_2	-9.3%
GHG	-1.8%

While the Port Authority took the lead on just under half of all the actions implemented, five other entities stepped up to lead or collaborate on one or more action. These entities included four Strategy Group partners—NYCDOT, NJDEP, EPA Region 2, and NYCEDC—and one community partner, New Jersey Clean Cities Coalition (NJCCC). Additional detail on all of the original Strategy actions implemented can be found in the 2013 Implementation Report.[13] For quick reference, Appendix A of this document has a table listing the actions implemented between 2009 and 2013, including the period of implementation, funding amount, and lead implementer.

2014 AREAS OF FOCUS

In developing this updated Strategy and its list of sector-based actions, the Strategy Group took into account implementation success of early actions, updated Emissions Inventory data, stakeholder feedback, and any available knowledge of future technological advances. Based on this information, the Strategy Group identified the following three areas of focus for 2014 actions:

[11] The 33% average decrease across criteria air pollutants from 2006 to 2012 is measured in tons per million twenty-foot equivalent unit (TEU). In tons per year, criteria air pollutants decreased an average of 28% between 2006 and 2012.
[12] For the full 2012 PANYNJ Port Commerce Department Emissions Inventory, see: http://www.panynj.gov/about/pdf/panynj-multi-facility-ei-report.pdf, last visited on 12/31/14.
[13] The 2013 Implementation Report is available online at http://www.panynj.gov/about/pdf/CAS_Implementation_Report.pdf, last visited on 12/31/14.

- **GHG and ozone precursor (NO_x and VOCs) reductions**
  Of all the pollutants covered by this Strategy, the 5% annual reduction goal—equating to a 70% decrease from baseline 2006 levels—for GHGs[14] is the farthest from being met and therefore, additional strategies and actions to target this area are needed. In addition, New Jersey and New York do not meet the current National Ambient Air Quality Standard for ground-level ozone and the region is one of the few areas that EPA projects will not meet the proposed revision of the ozone standard by 2025. Since emissions from mobile sources now constitute over half of the region's ozone problem, the Strategy Group identified reducing the ozone precursors NO_x and VOC as an area of importance. The Strategy Group agreed the focus of implementation efforts to help achieve the GHG goal should be in reducing vehicle miles travelled (VMT) by trucks,[15] as well as switching trucks and cargo-handling equipment to alternative fuels.

- **Development of a robust alternative fueling infrastructure**
  Currently, the Port lacks a sizeable enough market to generate the necessary demand for large-scale investment in alternative fuel infrastructure, creating a chicken-and-egg dilemma. Port sectors are not converting to alternative fuels because the infrastructure is not available, and fuel providers are not servicing the Port in the quantities needed because they want first to be ensured a minimum amount of fuel will be used. Therefore, encouraging alternative fuel use at the Port will require a unique set of strategies to overcome this quandary.

- **Continuing areas of proven success**
  This includes replacing cargo-handling equipment at the end of its lifecycle or sooner, upgrading harbor craft engines, increasing modal diversity, and modifying overall business practices to take advantage of opportunities for increased environmental and economic sustainability. Changing business practices, including larger, newer ships with more efficient engines burning cleaner fuel; the Truck Phase Out Plan; more alternative-powered cargo handling equipment; and the continued push to move cargo onto rail will play a big role in future emission reductions.

This Strategy contains an updated list of voluntary, sector-based actions that address these areas of focus and continue to drive down emissions across pollutants despite anticipated port growth. This Strategy also tackles the challenge of identifying actions that continue to reduce emissions in a cost-effective manner after many of the opportunities with the greatest potential for emission reductions have been addressed by recent implementation efforts. Actions outlined in this Strategy will be prioritized based upon their available funding, corresponding tons of emissions reduced, localized area impacts, and cost-effectiveness. The real success of this Strategy will be demonstrated through on-the-ground implementation of the actions contained within, which in many cases depend on securing sufficient funding by, and the continued dedication of, the Port Authority's maritime partners.

[14] For reference, the GHG reduction goal in the Northwest Ports Clean Air Strategy is a 15% total reduction by 2020 from a 2006 baseline and there is no specific GHG goal in the San Pedro Bay Ports Clean Air Action Plan.
[15] Measured from the point of origin for trucks travelling to the Port and to the first point of rest within, or out to the limits of, the NYNJLINA region for trucks leaving the Port, as defined in the 2012 Emissions Inventory.

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Emission Reduction Actions

Explanation of Covered Sectors (Source Categories)

Mirroring the 2009 Strategy and Emissions Inventories, this Strategy lists actions for emission reduction by source category, or sector of port operations. These five sectors are Ocean-Going Vessels, Heavy-Duty Diesel Vehicles (Trucks), Railroad Locomotives (Rail), Cargo Handling Equipment, and Harbor Craft.

The actions in this Strategy address both criteria pollutants and GHGs in light of the overarching emissions reduction objectives and goals (pages 2-3). The Port Authority's emissions by source category are presented in Tables 3 and 4 to gain a better sense of where the emissions are coming from and thus, where to focus actions. As the tables show, Ocean-Going Vessels are the greatest source of PM_{10}, $PM_{2.5}$ and SO_2 emissions of any port sector, while Trucks are the greatest source of NO_x, VOC, CO, CO_2 and carbon equivalent (CO_2 Eq).[16]

Table 3: Criteria Pollutant Emission Summary by Source Category, Percentage

Source Category	NO_X	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2
Ocean-Going Vessels	35%	**50%**	**45%**	33%	16%	**99.6%**
Cargo Handling Equipment	18%	16%	17%	24%	25%	0.07%
Heavy-Duty Diesel Vehicles (Truck)	**38%**	28%	31%	**35%**	**54%**	0.14%
Railroad Locomotives (Rail)	4%	2%	2%	5%	3%	0.08%
Harbor Craft	6%	4%	5%	4%	3%	0.10%
Total PANYNJ Emissions, tons per year	7,096	501	441	433	1,632	1,735

(Columns do not all add to 100% due to rounding)

Table 4: GHG Emissions Summary by Source Category, Percentage

Source Category	CO_2	N_2O	CH_4	CO_2 Eq
Ocean-Going Vessels	22%	**45%**	19%	23%
Cargo Handling Equipment	21%	38%	23%	21%
Heavy-Duty Diesel Vehicles (Truck)	**50%**	2%	0%	**50%**
Railroad Locomotives (Rail)	3%	2%	9%	3%
Harbor Craft	3%	13%	**49%**	4%
Total PANYNJ Emissions, tons per year	629,613	20	15	634,697

(Columns do not all add to 100% due to rounding)

[16] Data from the 2012 PANYNJ Port Commerce Department Emissions Inventory: http://www.panynj.gov/about/pdf/panynj-multi-facility-ei-report.pdf, last visited on 12/31/14.

ACTION CATEGORIES

The actions in this Strategy are divided into two categories: Implemented Actions and Committed Actions.

Implemented Actions

Implemented actions represent completed or ongoing emission reduction actions. The actions listed first in each sector and shaded in darker blue were implemented between 2006 and 2009, prior to release of the original Strategy. These actions correspond to those in the Implemented Action tables in the 2009 Strategy. The implemented actions shaded in lighter blue were 2009 Committed Actions implemented between 2009 and 2014.[17] As mentioned in the First Five Years of Implementation section of this Strategy (page 7), additional detail on all of the original Strategy actions implemented can be found in the 2013 Implementation Report.[18] For quick reference, Appendix A of this document has a table listing the actions implemented between 2009 and 2013, including the period of implementation, funding amount, and lead implementer.

Committed Actions

Committed Actions represent the new list of actions to be implemented in the next five years, between 2015 and 2020, developed following the process described on pages 5-6 of this document. Future Strategy Implementation Reports will include estimated emissions reductions based on actual implementation data (i.e., number and types of equipment), and future Emissions Inventories will show the aggregate results of actions implemented (see the Reporting and Accountability section for additional detail (page 26)). The Strategy Group will continue to convene over the life of the Strategy to work out the details of implementing the actions, including defining timelines and securing funding. As the Port Authority seeks to remain at the forefront of maritime-related emissions reduction efforts with this Strategy, its success will depend on continued coordination and collaboration with all its partners.

Sector-Based Actions

OCEAN-GOING VESSELS (OGVs)

Background

Ocean-Going Vessels (OGV) are the greatest source of particulate matter ($PM_{2.5}$ and PM_{10}) and SO_2 from maritime-related activity at the Port. This sector is also the second greatest source of NO_X, VOCs, and

[17] Where the actions have updated lettering in this Strategy for the purposes of keeping the list sequential (e.g., CHE(g)), the corresponding action in the 2009 Strategy is noted in green italics below the updated action label.
[18] The 2013 Implementation Report is available online at http://www.panynj.gov/about/pdf/CAS_Implementation_Report.pdf, last visited on 12/31/14.

CO_2 Eq emissions. As mentioned under Strategy Scope (page 3), the addition of Global Container Terminal and Cape Liberty Cruise Terminal in 2012 resulted in a 3% overall increase of vessel activity at the Port. Despite this increase, emissions from OGVs decreased an average of 40.5% across all criteria pollutants between 2006 and 2012.[19] A table listing the emission reductions for each criteria air pollutant can be found in Appendix B.

These significant reductions resulted from several factors including business practice changes by shipping lines (e.g., using newer or retrofitted ships incorporating an array of efficiency and fuel consumption reduction measures); Strategy initiatives, including the OGV Low-Sulfur Fuel Incentive Program and Clean Vessel Incentive Program; and implementation of the North American Emissions Control Area (support for which was a 2009 Strategy action) beginning in 2012, which mandates use of 1% sulfur fuel within 200 miles of the North American coast. In addition, one of the prioritization considerations used by the Port Authority and its Strategy Group partners for implementing Strategy actions is local area impact. Taking this into account, the Port Authority selected the Brooklyn Cruise Terminal as the location for the first instillation of shorepower capability (2009 Strategy action *OGV(e)*; scheduled for completion in 2015) due in large part to its proximity to the highest-density population of any site under the Port's jurisdiction.

Along with Trucks, the OGV sector was a major focus in the first five years of Strategy implementation. As the highest and second highest source of a majority of pollutants, this sector will remain at the forefront of Strategy implementation over the next five years. The updated action list reflects the continued commitment by the Strategy Group to support long-term operational changes and deployment of proven strategies for emission reductions from OGVs.

Implemented Actions[20]	
OGV(a)	The Port Authority is working with the Port of Rotterdam to develop an Environmental Ship Index as a means of establishing criteria for evaluating and recognizing clean ships.
OGV(b)	Establish a year-round vessel speed incentive program for ships approaching the harbor. • The Port Authority program would cover the portion of the year (May 1 through October 31) that does not fall under the National Oceanic and Atmospheric Administration's seasonal management restrictions for the mid-Atlantic area.[21]

[19] All emissions reported in the Emission Reduction Action section are measured in tons per million TEU. The data in this Strategy does not include emissions from cruise vessels as there is not a comparable TEU measurement for cruise vessels. However, emissions from cruise vessels are included in the Emissions Inventories.
[20] The wording of implemented actions remains exactly as it appeared in the 2009 Strategy. Where the actions have updated lettering in this Strategy for the purposes of keeping the list sequential (e.g., CHE(g)), the corresponding action in the 2009 Strategy is noted in green italics below the updated action label.
[21] For more information on NOAA's restrictions, see: http://www.nmfs.noaa.gov/pr/shipstrike/, last visited on 12/31/14.

Implemented Actions[20]	
OGV(c)	Develop an incentive program for OGVs to switch to low sulfur fuel when in the Port of New York and New Jersey. This incentive would likely be funding to help cover the cost differential between the use of low sulfur fuel and conventional bunker fuel while in port. • Incentive payments would apply to main and auxiliary engine consumption and approximate 50% of the cost differential between heavy fuel oil and marine gas oil at 0.2% sulfur content. • To qualify for the incentive, vessels would also have to participate in the vessel speed reduction program.
OGV(d)	Develop a Clean Ship/Green Flag program, using the ESI mentioned above, to recognize ships that use vessel speed reduction and clean engine technology to reduce their air emissions.
OGV(e)	Install shore-power ("cold ironing") capability at the Brooklyn Cruise Terminal.
OGV(f)	Continue/expand an international partnership with the Port of Rotterdam, and other ports if opportunities exist, working to implement "clean ship" and other related programs/projects.
OGV(g)	Support the establishment of a North American Emissions Control Area, led by EPA R2 helping to advance the agency work needed to submit and support the application process.
OGV(h)	NYCEDC to seek to repeal the New York State tax exemption for bunker fuel.

Committed Actions	
OGV(i)	Implement a follow-on program to the Clean Vessel Incentive Program, which ends in 2015.
OGV(j)	Research opportunities for reducing barriers to expansion of cold-ironing. If barriers can be overcome, create the infrastructure to support the use of cold ironing.
OGV(k)	Implement pilot projects for promising new technologies, such as diesel particulate filters (DPFs), selective catalytic reduction (SCR), and scrubbers.
OGV(l)	Examine the feasibility of and demand for a compressed natural gas (CNG)/liquefied natural gas (LNG) refueling station for OGV and implement if feasible.

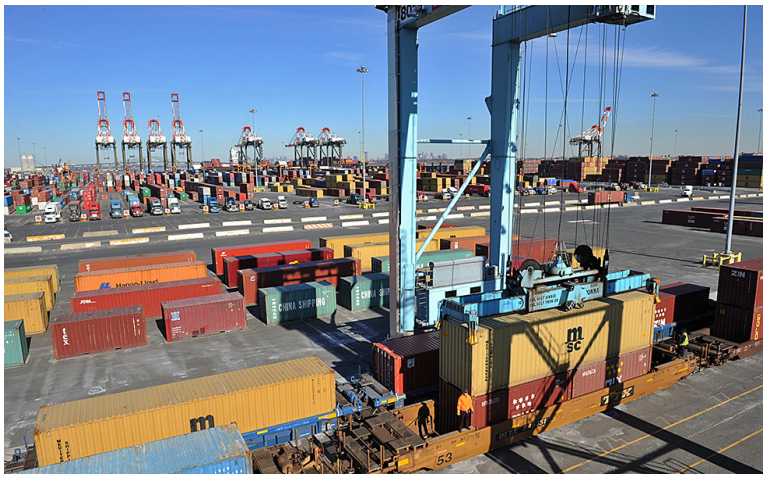
CARGO HANDLING EQUIPMENT (CHE)

Background

Cargo handling equipment (CHE) is the second most significant source of CO at the Port. Emissions from CHE reduced an average of 36% across all criteria pollutants between 2006 and 2012. A table listing the emission reductions for each criteria air pollutant can be found in Appendix B. However, from 2010 to 2012, emissions for NO_X and particulate matter ($PM_{2.5}$ and PM_{10}) increased.[22] The increase over the most recent two years of Emissions Inventory data is likely attributed to an increase in the total amount of equipment (up 13%) with the addition of Global Marine Terminal in 2012. The updated actions for this

[22] From 2010 to 2012, NOX emissions increased 4% and emissions of $PM_{2.5}$ and PM_{10} both increased by 8% (measured in tons per million TEU).

sector target the need to balance handling increased cargo throughput with continued emission reductions.



In the first five years of Strategy implementation, the Port Authority invested $2.24 million in incentives for marine terminal operators to purchase new equipment. The incentives, which covered 20% of the unit cost, replaced 46 pieces of old equipment with units that meet the latest emission standards. Mandated use of ultra-low sulfur diesel (ULSD) fuel after 2012 resulted in a substantial decline in SO_2 emissions. Additionally, many terminal operators have implemented a host of business practice changes resulting in increased capacity, efficiency, and emission reductions.

While these initiatives have been successful at reducing emissions from the 2006 baseline, compared to other sectors CHE saw the least amount of progress in terms of number and percentage of Strategy actions implemented. Contributing factors include the sheer number of pieces of equipment, equipment upgrades occurring only on a specific replacement cycle (i.e., at the end of its lifecycle or when significant repairs are needed), and a lack of infrastructure for fuel alternatives, most notably compressed natural gas. The new set of actions included in this Strategy attempt to address those challenges. The actions are also intended to target two CHE unit types, terminal tractors and straddle carriers, which compose over 60% of the fleet and account for nearly 70% of the emissions.[23]

Implemented Actions	
CHE(a)	Completed switchover to use of ULSD fuel in all CHE.
CHE(b)	Installed and evaluated active DPFs on yard tractors.
CHE(c)	Currently using CNG, propane, or electric-powered forklifts in warehouses.
CHE(d)	Instituted an Idle Reduction Program at all marine container terminals, restricting idling times of diesel powered cargo handling equipment through the use of automatic shutoff devices and electric plug-in technology.
CHE(e)	Completed installation of 39 out of 53 total electric cranes and modernization of all CHE at container terminals to models meeting EPA's 2004 on-road emissions standards.

[23] A full profile of CHE, including information on the amount, model and year of equipment operating at the Port Authority, is contained in the 2012 Emission Inventory.

Implemented Actions	
CHE(f)	Sponsor pilot projects to test hydraulic and electric hybrid yard hostlers.
CHE(g) *CHE(h)*	Accelerate modernization/upgrade/decommission up to 300 pieces of CHE, including 50 pieces of equipment with the oldest engines at all Port Authority leased terminals to meet EPA's 2007 on-road standards.
CHE(h) *CHE(k)*	Decommission or electrify eleven diesel cranes at Port Newark and Port Elizabeth. • Create an incentive program to retire and dismantle a minimum of two diesel powered cranes. • Install/upgrade electrical power infrastructure to support new electric wharf cranes for the remaining balance (nine cranes).

Committed Actions	
CHE(i)	Develop a new CHE program, prioritizing yard tractors and straddle carriers, to incentivize faster turnover of equipment to the best-available technology (currently Tier 4).
CHE(j)	Continue to upgrade and replace the CHE fleet at all Port Authority leased terminals with equipment that enhances operational efficiencies while reducing environmental impact.
CHE(k)	Support changing business practices and operating systems that will increase efficiency, minimize emissions and support the Port Performance Task Force recommendation for a Chassis Management program.
CHE(l)	Conduct demonstration projects with alternatively powered yard tractors and explore other projects, such as bringing alternative power to a terminal (i.e., a mobile fueling station), which will help overcome alternative fueling issues that are a barrier to widespread adoption.
CHE(m)	Install wind turbines as alternative energy source at terminals, where feasible.

HEAVY-DUTY DIESEL VEHICLES (TRUCKS)

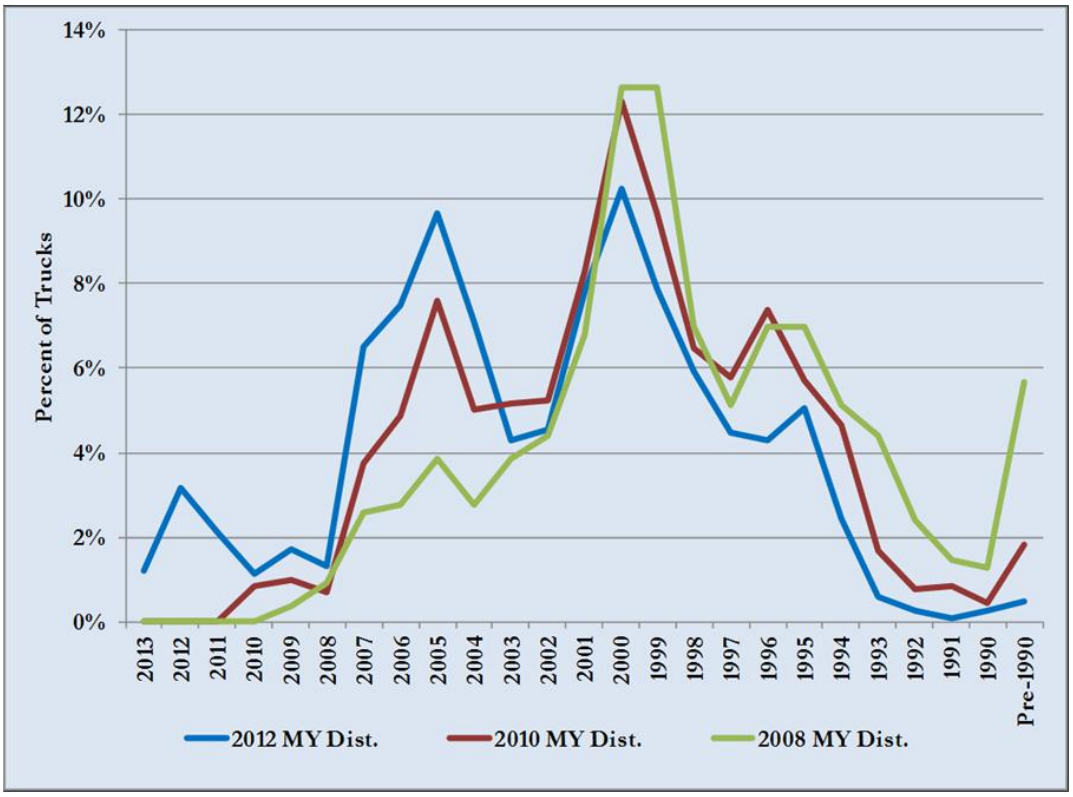
Background

The first five years of Strategy implementation placed a heavy emphasis on Truck sector actions since trucks represent a significant source of port emissions and are also the sector of greatest concern to near-port communities. Strategy actions to-date have helped achieve significant reductions in $PM_{2.5}$, PM_{10}, and SO_2 from the 2006 baseline—42%, 47%, and 92%, respectively. That said, Trucks remain the greatest source of NO_X, VOC, CO, and CO_2 Eq emissions and the second greatest source of particulate matter ($PM_{2.5}$ and PM_{10}) emissions from maritime-related activity at the Port, and therefore will continue to be at the forefront of Strategy efforts.

In the first five years of Strategy implementation, more than $62 million was put toward Truck sector actions focused on shifting the model year distribution of trucks servicing the Port and nearby areas toward newer, cleaner vehicles (see Figure 2). Together the stakeholder-designed Truck Replacement

program and the Supplemental Truck Replacement program resulted in replacing 429 older trucks (model year 2003 or older engines) serving the Port. Not captured in the distribution in Figure 2, Hurricane Sandy damaged an estimated 25% of trucks servicing the Port in October 2012. As these damaged trucks are replaced, the truck profile is likely to shift even further toward newer models.

Figure 2: Model Year Distribution of Trucks Calling the Port Authority



In another major effort, the Port Authority made modifications to the Rules and Regulations applying at Port Authority marine terminals to implement a Truck Phase Out Plan that, as of January 1, 2011, denied access to drayage trucks with engines model year 1993 or older, and on January 1, 2017 will deny access to any drayage truck not equipped with an engine model year 2007 or newer. In parallel, the Port Authority has been supporting its partners in implementing an on-port RFID system, scheduled for full deployment in late 2014, which will provide the ability to ensure 100% compliance with the Phase Out Plan. The RFID system will also provide a better picture of the number of trucks that will need to be replaced for a smooth transition to the 2017 phase out (i.e., how many pre-2007 trucks still frequently call the Port, the majority of which will need to be replaced), and consequently provide insight into the design of strategies to replace the number of trucks necessary to comply with the 2017 deadline, as covered in action Truck (l).

Even with a shift toward newer trucks, achieving real reductions in GHG emissions to reach the Strategy goal of an annual 5% reduction will require reducing dependency on trucks to move cargo resulting in fewer vehicle miles traveled (VMT),[24] as well as shifting to alternative fuel sources. Therefore, this Strategy update also includes a range of actions aimed at increasing efficiency, using alternative fuel vehicles, and shifting goods moved to alternatives such as rail and barge. Lastly, the suite of Truck actions addresses reducing congestion and idling[25] on and near the Port as a means of continuing to decrease emissions across all pollutants. Due to the proportionally high level of emissions from Trucks, opportunities for greatly reducing GHG emissions, and continued community concern, the Strategy Group remains strongly committed to addressing emissions from this sector while maintaining economically-important smooth operations at the Port.

Implemented Actions	
Trucks(a)	Initiated New York/New Jersey Roadway enhancement program to increase roadway capacity and reduce congestion.
Trucks(b)	Terminal operators installed electric gates, relocated gates, and extended gate hours at both ends, where feasible, to reduce truck congestion and idling emissions at terminals.
Trucks(c)	NYCEDC negotiated a mandate in its lease with Phoenix Beverages at Pier 11 Red Hook to convert its entire fleet of trucks (100 trucks) to CNG within seven years.
Trucks(d)	Currently using the Portfields initiative to promote development of warehouse and distribution centers on abandoned, contaminated industrial sites located near the Port which would reduce truck vehicle miles traveled and their associated emissions.
Trucks(e)	Create and implement a $2M Emission Reduction Fund for port truck owners to finance acquisition of newer, lower emitting vehicles, with $750K in Port Authority funding to match an EPA grant of $750K combined with $500K from a micro-lender.

[24] Measured from the point of origin for trucks travelling to the Port and to the first point of rest within, or out to the limits of, the NYNJLINA region for trucks leaving the Port, as defined in the 2012 Emissions Inventory.
[25] Note, based on 2012 Emissions Inventory data, on-terminal idling hours decreased 43.4% between 2010 and 2012 despite an increase in truck activity during that time.

Implemented Actions	
Trucks(f)	Work with shippers and vessel operators to establish a SmartWay-type partnership with vessel operators and shippers that would enhance business to truckers that use vehicles equipped with SmartWay air emission and fuel efficiency upgrades. Upgrades may include the installation of DPFs and/or a diesel oxidation catalyst (DOC).
Trucks(g) *Trucks(g1)*[26]	Develop a program to phase out older trucks serving Port Authority marine terminal facilities based on model year. To advance this action: • Establish a truck working group by June 2009 to work out implementation details, including funding, tracking mechanisms, and structure and timing for denying Port access. • Implement a Truck Replacement Program to provide incentives and financing to replace pre-1994 trucks with 2004 or newer vehicles.
Trucks(h)	Conduct a study of freight movement, modal splits, and short sea shipping, led by NYCEDC.

Committed Actions	
Trucks(i)	Support implementation of the Port Performance Task Force recommendation for a Chassis Management Improvement System.
Trucks(j)	Support the development of a Truck Management System recommended by the Port Performance Task Force for trucks serving the terminals in order to decrease truck congestion and peaking at terminal gates, as well as reducing truck on-terminal or turn time.
Trucks(k)	Develop and implement strategies, including providing financial incentives to purchase alternative fuel vehicles, to replace the number of trucks necessary to comply with the 2017 phase out plan.
Trucks(l)	Examine the feasibility of and demand for a CNG/LNG refueling station for trucks and implement if feasible.
Trucks(m)	Conduct an on-terminal idling study that looks at a representative sample over the course of year (accounting for seasonality, high/low cargo, etc.). Based on the results, develop and implement an idle reduction strategy and/or an incentive program for the use of on-board automatic shutdown devices.
Trucks(n)	Install RFID readers at terminal entry and exit points and on the nearby roadways, where feasible, to determine delay times and provide a real-time information management system (i.e., an intelligent roadway).
Trucks(o)	Reduce dependency on trucks by enhancing the use of barges and implementing short sea shipping.

[26] The 2009 Strategy included two Heavy-Duty Diesel Vehicle actions labeled as Trucks(g). Trucks(g1) refers to the first action listed as Truck(g) on p. 21 of the 2009 Strategy, "Develop a program to phase out older trucks…" This action was implemented. Trucks(g2) refers to the second action listed as Truck(g) on p. 22 of the 2009 strategy, "Develop an appointment system…" This action was not implemented in the 2009-2014 timeframe.

RAILROAD LOCOMOTIVES (RAIL)

Background

The rail sector contributes fewer than 5% of criteria air pollutant and GHG emissions from the Port Authority maritime activities, making it the lowest source of almost all emissions (it is the second lowest for VOCs at 5%; harbor craft is 4%). In addition, data from the 2012 Emissions Inventory shows that emissions for Rail are on the decline: emissions declined across all criteria air pollutants and for GHG emissions from 2006 to 2012 even though containers moved by rail over the same period increased by 27.9%. Part of this trend is attributable to cleaner technology as a result of the 2009 Strategy. In the first five years of Strategy implementation, four switching locomotive engines were retrofitted to a GenSet configuration,[27] operational procedures and technology to reduce idling were deployed, and rail lines were extended and modernized to promote movement of goods by freight rail.

Shifting the modal split of cargo containers from truck to rail will continue to be a key means for balancing increasing cargo volume/economic output with continued emission reductions. Currently, the projected growth of goods moved by rail—5% per year—outpaces the anticipated growth of total cargo volume—4% per year—through 2020. Off-port rail capacity and congestion presents a barrier to increasing the movement of goods by rail above the 5% projection. While the Strategy Group commits to supporting efforts to address this issue, reducing congestion outside of the Port may require a coordinated regional rail freight strategy.

Implemented Actions	
Rail(a)	Invested over $600M in ExpressRail expansion. Established on-dock rail at all container terminals. Achieved 358,000 rail lifts in 2007, displacing over 537,000 truck trips. Capacity when complete: 1.2M rail lifts/year; displacing over 1.8M truck trips.
Rail(b)	NYCEDC installed a Kim Hot Start anti-idling device on an on-dock switcher locomotive at New York Container Terminal.
Rail(c)	Currently using a ground air system in place of an on-board air compressor (which is powered by a vehicle's diesel generator) to provide locomotives' compressed air needs.
Rail(d)	Expanded rail capacity by extending and modernizing the Staten Island Railroad, with resource support from NYCEDC.[28]

[27] GenSet engines are computer controlled, monitoring engine idling and turning on and off on an as-needed basis. These controls reduce engine idling and the resulting emissions.
[28] This project consisted of extending track to new facilities previously not served by rail and removing outdated track geometries that prohibited certain types of rail cars (90 foot flat cars; 89 foot auto carriers) from moving over the waterfront rail lines safely, making rail a more viable option for moving cargo to and from Port facilities.

Implemented Actions	
Rail(e)	NYSA created a rail incentive program in July 2007 with investments of over $40M to-date.
Rail(f)	NYCEDC negotiated a lease agreement at South Brooklyn Marine Terminal with Axis, which includes financial incentives for moving goods by rail or barge.
Rail(g)	Retrofit/replace up to three switching locomotives[29] serving the Port with GenSets, particulate filters, and possibly SCR technology for NO_x reduction. Administrative support by NJDEP and funding from Supplemental Environmental Project, negotiated by NJDEP.
Rail(h)	Reconfigure two switching locomotive engines with GenSets. The railways, CSX and Norfolk Southern, would provide 20%of the costs; an additional 20% would come from the Port Authority, and 60% would be provided by a grant from the Congestion Mitigation Air Quality program.
Rail(i)	Implement a switch to ULSD fuel in switcher locomotives serving the Port and in cargo handling equipment at intermodal yards, prior to EPA's 2012 off-road engine standards taking effect.
Rail(j)	Implement operational procedures to shut down locomotive engines when not in use and outside temperatures permit.
Rail(k)	Extend and modernize rail lines to and in South Brooklyn Marine Terminal and the Port Jersey Peninsula to increase efficiency.
Rail(l)	Install anti-idling technology in switcher locomotive engines not retrofitted with GenSets at the Port of Newark and Elizabeth Marine Terminal.

Committed Actions	
Rail(m)	Upgrade to the best available and reliable technology an additional five (5) switching locomotive engines that regularly service the Port.
Rail(n)	Support building line-haul trains directly on-port to decrease the use of switching locomotives (number or operating hours).
Rail(o)	Pilot a CNG mother-slug set.
Rail(p)	Evaluate and implement using alternative powered lifting equipment at Kearney, CSX, and Norfolk Southern intermodal yards.
Rail(q)	Support implementation of long-term operational changes to increase the amount of cargo leaving the Port on rail versus truck, including Express rail expansion and increasing short-haul rail capabilities (e.g., development of an inland port).
Rail(r)	Support external efforts, to the extent possible, to address off-port rail capacity and congestion issues in New Jersey (e.g., adding another track to Conrail's Lehigh line).

[29] The five switcher engines covered in Rail(g) and Rail(h) that serve the Port at any one time are pulled from a regional pool of thirty engines.

HARBOR CRAFT

Background

The Harbor Craft sector includes private tour vessels, public and private passenger ferries, commercial vessels, tugs, and pleasure craft, all of which share the waterways with Port Authority operations. In contrast to the other four sectors, the Port Authority has little to no direct influence over most of the Harbor Craft sector and therefore, relies on its partners to implement the majority of actions. It is important to note that emissions for this sector included in this Strategy and the Port's Emissions Inventories only reflect emissions from OGV tug assists and do not include emissions—or reductions—resulting from non-port-related harbor craft activities. Nevertheless, Strategy Group and stakeholder partners are committed to further reducing emissions from this sector.

In the first five years of Strategy implementation, NYCDOT led the efforts in this sector installing diesel oxidation catalysts on more than 31 boats, upgrading nine ferries from Tier 2 to Tier 3 engines, encouraging all ferries operating in the harbor to use ULSD ahead of the 2012 mandate, and securing a grant to repower an additional ferry with a Tier 2 engine. In addition to NYCDOT's efforts, NYCEDC, EPA Region 2, and the Port Authority all implemented actions to reduce emissions from harbor craft. A new community partner, the New Jersey Clean Cities Coalition (NJCCC), also stepped up and replaced 16 Tier 0 engines with Tier 2 engines on six private harbor craft using EPA grant funding. Future actions in this sector, again to be led by a variety of partners, focus on areas of proven success and alternative fuel/energy sources, including dockside electrification, hybrid technology, post-combustion controls, and continued engine upgrades. The type of collaboration highlighted in this sector is a model for the type of integrated and coordinated effort that is needed for the overall Strategy to succeed.

Implemented Actions	
HC(a)	Began switchover to ULSD in all harbor craft, including Staten Island Ferries.
HC(b)	Completed engine retrofits on four Staten Island public ferries and engine replacements on fifteen tugs operating in the New York/New Jersey Harbor as part of the Harbor Deepening Project Air Offset Program.
HC(c)	Currently implementing a Marine Vessel Engine Replacement Program, led by NYCDOT, to upgrade to Tier 1, 2, or 3 marine engines.
HC(d)	Revitalize the cross-harbor rail barge and convert the locomotive switcher engines supporting the operation to GenSet configuration and implement use of ULSD in both the locomotive and the harbor tug assigned to move the rail barge.

Implemented Actions	
HC(e)	Install diesel oxidation catalysts on private ferries, led by New York City under a federal grant.
HC(f)	Accelerate the use of ULSD fuel in harbor craft in advance of EPA's 2012 non-road diesel standards.[30] • Work with suppliers to ensure ULSD, with additives, is available. • Work with suppliers to add more fueling sites or a central fueling depot in the New York/ New Jersey Harbor.
HC(g)	Adopt measures to increase fuel efficiency in harbor craft: • Vessel speed reduction; • Vessel assignment planning to reduce transit length; • Use Automatic Identification System to monitor incoming vessel speeds and plan just in time arrival; and Identify places—as part of NYCEDC's Phase II Maritime Support Study—where tugs can tie up and shut down engines between assignments in same general location.
HC(h) *HC(i)*	Raise awareness about reducing emissions and influence new purchases to include equipment up to highest emission standards. EPA Region 2 commitment to conduct outreach to harbor craft owners and operators via the National Clean Diesel Campaign, the Northeast Diesel Collaborative (NEDC), and the NEDC Goods Movement Workgroup.
HC(i) *HC(j)*	Expand marine vessel engine replacement or engine retrofit program (MERP) to private ferries, tugs and other harbor craft, as an effort separate from the Harbor Deepening Project Air Offset Program. Initial goal of replacing eleven engines. • Work to relax the requirement to stay in the harbor a large percent of the time.

Committed Actions	
HC(j)	Develop dockside electrification for harbor craft at Brooklyn Army Terminal Pier 4, Atlantic Basin (Brooklyn), and Homeport (Staten Island).
HC(k)	Repower/upgrade an additional 35[31] engines on private ferries, tugs, and other harbor craft, as an effort separate from the Harbor Deepening Project Air Offset Program.
HC(l)	Investigate and test post-combustion controls (diesel oxidation catalysts) and after-treatment technologies for tugs.
HC(m)	Implement a hybrid harbor craft pilot program.
HC(n)	Research the results of using anti-fouling hull coatings on marine vessels to reduce drag and improve fuel efficiency, and incentivize its use if found effective and does not cause disproportional harm to water-based ecosystems.

[30] For more information see EPA's Clean Air Non-road Diesel Rule at: http://www.epa.gov/otaq/documents/nonroad-diesel/420f04032.pdf, last visited on 12/31/15.

[31] This number was derived based on EPA Region 2 calculations showing 60 engine repowers/upgrades would be needed to meet the Strategy's criteria pollutant goal (an average of 3% per year) for Harbor Craft. Twenty-five engines were replaced in the first five years of Strategy implementation, leaving 35 remaining to meet the goal.

Implementation and Reporting

Approach to Implementation

The Port Authority and its Strategy Group partners recognize that the development of this updated Strategy is only one step towards achieving future emission reductions. As with the 2009 Strategy, the key will be transitioning from the promising strategies contained herein to actual implementation of the specific actions. This requires the commitment and full cooperation of the Port Authority and its Strategy Group partners, the development and deployment of technology and/or operational changes, and, in most cases, dedication of sufficient funding. The Port Authority and its Strategy Group partners commit to working at the local, state, and federal levels to secure sufficient funding to help realize those actions described in the Strategy.

The Port Authority and its Strategy Group partners continue to work closely with other agencies and the maritime industry to share lessons learned from projects implemented outside the region and to encourage coordination of a range of demonstration projects to accelerate the availability of promising innovations. As mentioned on page 9, the priority of implementing the actions provided within this Strategy will be based upon their available funding, corresponding tons of emissions reduced, localized area impacts, and cost-effectiveness. Those actions which appear to be most promising will be implemented first.

Reporting and Accountability

The approach to reporting and accountability and to ensure the actions outlined in this Strategy are achieving real emissions reduction results remains very similar to that outlined in 2009. Total emission reductions for each sector will be reported via annual Emissions Inventory updates, posted publicly on the Port Authority's website, with the 2006 Inventory acting as the baseline for measuring change. Reductions reported within each Emissions Inventory update will incorporate specific actions implemented during the year covered. The baseline annual emission reduction goals for criteria pollutants (3%) and GHGs (5%) provide metrics to measure overall success and ensure that these emissions will continue to decrease despite anticipated port growth over the life of this Strategy.

As a complement to Emissions Inventory updates, the Port Authority, working with the Strategy Group, will draft at least one additional Implementation Report describing progress towards the objectives and goals outlined in this Strategy, as well as progress toward implementing the Strategy actions. Over the course of implementation, the Strategy Group will continue to identify ways to improve the ability to measure the impact of Strategy actions and identify new opportunities for meeting the Strategy goals. In addition, the Strategy Group acknowledges other ongoing data collection and localized air quality monitoring efforts (e.g., DEP dispersion modeling, Brooklyn micro-scale monitoring study) and commits to reviewing and considering new data as they are available, continuing to support measures to better understand impacts at the local level, and updating the Strategy and/or action priority as needed.

Conclusion

This 2014 Clean Air Strategy Update outlines a comprehensive approach for reducing emissions over the next six years from maritime-related activities associated with the Port Authority of New York and New Jersey. These actions target reducing air quality impacts on human health and the environment, reducing contributions to GHG emissions associated with climate change, and contributing to the regional effort to bring the NYNJLINA into attainment for ozone and maintain attainment for fine particulate matter (PM2.5). A suite of voluntary actions for reducing emissions are included for all five sectors of maritime activities identified in the baseline 2006 Emission Inventory.

This updated Strategy and the actions within build upon the success and lessons learned of the first five years of Strategy implementation and aim to drive emissions even lower for the four criteria air pollutants (NOx, PM10, PM2.5, SO2) that are currently meeting or exceeding the annual reduction goal, and ensure the goals will be met for the three pollutants (VOCs, CO, and GHG) that have fallen short. By 2020, the actions in this Strategy aim to achieve a 42% decrease in all criteria air pollutants and a 70% decrease in GHGs from baseline 2006 levels despite any port growth. This Strategy's actions focus on continuing areas of proven success, as well as driving innovation and modifying overall business practices to take advantage of opportunities for increased environmental and economic sustainability.

The cooperation and support of the Strategy Group and the Port's industry and community partners to support and lead actions in the first five years of implementation was instrumental to the Strategy's early achievements. Over the next six years and beyond, these partnerships and collaborations will again be critical, as without this type of broad effort, the Strategy would falter under the weight of its ambitious nature and the amount of resources, both human and financial, needed to achieve its goals. The Strategy Group is aware that many of the implementation details, including identifying and securing sufficient funding, still need to be worked out, and have made a commitment to continue to work together to provide the leadership and strategic direction necessary to ensure Strategy success. The Port Authority and its Strategy Group partners look forward to working with all parties and interests that share in the desire to put the Strategy to work for the health and well-being of the people and environment it will affect.

Appendices

APPENDIX A

The following table provides a summary of the Strategy actions implemented between 2009 and 2014, including the period of implementation, funding amount, and lead implementer for each action. Comprehensive implementation details can be found in the 2013 Implementation Report.[32]

Implemented Actions, 2009-2013		Period of Implementation	Funding Amount	Lead Implementer
Ocean-Going Vessels (OGV)				
OGV(b) OGV(c)	Vessel Speed Incentive Program ULSD Fuel Incentive Program *(Note these two actions were combined during implementation)*	2010–2012	$822K	PANYNJ
OGV(d)	Clean Vessel/Green Flag Program	2013–2015	$5.5M	PANYNJ
OGV(e)	Brooklyn Cruise Terminal Shore Power	2009–2015	$19.3M	PANYNJ
OGV(f)	Port of Rotterdam Partnership	2009–2014	–	PANYNJ
OGV(g)	North American Emissions Control Area	2009	–	EPA R2
OGV(h)	Seek to Repeal Tax Exemption of Bunker Fuel	2009	–	NYCEDC
Cargo Handling Equipment (CHE)				
CHE(f)	Hydraulic and Electric Hybrid Pilots	2008–2013	$120K[33]	PANYNJ
CHE(h)	Modernize CHE to meet 2007 or newer Standards	2010–2013	$2.24M	PANYNJ
CHE(k)	Decommission/Electrify 11 Diesel Cranes	2009–2013	–	Terminal Ops
Heavy-Duty Diesel Vehicles (Trucks)				
Trucks(e)	Emission Reduction Fund	2010–2013	$2.6M	PANYNJ
Trucks(f)	SmartWay-type Partnership	2010–2012	–	EPA R2
Trucks(g)	Truck Replacement Program Truck Phase Out Program	2010–2013 2011–2017	$35.3M $808K	PANYNJ
Trucks(h)	Freight Movement Study	2010–2012	–	NYCEDC

[32] The 2013 Implementation Report is available online at http://www.panynj.gov/about/pdf/CAS_Implementation_Report.pdf, last visited on 12/31/14.

[33] This is the amount provided by the Port Authority for this project. The total project cost is significantly higher with the balance in contributions from the following entities: New York Power Authority, EPA Office of Transportation and Air Quality Ann Arbor, APM Terminal, and New York Container Terminal.

Implemented Actions, 2009-2013		Period of Implementation	Funding Amount	Lead Implementer
New Action	Hunt's Point Voluntary Truck Program	2012–2015	$19.5M	NYDOT
Railroad Locomotives (Rail)				
Rail(g)	Retrofit Three Switching Locomotives with GenSets	2007–2010	$3.3M	NJDEP
Rail(h)	Retrofit Two Switching Locomotives with Gen Sets	2010–2014	$3M	PANYNJ
Rail(i)	ULSD Fuel in Switchers and CHE	2009–2012	–	Rail Lines
Rail(j)	Operational Procedures for Reducing Idling	2009–2013	–	Rail Lines
Rail(k)	Extend and Modernize Rail Lines	2011–2013	$329M[34]	PANYNJ
Rail(l)	Install Anti-idling Technology	2009–2013	–	Rail Lines
Harbor Craft (HC)				
HC(d)	Cross-Harbor Rail Barge Actions	2009–2014	$133M	PANYNJ
HC(e)	Install DOCs on Private Ferries	2011–2013	$7M	NYCDOT
HC(f)	Accelerate Use of ULSD in Harbor Craft	2010–2011	–	NYCDOT
HC(g)	Fuel Efficiency Measures for Harbor Craft	2012–2015	$15M	NYCEDC
HC(i)	Raise Awareness	2010–2012	–	EPA R2
HC(j)	Expand MVERRP to Private Harbor Craft • Seastreak Repower • Private Engines	 2012 2012–2013	 $2M $1.3M	 NYCDOT NYCDOT/NJCCC

[34] The 2013 Implementation Report funding amount only included $9M for NYCEDC's investments to promote the movement of goods by freight rail, including upgrades along 1st Avenue in Brooklyn, allowing modern, larger railcars to access the South Brooklyn Marine Terminal. The Port Authority recently completed an additional $320M of improvements to enhance capacity and efficiency in Port Jersey.

APPENDIX B

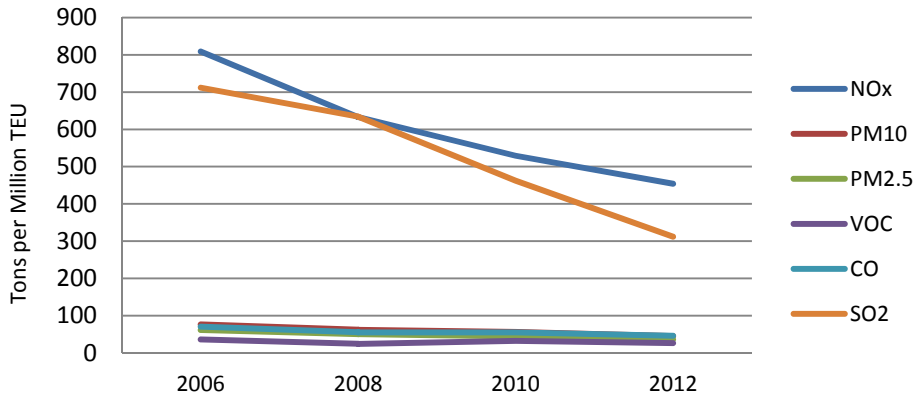
The following tables and charts show the percent change in emissions for criteria air pollutants for each sector from the 2006 baseline based on the 2012 Emissions Inventory. More information on Port Authority maritime-related emissions trends, sources and the methodology behind the Inventory is available in *The Port of New York and New Jersey Port Commerce Department 2012 Multi-Facility Emissions Inventory* full report.[35]

Ocean-Going Vessels

Table B1. OGV Criteria Air Pollutant Emissions, Percent Change 2006 to 2012 (tons/million TEU)[36]

	NO_X	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2
2006-12	-44%	-41%	-41%	-28%	-34%	-56%

Figure B1. Ocean-Going Vessel Criteria Air Pollutant Emissions, 2006-2012



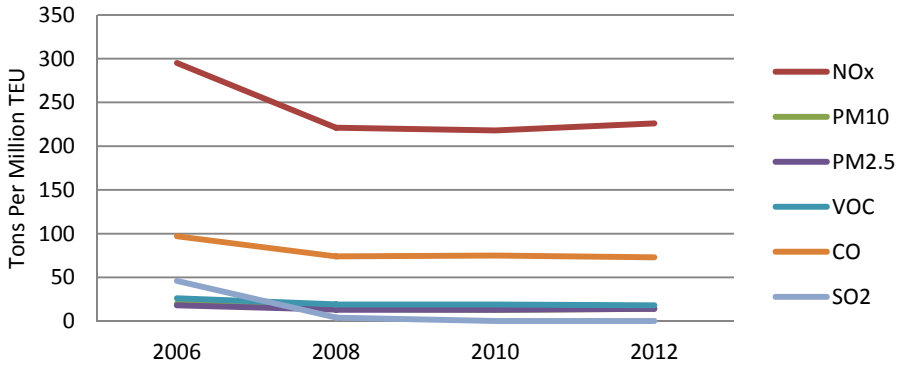
Cargo-Handling Equipment

Table B2. CHE Criteria Air Pollutant Emissions, Percent Change 2006 to 2012 (tons/million TEU)[37]

	NO_X	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2
2006-12	-23%	-30%	-22%	-31%	-25%	-100%

[35] The 2012 Emissions Inventory and past Emissions Inventories are available online at: http://www.panynj.gov/about/port-initiatives.html, last visited on 10/23/14.
[36] Data based on Table 5.25 in the 2012 Emissions Inventory.
[37] Data based on Table 2.11 in the 2012 Emissions Inventory.

Figure B2. Cargo Handling Equipment Criteria Air Pollutant Emissions, 2006-2012



Heavy-Duty Diesel Vehicles

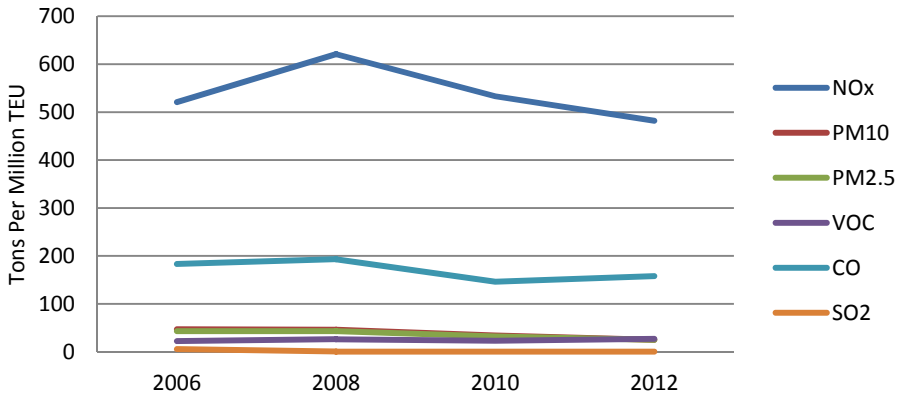
Table B3. Trucks Criteria Air Pollutant Emissions, Percent Change 2006 to 2012 (tons/million TEU)[38]

	NO_X	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2
2006-12	-7%	-47%	-42%	23%	-14%	-92%

Table B4. Vehicle Miles Traveled and Idling Hours for Port Authority Trucks

		VMT	Idling Hours
On Terminal	2012	4,696,337	1,970,936
	2010	4,025,715	3,483,603
		VMT	
On Road VMT	2012	124,718,000	
	2010	115,005,411	

Figure B3. Trucks Crtiteria Air Pollutant Emissions, 2006-2012



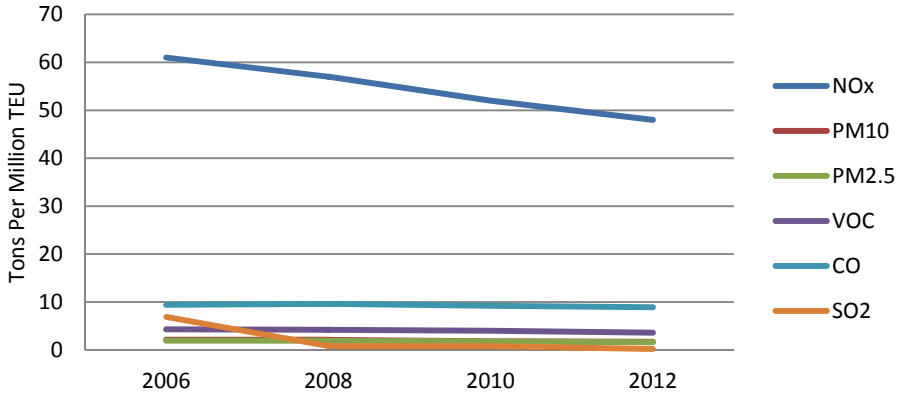
[38] Data based on Table 3.19 in the 2012 Emissions Inventory.

Railroad Locomotives

Table B5. Rail Criteria Air Pollutant Emissions, Percent Change 2006 to 2012 (tons/million TEU)[39]

	NO_X	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2
2006-12	-21%	-19%	-16%	-16%	-5%	-97%

Figure B4. Rail Criteria Air Pollutant Emissions, 2006-2012

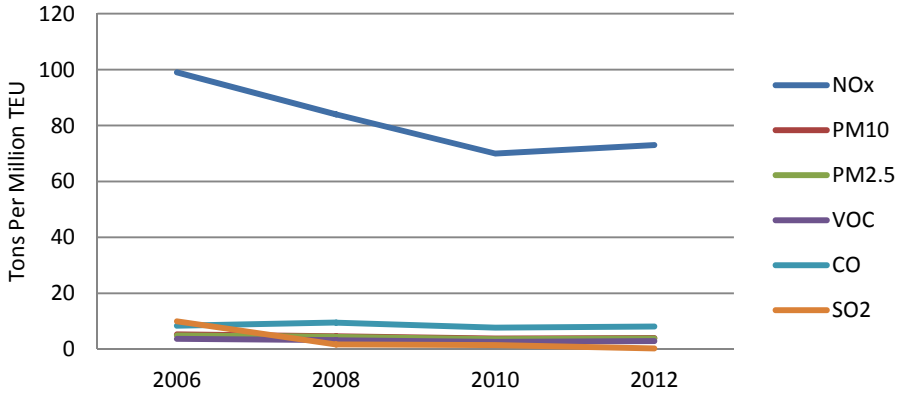


Harbor Craft

Table B6. Harbor Craft Criteria Air Pollutant Emissions, Percent Change 2006 to 2012 (tons/million TEU)[40]

	NO_X	PM_{10}	$PM_{2.5}$	VOC	CO	SO_2
2006-12	-26%	-25%	-22%	-22%	-4%	-97%

Figure B6. Harbor Craft Criteria Air Pollutant Emissions, 2006-2012



[39] Data based on Table 4.11 in the 2012 Emissions Inventory.
[40] Data based on Table 5.26 in the 2012 Emissions Inventory.

A CLEAN AIR STRATEGY

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