A Clean Air Strategy

for The Port of New York & New Jersey

2013 Implementation Report

December 2013

THE PORT AUTHORITY OF NY & NJ

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List of Acronyms

CAS	Clean Air Strategy
CHE	Cargo Handling Equipment
CMAQ	Congestion Mitigation and Air Quality
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DOC	Diesel Oxidation Catalyst
DPF	Diesel Particulate Filter
ECA	Emissions Control Area
EPA	Environmental Protection Agency
ESI	Environmental Ship Index
GHG	Greenhouse Gas
HC	Harbor Craft
IMO	International Maritime Organization
LNG	Liquefied Natural Gas
LSD	Low Sulfur Diesel
PPM	Parts per Million
NAAQS	National Ambient Air Quality Standards
NJCCC	New Jersey Clean Cities Coalition
NJ DEP	New Jersey Department of Environmental Protection
NO_x	Mono-Nitrogen Oxides NO and NO2 (Nitric Oxide and Nitrogen Dioxide)
NYC DOT	New York City Department of Transportation
NYC EDC	New York City Economic Development Corporation
NYNJLINA	New York/Northern New Jersey/Long Island Non-Attainment Area
NYSA	New York Shipping Association
NYS DEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
OGV	Ocean-Going Vessels
PANYNJ	Port Authority of New York and New Jersey
PM	Particulate Matter
RFID	Radio-Frequency Identification
SO_2	Sulfur Dioxide
ULSD	Ultra-Low Sulfur Diesel

Executive Summary

This first Implementation Report of the Clean Air Strategy for the Port of New York and New Jersey provides details on the actions implemented to reduce air emissions generated by marine terminal activities and tracks progress toward the goals and objectives set forth in the 2009 Clean Air Strategy (CAS). And what significant progress there has been, both in terms of the sheer number of actions implemented and their associated reduction of air emissions. In the first four years of CAS implementation, from October 2009–November 2013, 80% (27 of 34) of the near-term actions identified in the CAS across all five sectors of port operations (ocean-going vessels, cargo handling equipment, trucks, rail, and harbor craft) were completed or are currently underway.

In addition, the latest 2010 Port Authority of New York and New Jersey Port Commerce Department Emissions Inventory, released in December 2012,[1] shows that between 2006 and 2010 all criteria air pollutants decreased at a rate greater than or equal to the annual 3% goal set in the CAS, despite a 4.2% increase in cargo volume at the port during those four years. Greenhouse gases (GHGs) also decreased at an annual average rate of 1.75% over those four years. The decrease in GHGs, however, did not meet the annual 5% net decrease goal identified in the CAS, making this an area of focus for future action development. Table ES.1 provides the average annual rate of decrease for each emission type.

Table ES.1: Average Annual Rate of Decrease of Maritime-Related Air Emissions from 2006 to 2010

Emission Type	Average Annual Rate of Decrease
NO_x	3%
PM10	4.75%
PM2.5	4.5%
VOC	3.25%
CO	3.5%
SO_2	6.25%
GHG	1.75%

As the 2010 Emissions Inventory only included fourteen months of CAS implementation, the full impact of CAS actions is not covered in this Implementation Report. Future inventories are likely to show even more dramatic emissions reductions of both criteria pollutants and GHGs as a result of some of the larger CAS programs, such as the Clean Vessel Incentive Program and Truck Replacement Program, which had barely just or not yet begun at the time of the last inventory. The upcoming 2014 CAS Update and 2015 Implementation Report will provide additional information on the impact of CAS actions on emissions, including the total estimated percent reductions per year for each sector calculated from the 2006 sector baseline.

[1] For the full 2010 PANYNJ Port Commerce Department Emissions Inventory, see: http://www.panynj.gov/about/pdf/pv_final_panynj_2010_multi_facility_ei_repor_1feb13_scg.pdf.

While the full extent of the resulting emission reductions from CAS actions cannot be verified at this time, it is evident that the actions implemented in all sectors since 2009 have been substantial and have advanced the goals and objectives laid out in the CAS. None of this would be possible without the tremendous effort put forth by a large group of CAS partners. In addition to the twelve actions led by the Port Authority, another eleven actions were implemented by four (EPA Region 2, NJ DEP, NYC DOT, and NYC EDC) of the eleven Strategy Group Partners and a new community partner (New Jersey Clean Cities Coalition); four more actions were implemented directly by the rail lines and terminal operators at the port.

Coupled with detailed information on implemented and in-progress actions, this report describes the status of any outstanding CAS-committed actions and future implementation plans for each sector. As the CAS moves into the second phase of implementation, the Strategy Group, with continued input from sector-specific and broader community and environmental stakeholders, will look to identify new CAS actions as part of the 2014 CAS Update that will build upon the existing strong foundation. These actions will focus on continuing areas of proven success, such as retrofitting and replacing old equipment, as well as looking at how new technologies could be deployed, how to address alternative fuel infrastructure issues, and how to continue to increase modal diversity. Future actions will look to both drive innovation and be grounded enough to ensure continued emissions reduction, despite any port growth.

Even as the region's air emissions begin to show improvement and port-related emissions continue to decline, more work is needed to ensure this trajectory continues. One of the biggest challenges faced for future efforts is identifying resources to implement additional initiatives, including funding for incentives to encourage participation in voluntary actions, as well as cross-agency coordination to manage programs, verify their completion, and track resulting emission reductions. Another challenge will be identifying actions that continue to reduce emissions in a cost-effective manner after the opportunities with the greatest potential for emissions reduction have already been addressed. 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.

Introduction

Clean Air Strategy Overview

Purpose and Goals

The Clean Air Strategy for the Port of New York and New Jersey (herein referred to as the CAS), finalized October 21, 2009, was developed by the Port Authority of New York and New Jersey (Port Authority or PANYNJ) and its Partners in consultation with industry, environmental, and community stakeholders to ensure that air emissions generated by mobile sources associated with marine terminal operations and activities decline even with anticipated future port growth over the subsequent ten years. The CAS is focused on reducing maritime emissions from all five port sources: ocean-going vessels (OGV), cargo handling equipment (CHE), heavy-duty diesel vehicles (trucks), railroad locomotives (rail), and harbor craft. The CAS seeks to achieve an overall decrease in port-related maritime emissions, despite any port growth, between 2009 and 2019. The overall purpose of the CAS is to address three primary objectives: 1) reduce emissions-related impacts on human health and the environment resulting from maritime-related criteria air pollutant emissions, particularly those that come from diesel particulate emissions; 2) reduce maritime-related contribution to greenhouse gas emissions associated with climate change; and 3) contribute to the effort to bring the New York/Northern New Jersey/Long Island Non-Attainment Area (NYNJLINA) into attainment.

In addition, the CAS identifies two specific emission reduction goals. They are:

- Achieve an annual 3% net decrease of criteria pollutants. This equates to a 30% decrease from baseline 2006 levels despite any port growth over the next ten years [2009 to 2019].
- Achieve an annual 5% net decrease of greenhouse gases (GHGs). This equates to a 50% decrease from 2006 baseline levels despite any port growth over the next ten years [2009 to 2019].

At the time the CAS was drafted, the region was in non-attainment of national ambient air quality standards for fine particulate matter (PM2.5) and ozone, of which oxides of nitrogen are a precursor. In December 2012, New Jersey submitted a request to the United States Environmental Protection Agency (EPA) for the redesignation to attainment for the 1997 annual and 2006 24-hour PM2.5 national ambient air quality standards (NAAQS) for the New Jersey portion of the New York-Northern New Jersey, NY-NJ-CT nonattainment area, and the Philadelphia-Wilmington, PA-NJ-DE nonattainment area. In June 2013 New York requested redesignation to attainment for the New York portion of the New York-Northern New Jersey nonattainment area. On September 4, 2013 EPA approved the redesignation to attainment for the 1997 annual and 2006 24-hour PM2.5 NAAQS for the New Jersey portion of the New York-Northern New Jersey nonattainment area and the Philadelphia-Wilmington nonattainment area. EPA has not yet proposed action on New York's redesignation request.

EPA's new PM2.5 standard, which is more protective than the 2006 standard,[2] was promulgated in December 2012. EPA is in the process of reviewing data that will determine which areas will be in nonattainment of the 2012 standard and anticipates completing that process by December 2014. Although one of the overarching goals of the CAS is to help the NYNJLINA reach attainment—which is now close to happening—the relevance of the CAS remains the same for three main reasons: 1) the area is still out of attainment for ozone, 2) local-level exposure and impacts are still a concern, and 3) the area will be in maintenance mode and will need to continue to reduce emissions and work to stay in attainment, particularly with anticipated economic growth. Neither of the applications for attainment or the new emissions standard will affect the overall specific emissions reduction goals of the CAS, which are measured against the 2006 emissions baseline.

Scope and Partners

The scope of the CAS includes Port Authority marine terminal facilities within the Port District, located within a twenty-five mile radius of the Statue of Liberty. These facilities include the Port Newark, Port Jersey and Elizabeth Port Authority Marine Terminals. Since the CAS 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. The Global Marine terminal was previously privately owned, however it was (and is)

[22] The new annual NAAQS for fine particles (PM2.5) is 12 (down from 15) micrograms per cubic meter ($\mu g/m^3$).

still considered part of the original scope of the CAS, even though it was not included in the 2006 baseline emissions inventory. It also includes maritime facilities controlled by the CAS Partner, New York City, including the Brooklyn and Manhattan Cruise terminals, Howland Hook marine terminal, and related freight areas such as Hunts Point. The CAS 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.

A key component of developing the CAS actions was working with the following group of Partners, known, along with the Port Authority, as the Strategy Group:

- New Jersey Department of Environmental Protection (NJ DEP)
- New York State Department of Environmental Conservation (NYS DEC)
- City of New York, Mayor's Office of Long Term Planning and Sustainability
- New York City Department of Transportation (NYC DOT)
- New York City Economic Development Corporation (NYC EDC)
- New York Shipping Association (NYSA)
- United States EPA Region 2
- Cities of Bayonne, Elizabeth, Jersey City, and Newark in New Jersey

These Partners, along with the Port Authority, signed a Statement of Intent to share accountability and commitment with respect to supporting implementation of the CAS. In addition to implementing specific actions, they agreed to work cooperatively to:

- Implement the actions outlined in the CAS to significantly reduce emissions of port-related criteria air pollutants, and greenhouse gases in the next decade;
- Prioritize the actions outlined in the CAS 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 CAS;
- Develop methods including periodic air emissions inventories to measure progress towards achieving the goals in the CAS;
- Publicize environmental results and accomplishments; and
- Continue to pursue opportunities to collaborate on ways to enhance port sustainability.

In the first four years of CAS implementation, Partners executed specific actions, supported grant applications submitted by the Port Authority for CAS actions, and engaged in and conducted general outreach, education, and advocacy activities in support of the CAS. The Port Authority and Partners continue to reach out to local and state agencies, Port Authority tenants and customers, and environmental and community stakeholders to engage them in CAS action implementation, as well as obtain their feedback on changes needed to future iterations of the CAS. In addition, the Strategy Group is working to expand support for the CAS and implementation of its actions by growing the list of involved stakeholder partners.

2013 Implementation Report Overview

Context

CAS actions implemented since the Strategy's inception were prioritized based almost entirely on emissions reduction potential and available funding. There were also a number of external factors and business trends that contributed to the trajectory of implementation efforts and will continue to play into discussions regarding future actions and updates needed to the CAS. An encouraging trend, in terms of emissions reduction, is the shift in the modal split of cargo containers towards rail. This is partially due to the cost structure change instituted by the Port Authority and NYSA in an attempt to bolster this shift. Currently, the projected growth of goods moved by rail (5% per year) outpaces the anticipated growth of total cargo volume (4% per year) over the next seven years (through 2020). The new North American Emissions Control Area (ECA), support for which was an action in the CAS, as well as EPA's 2010 non-road diesel standards mandating the use of ultra-low sulfur diesel (ULSD), both helped set the stage for further maritime-related emissions reductions.

Balancing continued emissions reductions with anticipated port growth, which is needed for the economic stability of the region, will continue to be at the forefront of future CAS efforts.

Superstorm Sandy in 2012 resulted in a few implementation setbacks as terminals and equipment were inundated with salt water; however, the fallout from the storm also presented some unforeseen opportunities. With the estimated loss of 25% of trucks serving the Port Authority due to storm damage, there is the potential to see a resulting profile shift in the age of trucks to newer trucks as damaged trucks

are replaced. Lastly, as the Panama Canal expansion nears completion, the Port Authority is gearing up to accommodate larger ships that will call the port (resulting in the same cargo moved with less vessel trips in and out of the harbor) and continuing to encourage multi-modal diversity, as mentioned above. Balancing the CAS goal of continued emissions reductions with anticipated port growth, which is needed for the economic stability of the region, will continue to be at the forefront of future CAS efforts.

Between 2006 and 2010 there was an average decrease from the 2006 baseline of 17% across criteria air pollutants associated with port operations, despite a 4.2% increase in cargo volume. In addition, all criteria air pollutants decreased at a rate greater than or equal to the annual 3% goal set in the CAS.

General Assessment of Current Progress

The Port Authority and its Partners have made tremendous strides toward the goals outlined in the CAS and CAS actions have succeeded in improving air quality in and around the port. The latest 2010 PANYNJ Port Commerce Department Emissions Inventory, released in December 2012, shows an average decrease from the 2006 baseline of 17% across criteria air pollutants, despite a 4.2% increase in cargo volume at the port between 2006 and 2010.[3,4] Table 1 shows the detailed comparison between 2006 and 2010.

This data illustrates that all criteria air pollutants have decreased at a rate greater than or equal to the annual 3% goal set in the CAS in the four years between 2006 and 2010. It also signals that significant focus is still needed to reach the goal of an annual 5% net decrease reduction of GHGs. However, as the last Emissions Inventory covers only 14 months of CAS implementation (November 2009–December 2010) the data does not include results from the majority of CAS actions implemented to-date, many of which began in earnest after 2010. The actions implemented in all sectors since 2010 have been substantial and achieved significant progress in upgrading technologies, fuels, and business practices as directed by the CAS.

Table 1: Total PANYNJ Port Related Emissions Comparison 2006 to 2010

Criteria Air Pollutant	Change % 2006 to 2010
NO_x	12% decrease
PM10	19% decrease
PM2.5	18% decrease
VOC	13% decrease
CO	14% decrease
SO_2	25% decrease
CAP (Ave)	17% decrease
Cargo Volume (TEU)	4.2% increase
CAP/TEU (Ave)	20% decrease
GHG (CO2 Eq)	7% decrease

While the full extent of the resulting emission reductions from CAS actions cannot be verified at this time, the emissions reduction estimates for each action provided in the CAS appear to be holding accurate, or in some cases were even underestimated; hence it can be stated that substantial emissions reductions have indeed occurred from these improvements. Where possible, this report includes updated emissions reduction estimates for individual actions in tons per year based on actual implementation

[3] These numbers are inclusive of cargo and emissions for the second half of 2010 from the Global Container Terminal, which was acquired by the Port Authority that year.
[4] For the full 2010 PANYNJ Port Commerce Department Emissions Inventory, see: http://www.panynj.gov/about/pdf/pv_final_panynj_2010_multi_facility_ei_repor_1feb13_scg.pdf.

details (i.e., number and types of equipment replaced). The 2014 CAS Update and 2015 Implementation Report (discussed in more detail in the Looking Ahead section of this report), will provide a much clearer quantified picture of the impact CAS actions have had on emissions, which in turn will help identify what additional actions make sense to pursue to build upon the success seen so far and to ensure continued reductions despite any port growth.

The current status of the Committed Actions outlined in the CAS are as follows: all seven Ocean-Going Vessel (OGV) actions are implemented or in progress; six of seven Rail actions are implemented or in progress; six of seven Harbor Craft actions are implemented or in progress; four of six Truck actions are implemented or in progress along with one new action; and three of six Cargo Handling Equipment (CHE) are implemented or in progress. Table 2 provides an overview of which actions have been fully implemented, which are in progress, and which have not yet been started. Further details on all CAS Committed actions, including associated emissions reductions for implemented and in progress actions where known, are found in the next section.

Table 2: CAS Committed Action Status Overview

CAS ID	Action	Status	Implementer
OGV (b)	Vessel Speed Inventive Program	Implemented	PANYNJ
OGV (c)	ULSD Fuel Incentive Program	Implemented	PANYNJ
OGV (d)	Clean Vessel/Green Flag Program	In progress	PANYNJ
OGV (e)	Brooklyn Cruise Terminal Shore Power	In progress	PANYNJ
OGV (f)	Port of Rotterdam Partnership	In progress	PANYNJ
OGV (g)	North American Emissions Control Area	Implemented	EPA R2
OGV (h)	Seek to Repeal Tax Exemption of Bunker Fuel	Implemented	NYC EDC
CHE (f)	Hydraulic and Electric Hybrid Pilots	Implemented	PANYNJ
CHE (g)	Install Engines with DPFs on Wharf Cranes	Committed	-
CHE (h)	Modernize CHE to meet 2007 Standards	In Progress	PANYNJ
CHE (i)	Replace ⅓ of CHE with Alternative Powered CHE	Committed	-
CHE (j)	Strengthen Idle Reduction Program	Committed	-
CHE (k)	Decommission/Electrify 11 Diesel Cranes	In Progress	Terminal Ops
Trucks (e)	Emission Reduction Fund	Implemented	PANYNJ
Trucks (f)	SmartWay-type Partnership	Implemented	EPA R2
Trucks (g)	Truck Phase Out and Replacement Program	In Progress	PANYNJ
Trucks (g2)	Truck Appointment System	Committed	-
Trucks (h)	Freight Movement Study	Implemented	NYC EDC
Trucks (i)	Public-Private Partnerships	Committed	-
New Action	Hunt's Point Voluntary Truck Program	In Progress	NYC DOT

CAS ID	Action	Status	Implementer
Rail (g)	Retrofit 3 Switching Locomotives with GenSets	Implemented	NJ DEP
Rail (h)	Retrofit 2 Switching Locomotives with GenSets	In Progress	PANYNJ
Rail (i)	ULSD Fuel Use in Switchers and CHE	Implemented	Rail Lines
Rail (j)	Operational Procedures for Reducing Idling	Implemented	Rail Lines
Rail (k)	Extend and Modernize Rail Lines	Implemented	PANYNJ
Rail (l)	Install Anti-idling Technology	In Progress	Rail Lines
Rail (m)	Evaluate Alternative Powered Lifting Equipment	Committed	-
HC (d)	Cross-Harbor Rail Barge Actions	In Progress	PANYNJ
HC (e)	Install DOCs on Private Ferries	Implemented	NYC DOT
HC (f)	Accelerate Use of ULSD in Harbor Craft	Implemented	NYC DOT
HC (g)	Fuel Efficiency Measures for Harbor Craft	In Progress	NY EDC
HC (h)	Test Combustion Controls for Tugs	Committed	-
HC (i)	Raise Awareness	Implemented	EPA R2
HC (j)	Expand MVERRP to Private Harbor Craft	In Progress	NYC DOT/NJCCC

As the table illustrates, significant advancements have been made in terms of the number of actions fully implemented or in progress across all five sectors in the first four years of the CAS. In recognition of this achievement, the Northeast Diesel Collaborative—a partnership between EPA, state agencies, and private and nonprofit groups—awarded the 2011 Breathe Easy Leadership Award to the Port Commerce Department of the Port Authority—which implemented the most number of CAS actions, as well as secured and provided the greatest amount of resources for implementation—for its efforts under the CAS.

Significant advancement has been made in terms of the number of committed actions fully implemented or in progress (27 out of 34) across all five sectors in the first four years of the CAS.

The biggest challenge faced for future efforts is identifying resources to implement additional initiatives. Resource needs include funding for incentives to encourage participation in voluntary actions, as well as cross-agency coordination to manage programs, verify their completion, and track resulting emission reductions. The Port Authority has committed to be a sustainable port, both economically and environmentally, and the achievements made through implementing CAS actions are crucial to meeting that commitment. Responding to the challenge of accommodating port growth, with all the economic benefits that it brings to the region, in a way that protects and improves the environment is a worthy undertaking whose success will rely on continued engagement by the Port Authority and all of its partners and stakeholders.

Report Organization

The remainder of this report is organized into three sections: Sector-Based Implementation Progress, Looking Ahead, and Conclusion. The Sector-Based Implementation Progress section is the heart of the

report and provides details on CAS Committed Actions that have been completed or are currently underway, the status of Committed Actions not yet implemented, and an update on Future Actions for each sector of port operations. Each sector subsection contains 1) a sector overview, 2) implementation details and a table providing the period of implementation, funding, and updated estimated emissions reductions, where available, for all implemented actions, and 3) notes on future efforts and next steps, including updates on those action not yet implemented. The Looking Ahead section provides information on the future direction CAS implementation, how technological and economic changes may influence future CAS efforts, and an update on further CAS reporting and outreach. The Conclusion section provides a recap of CAS progress to-date and trajectory for future CAS actions and efforts. Appendix A provides the complete list of 2009 CAS Committed and Future Actions for reference.

Sector-Based Implementation Progress

Background

As noted in the prior section, there has been remarkable progress in first four years of CAS implementation, with fifteen CAS actions fully implemented, eleven CAS actions plus one new action (not part of the original 2009 CAS action list) in progress, and only seven outstanding CAS actions—some of which may no longer make sense to implement based on new alternatives, technological feasibility, or other factors that were unknown at the time the CAS was finalized. This section provides detailed information, by sector, on CAS Committed Actions that have been fully implemented or are in progress as of December 1, 2013. These actions are titled "Newly Implemented Actions" here to differentiate them from the previously Implemented Actions as listed in the CAS.[5]

Below the implementation details in each sector is a table that includes the period of implementation, associated funding amount, and updated emissions reductions for each implemented or in progress action.

- The **Period of Implementation** column states the year or span of years in which the action was implemented. For those actions that resulted in developing a program (e.g., the Clean Vessel/Green Flag Program), the full anticipated length of the program is used as the period of implementation, not just the time it took to get the program up and running; therefore, many of those actions as considered still "In Progress."
- The number in the **Funding** column is the total cost to implement the action, including any grants, matching funds, and administrative costs.
- **Updated Estimated Emissions Reductions** provides estimates in tons per year for PM, NO_x, and GHG reductions associated with each action, where known, based on actual implementation data (i.e., number and types of equipment).
- The final column lists the **Estimated Emissions Reductions** as they were included in Appendix A of the 2009 CAS, for reference and comparison purposes. The 2014 CAS Update will include the total estimated percent per year reductions for each sector calculated from the 2006 sector baseline.

For those sectors that have Committed Actions that are not yet underway (all but ocean-going vessels), the Status of Outstanding Committed Actions section provides an update on each of those actions, describing

[5] Note that for this report the Newly Implemented Action titles are paraphrased from the original CAS Committed Action language; see Appendix A for the full action as written in the CAS.

the timing for implementation, roadblocks to implementation, or reasons why it may no longer make sense to implement that specific action. Each sector subsection then wraps up with Future Implementation Plans which lists the Future Actions from the CAS and gives some general thoughts on areas of focus and ideas for potential new actions. The Strategy Group, with input from stakeholders, will discuss updating or replacing any outstanding actions with new actions as part of the 2014 CAS update (see the Looking Ahead section in this report for more detail).

Ocean-Going Vessels (OGVs)

As described in the CAS, OGVs are the greatest port-related source of criteria pollutants, with the exception of carbon monoxide (CO), and they are the second greatest source of carbon dioxide (CO_2)-equivalent emissions. As such, this sector has been a major focus of efforts since the CAS was issued, resulting in all seven of the Committed Actions implemented or in progress. As discussed above, since the 2010 Emissions Inventory data only goes through 2010, the majority of the impact these actions had on this sector's emissions will not be captured until the 2012 and 2013 emissions inventories are released in early 2014 and 2015, respectively.

All seven of the OGV Committed Actions are implemented or in progress.

Implementation Details

Newly Implemented Actions

OGV (b) and (c): Vessel Speed Reduction[6] Program and LSD Fuel Incentive Program **(IMPLEMENTED)**

In 2010 the Port Authority launched an OGV Low-Sulfur Diesel (LSD) Fuel Incentive Program, to encourage the use of low-sulfur fuel. Qualifying vessels received 50% of the delta in cost between conventional bunker fuel and low sulfur fuel at 0.2% sulfur content for the gallons used on transits into/out of the port and while at berth. In order to participate in the program, vessels had to also participate in the Vessel Speed Reduction Program, limiting speed to an average speed of ten knots on inbound/outbound transits. The LSD Fuel Incentive Program was replaced by the Clean Vessel Incentive Program below in January 2013. At the end of the program in 2012, program costs totaled $821,688 in Port Authority funds, including incentives to vessels making 701 vessel calls, resulting in estimated emissions reductions of 35.6 tons of NO_x, 12.5 tons of PM, and 1,384.6 tons of GHG for the program (2010–2012).

> **Promoting Cleaner Fuel and Slower Speeds**
>
> **The Low-Sulfur Diesel Fuel Incentive Program, replaced by the Clean Vessel Incentive Program in January 2013, provided incentives to vessels making 701 vessel calls, resulting in estimated emissions reductions of 35.6 tons of NO_x, 12.5 tons of PM, and 1,384.6 tons of GHG.**

OGV (d): Clean Vessel Incentive Program **(IN PROGRESS)**

This Port Authority funded program began January 2013 and provides qualifying ships with a financial incentive based on the vessel's score achieved on the World Port Climate Initiative's Environmental Ship Index (ESI).[7] Vessels with ESI scores of 20–29 receive $1,500, and ships with scores greater than 30 receive $2,500 for each vessel call. Vessels that participate in vessel speed reduction, limiting their speed to ten knots on inbound and outbound transits earn an additional five points, which may be added to the ESI score. The program awards ships with Tier II engines an additional $1,000 and those with Tier III engines receive an additional $2,000. The program will run through 2015 with $1.6M in incentives dedicated to each year. If the committed funds for a certain year have all been allocated before the end of the year, the program will start again at the beginning of the following year. Based on an anticipated participation rate of 20% of the total vessel calls at Port Authority marine terminals, which would represent approximately 600 vessel calls per year, and assuming that 80% (480) of those vessel calls would have a qualifying ESI score between 20–29 points and 20% (120) of those vessel calls would have a qualifying ESI score of above 30 points, the program is expected to provide annual emission reductions of 182.2 tons of NO_x, 38.3 tons of PM, and 264.1 tons of sulfur dioxide (SO_2).

OGV (e): Brooklyn Cruise Terminal Shore Power **(IN PROGRESS)**

The Port Authority has authorized $19.3M for the Brooklyn Cruise Terminal Shore Power project to install the electrical infrastructure necessary for cruise vessels to connect to a landside electrical grid while at berth, with $4.3M provided by New York State and $2.858M via an EPA grant. The construction phase for the project began in May 2013 and is scheduled for completion by the end of April 2015. The specific site

[6] The text of the report uses the official program titles for implemented actions; in a few cases this differs slightly from the action titles as paraphrased from the CAS and included in the tables of this report (i.e., Vessel Speed Reduction Program (implementation title) versus Vessel Speed Incentive Program (CAS title).

[7] Scores are based on three factors: the amount below the IMO standard for both NO_x emissions and sulfur content of fuel the ship is using and whether the ship has the capability to receive shore power. For further detail on how scores are calculated see: http://esi.wpci.nl.

was chosen due to the Brooklyn Cruise Terminal's proximity to a densely populated residential area, and thus the greatest potential to improve health in the local community. It is important to note that the electrical rates, in dollars per kilowatt-hour, are approximately three times higher than what it costs cruise ships to generate power with their onboard diesel generators. As a result, the only way to ensure that the cruise lines, which had already spent close to $2M, would plug-in while at berth was to get an agreement between NYC EDC and New York Power Authority in place to cover the delta between the prevailing electricity rate and cost to generate power onboard. That agreement ends on December 31, 2017. Currently, there are two ships that are designated to plug into shore power—the Queen Mary 2 is ready to go and the Caribbean Princess' conversion is 90% complete. The estimated emissions reductions from this action remain the same as originally estimated in the CAS.

OGV (f): Port of Rotterdam Partnership **(IN PROGRESS)**

The Port Authority has continued its Partnership with the Port of Rotterdam. The two ports meet on occasion to exchange information on sustainability initiatives and both participate as incentive providers in the ESI-based Clean Vessel Incentive program. The Port Authority also provides the Port of Rotterdam updates on the status of the Hydraulic Hybrid Yard Hostler pilot program.

OGV (g): North American Emissions Control Area **(IMPLEMENTED)**

The Port Authority supported EPA's application to the International Maritime Organization (IMO) for the establishment of a North American Emissions Control Area (ECA). The IMO officially designated the waters off of North American coasts as an ECA on March 26, 2010. The effective date of the first-phase fuel sulfur standard (10,000 parts per million (ppm) sulfur) is 2012, and the second phase begins in 2015 (1,000 ppm sulfur). In addition more stringent Tier 3 NO_x standards for new ships that call on ports in ECAs are set to begin in 2016. The IMO also officially designated the water around Puerto Rico and the Virgin Islands as an ECA on July 15, 2011, with the first-phase sulfur standard in effect starting in 2014, second phase in 2015, and NO_x standards in 2016. This action provides significant reductions in particulate matter as a result of the dramatic reductions in the sulfur content of fuel from 30,000 ppm prior to 2012 to 1,000 ppm in 2015.

OGV (h): Seek to Repeal Tax Exemption of Bunker Fuel **(IMPLEMENTED)**

NYC EDC sought to repeal the New York State tax exemption for bunker fuel and found it to be politically more complicated than anticipated, and thus, infeasible to implement at this time.[8] However, despite no repeal, a private company named Metro Energy took the initiative to open a biodiesel fueling station for harbor craft at its facility in Newtown Creek, Brooklyn, New York.

[8] As this action was worded as "seek to repeal" for the purpose of the CAS action tracking, this action is considered implemented.

Table 3: OGV Newly Implemented Actions Details

CAS ID	Action	Period of Implementation	Funding	Updated Estimated Emission Reductions in Tons Per Year (TPY) of PM / NO_x / GHGs[9]	Estimated TPY Emission Reductions PM / NO_x / GHGs from CAS Appendix A[10]
OGV (b) OGV (c)	Vessel Speed Incentive Program ULSD Fuel Incentive Program *(Note these two actions were combined during implementation)*	2010–2012	$822K	4.2 / 11.9 / 461.5[11]	40.3 / 705 / 25,831
OGV (d)	Clean Vessel/Green Flag Program	2013–2015	$5.5M	38.3 / 182.2 / 264.1	Not previously calculated
OGV (e)	Brooklyn Cruise Terminal Shore Power	2009–2015	$19.3M	6.5 / 95.3 / 1,487	6.5 / 95.3 / 1,487
OGV (f)	Port of Rotterdam Partnership	2009–2014	–	Not quantifiable	Not quantifiable
OGV (g)	North American Emissions Control Area	2009	–	Not quantifiable	Not quantifiable
OGV (h)	Seek to Repeal Tax Exemption of Bunker Fuel	2009	–	Not quantifiable	Not quantifiable

Future Implementation Plans

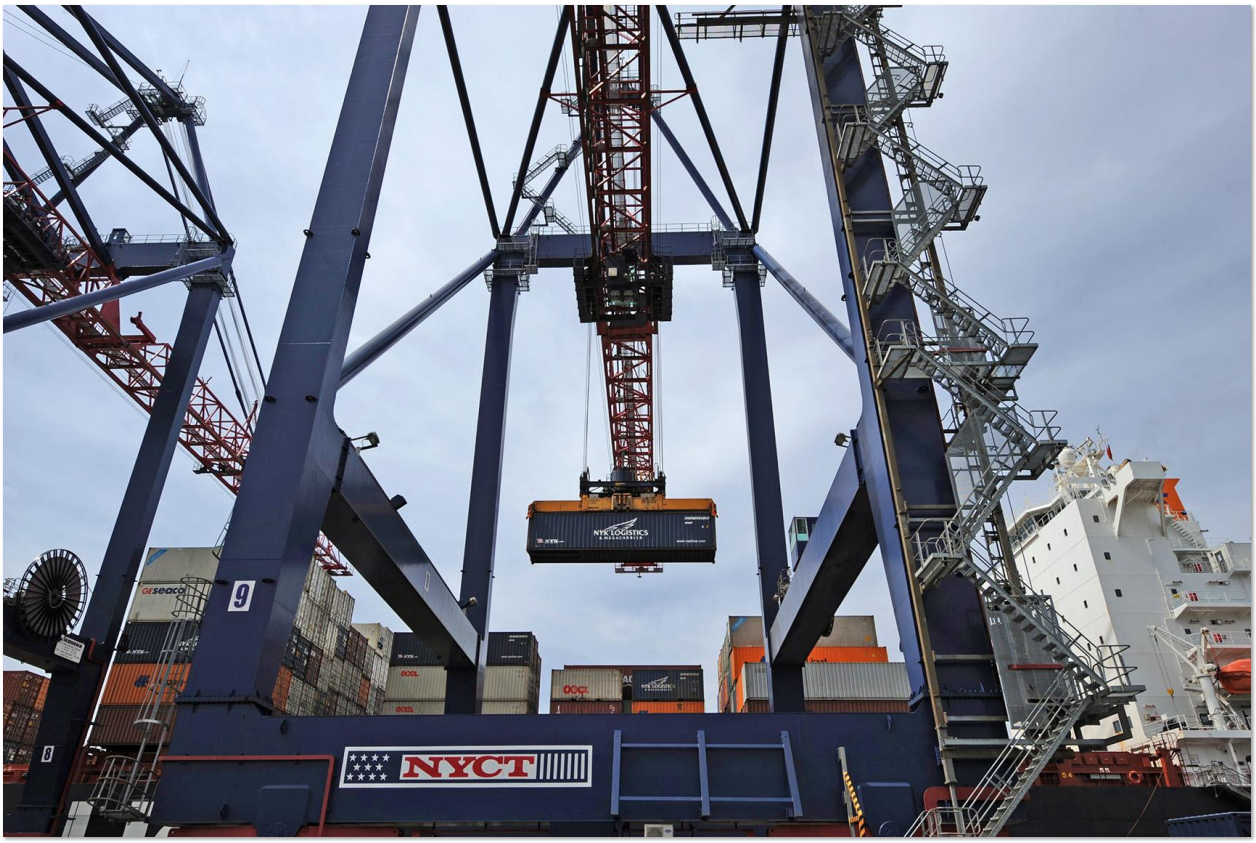
Immediate next steps include continuing the programs currently in place and ensuring continued participation after existing incentives run out. In addition, the CAS contains three Future Actions for the OGV sector:

- OGV (i): Install shore power capability at the NYC EDC's Manhattan Cruise Terminal and in conjunction with all new terminal developments.
- OGV (j): Implement pilot projects for bonnets and other promising new technologies.
- OGV (k): Seek to establish a New York State tax exemption for low-sulfur fuel.[12]

OGV (i) would be a similar action to the Brooklyn Cruise Terminal; however, the focus now is on completing the Brooklyn terminal and analyzing the lessons learned prior to embarking on the Manhattan Terminal. The biggest lesson so far has been that developing the infrastructure for shore power at the Brooklyn

[9] Rounded to one decimal place in this, and all the following, sector tables.
[10] Rounded to one decimal place in this and all the following sector tables.
[11] Due to the downturn in the economy at the time this action was implemented resulting in ships operating on the margin, combined with the fact the Port Authority could only provide 50% of the delta between costs of fuel rather than the anticipated 100%, participation in this program was much less than desired and previously estimated.
[12] This action is only applicable in New York because New Jersey does not have a tax.

Cruise Terminal was very expensive and that other options should be considered, along with conducting an analysis to determine if cost savings could be achieved at other New York/New Jersey terminals. Stakeholders additionally encouraged the Strategy Group to consider technologies other than bonnets, which the industry has found to not work very well. As part of the 2014 CAS Update, the Strategy Group, with input from stakeholders, will consider new actions for the OGV sector, including those looking at alternative sources of power and ways to reduce time at berth.



Cargo Handling Equipment (CHE)

Compared to the other sectors, this sector saw the least amount of progress in terms of number and percentage of actions implemented, with three of six Committed Actions implemented or in progress. Some of the factors contributing to this include the sheer number of pieces of equipment, the fact that most equipment is upgraded on a specific replacement cycle (i.e., when old equipment has reached the end of its lifecycle or is in need of major repairs), and the lack of infrastructure for some alternatives, most notably compressed natural gas (CNG) fuel. That said, the three actions that are completed or underway are contributing to emissions reductions in the sector and are paving the way for future action implementation.

Implementation Details

Newly Implemented Actions

CHE (f): Hydraulic and Electric Hybrid Pilots **(IMPLEMENTED)**

The Port Authority completed pilot projects testing the availability and technical feasibility of using alternative powered (hydraulic and electric) CHE. Since the results appeared promising, the Port Authority then designed a program within which the Port Authority would pay the delta between a new diesel-powered piece of CHE and a new alternative-powered piece of CHE. However, it became clear that there are roadblocks to moving forward with this program and implementing either technology on a larger scale. Concerns by terminal operators include the need to train mechanics to conduct preventive and corrective maintenance for hydraulic technology. In addition, maintenance for electric technology is currently cost-prohibitive—until a critical mass is reached that would support east coast/local maintenance staff, a maintenance person has to be flown in from the west coast.

In general, terminal operators only purchase new equipment when the old equipment has reached the end of its lifespan, thus it would take many years for any large scale turnover to take place. One idea terminal operators had to move this forward is to have the Port Authority purchase the equipment and allow terminals to lease a large fleet with the option to buy if the technology proves viable. This would help to jumpstart more wide-spread adoption and reach the critical mass that is needed for terminal operators to invest independently in the equipment and its maintenance. The fiscal challenges for the Port Authority in this approach, however, are clearly evident. This idea is also applicable to CHE (i) below, which faces the same challenge of needing a critical mass to be reached in order for terminal operators to really be interested. The Strategy Group, with input from stakeholders, will discuss approaches for meeting this challenge.

Partnering with Terminal Operators to Replace Old Equipment

Working with terminal operators, the Port Authority has replaced 46 pieces of old CHE with newer, cleaner units meeting 2007 or newer off-road engine standards. The program incentive limit of $560K per year was met in 2010, 2011, and 2012; the four year program ends in 2013.

CHE (h): Modernize CHE to meet 2007 Standards **(IN PROGRESS)**

In 2011, the Port Authority began implementing a Cargo Handling Equipment Modernization incentive program that focuses on replacing old equipment with newer, cleaner units meeting 2007 or newer on-road engine standards or the latest Tier standards for non-road engine model year. The old equipment is removed from the non-attainment area or scrapped. So far, working with terminal operators, the Port Authority has been able to replace 46 pieces of equipment, with a total of 50 pieces of CHE expected to be replaced through the program which ends in 2013. The Port Authority provides 20% of the cost of new equipment, with a program incentive limit of $560K per year. This limit was met in 2010, 2011, and 2012, for a total of $1.68M given to terminal operators over that timeframe. New York Container Terminal was the first to take advantage of the program followed by APM Terminal; terminals can participate multiple times.

CHE (k): Decommission/Electrify 11 Diesel Cranes **(IN PROGRESS)**

Prior to the CAS, the Port Authority worked with terminal operators to electrify its fleet of cranes, leaving only eleven diesel cranes remaining out of a total 78 cranes in operation at the port. Out of those remaining eleven, terminal operators have decommissioned four diesel cranes to-date, leaving only seven diesel cranes at Port Authority terminals.

Table 4: CHE Newly Implemented Action Details

CAS ID	Action	Period of Implementation	Funding	Updated Estimated Emission Reductions in Tons Per Year (TPY) of PM / NO_x / GHGs	Estimated TPY Emission Reductions PM / NO_x / GHGs from CAS Appendix A
CHE (f)	Hydraulic and Electric Hybrid Pilots	2008–2013	$120K[13]	Not calculated	24.5 / 204 / 12,551
CHE (h)	Modernize CHE to meet 2007 or newer Standards	2010–2013	$2.24M	Not calculated	9.6 / 164.6 / 0.0
CHE (k)	Decommission/Electrify 11 Diesel Cranes	2009–Ongoing	–	Not calculated	3.2 / 37.8 / 1,082

Status of Outstanding Committed Actions

There are three Committed actions that have not yet been implemented:

- CHE (g): Install new engines with diesel particulate filters (DPFs) on two wharf cranes the Port Authority owns at Red Hook Container Terminal in Brooklyn and on two on-road stick cranes at the American Stevedoring, Inc. facility at Port Newark.
    - This item has not been implemented due to uncertainty over the future of Red Hook Container Terminal.
- CHE (i): Replace up to one-third of the CHE fleet at all Port Authority leased terminals with alternative powered equipment, including, but not limited to, diesel electric, hydraulic hybrid, and CNG, where technologically feasible.
    - Terminal operators have voiced their willingness to purchase CNG equipment if the infrastructure for CNG refueling exists and the CNG-powered equipment can demonstrate that they are as fuel-efficient as the diesel-powered equivalent. The Port Authority has spoken with a couple of CNG providers that expressed interest in installing a fueling station at the port, however there is concern that there would not be enough market demand. The goal would be to find a location serving more than one terminal that could also serve CNG-powered drayage trucks. There is also the potential to provide mobile fueling to the terminals. In addition, there has been some interest in converting buildings from #2 heating oil to CNG, which would further drive demand.
- CHE (j): Determine the causes of on-terminal idling by CHE and work to strengthen the Idle Reduction Program by implementing actions which reduce or eliminate those causes, where feasible.
    - Since newer engines have idle control technologies built in, this action is no longer relevant; future actions will focus on continuing to upgrade equipment.

[13] 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.

Future Implementation Plans

Efforts will continue to focus on fleet modernization and implementation of new technology. In addition, the CAS contains three Future Actions for the CHE sector:

- CHE (l): Install wind turbines as alternative energy source on Port Authority facilities.
- CHE (m): Consider actions to address cold weather idling. Start with a pilot program to work through technical issues.
- CHE (n): Replacement/upgrade of all remaining CHE not covered under CHE actions (h) and (i) using the best available technologies at the time of replacement.

Future actions will continue to focus on replacement and upgrading of all CHE. The Strategy Group will also explore actions promoting alternative sources of energy including wind turbines and solar. The Port Authority has already identified potential locations for wind turbines on the Port Jersey Peninsula and has begun identifying building roofs that meet the minimum requirement for solar. A number of ways to reduce idling are under consideration including electrical infrastructure for plug-in and automatic shut-down devices. More information is needed on the costs and benefits of such strategies, including whether emissions are worse when turning an engine on and off, versus letting it idle.

Heavy-Duty Diesel Vehicles (Trucks)

This sector was a main area of focus for initial CAS implementation due to the degree of concern over local level impacts that trucks can impart. With input from stakeholders, the Port Authority implemented two large programs to address emissions from this sector. These, combined with implementation of two additional CAS truck actions (for a total of three of six CAS actions fully implemented and one in progress) as well as one new action in progress, have greatly reduced this sector's emissions. A comparison between 2008 and 2010, before either of the major programs were in full swing, show total emissions from drayage trucks serving PANYNJ marine terminals already decreased on average 14%, while truck vehicle miles traveled increased 14%, and total drayage truck on-terminal idling hours decreased 28%, which contributed to a 31% average decrease in total truck idling emissions during the same time period. These reductions occurred despite a cargo volume increase of 1.4% during the same timeframe.

A comparison between 2008 and 2010, before either of the PANYNJ major truck programs were in full swing, show total emissions from drayage trucks serving PANYNJ marine terminals decreased on average 14%, while truck vehicle miles traveled increased 14%. In addition, total drayage truck on-terminal idling hours decreased 28%.

Truck emissions from port-related activity will continue on this decreasing trajectory as program implementation moves forward improving business practices and the overall quality of the fleet servicing the port. For example, by 2017 all trucks servicing the port will have engines with model year 2007 or newer, per the Port Authority truck phase-out plan and this will be monitored accurately through the new Radio-Frequency Identification (RFID) system set to launch in late 2013. In addition, the Port and Strategy Group Partners are continuing to find ways to encourage and implement practices supporting modal diversity, shifting cargo from trucks to rail, barge, and other manners of transportation with reduced emission impacts.

Implementation Details

Newly Implemented Actions

Trucks (e): Emission Reduction Fund **(IMPLEMENTED)**

The Port Authority implemented a $2.6M Emissions Reduction program to provide financial incentives to truck owners for the purchase of used 2004–2006 trucks that have been retrofitted with verified emission control technologies, with $750,000 provided by the Port Authority, $750,000 provided via an EPA grant, and $1.1M in private leveraged funds provided by micro lender ACCION. The program offered low interest loans and free retrofit equipment to 31 participants purchasing trucks with engine model years 2004–2006. Eligible applicants received retrofit equipment (DPFs) at no charge and financing or re-financing for five years at 0% interest through ACCION.

Trucks (f): SmartWay-type Partnership **(IMPLEMENTED)**

EPA launched a SmartWay Drayage Program shipper recruiting campaign in New York and New Jersey in 2011, working with the Port Authority, Coalition for Responsible Transportation, and the Environmental Defense Fund. Lowes, Home Depot, Walmart, Best Buy, and Hewlett Packard are some of the partners that committed to promoting cleaner supply chain actions in their goods movement activities. There had been a lot of interest in the program, however many lost their trucks in Superstorm Sandy causing some setbacks to the number of partners signing on at this time.

Trucks (g): Truck Phase Out and Replacement Program **(IN PROGRESS)**

In 2010 the Port Authority launched a $28M Truck Replacement program to replace drayage trucks that frequently serve the port and that have model year 2003 or older engines with newer drayage trucks that generate fewer emissions and have greater fuel efficiency. This program was designed by a working group composed of industry, labor, environmental, and community stakeholders. A $7M EPA grant covers 25% of the replacement truck cost, while the Port Authority allocated $21M for a low interest (5.25%) loan fund to cover the remaining 75% of the cost. The old truck must be scrapped.

In addition, the Port Authority instituted a $7.2M Supplemental Truck Replacement program, to replace drayage trucks equipped with model year 2003 or older engines with trucks equipped with model year engines 2007 or newer. A $1.6M EPA grant covered 25% of the replacement truck cost, while the Port Authority allocated $4.3M for a low interest loan fund to cover the remaining 75% of the cost. The old truck had to be scrapped. There have been zero defaults to-date on the 175 loans extended through both programs. It should be noted that the "soft" costs for both programs to administer such complex programs are high, and have run about $7.3M to cover the grant and loan administration, tracking, and reporting.

Replacing Older Trucks Makes a Big Impact on Emissions

The stakeholder designed $28M Truck Replacement program and $7.2M Supplemental Truck Replacement program, running from 2010–2013, resulted in the replacement of 429 older trucks serving the Port. The associated annual emissions reductions are roughly 70% for NO_x and 64% for PM when compared to emissions from the fleet of older, replaced trucks.

The Port Authority completed both programs in March 2013, expending all of the grant funds and replacing 429 old trucks with newer, cleaner, more fuel-efficient vehicles. Annual emission reductions from these programs total 356 tons of NO_x and 14 tons of PM, which represent roughly 70% and 64% reductions respectively in both pollutants when compared to emissions from the fleet of old trucks that were replaced, and is triple the amount of NO_x reductions previously estimated in the CAS. The Port Authority hopes to implement additional truck replacement programs depending on if and when substantial additional grant funding becomes available.

In addition to the Truck Replacement programs, 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. Once the RFID tags and reader system goes live (estimated in late 2013), ability to achieve 100% compliance will be realized.

Trucks (h): Freight Movement Study **(IMPLEMENTED)**

NYC EDC completed a study of freight movement, modal splits, and short sea shipping called the Marine Cargo Plan.[14] With regard to freight movement, use of low emission/alternate fuel trucks is a priority for the New York City. Wherever possible, the city will mandate use of clean trucks at city-based marine

[14] This study was not publically released.

facilities. This has already occurred at the Brooklyn Port Authority Marine Terminal where the main tenant has been converting its delivery truck fleet to CNG.

New Action: Hunt's Point Voluntary Truck Program[15] **(IN PROGRESS)**

NYC DOT implemented a new action funded by a $25M Congestion Mitigation and Air Quality (CMAQ) grant to encourage, via a financial incentive, upgrades from older to newer trucks or use of alternative fuels by trucks servicing Hunt's Point two to three times per week with vehicle miles travelled occurring locally and/or in the New York metro non-attainment area. Truck owners are reimbursed between $34–$43K for a 2010 EPA compliant diesel truck; up to $48K for a new CNG vehicle or diesel hybrid truck; and $70K for a new electric vehicle, as well as the cost to purchase and install diesel retrofit equipment on older vehicles. There is also a scrap-only incentive.

As of June 2013, eight diesel retrofits, 196 new 2010 diesels, and twenty-two 2010 CNG replacement trucks have been placed into service. Another twenty-two trucks have been given cash for scrappage only. NYC DOT and others are looking at ways to expand the program by helping to get CNG fueling infrastructure in place. There has been high interest from the trucking industry in purchasing more CNG trucks—NYC DOT estimates at least 100–200 more trucks—if the infrastructure was there. Conversely, due to the lack of CNG infrastructure, many fleets are turning their interest toward diesel hybrid technology for its fuel efficiency benefits during the interim until CNG fueling facilities become available.

Table 5: Trucks Newly Implemented Action Details

CAS ID	Action	Period of Implementation	Funding	Updated Estimated Emission Reductions in Tons Per Year (TPY) of PM / NO_x / GHGs	Estimated TPY Emission Reductions PM / NO_x / GHGs from CAS Appendix A
Trucks (e)	Emission Reduction Fund	2010–2013	$2.6M	1.5 / 0 / 0	0.7 / 0 / 0
Trucks (f)	SmartWay-type Partnership	2010–2012	–	Not calculated	19 / 0 / 0
Trucks (g)	Truck Replacement Program Truck Phase Out Program	2010–2013 2011–2017	$35.3M –	14 / 356 / not calculated 71.7 / 1,192 / not calculated[16]	14 / 118 / 1,675
Trucks (h)	Freight Movement Study	2010–2012	–	Not quantifiable	Not quantifiable
New Action	Hunt's Point Voluntary Truck Program	2012–2015	$24M	6 / 111 / 3093	Not previously calculated

[15] Although not Port Authority property, this action is included as the CAS scope covers "facilities controlled by the Strategy Partner, New York City, including the Brooklyn and Manhattan Cruise Terminals, potential cross-harbor rail facilities, and related freight areas such as Hunts Point."

[16] To prevent double counting, these totals do not include the emissions reductions from the Truck Replacement Program, which were calculated independently.

Status of Outstanding Committed Actions

There are two Committed Actions that have not yet been implemented:

- Trucks (g2): Develop an appointment system for trucks serving the terminals, including a fast lane at the gate for newer (2004 and younger) vehicles, in order to decrease total truck turnaround time.
    - Some trucking sector stakeholders are not in favor of an appointment system due to lack of confidence that it would it work to reduce terminal gate wait times and a concern that roadway congestion would prevent them from meeting their assigned appointment time. The stakeholders recommended that the first step would be to use the new RFID system to gather accurate data on turnaround times and then consider actions to specifically address this issue.
- Trucks (i): Develop public-private partnerships for retrofits and/or alternative fuels.
    - As mentioned above, the trucking industry has expressed interest in CNG, however moving forward depends on fueling infrastructure availability, which in turn depends on demand. The Port Authority is evaluating demands as well as infrastructure availability and will report its findings.

Future Implementation Plans

Near-term efforts will focus on continuing to implement the programs currently in place, as well as launching the Truck RFID system. In addition, the CAS contains four Future Actions for the Truck sector:

- Trucks (k): Develop near-port truck parking areas with plug-in electrification technology to reduce idling emissions. Consider including rest stop amenities as part of the parking area to encourage use.
- Trucks (l): Assess the feasibility of creating a new exit ramp or port-only lane off of the New Jersey Turnpike between exits 13a and 14a for port truck traffic.
- Trucks (m): Work with shipping lines to change the operating rules for chassis pool so they are more effective.
- Trucks (n): Install plug-ins for refrigerated containers (reefers) at New York City marine terminals and Hunts Point, led by New York City.

As part of the CAS update process, the Strategy Group will consider new actions to continue engine upgrades and use of alternative fuels. Implementation of the GHG Emissions Standards and Fuel Efficiency Standards for Medium and Heavy Duty Engines and Vehicles rule begins with model year 2014 vehicles and will have some beneficial effect on GHG emissions for new heavy duty vehicles. Other issues to be addressed include turnaround time at the terminals and inefficiencies of the chassis pool (e.g., shortages and underinflated tires), which can compound the problem of turnaround time and associated idling. Based on stakeholder feedback, Future Action Trucks (k) may no longer make sense to pursue. Stakeholders felt it would be an inefficient use of money as it would get very little use since there are only a small percentage of trucks coming from a long distance away for which this would be beneficial.

Railroad Locomotives (Rail)

This sector has shown great progress since the CAS was released, with four of seven Committed Actions fully implemented and two in progress. The Port Authority and Strategy Group Partners would like to acknowledge that many of the actions in this sector have been self-implemented by the rail lines. The Port Authority and its Partners commend the rail lines for their proactive stance, and will continue to encourage this type of effort.

Four of seven Committed Actions in this sector are fully implemented and two additional are in progress. Half of the actions have been self-implemented by the rail lines, taking a proactive stance as a CAS stakeholder.

Implementation Details

Newly Implemented Actions

Rail (g): Retrofit Three Switching Locomotives with GenSets **(IMPLEMENTED)**

In a $3.3M program led by MJ Bradley and Associates with funding from the Supplemental Environmental Project as negotiated by NJ DEP, who also provided administrative support, three switching locomotives were each retrofitted by replacing a single large generator set (GenSet) with three small ultra-low-emitting generator sets engines which are used only as necessary to provide as-needed power. The GenSet engines met Tier 3 non-road standards and had exhaust diesel particulate filters, resulting in meeting United States EPA's Tier 4 PM locomotive emissions standards. The retrofits are estimated to reduce PM emissions by 2.8 tons/year and NO_x by 47.5 tons/year; an effective more than 99% reduction in PM and 88% reduction in

NO_x from the pre-retrofitted Tier 0 locomotives. The engines are housed at CSX's TRANSFLO Terminal in Elizabeth, NJ and Intermodal yard in Kearny, NJ, both operating in the shared asset area serving Port Authority terminals.

Working Together to Replace Engines

A total of four switching locomotives have been retrofitted to GenSet configuration, with another planned. The three retrofitted through negotiations by NJ DEP have additional retrofits and together are estimated to reduce PM emissions by 2.8 tons/year and NO_x by 47.5 tons/year; an effective greater than 99% reduction in PM and 88% reduction in NO_x compared to the pre-retrofit engines.

Rail (h): Retrofit Two Switching Locomotives with Gen Sets **(IN PROGRESS)**

The Port Authority is overseeing a $3M program to retrofit two port switching locomotives to GenSet configuration, with $1.8M provided via a CMAQ grant, $600,000 provided by the Port Authority and $600,000 provided by CSX. One retrofit is complete. The second retrofit received approval from the Federal Highway Administration and New Jersey Department of Transportation in September 2013 and will be completed in early 2015.

Rail (i): ULSD Fuel in Switchers and CHE **(IMPLEMENTED)**

ULSD is now used in switcher locomotives and CHE at all rail yards in New Jersey and New York City, and it is likely the majority of the change to ULSD occurred prior to EPA's 2012 off-road engine standards taking effect, which mandated the change.

Rail (j): Operational Procedures for Reducing Idling **(IMPLEMENTED)**

Both Norfolk Southern and CSX have an anti-idling rule in effect.

Rail (k): Extend and Modernize Rail Lines **(IMPLEMENTED)**

New York City EDC invested $9M to promote the movement of goods by freight rail, including upgrades along First Avenue in Brooklyn, allowing modern, larger railcars to access the South Brooklyn Marine Terminal. The construction of an intermodal container transfer facility, as well as similar upgrades to extend and modernize the rail lines at the Port Jersey Peninsula, is underway.

Rail (l): Install Anti-idling Technology **(IN PROGRESS)**

All new CSX engines have automatic start and stop. As an expansion to this action, rail sector stakeholders have expressed an interest in plug-in stations for the winter months.

Table 6: Rail Newly Implemented Action Details

CAS ID	Action	Period of Implementation	Funding	Updated Estimated Emission Reductions in Tons Per Year (TPY) of PM / NO_x / GHGs	Estimated TPY Emission Reductions PM / NO_x / GHGs from CAS Appendix A
Rail (g)	Retrofit Three Switching Locomotives with GenSets	2007–2010	$3.3M	2.8 / 47.5 / not calculated	1.3 / 31 / 499
Rail (h)	Retrofit Two Switching Locomotives with Gen Sets	2010–2014	$3M	0.5 / 18.6 / 192[17]	1 / 37.1 / 387
Rail (i)	ULSD Fuel in Switchers and CHE	Pre-2012	–	Not calculated	0.2 / 6.4 / 0.0
Rail (j)	Operational Procedures for Reducing Idling	Unknown	–	Not calculated	Not previously calculated
Rail (k)	Extend and Modernize Rail Lines	2011–2013	$9M	Not quantifiable	Not previously calculated
Rail (l)	Install Anti-idling Technology	In progress	–	Not calculated	0.3 / 8.5 / 333

Status of Outstanding Committed Actions

There is one Committed Action that has not yet been implemented:

- Rail (m): Begin evaluation of alternative powered (hybrid, CNG or all-electric) lifting equipment at intermodal yards.
    - This action remains a Committed Action. Together the Strategy Group and stakeholders will determine a path forward.

Future Implementation Plans

The CAS contains three Future Actions for the Rail sector:

- Rail (n): Consider a long term, operational change to increase the amount of cargo leaving the port on rail versus truck. This includes increasing short-haul rail capabilities.
- Rail (o): Implement efficiency improvements, such as the electrification of lift equipment and use of alternative powered (hybrid, CNG or all-electric) lifting equipment, at intermodal yards close to the port, where technologically feasible.

[17] The updated estimated emission reductions for Rail (h) only includes one of two retrofits, as the second one is still in progress. In addition, the retrofit(s) conducted for Rail (h) did not include additional DPF filters as they did in Rail (g), thus the difference in estimated PM emission reduction between the two actions.

- Rail (p): Reduce dependency on trucks by enhancing use of rail and barge, such as through Express Rail expansion, development of short haul rail lines, and implementation of short sea shipping.

Since the CAS was released, the Strategy Group determined Rail (n) and Rail (p) are essentially the same action and will be combined in the next version of the CAS. These actions have already begun, as mentioned throughout the report, and will continue in the near future as a major area of focus for this sector. Currently, approximately 430,000 containers per year move by rail to/from the port; however, the Port Authority's ExpressRail system has the capacity to handle over one million containers. As part of the CAS update, the Strategy Group will also consider actions around technologies other than GenSet where there has been proven success.

Harbor Craft

Similar to the other sectors, great strides were seen in this sector during the initial years of CAS implementation, with six of seven Committed Actions implemented or in progress. Implemented actions conducted by Strategy Group Partners focused on engine upgrades and replacements. In addition, the New Jersey Clean Cities Coalition (NJCCC) led one of the actions, taking on the role of a new partner in CAS implementation. The type of collaboration showcased in this sector is a key factor in making the CAS successful in achieving its goals, and is particularly important for this sector over which the Port Authority has no direct control.

The New Jersey Clean Cities Coalition, using EPA grant funding, is leading an action to replace 16 Tier 0 engines with Tier 2 engines on six private harbor craft, taking on the role of a new partner in CAS implementation.

Implementation Details

Newly Implemented Actions

Harbor Craft (d): Cross-Harbor Rail Barge Actions **(IN PROGRESS)**

The Port Authority launched cross-harbor rail barge operations in 2009 and moved 873 loaded rail cars that year. Rail cars moved by barge have increased each year since, and as of late July, over 1656 loaded rail cars have been moved in 2013. The current leased switcher locomotives, as well as the harbor tug assigned to move the barge use ultra-low sulfur diesel fuel. In February 2014, the Port Authority will purchase two new or remanufactured switching locomotives equipped with new, ultra-low emitting single engine GenSets.

> **Advancing Emissions Reductions through Partner Actions**
>
> **NYC DOT 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 mandate, and securing a grant to repower an additional ferry with a Tier 2 engine. Emissions reductions and fuel savings from these efforts top 90% and 30%, respectively.**

Harbor Craft (e): Install DOCs on Private Ferries **(IMPLEMENTED)**

NYC DOT, with funding from CMAQ and the Federal Transit Authority, installed diesel oxidation catalysts (DOCs) on over 31 boats and upgraded nine vessels from Tier 0 to Tier 2 engines on BillyBey and Waterway ferries, resulting in approximately 90% emissions reductions compared to non-retrofitted ferries.

Harbor Craft (f): Accelerate Use of ULSD in Harbor Craft **(IMPLEMENTED)**

NYC DOT encouraged all harbor ferries to begin burning ULSD ahead of the mandate of which many did. So far, there has been no cited problem in ULSD fuel availability.

Harbor Craft (g): Fuel Efficiency Measures for Harbor Craft **(IN PROGRESS)**

New York City EDC launched its DockNYC initiative in 2012 with a competitive Request for Proposal process and executed a contract with BillyBey Transportation in Summer 2013 to operate docking locations where harbor craft and tugs can tie up and shut down between assignments at six sites as follows: Atlantic Basin, Brooklyn; Brooklyn Army Terminal Pier 4; Homeport, Staten Island; West Harlem Piers, Manhattan; Skyport, East 23rd Street Manhattan; and Pier 36, Manhattan. At this time, Atlantic Basin and Homeport have shore power capability. Shore power will be installed at the other sites over the next two years (estimated timeframe).

Harbor Craft (i): Raise Awareness **(IMPLEMENTED)**

At the Annual Coast Guard Small Passenger Vessel Industry Day, EPA presents on marine regulations that apply to this category of vessels, which includes new engine standards, remanufacturing and fuel requirements. In addition, the Ports Workgroup of the Northeast Diesel Collaborative, which EPA Region 2 co-chairs, has discussed topics such as emission control area regulations, clean truck programs, clean vessel initiatives, and funding opportunities. The group also developed a repower guide for marine vessel operators considering cleaning up their fleet.

Harbor Craft (j): Expand MVERRP to Private Harbor Craft **(IN PROGRESS)**

Seastreak/Wall Street Ferry Repower

NYC DOT received a $2M EPA grant, with Seastreak matching $730K, to repower the Seastreak/Wall Street Ferry with a Tier 2 engine, creating a fuel savings of 30% and 57 tons per year NO_x reduction and 1.13 tons/year PM reduction.

Private Harbor Craft Engine Replacement

NJCCC is managing a project to replace 16 Tier 0 engines with Tier 2 engines on six private harbor craft operating in the New York-New Jersey harbor. The project was slightly delayed due to Superstorm Sandy, but as of the end of July 2013, installation of all of the new engines is complete. Two of the vessels have not yet been put back into service as they are currently scheduled to undergo sea trials. The cost of the entire two year project is approximately $1.3M, with approximately $900K coming from an EPA grant and the remainder provided by the vessel operators.

NJCCC estimates the project will result in annual emissions reductions of 1.4 tons of PM, 3.5 tons of CO, 21.8 tons of NO_x and 0.2 tons of hydrocarbons. Reductions over the estimated remaining life of these engines total of more than 15 tons of PM, 35 tons of CO, 215 tons of NO_x, and 1 ton of hydrocarbons. In addition, the project is expected to result in 25–35% improvement in fuel economy for each of the repowered engines, resulting in diesel fuel savings of 1.6–2.2 million gallons over the lifetime of the engines. Due to the success of the initial project, EPA selected NJCCC for another grant (not yet awarded at the time this report was finalized) to replace an additional six Tier 0 engines with new Tier 3 engines on three other vessels.

Table 7: Harbor Craft Newly Implemented Action Details

CAS ID	Action	Period of Implementation	Funding	Updated Estimated Emission Reductions in Tons Per Year (TPY) of PM / NO_x / GHGs	Estimated TPY Emission Reductions PM / NO_x / GHGs from CAS Appendix A
HC (d)	Cross-Harbor Rail Barge Actions	2011–Ongoing	$133M	Not calculated	Not previously calculated
HC (e)	Install DOCs on Private Ferries	2011–2013	$7M	Not calculated	Not previously calculated
HC (f)	Accelerate Use of ULSD in Harbor Craft	2010–2011	–	Not quantifiable	1.3 / 24.3 / 0.0
HC (g)	Fuel Efficiency Measures for Harbor Craft	2012–2015	$15M	Not calculated	Not previously calculated
HC (i)	Raise Awareness	2010–2012	–	Not quantifiable	Not quantifiable
HC (j)	Expand MVERRP to Private Harbor Craft - Seastreak Repower - Private Engines	 2012 2012–2013	 $2M $1.3M	 1.1 / 57 / not calc. 1.4 / 21.8 / not calc.	Not previously calculated

Status of Outstanding Committed Actions

There is one Committed Action that has not yet been implemented:

- HC (h): Investigate and test post-combustion controls and after-treatment technologies for tugs.
    - This action remains a committed action. Together the Strategy Group and stakeholders will determine a path forward.

Future Implementation Plans

The CAS contains five Future Actions for the Harbor Craft sector:

- HC (k): Explore options for reducing the cost of cleaner/alternative fuels for harbor craft, including obtaining bulk suppliers and working to reform tax laws to waive taxes on fuel consumed in New York waters.
- HC (l): Install strong-arm dockers on ferries, which will enable them to shut off their engines while picking up or discharging passengers at dock.
- HC (m): Develop dockside electrification for tugs, where feasible.
- HC (n): Implement a hybrid ferry and tug pilot program, stemming from NYC EDC feasibility studies under development of a hybrid tug for cross-harbor rail operations.
- HC (o): Use anti-fouling hull coatings on marine vessels to reduce drag and improve fuel efficiency.

Along with continued engine upgrades (from Tier 0/1 to 3 or 4), alternative fuel and anti-idling options will be the focus of near-term future actions. The technology exists for liquefied natural gas (LNG) powered engines; however, the availability waterside is a major challenge. CNG has been shown to be prohibitive because of fuel tank capacity issues. Conversely, modifying tugs to receive shore power is relatively easy; however identifying ideal locations for this is difficult. The New York State Energy Research and Development Authority (NYSERDA) is looking into a study on hybrid tugs and the Port Authority submitted a grant proposal for a hybrid tug project, which was not accepted for award. Some harbor craft stakeholders have noted that hybrids are very expensive and do not have the power of a conventional tug. Stakeholders also suggested the Strategy Group consider removing Future Action HC (l), as to their knowledge there is still no design for this type of technology and they consider the action impractical.

Looking Ahead

Future Direction

Even as the region's air emissions begin to show improvement and port-related emissions continue to decline, more work is needed to ensure this trajectory continues, especially in light of anticipated port growth. 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 emissions reductions. However, this will be just one piece of the complex puzzle the Strategy Group hopes to address through future CAS actions and implementation efforts.

Identifying new areas for partnering and continuing to broaden implementation and outreach opportunities—between the Strategy Group and other partners—will be key to achieving future emissions reductions and the goals of the CAS. In part, this is because CAS actions are often costly to implement, and therefore identifying alternative or additional sources of funding is also vital to the future direction of the CAS. The Strategy Group has identified a few potential funding sources including CMAQ funding authorized under the "Moving Ahead for Progress in the 21st Century Act" to be spent to reduce emissions in PM2.5

non-attainment and maintenance areas, and opportunities through NYSERDA, Homeland Security, and the United States Department of Transportation TIFA Loan Program, which they will pursue along with other avenues. The Strategy Group Partners will also consider how the CAS fits in with other local and regional planning efforts such as the City of Newark's Sustainability Action Plan and Together North Jersey's Regional Plan for Sustainable Development, which could offer opportunities for further cooperation and collaboration among a wide range of agencies and stakeholders.

Incentivizing modal diversity as a means of balancing increasing cargo volume/economic output with continued emissions reduction is another key area the Strategy Group will continue to explore as CAS efforts move forward. NYC EDC already has efforts underway to promote the movement of more goods by water and rail (versus truck, which produces more emissions per amount of goods moved) and plans to explore how to more efficiently utilize existing infrastructure, including increasing volume at Howland Hook Marine Terminal by making additional direct investments in rail there. As mentioned elsewhere in this report, the Port Authority has established a goal to expand the modal shift of containers from trucks to rail for regional and national transport to and from the port.

The future direction of fuels will be another relevant topic related to CAS goals and future emissions reductions. As demand for alternative fuels like CNG and LNG continues to increase, some are beginning to question the primacy of diesel fuel in the future. However, a "chicken and egg" problem continues to exist, as alternative fuel infrastructure needs to be in place in order for operators to make the switch to CNG or LNG, yet there is a reluctance to invest heavily in alternative fuel infrastructure without a guarantee that the demand exists for these fuels. The Strategy Group plans to investigate this issue and determine if there are any new actions that could help solve some of the alternative fuel issues and promote more widespread adoption.

In the next couple of years, the Strategy Group will look to lead, or identify others who can lead, implementation of those actions not yet implemented where it still makes sense to do so. In addition they will identify new actions that address the topics mentioned above, as well as those that continue areas of proven success such as retrofitting and replacing old equipment. They also plan to identify actions which will result in more substantial GHG reductions per the CAS goal. In sum, the Strategy Group agrees that although the work to reduce port-related emissions is clearly on track, it is not over, and there is a need to continue to identify additional actions for future implementation that produce the most reduction.

CAS Reporting, Outreach and Monitoring

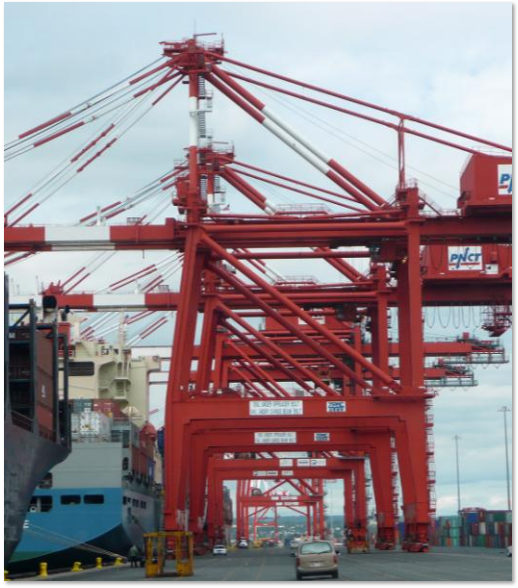
In 2014, a full update of the CAS will be published which will include additional information on the direction of activities, context, and funding for the CAS and its associated actions. As the 2014 timeline for near-term Committed Actions as stated in the CAS nears the end, the Strategy Group will conduct an extensive review of any committed and future actions that have not yet been implemented and will include any necessary changes or updates, as well as the addition of new actions, where applicable. They will also consider actions which specifically address ozone precursors. These discussions and resulting actions will be informed by updated emissions reduction data, both from the 2012 Emissions Inventory (scheduled for release in early 2014), as well as updated estimated emissions reduction calculations for each individual CAS action implemented. Further convening of the Strategy Group will occur over the next couple of years to provide input into the 2014 CAS Update and 2015 Implementation Report and to continue coordination on CAS implementation activities. The Port Authority and its partners will continue sector-specific and

community stakeholder outreach during this time to garner support for implementation of current actions and inform development of new actions focused on addressing industry and community concerns related to port-related air emissions impacts.

In addition, in support of the Strategy Group Partners' desire for on-the-ground monitoring of emissions reductions resulting from actions in the CAS, EPA researchers from the Office of Research and Development and Region 2 launched a research project in 2012 known as R2PIER to investigate local air quality in an Elizabeth, NJ community close to the port. A monitoring station is collecting high time-resolution sampling of several gaseous and particulate species in order to observe the temporal variation of air pollution and identify wind direction trends. These air quality measurements, sustained over a time horizon of at least two years, will be input into new inverse modeling tools to assess changes in source area contributions over time. The insight gained from this effort could be an appropriate foundation for future monitoring efforts, recognizing that in port areas, emissions can be spread over large geographic areas and other major nearby transportation sources—such as highways, rail yards, or airports—can make it difficult to isolate local air quality impacts from one source versus another.

Conclusion

The first four years of implementation of the ten year Clean Air Strategy for the Port Authority of New York and New Jersey has resulted in tremendous progress towards addressing port-related criteria emissions. Eighty percent of the committed actions across all five sectors have already been implemented or are currently underway. The 2010 Emissions Inventory shows that all criteria air pollutants have decreased at a rate greater than or equal to the annual 3% goal set in the CAS. It also shows that more work is needed to achieve the annual 5% GHG goal, which will be a focus of new efforts moving forward. As the 2010 Emissions Inventory only covered fourteen months of CAS implementation, future inventories are likely to show even more dramatic emissions reductions of both criteria pollutants and GHGs as a result of some of the larger CAS programs, such as the Clean Vessel Incentive Program and Truck Replacement Program, which had barely just or not yet begun at the time of last inventory.



As the CAS moves into the second phase of implementation, the Strategy Group, with continued input from stakeholders, will look to identify new CAS actions as part of the 2014 CAS Update that will build upon the existing strong foundation. These actions will focus on continuing areas of proven success, such as replacing cargo-handling equipment at the end of its lifecycle, as well as looking at how new technologies could be deployed, how to address alternative fuel infrastructure issues, and how to modify overall business practices to take advantage of opportunities for increased environmental and economic sustainability. Future actions will look to both drive innovation and be grounded enough to ensure continued emissions reduction, despite any port growth.

The success of the CAS to-date would not be possible without the cooperation and support of the Strategy Group Partners and industry and community stakeholders involved, many of whom have directly implemented a number of the actions themselves. Without this type of broad effort, the CAS would falter under the weight of its ambitious nature and the amount of resources, both human and financial, needed to achieve its goals. Even as regional air emissions are improving, the Strategy Group recognizes the need to continue to balance further emissions reductions with anticipated port growth and looks forward to working together and with sector-based stakeholders and the surrounding community to persist in reducing emissions and building a sustainable port.

Appendices

Appendix A: Complete List of 2009 Clean Air Strategy Committed and Future Actions

OGV Committed Actions	Estimated Period of Implementation	Estimated Emission Reductions PM / NO_x / GHGs
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 (NOAA)'s seasonal management restrictions for the mid-Atlantic area.	2009 – 2012	11.6% / 19.1% / 6.6%
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.	2009 – 2012	54.4% / 11.58% / 0.00%
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.	2009 – 2014	Implementation details needed prior to calculation
OGV(e). Install shore-power ("cold ironing") capability at the Brooklyn Cruise Terminal.	2009 – 2011	1.87% / 2.58% / 0.38%
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.	2009 – 2014	Not quantifiable
OGV(g). Support the establishment of a North American Emissions Control Area, led by US EPA R2 helping to advance the agency work needed to submit and support the ECA application process.	2009	Not quantifiable

OGV(h). NYCEDC to seek to repeal the New York State tax exemption for bunker fuel.	2009	Not quantifiable
OGV Future Actions		
OGV(i). Install shore-power capability at the NYCEDC's Manhattan Cruise Terminal and in conjunction with all new terminal developments.		
OGV(j). Implement pilot projects for bonnets and other promising new technologies.		
OGV(k). Seek to establish a New York State tax exemption for low-sulfur fuel.		
CHE Committed Actions	**Estimated Period of Implementation**	**Estimated Emission Reductions PM / NO_x / GHGs**
CHE(f). Sponsor pilot projects to test hydraulic and electric hybrid yard hostlers.	2009 – 2011	26.3% / 14.6% / 4.39%
CHE(g). Install new engines with DPFs on two wharf cranes the Port Authority owns at Red Hook Container Terminal in Brooklyn and on two on-road stick cranes at the ASI facility at Port Newark.	2010	2.25% / 0.76% / 0.00%
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.	2009 – 2014	10.3% / 11.8% / 0.00%
CHE(i). Replace up to one-third of the CHE fleet at all Port-Authority leased terminals with alternative powered equipment, including, but not limited to, diesel electric, hydraulic hybrid, and CNG, where technologically feasible.	2009 – 2016	26.3% / 14.6% / 0.00%
CHE(j). Determine the causes of on-terminal idling by CHE and work to strengthen the Idle Reduction Program by implementing actions which reduce or eliminate those causes, where feasible.	2009	Not quantifiable
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).	2009 – 2014	3.5% / 2.7% / 0.38%
CHE Future Actions		
CHE(l). Install wind turbines as alternative energy source on Port Authority facilities.		
CHE(m). Consider actions to address cold weather idling. Start with a pilot program to work through technical issues.		
CHE(n). Replacement/upgrade of all remaining CHE not covered under CHE actions (h) and (i) above using the best available technologies at the time of replacement.		
Trucks Committed Actions	**Estimated Period of Implementation**	**Estimated Emission Reductions PM / NO_x / GHGs**
CHE(l). 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.	2009 – 2012	1.10% / 0.00% / 0.00%

Trucks(e).	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 diesel particulate filters (DPFs) and/or a diesel oxidation catalyst (DOC).	2009 – 2010	32.15% / 0.00% / 0.00%
Trucks(f).	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.	2010 – 2017	23.73% / 6.1% / 0.4%
Trucks(g).	Develop an appointment system for trucks serving the terminals, including a fast lane at the gate for newer (2004 or younger) vehicles, in order to decrease total truck turnaround time.	2010	Implementation details needed prior to calculation
Trucks(h).	Conduct a study of freight movement, modal splits, and short sea shipping, led by NYCEDC.	2009	Not quantifiable
Trucks(i).	Develop public-private partnerships for retrofits and/or alternative fuels.	2009 – 2014	Not quantifiable
Trucks Future Actions			
Trucks(k).	Develop near-Port truck parking areas with plug-in electrification technology to reduce idling emissions. Consider including rest stop amenities as part of the parking area to encourage use.		
Trucks(l).	Assess the feasibility of creating a new exit ramp or Port-only lane off of the New Jersey Turnpike between exits 13a and 14a for Port truck traffic.		
Trucks(m).	Work with shipping lines to change the operating rules for chassis pool so they are more effective.		
Trucks(n).	Install plug-ins for refrigerated containers (reefers) at New York City marine terminals and Hunts Point, led by New York City.		
Rail Committed Actions		**Estimated Period of Implementation**	**Estimated Emission Reductions PM / NO_x / GHGs**
Rail (g).	Retrofit/replace up to three switching locomotives serving the Port with GenSets, particulate filters, and possibly selective catalytic reduction (SCR) technology for NO_x reduction. Administrative support by NJDEP and funding from Supplemental Environmental Project, negotiated by NJDEP.	2009 – 2011	12.7% / 10.8% / 1.7%
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 (CMAQ) program.	2010 – 2011	9.5% / 12.99% / 1.32%

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.	2009 – 2012	2.2% / 2.2% / 0.00%
Rail (j).	Implement operational procedures to shut down locomotive engines when not in use and outside temperatures permit.	2009	Implementation details needed prior to calculation
Rail (k).	Extend and modernize rail lines to and in South Brooklyn Marine Terminal and the Port Jersey Peninsula to increase efficiency, led by NYCEDC.	2009 – 2011	Not quantifiable
Rail (l).	Install anti-idling technology in switcher locomotive engines not retrofitted with GenSets at the Port of Newark and Elizabeth Marine Terminal.	2009 – 2010	3.3% / 3.0% / 1.1%
Rail (m).	Begin evaluation of alternative powered (hybrid, CNG or all-electric) lifting equipment at intermodal yards.	2011 – 2014	Not quantifiable
Rail Future Actions			
Rail (n).	Consider a long term, operational change to increase the amount of cargo leaving the Port on rail versus truck. This includes increasing short-haul rail capabilities.		
Rail (o).	Implement efficiency improvements, such as the electrification of lift equipment and use of alternative powered (hybrid, CNG or all-electric) lifting equipment, at intermodal yards close to the port, where technologically feasible.		
Rail (p).	Reduce dependency on trucks by enhancing use of rail and barge, such as through Express Rail expansion, development of short haul rail lines, and implementation of short sea shipping.		
Harbor Craft Committed Actions		**Estimated Period of Implementation**	**Estimated Emission Reductions PM / NO_x / GHGs**
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.	2009 – 2014	Implementation details needed prior to calculation
HC (e).	Install diesel oxidation catalysts on private ferries, led by New York City under a federal grant.	2009 – 2014	To be calculated by April 2010
HC (f).	Accelerate the use of ULSD fuel in harbor craft in advance of EPA's 2012 non-road diesel standards. • 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.	2009 – 2011	5.0% / 5.0% / 0.0%
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 (AIS) to monitor incoming vessel speeds and plan just in time arrival; and • Identify places—as part of NYC EDC's Phase II Maritime Support Study — where tugs can tie up and shut down engines between assignments in same general location.	2009 – 2011	Implementation details needed prior to calculation

HC (h).	Investigate and test post-combustion controls and after-treatment technologies for tugs.	2010 – 2012	Not quantifiable
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.	2009 – 2010	Not quantifiable
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.	2009 – 2014	Implementation details needed prior to calculation
Harbor Craft Future Actions			
HC (k).	Explore options for reducing the cost of cleaner/alternative fuels for harbor craft, including obtaining bulk suppliers and working to reform tax laws to waive taxes on fuel consumed in New York waters.		
HC (l).	Install strong-arm dockers on ferries, which will enable them to shut off their engines while picking up or discharging passengers at dock.		
HC (m).	Develop dockside electrification for tugs, where feasible.		
HC (n).	Implement a hybrid ferry and tug pilot program, stemming from NYC EDC feasibility studies under development of a hybrid tug for cross-harbor rail operations.		
HC (o).	Use anti-fouling hull coatings on marine vessels to reduce drag and improve fuel efficiency.		

A Clean Air Strategy

for The Port of New York and New Jersey

2013 IMPLEMENTATION REPORT