INTERNATIONAL ASSOCIATION OF PORTS AND HARBORS
PORT ENVIRONMENT AWARD 2017

PORT OF LOS ANGELES ENTRY
CLEAN AIR ACTION PLAN

Project Summary – A decade after developing and implementing a series of comprehensive, far-reaching strategies under its landmark Clean Air Action Plan (CAAP), the Port of Los Angeles is happy to report that it has significantly exceeded its 2014 criteria pollutant emission reduction goals that were developed to assist the region in which it is located meet USEPA requirements. Many of the actions initially laid out in the CAAP have since been adopted by various regulatory agencies as law and have served models for ports across the globe. Achievement of these goals has reduced air pollution and related health risks by unprecedented levels, while allowing Port development, job creation, and economic activity to continue. The CAAP demonstrates the effectiveness of public-private partnerships to set its ambitious goals for air emission reductions. This partnership must continue as new challenges to reduce harmful greenhouse gas must be faced in the coming years.

CONTACT:

CHRISTOPHER CANNON

Director of Environmental Management
Port of Los Angeles
425 South Palos Verdes Street, San Pedro CA 90731 USA
ccannon@portla.org
PHONE: 1-310-732-3763 FAX: 1-310-547-4643

The Reduction of Air Pollution Resulting from the Adoption of the Clean Air Action Plan

Background:

The Clean Air Action Plan (CAAP) is a strategic air quality emissions reduction plan implemented by the Port of Los Angeles (POLA) to reduce harmful air emissions produced by mobile sources in and around POLA. The CAAP was developed to address concerns raised by the local community and air quality regulators about health risks associated with emissions from goods movement-related activities occurring in and around the port. The CAAP set aggressive goals for reduction of emissions from the primary sources of these emissions, including ships, drayage trucks, cargo-handling equipment, harbor craft, and railroad operations. The original CAAP was adopted by POLA, in coordination with the Port of Long Beach, in 2006, and was updated in 2010. Recent emission inventory data now show that CAAP air pollution and health risk reduction goals for 2014 were met and exceeded by substantial margins, and POLA is on-track to exceed further goals set for 2020 and 2023. A new goal to address harmful greenhouse gas (GHG) emissions will be added to the CAAP in a proposed 2017 update.

POLA is an official department within the City of Los Angeles, located in Southern California and is the number one port by container volume and cargo value in the United States, handling 8.1 million TEUs (twenty-foot equivalent units) in calendar year 2015. As a landlord port, POLA does not have direct control of port-related emission sources, but POLA has effectively utilized its role as a key node in the supply chain to partner and collaborate with the business industry and other stakeholders to significantly reduce air pollution from goods movement activities through the CAAP.

As the CAAP broadens its focus to include reduction of GHG emissions, international collaboration among ports will be essential. POLA has taken a lead role in several international partnerships, including being a founding member of the International Association of Ports and Harbors (IAPH), World Port Climate Initiative (WPCI). Approximately 60 of the world's key ports, acknowledging their unique capacity as key hubs in global supply chains, have come together in a commitment to reduce their emissions while continuing their role as transportation and economic centers. POLA hosted the formation of the WPCI in November 2008 and is the lead port for the IAPH Tool Box and Carbon Footprinting working groups. In addition, in 2013, POLA became this first port in North America to join the WPCI's Environmental Ship Index (ESI) program in an effort to continue to reduce emissions from ships. As of October 2016, there are 47 incentive providers and over 4,600 participating ships in the program. POLA also co-founded the Pacific Ports Clean Air Collaborative (PPCAC), a group of ports, regulatory agencies, shipping lines, and other stakeholders along the Pacific Rim, which come together to share information collaborate on air quality initiatives. POLA co-hosted the most recent PPCAC conference, which occurred in Shanghai, China in November 2015.

Audience/Beneficiaries

POLA is located adjacent to two communities, San Pedro and Wilmington. Both of these communities are considered within the top 25% of disadvantaged communities according to the State of California screening tool, CalEnviroScreen. In addition, POLA is located within the South Coast Air Basin (SoCAB), which has some of the worst air quality in the US. This represents a major health concern for its approximately 18 million residents. Much of this air quality problem is attributable to the fact that the SoCAB is the second largest urban area in the nation and to the existence of topographical and meteorological conditions that enhance the formation of air pollution. Currently, the SoCAB is designated by the United States Environmental Protection Agency (USEPA) as being in non-attainment of the National Ambient Air Quality Standards (NAAQS) for ozone and for particulate matter less than 2.5 microns (PM2.5). In addition, CARB has designated the exhaust from diesel-fueled engines as a toxic air contaminant, with diesel particulate matter (DPM) as a surrogate for total emissions. According to CARB, about 70% of the potential cancer risk from toxic air contaminants in California can be attributed to DPM.

In 2000, the South Coast Air Quality Management District (SCAQMD) released the results from its second Multiple Air Toxics Exposure Study (MATES II), which raised concerns about the impact of emissions from ships, trucks, and trains in the vicinity of the Ports and major transportation corridors. It was evident that in order for the SoCAB to attain the NAAQS and to protect public health, aggressive actions beyond regulation were necessary to significantly

reduce emissions from all sectors, including goods movement. Thus POLA began work with stakeholders in the area and the industry to develop a broad plan to take on the challenge of the air emissions associated with POLA's operation.

Purpose/Objectives

POLA partnered with our neighbor port, the Port of Long Beach, and other stakeholders to create the first CAAP in 2006. It is worthy to note that the even though the Port of Long Beach is a competitor of POLA, both ports recognized the importance of working together on the CAAP to improve air quality and the provide consistency to our customers This CAAP created a framework which showcased the Port's dedication in reducing emissions from mobile source activity, thereby reducing the health risk for surrounding communities. A series of meetings with different industry stakeholder groups were held to discuss plans and receive feedback on potential measures, while several separate meetings were held to receive input from other government agencies, such as the USEPA, CARB, and SCAQMD. In close coordination with SCAQMD and CARB, the CAAP was designed to represent the joint approach for reducing the "fair share" of emissions associated with operations in and around the Port; however, the CAAP was a voluntary plan that was not mandated by any agency The document detailed a series of specific, measurable actions that were designed to reduce harmful emissions produced by the five major sources of pollution operating at the Port: Ocean-Going Vessels (OGVs), Heavy-Duty Vehicles (HDVs), Cargo-Handling Equipment (CHE), Locomotives, and Harbor Craft.

In 2010, after reaching the initial goal of 45% air emission reductions, the two Ports came together again to set longer-reaching goals and make changes to help accelerate reductions in criteria pollutants as set by agency regulations. Through this CAAP update, the San Pedro Bay Standards were developed to further reduce the health risk and air emissions associated with port-related operations, while allowing port development and growth to continue. These standards, detailed in Figure 1 below, were designed to align with regional and national air quality targets and goals (such as the NAAQS).

Figure 1. The San Pedro Bay Standards were designed to align with national and regional goals.

METHODOLOGIES

The CAAP introduced a series of strategies designed to reduce air pollution from sources related to Port operations. Each of these "measures" was drafted in close association with stakeholder groups made up of representatives from various businesses in operation at the Port. These groups were organized by the emission source categories identified in the CAAP: HDVs, OGVs, CHE, Locomotives, and Harbor Craft. There are 16 total measures in the original CAAP (expanded to 19 in the 2010 CAAP Update), which covered all of the above mentioned source categories, while including several more general actions. Several measures taken by POLA have been so successful that they have inspired formal regulations by the State of California. We believe that the best way for laws to develop is through initial local programs that vet the technology/procedure and build consensus, followed by regulation at a level that will allow for a "level playing field."

Key CAAP programs are discussed below.

Clean Truck Program

The Clean Truck Program (CTP) established a progressive ban on polluting trucks, which improves regional air quality, established a Concession Program for truck operators, and facilitates the replacement of old trucks with low-emission vehicles. The CTP is a bold initiative that has rapidly advanced the improvement of air quality at the Port by accelerating the replacement of high-polluting trucks with cleaner trucks. Specifically, the CTP banned all trucks that were not compliant with the USEPA's 2007 on-road truck emissions standards. As of

November 2016, approximately 59% of the trucks serving the Port had engines meeting 2007 standards; while an impressive 41% met the newest and cleanest 2010 standard. DPM emissions from trucks have been reduced by a staggering 97% between 2005 and 2015 as a result of the CTP.

Technology Advancement Program

The Port is committed to encouraging the development of cutting-edge emission-reduction technologies. POLA believes that technology advancement plays a critical role in achieving the aggressive goals set in the CAAP (as well as other goals), as those standards were intentionally set beyond what was feasibly achievable with the technology available at that time. To that end, the Port sets aside up to 1.5 million US dollars each year for the Technology Advancement Program (TAP), which provides funding, guidance, and staff support to test promising air technologies in a real-world port environment. Selected projects are focused on the five major mobile sources of air pollution in operation at the port. The goal of the TAP is to get successful technologies to the port market as quickly as possible. Therefore, the Port works closely with technology developers, regulatory agencies, and our port industry partners to take these technologies from testing to commercialization and – ultimately – widespread adoption.

An example of two recently successful TAP projects was assisting two local technology developers receive certification for an at-berth emission control system designed to reduce pollution from OGVs while at-berth. The Port assisted in obtaining CARB certification of the Advanced Maritime Emission Control System (AMECS) and the Maritime Emissions Treatment System (METS). Both systems consist of a capture hood linked to a treatment system, which included a series of scrubbers to reduce the emissions produced from the OGV's auxiliary engines while at-berth.

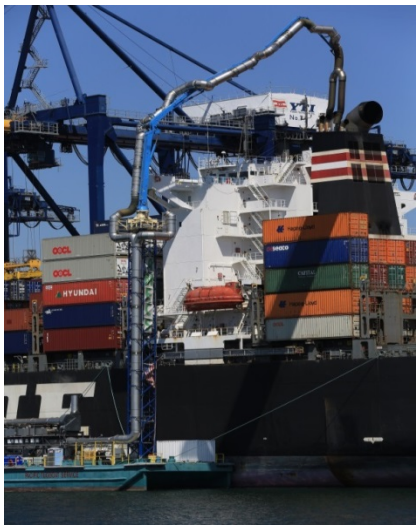

Figure 2. Barge-based emissions control systems for OGVs at berth.

In June 2016, the Board of Harbor Commissioners approved a TAP project with Maersk Line A/S to retrofit twelve 10,000 TEU container vessels to achieve energy efficiency and fuel consumption improvements. The retrofits include modification of the bulbous bows, installation of improved propellers, de-rating of the main engines, and other improvements. The TAP project provides funding to assist with the purchase of equipment and data collections systems necessary to verify the environmental benefits of the retrofits on four of the vessels. Since then, 11 of the 12 ships have been retrofitted, and baseline data is currently being reviewed. The project is planned to continue for a term of 3 years.

Several other TAP projects are currently ongoing. The TAP program has invested in the testing of several Zero Emission Electric Drayage trucks, manufactured by Transpower, Inc. for Port operations. A total of seven vehicles are currently in operation at multiple trucking companies, logging over 29,000 miles of demonstration testing as of November 2016. This project hopes to further advance electric truck technology and infrastructure to be used for long and short haul drayage in the future. In addition, in November 2016 the TAP approved a project to demonstrate a near-zero emissions switcher locomotive with Pacific Harbor Line, the local switching company that operates at both POLA and the Port of Long Beach. The locomotive, which will be manufactured by VeRail Technologies, Inc., will run on renewable natural gas in a one-year demonstration run.

Environmental Ship Index Program

POLA's voluntary ESI Program has been developed to reward vessel operators for reducing DPM, NOx, and GHG emissions from their OGVs. This program provides a financial incentive to operators for going beyond compliance by bringing their newest and cleanest vessels to POLA and demonstrating technologies onboard their vessels. It also encourages use of cleaner technology and practices in advance of regulations. In 2015, the Port incentivized 56% of all ship calls to POLA under the ESI program.

Shore Power/Low Sulfur Fuels – POLA was the first port in the world to install shore power at a container terminal in 2004. POLA now offers shore power at 25 berths, the most of any port. Each ship call that connects to shore power is estimated to reduce fuel consumption by 10 metric tons. The CAAP introduced a voluntary low sulfur incentive that was instrumental in gaining shipping line acceptance of fuel switching and led to regulatory action by CARB and, in 2015, creation of the North American Emission Control Area (ECA).

Vessel Speed Reduction Program

The objective of the Vessel Speed Reduction Program (VSRP) is to reduce NOx emissions from ocean-going vessels by slowing their speeds to 12 knots or lower as they approach or depart the Port, generally at 20 nautical miles from Point Fermin, with an added incentive for maintaining that speed through an additional 20 nautical mile zone. A voluntary VSRP was established in 2001 and POLA began rewarding ship operators with financial incentives in 2008. Since the establishment of the VSR program in 2001, the compliance rate has steadily increased each year. In November 2016, ships where in 93% compliance within 20 nautical miles, and 79% within 40 nautical miles of the Port. In 2015 alone, estimated GHG reduction resulting from the VSRP in the San Pedro Bay was nearly 100,000 tons.

Evaluation/Analysis

The challenges of the CAAP are not only reaching the most aggressive reduction targets of any port, but maintaining the standards while the Port continues to grow. POLA is leading with solutions and investing today in technologies that will ensure that growth can be accomplished without significant impact on the surrounding communities and environment. To assess emission reductions and progress toward goals, the Port conducts real-time air monitoring and detailed annual emissions inventories.

Since 2005, POLA has monitored air quality in and around the Port. This air quality monitoring program supports the Port's commitment to improve air quality within the San Pedro Bay Ports area under the CAAP, by helping to better manage and provide feedback on the Port's air quality improvement efforts. The monitoring program includes a network of four air monitoring stations, including two stations within the communities of Wilmington and San Pedro, which measure a comprehensive set of air pollutants. The figure below shows the annual average measurements of elemental carbon at each of the four air monitoring sites located within the Port. Elemental Carbon is used as surrogate for Diesel Particulate Matter in monitoring, and as an indicator of health risk.

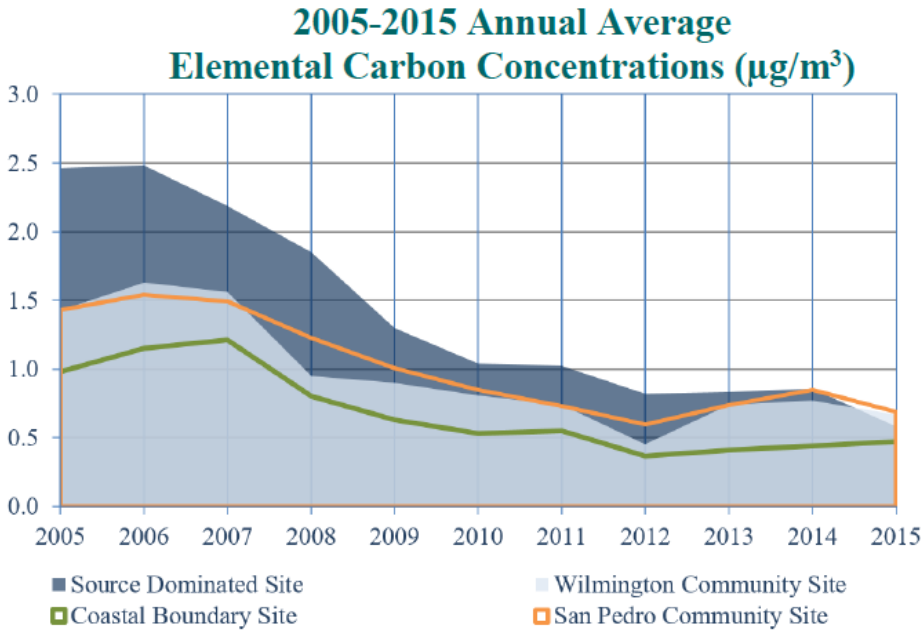

Figure 3. Annual average elemental carbon concentration readings have reduced by 52-76% since 2005.

The Port believes it is important to continuously update and improve upon the CAAP, in order to monitor progress, plan for the future, and maximize success. An Annual Emissions Inventory has been published since 2005. These reports calculate the air pollution associated with every piece of mobile equipment serving the Port and provide total emission reductions compared to the baseline year of 2005. These reports focus primarily on the reduction of DPM, NO_X, and SO_X as well as GHG emissions generated. The latest report for 2015 shows significant reductions of DPM (85%), NO_X (51%), SO_X (97%), and GHGs (10%) since 2005. When compared to the aggressive goals set in the 2010 CAAP update, the Port has far surpassed those set for 2014, and is well on the way to meeting those set for 2023. With eyes on the future, looking for innovative methods to sustaining emissions reductions while accommodating growth, POLA continues to look for emissions reduction and efficiency opportunities. The Annual Emission Inventory not only shows progress toward goals, but also helps identify focus areas for new programs. The figure below shows emission reductions occurred while throughput (pink line) increased.

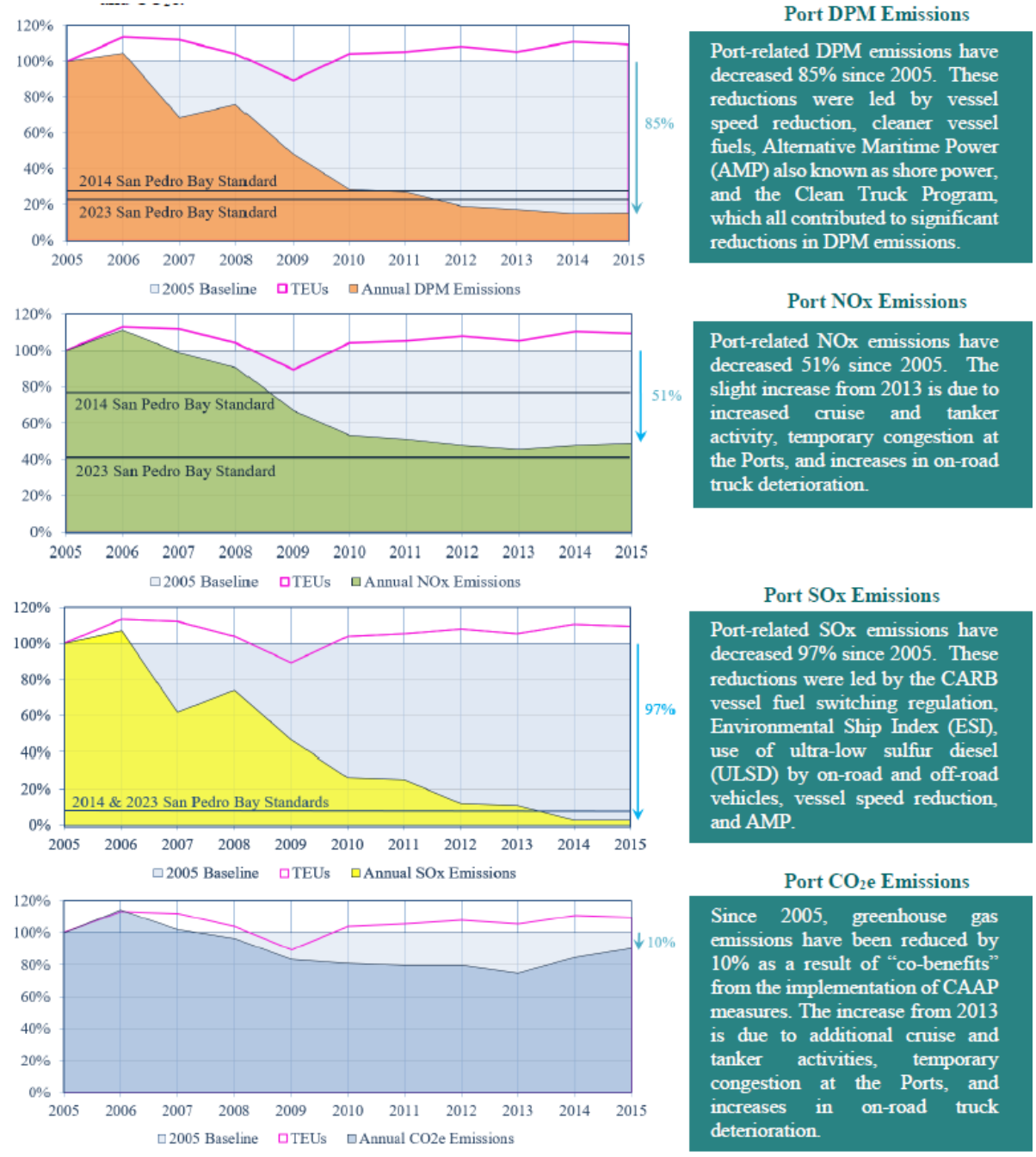

Figure 4. Port of Los Angeles Emissions Inventory, 2015, results by pollutant category.

In addition to the programs listed above, POLA has begun work on several major projects in collaboration with regulatory agencies. With major funding from CARB, POLA has begun work (Fall 2016) on a "Green Omni-Terminal" project at its Pasha Terminal. This project is designed to demonstrate a tremendous variety of green technologies and efficiency procedures, including several zero-emission HDVs, a solar-powered micro-grid, and an at-berth vessel

emission control system. The terminal upgrades are expected to be completed by 2019. In addition, the California Energy Commission has provided funding to POLA and Everport to conduct a trial demonstration of 20 near-zero emission and 5 zero-emission yard tractors. This project was approved in December 2016, and work is expected to begin in early 2017.

Conclusion

Moving forward, the Port is currently working with the Port of Long Beach to develop an update to the CAAP, scheduled to be released in 2017.Once again, POLA understands that open and continuous discussions need to be held with all invested parties for a plan of this magnitude to be successful. Starting in 2015, following the framework established with the original CAAP and its 2010 Update, the team working on the update has convened stakeholder groups, held regular discussions with regulatory agencies such as CARB and SCAQMD, and organized public outreach meetings. So far, these efforts have resulted in a discussion document that was released at a joint meeting of both Boards of Harbor Commissioners in November 2016 that included the major plans that would be included in the final plan. The 2017 CAAP update is being designed to align with recent published plans from local regulatory agencies, such as the Sustainable Freight Action Plan published by CARB in 2016, as well as recent GHG goals established by the California State Legislature. The update includes a series of strategies to further reduce emissions from sources in and around the Ports, particularly focused on GHGs.

While the previous of the CAAP have succeeded in achieving significant results in reducing criteria pollutant emissions (specifically, NO_x, SO_x, and DPM), GHGs have proven to be a more resilient challenge. Due to the global concern regarding GHGs, such as those reflected in recent international accords on climate change, the upcoming CAAP update will include an increased focus on GHG emission reduction strategies. These strategies include advancing the Clean Trucks Program to phase out older trucks and transition to zero-emission trucks by 2035; transitioning to zero-emissions terminal equipment; developing a Clean Ship Program to transition the oldest, most polluting ships out of the San Pedro Bay fleet; accelerating the deployment of cleaner harbor craft engines and operational strategies to reduce harbor craft emissions; expanding use of on-dock rail to shift more cargo leaving the port to go by rail; and reducing GHGs from port-related sources to 80% below 1990 levels by 2050.

The 2017 CAAP Update will guide the Port forward in its efforts to improve air quality in the region and around the world. The CAAP is a great example of how effective a true partnership between public agencies and private interests can be effective, as it has led to unprecedented success in reducing air emissions and many of its programs have been replicated to achieve clean air benefits at ports across the globe.