



ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS BY 2050

Submitted by City of Los Angeles Harbor Department
Environmental Management Division
Christopher Cannon, Director

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Foreword

This document is the Harbor Department's response to City Council Motion No. 14-0907, dated June 27, 2014, requesting a report on actions that City Departments can take to reduce the City's carbon dioxide and other greenhouse gas emissions, both stationary and mobile, to at least 80% below 1990 levels by 2050. This document provides an overview of the City of Los Angeles Harbor Department's ongoing efforts and initiatives to reduce greenhouse gas emissions from sources that the Harbor Department directly controls, as well as its leadership in existing and anticipated collaborative programs with industry partners that are expected to lead to achievement of the goal of 80% greenhouse gas emission reduction from sources operating at the Port of Los Angeles. Additionally, while not a requisite of Motion 14-0907, the Harbor Department submits annual emissions inventories to agencies external to the City for documentation and review.



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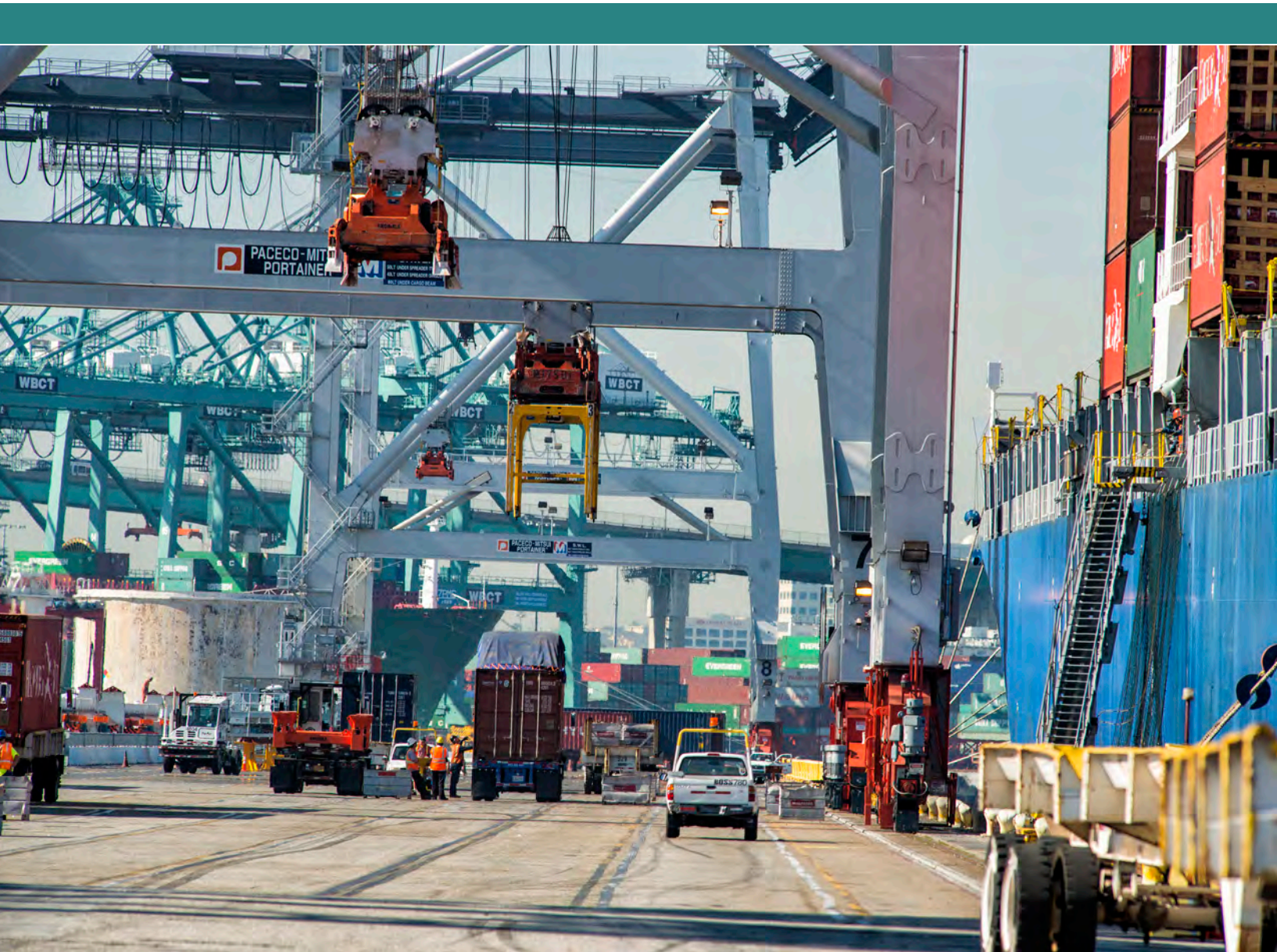
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AMP'ing Up the Future

In 2004, the Harbor Department installed shore-side Alternative Maritime Power™ (AMP) infrastructure at the West Basin Container Terminal – the first AMP installation for containerships in the world. Instead of running on diesel power while at berth, AMP-equipped ships “plug in” to shore side electrical power – literally an alternative power source for oceangoing vessels, also referred to as “cold ironing.” Since then, the Harbor Department has developed and installed AMP at 25 berths, more than any other port, at a cost of over 180 million dollars. Starting in 2014, CARB shore power regulation requires 50% of applicable calls to be plugged in, with 70% and 80% to be required in 2017 and 2020, respectively. The affected shipping lines have been investing \$500,000 to over \$1.5 million per ship for retrofits to connect and use the new AMP berths. On average, it’s anticipated that nearly 9 metric tons of CO₂ is reduced per call. This illustrates how the maritime industry and the Port work together to meet or exceed the regulatory requirements.

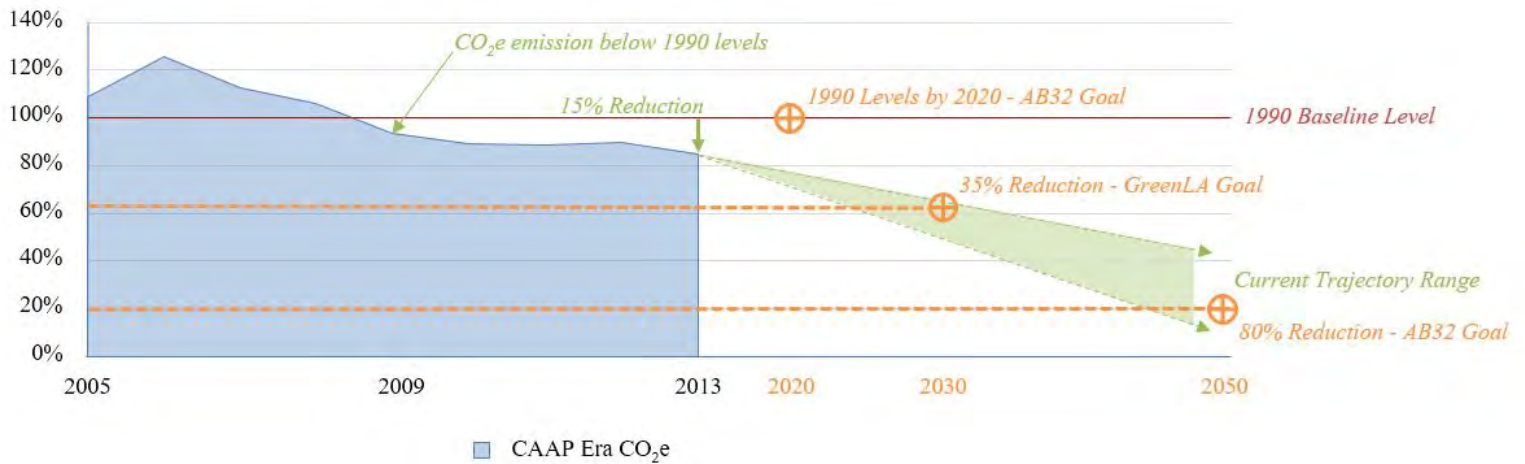


Overview

This document presents a summary of the actions currently being undertaken by the City of Los Angeles Harbor Department (Harbor Department) to reduce greenhouse gas (GHG) emissions associated with Harbor Department operations, as well as its leadership role to help the maritime industry reduce its emissions occurring in the greater Port of Los Angeles (POLA or Port) area. This document shows that quantifiable progress has been made in reducing GHG emissions reductions from 1990 to 2013 and outlines actions/strategies that are either being implemented or evaluated to continue the reduction of GHG emissions and meet a target of 80% reduction by 2050.

Figure 1 summarizes the Port’s progress to date, in carbon dioxide equivalents (CO₂e), the most commonly used metric for GHGs, compared to 1990 levels, as well as the anticipated GHG reduction trajectories to 2050 based on existing, planned, and other potential reduction measures. The Harbor Department has already met the California’s Assembly Bill 32 (AB32) goal of reducing GHG emissions to 1990 levels by 2020, and is well on its way to the *GreenLA* and AB32 goals of reducing GHG levels to 35% and 80% below 1990 levels by 2030 and 2050, respectively.

Figure 1: Scope 1-3 GHG Emissions 2005-2013 & GHG Reduction Trajectories to 2050



Background Information & Context

The Harbor Department is taking a leadership role in pursuing GHG reductions on a **port-wide basis**, working closely with Port tenants and maritime industry emission sources, regulatory agencies, and other stakeholders. As such, the Harbor Department is engaged in a comprehensive approach of identifying and evaluating specific emission reduction strategies and energy efficiency opportunities taken by both the Harbor Department and maritime industry operators of the major emission sources at the Port. Engagement with the entire port community is critical as GHG emissions associated with mobile and stationary sources operated by the maritime industry in and around the Port outweigh Harbor Department GHG emissions.

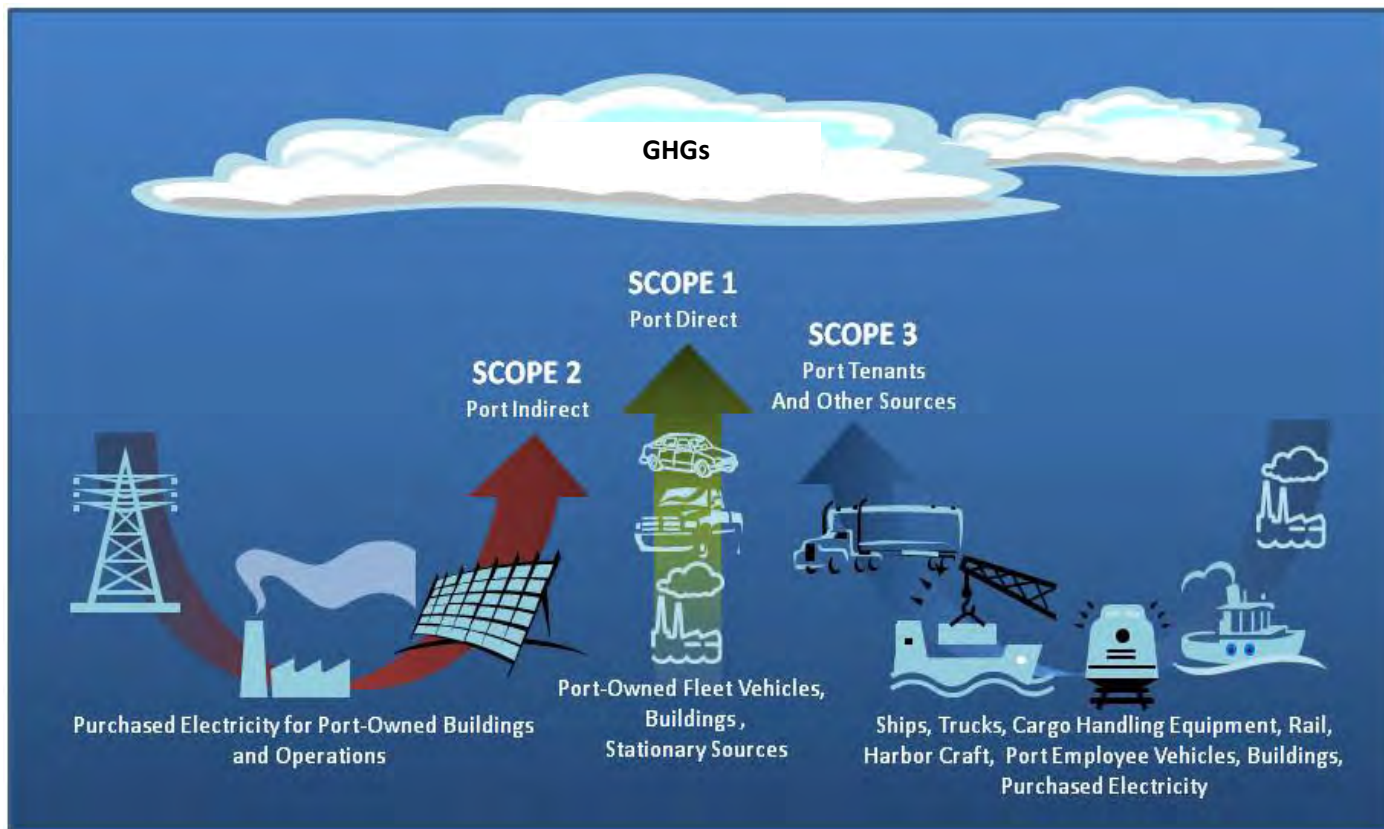
Assessment of GHG emissions is organized according to the following scopes and illustrated in Figure 2:

Scope 1 – includes all direct and indirect GHG emissions from the Harbor Department’s own directly-controlled stationary and mobile sources (Harbor Department Sources)

Scope 2 – includes indirect GHG emissions associated with the import and consumption of purchased electricity by the Harbor Department for Harbor Department Sources

Scope 3 – accounts for emissions from stationary and mobile sources outside of the Harbor Department’s control, operated by the maritime industry, including Port tenants, shipping lines, railroads, etc.

Figure 2: GHG Emission Scopes



*Total GHG emissions associated with maritime industry sources at the Port of Los Angeles in the South Coast Air Basin have been reduced by **over 15%** in 2013 compared to 1990 levels – **exceeding the 2020 AB32 goal** and making real quantifiable progress towards the 2030 GreenLA goal of 35% reduction of 1990 levels and the 2050 AB32 goal of 80% reduction from 1990 levels. These reductions are a result of “co-benefits” from the implementation of CAAP measures, co-benefits from regulations, and from the maritime industry’s improvements in operational efficiencies.*

This document utilizes the results from several discrete Harbor Department efforts to form a complete Scope 1, 2, and 3 inventory:

- Harbor Department Scope 1 and 2 Municipal Annual Inventory
- POLA Annual Inventory of Air Emissions (Scope 3)
- Tenant Stationary Sources Inventory

Harbor Department Scope 1 and 2 GHG emissions inventories have been submitted annually to The Climate Registry (TCR, formerly the California Climate Action Registry) since 2006. The geographic domain is the Harbor Department’s administrative boundary. Scope 1 and 2 inventories are validated by a third-party verifier in accordance with TCR protocol and available for public viewing on the TCR website.

The geographical domain for the annual POLA Inventory of Air Emissions (EI) includes the South Coast Air Basin’s land and overwater boundaries, as presented in Figure 3. The primary purpose of the EI is to demonstrate progress towards the San Pedro Bay Ports (POLA and Port of Long Beach) Clean Air Action Plan (CAAP) emission reduction targets for diesel particulate matter, oxides of nitrogen, and sulfur dioxide. Scope 3 GHG emissions were added to the EI in 2006 and are recalculated annually as part of each emissions inventory comparison section to ensure “apples-to-apples” comparison. EIs are documented and reviewed by the United States Environmental Protection Agency (USEPA), California Air Resources Board (CARB), and the South Coast Air Quality Management District (SCAQMD).

Figure 3: GHG Inventory Geographical Domain





The 1990 Port GHG baseline for this assessment was set using the latest CARB transportation sector data from 1990 and 2006 and back casting using the Harbor Department and Port’s 2006 emissions inventories. This methodology is consistent with the approach used by AB32 and the City of Los Angeles’ *GreenLA* Plan.

GHG Emissions & Progress to Date

There has been a net reduction of GHG emissions associated with Scope 1, 2, and 3 operations of over 15% since 1990, as presented in Table 1. It is important to understand the dominance of Scope 3 emissions when looking at total operations as they make up over 98% of the associated GHG emissions. This trend has been observed since 1990 and is anticipated to continue through 2050.

Table 1: 1990 & 2013 POLA GHG Emissions by Scope (metric tons/year)

Scope	Baseline 1990	Actual 2013*	Change
Scope 1	1,911	3,818	100%
Scope 2	6,232	6,878	10%
Scope 3	1,053,028	891,292	-15%
	1,061,170	901,988	-15%

* 2013 Scope 1 and 2 results are preliminary at the time of this report

Harbor Department Source (Scope 1 and 2) Emissions

Harbor Department Sources include the buildings the Department occupies and the vehicles, equipment, and vessels owned by the Harbor Department for the police, pilots, and construction and maintenance groups. The increase in Scope 1 emissions is due to a significant increase in facilities/square footage of Harbor Department buildings for increased staffing to support an increase in Port tenant operations between 1990 and 2013 (container throughput, measured twenty-foot equivalents or TEUs, increases over 375% in the same time period) as well as the increase of fuel consumption for Harbor Department Police patrols (both land and water) associated with significant increase in security after the September 11, 2011 terrorist attacks. Scope 2 emissions have remained nearly flat compared with Scope 1 emissions since 1990 despite a significant increase in operations, due to Harbor Department energy efficiency measures and the continuing improvements made by the Los Angeles Department of Water and Power (LADWP) in reducing the carbon intensity factor of grid provided power. The Harbor Department is continuing to develop strategies through its Energy Management Action Plan (EMAP) and other initiatives (see Table 2) to significantly reduce Scope 1 and 2 emissions and anticipates that these sources can be reduced to meet the 2050 goal through increased use of low carbon alternative sources of fuel/power and LADWP’s increased use of renewables for energy generation. It is important to note, even if Scope 1 and 2 emissions ultimately go to zero, their elimination from the total Scope 1, 2, and 3 GHG emissions would have minimal effects.

The Harbor Department is in the process of installing a 300 kilowatt (kW) solid oxide fuel cell system at the Harbor Administration Building, which houses most of the Harbor Department staff. The fuel cell system will be fueled with natural gas and use air as its oxidant, and will generate electricity at a lower cost than the utility’s electrical grid for the 20 year life of the system. Fuel cell systems have “near-zero” harmful emissions which also reduces the greenhouse gases associated with power production.



Table 2: Scope 1 & 2 Harbor Department Strategies

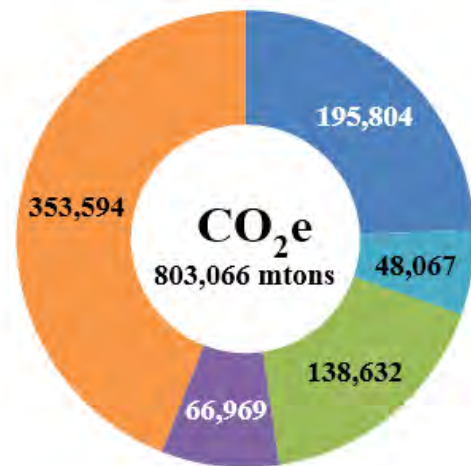
Scope	GHG Reduction Strategy	Scope	GHG Reduction Strategy
1	Alternative Fuel City Vehicles (Land & Water)	2	25% Green Power Purchase
1	Employee Commuting Initiatives	2	Water Conservation Initiative
1	Red Car Route (Electric Trolley)	2,3	Solar "Green Power" Initiative
1	Green Purchase Requirements	NA	Brownfield Remediation & Creation of Open Space
1,2	Increase Employee Awareness	NA	Tree Planting
1,2,3	Implementing Green Building Policy (Retrofits & New Buildings)	NA	Community Outreach
1,3	Expand Recycling		

Port of Los Angeles Tenant & Maritime Industry (Scope 3) Emissions

Over 90% of Scope 3 emissions are from maritime industry mobile sources that are operated and owned by other parties. These sources are not controlled by the Harbor Department. The mobile source categories associated with the maritime goods movement industry are ocean-going vessels (OGVs/ships), harbor craft, cargo handling equipment, rail locomotives, and heavy-duty vehicles. Figure 4 presents the emissions makeup of the five emission source categories, as tracked in the annual EI.

Figure 4: 2013 Scope 3 Cargo Movement GHG Breakout
carbon dioxide equivalents – CO₂e
metric tons – mtons

- Ocean-Going Vessels
- Harbor Craft
- Cargo Handling Equipment
- Locomotives
- Heavy-Duty Vehicles



Looking at the total 2013 Scope 3 emissions, heavy-duty vehicles or trucks, ships, and cargo handling equipment make up over three-quarters of the total Scope 3 emissions.



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

The Harbor Department installed 71,500 square feet of solar panels on the roof of its World Cruise Center which has the electrical generation capacity of 1.2 megawatt hours. The installation is the first phase of a broader initiative to install a total generation capacity of 10 megawatt hours over the next five years.



Building Toward 2050

In 2050, the Port is anticipated to be receiving its maximum estimated cargo capacity of 22.4 million TEUs, compared to 7.9 million TEUs moved in 2013. The maritime industry operates the various stationary and mobile sources handling the cargo, e.g. the trucks, ships, cargo handling equipment and trains that operate in and around the Port. The Harbor Department is not a regulatory agency and does not have regulatory control over these emission sources. In fact, local regulation of these sources is pre-empted by federal or international law. Therefore, it will take a coordinated, collaborative effort with both industry and the state and federal air agencies to realize the needed emission reductions from these sources. This section describes some of the Harbor Department's current initiatives, international collaborative efforts, and the challenges ahead.

Current Initiatives

Clean Air Action Plan Co-Benefits

There will be continued GHG emission reduction “co-benefits” from the implementation of CAAP programs such as voluntary vessel speed reduction (VSR) incentives that reduce transiting ship emissions and Alternative Maritime Power™ (AMP) which reduces ship emissions at berth. GHG reductions from AMP will be accelerated as grid power becomes cleaner.

As part of the CAAP, the Los Angeles and Long Beach Harbor Departments operate a Technology Advancement Program (TAP) to accelerate the verification or commercial availability of new, clean technologies, through evaluation and demonstration, to move towards an emissions-free port. Working with green technology developers, tenants, industry stakeholders, and the regulatory agencies, the TAP is focused on providing funding for new and emerging technologies, with the objectives of streamlining the process for reaching consensus on the emission reductions achieved by various technologies and facilitating development of new technologies and their adoption throughout the port industry. (www.cleanairactionplan.org/programs/tap/default.asp)

Zero Emissions Roadmap

A key initiative in reducing GHG emissions is to encourage the development of zero emission equipment. In 2011, the Harbor Departments of Los Angeles and Long Beach jointly issued a Zero Emissions Roadmap (ZERM) to guide the development of these technologies, including criteria for the technology to have the potential to be successfully implemented, to increase efficiency, and to reduce air emissions. (www.cleanairactionplan.org/reports/default.asp)

Energy Management Action Plan

The Energy Management Action Plan (EMAP) serves as the Harbor Department's guide to identify, develop and implement programs to enhance energy efficiency, reliability, quality, cost and resiliency, as well as keep up with increasing electrification and energy demand. Automation of container terminals has the potential to be the biggest driver of increased Port electricity demand over the next decade. Depending on the level of automation, electricity demand at the terminal could double or potentially triple. The Port's TraPac Container Terminal is currently undergoing automation and will be the first automated terminal on the West Coast. Outreach to promote energy efficiency programs and services to Port tenants is an integral part of the EMAP. One immediate action under the EMAP is the conversion of high mast lighting on terminals to light emitting diode (LED) fixtures that realizes an estimated 50 percent cost savings in electric utility bills and reduces GHG emissions. The Harbor Department has also committed to generating 10 Megawatts (MW) of solar power within the Port of Los Angeles. To date, 1.6 MW of photovoltaic (PV) solar power have been installed. The remaining amount of PV solar power will be installed through the LADWP Feed-in-Tariff Set Pricing (FiT) Program. Under the FiT program, LADWP will purchase energy from PV solar power projects within its service territory.

(www.portoflosangeles.org/newsroom/2013_releases/news_060313_EMAP.asp)

The Harbor Department has invested approximately \$6 million in zero emissions technology demonstration projects, including the development and testing of electric and fuel cell heavy duty drayage trucks and cargo handling equipment. Real world testing in full duty cycles is ongoing and the Harbor Department is hopeful that these technologies will be proven to be technically, operationally and commercially feasible and reliable for full implementation at some point in the future (www.cleanairactionplan.org/reports/default.asp).



Land Use and Planning

The Port Master Plan establishes policies and guidelines to direct the future development of portions of the Port of Los Angeles that are located within the coastal zone boundary as defined under the California Coastal Act. Through the environmental review process, mitigation measures were identified to reduce or avoid significant impacts from greenhouse gas emissions related to potential future development and expansion of the Port. The list of mitigation measures include the following: energy efficient lighting, routine energy audits, recycling, tree planting, feasibility review of solar panels on buildings, and water conservation. As future proposed development projects and land use changes allowable under the Port Master Plan undergo the necessary environmental review and approval in accordance with state and federal regulations, measures to reduce greenhouse gas emissions would be required, as applicable, and incorporated into permits, leases, agreements, or contracts.

(www.portoflosangeles.org/planning/masterplan.asp)

Through these and other programs, the Harbor Department continues to evaluate, promote, partner, and implement various potential GHG emission reduction strategies that may present opportunities for port operations. Some of the strategies being identified and evaluated along with the potential applicable implementing program, status, and strategy term (current, near-, mid-, and long-term) are provided in Table 3.

Table 3: GHG Emissions Reduction Strategies for Port Operations

Scope	GHG Reduction Strategy	Implementing Programs	Status	Timeline
1,2,3	Initiate Energy Efficiency Measures	EMAP, Harbor Master Plan	Being implemented	Ongoing
1,2,3	Implementing Green Building Policy (Retrofits & New Buildings)	Harbor Master Plan	Being implemented	Ongoing
1,2	Increase Employee Awareness	Harbor Master Plan	Being implemented	Ongoing
1,3	Electric/Hybrid Electric Vehicles/Plug-ins/ Alternative Fueled Vehicles	GreenLA, EMAP, AB32	Being implemented	Ongoing
1,3	Low Carbon Fuel Standards	CARB's Regulation (Being amended late 2014)	Being implemented	Ongoing
1,3	Expand Recycling	Harbor Master Plan	Being implemented	Ongoing
2,3	Wind Power Electrical Generation - POLA	Port's Energy Sustainability Initiative, EMAP	Under consideration	Near/Mid-Term
2,3	Increase Renewal Energy Portfolio - DWP	AB32, City Council's motion for DWP	Being implemented	Ongoing
3	OGV Vessel Speed Reduction	Voluntary/CAAP	Being implemented	Ongoing
3	OGV Reduction of At-Berth Emissions	CARB Regulation/CAAP	Being implemented	Ongoing
3	OGV Energy Saving Measures	IMO MARPOL standards for OGV energy efficiency	Being implemented	Ongoing
3	OGV Alternative Sources of Power	CAAP, AB32	Being evaluated	Mid/Long-Term
3	Incentive Provider, Environmental Ship	POLA OGV ESI Incentive Program	Being implemented	Ongoing
3	Operational Efficiency Improvements	Industry, GreenLA, EMAP, AB32	Being implemented	Ongoing
3	Electric Rubber Tired Gantry	Industry, Grants, ZERM, EMAP, AB32	Being implemented	Ongoing
3	Electric Yard Tractor	Industry, Grants, ZERM, EMAP, AB32	Being evaluated	Near-Term
3	Terminal Equipment Electrification	Industry, Grants, ZERM, EMAP, AB32	Being implemented	Ongoing
3	Hybrid Electric Tugs	Industry, Grants, E-MAP, AB32	Being implemented	Ongoing
3	Tug Staging Area	ZERM, EMAP, AB32	Being evaluated	Near-Term
3	PierPASS	GreenLA	Being implemented	Ongoing
3	Near-Term Zero-Emissions Technologies for Trucks	ZERM, AB32	Being evaluated	Near-Term
3	Electric/Hybrid Dray Trucks	ZERM, AB32	Being evaluated	Mid/Long-Term
3	Electrification of Alameda Corridor	ZERM, AB32	Being evaluated	Mid/Long-Term

Vessel Speed Reduction

Vessels transiting within the emission inventory overwater boundary that voluntarily reduce their speed to 12 knots significantly reduce the energy required to move the vessel through the ocean. VSR reduces over 80,000 metric tons of CO₂ annually from both Port of Los Angeles and Port of Long Beach.



International Collaborative Efforts

Recognizing that maritime emissions account for approximately 3-5% of worldwide GHG emissions, the Harbor Department has taken a leadership role, working with the international maritime community on innovative programs that help to reduce GHGs. The partnerships outlined below are just a few examples of these efforts.

In 2005, the Harbor Department and the Port of Shanghai signed a Friendship Agreement to work together on air quality issues. This Friendship Agreement led to the development of the Pacific Ports Clean Air Collaborative (PPCAC). The PPCAC was formed by the Harbor Department and Port of Shanghai, the USEPA Office of International and Tribal Affairs, and the United States Maritime Administration (MARAD) to bring together ports, regulatory agencies, shipping lines and terminal operators, and other stakeholders to discuss air quality issues. The 2008 PPCAC conference in Shanghai focused on GHG reduction and all three conferences held to date have encouraged collaborative discussion on GHG and climate change. (www.ppcac.org)



2012 Pacific Ports Clean Air Collaborative Conference at Port of Los Angeles



The Harbor Department has been an active member of the International Association of Ports and Harbors (IAPH) and engages the international port community through the IAPH Environmental Committee and other IAPH-related working groups. Through the IAPH, the Harbor Department helped to create the World Ports Climate Initiative (WPCI). As a leader in the WPCI, the Harbor Department has led initiatives, such as development of a Carbon Footprinting Guide for Ports guidance document, and free online carbon calculators that any port can use to estimate their Scope 1 and 2 facility emissions, or their Scope 3 transit emissions. In addition, the Harbor Department is currently active on WPCI's Environmental Ship Index (ESI), Shore Power, and Liquefied Natural Gas subgroups. (www.wpci.iaphworldports.org)



2008 World Ports Climate Initiative Inaugural Meeting at Port of Los Angeles



Challenges Ahead

Looking toward 2050, there are several unknowns that will affect future GHG emission levels. These unknowns include grid power portfolios; maritime industry preferences of power sources for ships, harbor craft, terminal equipment, locomotives, and trucks; advances in cargo movement efficiencies; the locations of manufacturing centers for products and commodities moved; and consumer demand for the carbon impacts associated with their purchases. The key relationships that have led to operational efficiency improvements to date are the cost of energy, current and upcoming regulatory programs, and the competitive nature of the goods movement industry. We anticipate these relationships will continue to produce co-benefits with regards to GHG emissions for the foreseeable future.

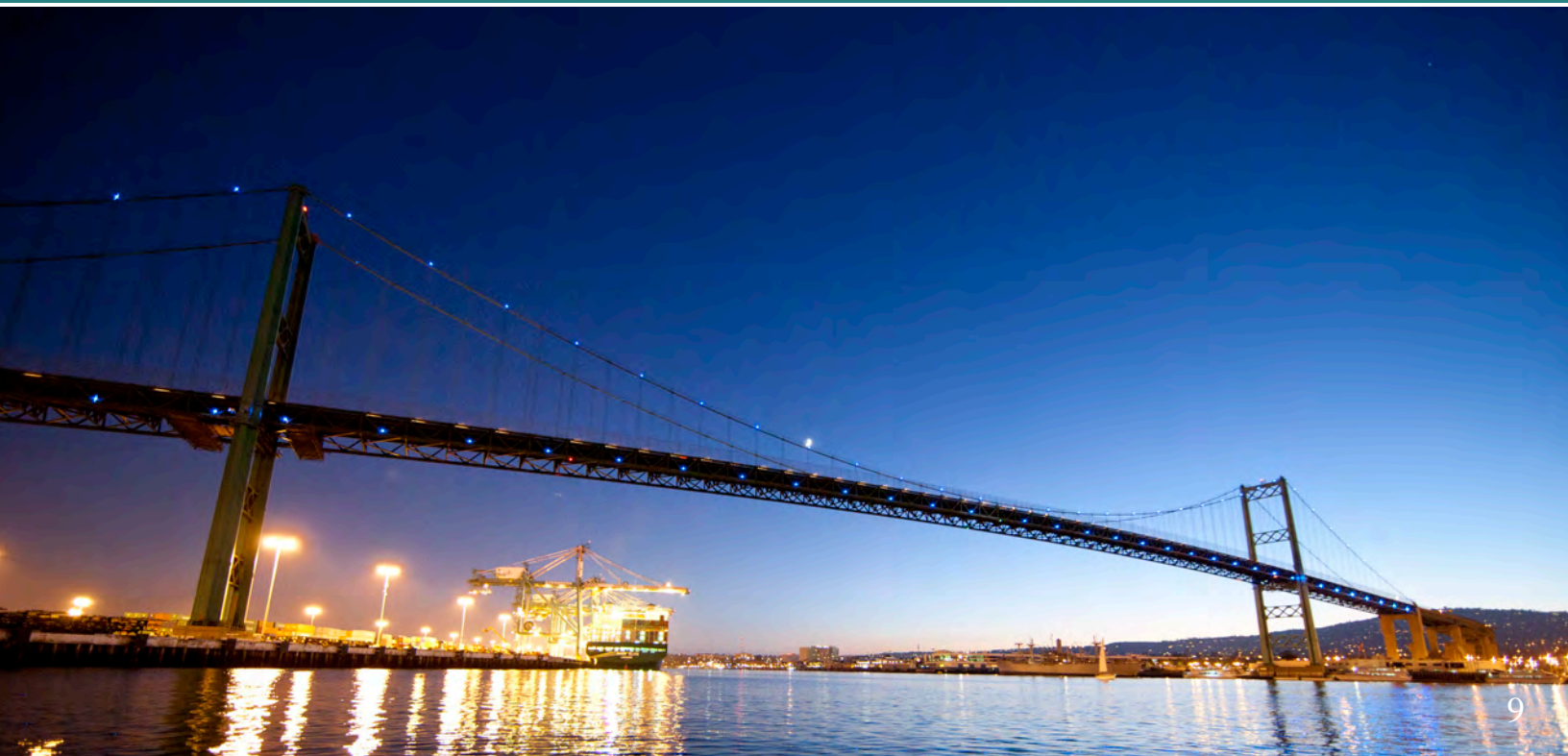
In order to reach AB32's target of 80% reduction in GHG emissions in 2050, compared to 1990 levels, there are tremendous challenges that will need to be overcome. Achieving the 2050 target will require nearly an additional 65% reduction beyond the reductions made in 2013. Ships will have to make vast improvements beyond current International Maritime Organization (IMO) standards, and while we fully expect them to have a substantially smaller carbon footprint in the next 40 years, they are unlikely to reach zero emission levels. As a result, ships will likely take over from trucks as the largest sources of GHG emissions among equipment operating in and around the ports. For this reason, trucks, currently the largest single source of GHG emissions, will have to operate at near zero levels to accommodate any shortfalls in ships. We expect this will gradually occur as zero and near zero-emission alternatives for heavy-duty vehicles become technologically and economically viable over the next 40 years. Similarly, onshore container movement systems on the terminals will also need to move to near zero GHG emissions to cover shortfalls from ships. Like trucks, it is anticipated that options like moving diesel powered equipment to grid power or alternative zero or near-zero emitting power systems (e.g., fuel cells, hydrogen, others) will need to be made over the next 40 years. Finally, though they currently only represent a small percentage of GHG emissions in and around the port, harbor craft and rail haul equipment will need to continue to make advances in reducing their carbon footprint.

IMO Stepping Up to the GHG Challenge

IMO's Energy Efficiency Design Index and Ship Energy Efficiency Management Plan regulations makes ships the only international transportation source to be controlled in regards to GHGs. These two programs will lead to significant efficiency improvements which will create a smaller carbon footprint for vessels throughout the world.

(www.imo.org/MediaCentre/HotTopics/GHG/Pages/default.aspx)

(www.imo.org/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Technical-and-Operational-Measures.aspx)



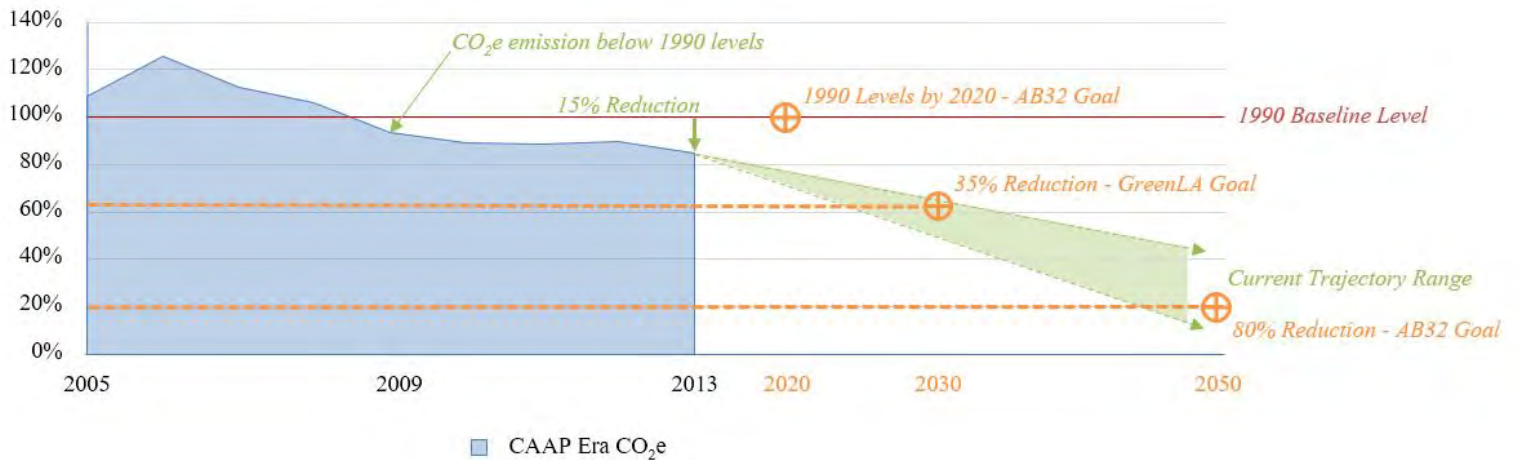


As referenced above, the vast majority of GHG emissions within the defined emissions inventory geographic domain are associated with Scope 3 ships, trucks, and cargo handling equipment that service the Port of Los Angeles. The Scope 3 sources are not controlled by the Harbor Department and are federally or internationally preempted from local regulation. Therefore, achieving the 2050 GHG emissions reduction target will require continued coordination between all stakeholders and regulators at all levels of government, including at the international level. In addition, since reaching the 2050 goal will take actions that will fundamentally change how cargo is moved, the actual progression of future scenarios require key decisions that reside within the maritime and goods movement industries and not just the Harbor Department.

There is no single “silver bullet” emission reduction strategy that easily reduces the sources to 80% reductions, so it will take continued research, evaluation, engagement, innovation, demonstrations, investment, and coordination/action to achieve the 2050 target. The Harbor Department is playing a leading role in implementing innovative programs, promoting research, applying for grant funding (e.g. CARB’s Cap-and-Trade Program) with our partners, and facilitating engagement and analysis on an international level. The Port has already exceeded the CARB AB32 goal of reduction of 2020 GHG levels to 1990 levels. The Harbor Department believes that a variety of scenarios are available that will meet or exceed the *GreenLA* goal of 35% reduction by 2030 and could put the long-term trajectory at or in excess of 80% reduction by 2050. This can only be accomplished by collaboration among key stakeholders in this process.

The Harbor Department looks forward to continuing the cooperation and collaboration that have resulted in significant GHG reductions to date and partnering in new programs with the potential to further reduce GHGs in the future. The Harbor Department will continue to engage in its leadership role, refine/update scenarios and emission reduction trajectories, and document actual GHG emission reductions on an annual basis. Figure 5 presents the total 2005-2013 CO₂e emissions, with respect to 1990 baseline levels, the AB32 and *GreenLA* goals, and the projected trajectory range based on various scenario estimates.

Figure 5: Scope 1-3 GHG Emissions 2005-2013 & GHG Reduction Trajectories to 2050





CLIMATE LEADERSHIP AWARDS

2012 Supply Chain Leadership
Award Winner

In 2012, the Harbor Department was recognized by the USEPA, The Climate Registry, The Association of Climate Change Officers (ACCO), and the Center for Climate and Energy Solutions (C2ES) for its collaborative efforts to reduce GHG emissions throughout the goods movement supply chain with an inaugural Climate Leadership Award.



Goods Movement & Greenhouse Gas Emissions – Win-Win!

Energy is typically the most significant cost associated with the goods movement industry. Diesel engines are and have been the prime mover of vessels, cargo handling equipment, trucks, and rail locomotives. As the sector becomes more cost competitive, fuel efficiency will become a significant opportunity to reduce costs and greenhouse gas emissions. Between now and 2050, we anticipate that energy types will continue to diversify, energy consumption will continue to be a market force, the movement of cargo will fundamentally change, and the resulting efficiencies will create a win-win for both the business sector and reduction of greenhouse gas emissions.



City of Los Angeles Harbor Department
Environmental Management Division
Christopher Cannon, Director
425 S. Palos Verdes Street
San Pedro, CA 90731
Phone: (310) 732-3675
www.portoflosangeles.org

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