

The initial set of potential port emission reduction strategies were developed by South Coast Air Quality Management District staff based on publicly available information including the Ports' Clean Air Action Plan. Associated presentation material for this table can be found at: <https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-2304>.
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Port Vehicle / Emission Source (NOx and DPM Emissions in 2022 per Ports' Emissions Inventory Report)	Desired Outcome	Potential Mechanisms <input type="checkbox"/> Indicates a proposed CAAP strategy	Potential Approaches to Measure Emission Reduction Benefits / Mechanism Effectiveness	Potential Primary Responsible Parties	Potential Tools for Mechanism Implementation	Additional Role(s) or Influence that Could be Provided by: - Port Authority? - Marine Terminal Operators? - Others?	Potential Constraints & Opportunities to Mechanism Implementation with Respect to: - Technology Demonstration? - Timing? - Equipment / Vehicle Manufacturing? - Costs? - Workforce? - Utilities? - Permitting / External Agency Approval? - Incentives? - Other Regulations? - Others?	Potential Community Benefits or Impacts from Mechanism	Any Other Considerations for Mechanism Development and Implementation
Ocean-going Vessels (NOx: 19.5 tpd; 63%) (DPM: 0.24 tpd; 48%)	Cleaner vessel visits	Enhanced / additional incentives to increase clean vessel visits through existing or related upcoming programs (e.g. Green Ship Incentives, Green Shipping Corridors, Vessel Speed Reduction)	Annual tier distribution of vessel calls	Port Authority	Environmental ordinance / tariff / Memorandum of Understanding				
		Establish a feebate program akin to Clean Truck Program to encourage cleaner vessel and discourage older vessel visits (e.g. CAAP-proposed Clean Ship Program)	Annual tier distribution of vessel calls	Port Authority	Environmental ordinance / tariff				
		Include in lease operating agreements and customer contracts that a minimum percentage of vessel calls meet latest IMO standards and/or use of emission control technologies. The minimum percentage is increased over time.	Annual tier distribution of vessel calls	Vessel Owner / Operator	Contractual agreements / negotiations				
		Technology demonstrations of emissions control technologies for in-use vessels	Funding amount allocated to projects Number of projects funded & completed NOx reduced per trip	Vessel Operator Technology Manufacturer / Provider	Obtain grant funding				
	Understanding co-benefits of NOx and other criteria pollutants with alternative fuels	Include in Green Shipping Corridor implementation plans study of criteria pollutant reduction benefits with GHG reductions and criteria pollutant reduction targets	NOx reduced compared to a diesel propulsion engine	Port Authority Trans-Pacific and Other International and Domestic Partners Shipping Lines	Memorandum of Understanding Obtain grant funding				
		Include in alternative technology demonstration projects (e.g. dual fuel engines) study of emissions profile to ensure Tier 3-level benefits and investigate any low load issues	NOx reduced compared to a diesel propulsion engine	Vessel Operator Technology Manufacturer / Provider	Obtain grant funding				
	Reduce at-anchor emissions	Build / facilitate building of support infrastructure for at-anchor emissions control through public-private partnerships	Annual infrastructure component installation progress report	Port Authority Infrastructure / technology supplier	Obtain grant funding				
		Introduce incentive program for use of technologies or methods to control emissions during anchorage	NOx reduced per trip	Port Authority	Environmental ordinance / tariff				

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Cargo Handling Equipment (NOx: 1.8 tpd; 6% (DPM: 0.1 tpd; 10%))	100% on-terminal ZE equipment by 2030	Development and implementation of terminal-specific master plans	Annual distribution of ZE vs. diesel vs. non-diesel	Marine Terminal Operators Port Authority	Contractual agreements / negotiations Environmental ordinance				
	Increase ZE equipment usage	Issue incentives for container moves to peel-off yard by ZE yard trucks	Annual emission reductions from diesel equipment replaced with ZE equipment	Marine Terminal Operators	Private-public partnerships to establish incentive program				

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Drayage Trucks (NOx: 4.1 tpd; 13%) (DPM: 0.03 tpd; 5%)	Increase ZE drayage usage / moves	Ocean carrier / terminal / on-road carrier (truck) who share same corporate structure coordinate dedicated ZE drayage fleet to sibling terminal (e.g. APM and Maersk and Performance Team)	Annual emission reductions from diesel truck visits replaced with ZE trucks per terminal	Ocean Carriers Marine Terminal Operator	Contractual agreement from ocean carriers				
		Terminal prioritizes contracts with customers (e.g. ocean carriers) that work with freight forwarders who can send ZE fleets	Annual emission reductions from diesel truck visits replaced with ZE trucks per terminal	Marine Terminal Operators Ocean Carriers Freight Forwarders	Contractual agreements / negotiations				
		Increase funds towards accelerated ZE drayage truck deployment	Annual emission reductions from diesel truck visits replaced with ZE trucks per terminal	Port Authority	Environmental ordinance / tariff Clean Truck Program / Policy amendments				
		Fee discounts or waiver programs on empty container storage fees moved by ZE trucks	Annual emission reductions from diesel truck visits replaced with ZE trucks per terminal	Port Authority Marine Terminal Operators	Contractual agreements / negotiations Environmental ordinance / tariff				
		Preferential gate access for ZE trucks via appointment system	Annual emission reductions from diesel truck visits replaced with ZE trucks per terminal	Marine Terminal Operators	RFID tags				
	Reduce on-terminal emissions	Feebate or incentive programs to reduce truck queue time (e.g. reward dual transactions and decreased truck turnaround times)	Emission reductions from annual reduced diesel truck idling time or distance traveled on-terminal	Marine Terminal Operators Port Authority	Assessments to determine feebate / incentive amounts that encourage uptake by terminals or truckers / shippers				
		Complementary mechanism to ensure compliance with Heavy-Duty Vehicle Inspection and Maintenance Regulation	Emissions monitoring/vehicle testing results	Port Authority	Environmental ordinance / tariff Clean Truck Program / Policy amendments				
		Infrastructure improvements to reduce vehicle miles traveled (vmt) on terminal	Emission reductions from annual reduced diesel truck idling time or distance traveled on-terminal	Marine Terminal Operators Utility Companies	Terminal layout/land assessments				
	Buildout ZE infrastructure	Allocate funds collected from (potentially increased) Clean Truck Fee towards ZE charging/fueling infrastructure	Annual MWh installed per power demand	Port Authority	Planning and progress updates on what has been built/installed and any challenges				

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Switcher Locomotives (NOx: 0.2 tpd; 1%) (DPM: 0.002 tpd; 0.4%)	100% Zero Emission Short Line Fleet	Include in short line operator contract turnover schedule of current locomotives to zero emission	Distribution of locomotive fleet by tier/technology NOx reduced per locomotive replaced	Port Authority Short Line Operator	Contractual agreements / negotiations				
	Build out ZE charging/fueling infrastructure	Partner with third party to build short line charging/fueling facility	Reductions per MWh (or additional energy unit) installed to meet demand for short haul locos/switchers	Port Authority	Public-private partnership Contractual agreements / negotiations (if tenant route)				
	Reduce idling emissions	Faster rail access on/off of Terminal Island	Emission reductions from Annual Reduced idle time or Reduced fuel consumption	Marine Terminal Operators Port Authority	Assessment of on-dock rail usage, operational efficiency, and logistical footprint of short line operator				
		Greater efficiency for switching activity at terminals	Emission reductions from Annual Reduced idle time or Reduced fuel consumption	Marine Terminal Operators Port Authority Short Line Operator	Assessment of on-dock rail usage, operational efficiency, and logistical footprint of short line operator				
Line Haul Locomotives (NOx: 3.2 tpd; 10%) (DPM: 0.1 tpd; 24%)	Cleaner locomotive visits to Ports	Dedicated Tier 4 or cleaner fleet for intrastate activity	Per train emission reductions compared to fleet average from Ports EI/1998 MOU Annual % reduction in line haul fleet composite emission factor (EF)	Class I Railroads	Contractual agreements / negotiations \$450 million incentive funding statewide for ZE infrastructure, locomotives, vessels, and vehicles through SWIFT				
		Per call incentive program for hybrid conversions and ZE trains	Per train emission reductions compared to fleet average from Ports EI/1998 MOU Annual % reduction in line haul fleet composite emission factor (EF)	Port Authority Class I Railroads	Contractual agreements / negotiations \$450 million incentive funding statewide for ZE infrastructure, locomotives, vessels, and vehicles through SWIFT				
	Establish "green corridor" for hybrid/ZE locomotives going from Ports to future Barstow International Gateway	Per train emission reductions compared to fleet average from Ports EI/1998 MOU Annual % reduction in line haul fleet composite emission factor (EF)	Port Authority Class I Railroads	Contractual agreements / negotiations \$450 million incentive funding statewide for ZE infrastructure, locomotives, vessels, and vehicles through SWIFT					
	Build out ZE charging/fueling infrastructure	Electrical infrastructure phase in plan with milestones	Annual MWh installed to meet demand stated in plan	Port Authority Marine Terminal Operators Class I Railroads Utilities	Contractual agreements / negotiations Public-private partnership Obtain funding				

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Commercial Harbor Craft (NOx: 2.2 tpd; 7%) (DPM: 0.05 tpd; 11%)	Cleaner harbor crafts at the Ports (Tier 4 by December 2024)	Terminal operators include in customer contracts (vessel operators) turnover to cleaner harbor craft by 20XX	Annual emission reduction from older to cleaner vessel	Port Authority Vessel Owners/Operators	Contractual agreements / negotiations Obtain grant/incentive funding				
		Incentivize harbor craft operators to repower/replace vessels to meet Tier 4 or cleaner by 20XX	Annual % fleet distribution	Port Authority Vessel Owners/Operators	Obtain grant/incentive funding Environmental ordinance / tariff				
	Accelerate ZE turnover / entry into harbor craft fleets	Incentivize harbor craft operators to enroll and meet specific ZEAT milestones or operation of vessel fleet above Tier 4 level starting year 20XX	Annual % fleet ZE distribution % Operating hours/kWh in ZE	Port Authority Terminal Operators Vessel Owner/Operator	Obtain grant funding for demonstration projects				
		Technology demonstrations and pilot projects	Annual % fleet ZE distribution % Operating hours/kWh in ZE	Port Authority Terminal Operators Vessel Owner/Operator	Contractual agreements / negotiations				
		Terminal operators include in customer contracts (vessel operators) minimum use of ZE/hybrid assist tugs, if demo successful	Annual % fleet ZE distribution % Operating hours/kWh in ZE	Port Authority Terminal Operators Vessel Owner/Operator	RFPs and grant funding for infrastructure installation				
	Buildout ZE charging / fueling infrastructure	Port include in leases with harbor craft operators equipment procurement/modernization schedule (Equipment type supported, # of vessels supported, # of plugs with amperage and voltage for each connection)	Annual MWh installed per power demand - planning and progress updates on what's been built/installed + challenges	Port Authority Vessel Owners/Operators	Contractual agreements / negotiations				
		RFPs and grant funding for infrastructure installation - Ports incorporate this into their master plan	Annual MWh installed per power demand - planning and progress updates on what's been built/installed + challenges	Port Authority	Obtain funding for infrastructure				

Instructions: Stakeholders welcome to provide additional potential emission reduction mechanisms not identified in "Potential Mechanisms" tab

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