

# REPORT

## **Report: Maritime Air Quality Improvement Plan (“MAQIP”) Status Report (Engineering)**

**MEETING DATE:** 12/14/2017

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**APPROVED BY:** J. Christopher Lytle, Executive Director

### **I. INTRODUCTION**

This Information Report (“Report”) describes the status of implementation of the Maritime Air Quality Improvement Plan (“MAQIP”), informs the Board of Port Commissioners (Board) and the public about seaport air quality, and seeks to solicit public comment and Board direction while alerting the Board to potential Port costs associated with grant applications as the Port formulates an updated version of the MAQIP.

The Report describes the Port of Oakland’s (“Port”) existing and anticipated seaport air quality obligations including State of California (“State”) regulations, the MAQIP, the Board of Port Commissioner (“Board”) Air Quality Policy Statement<sup>1</sup>, and the Oakland Army Base (“OAB”) Environmental Impact Report (“EIR”) mitigation program. The Report describes factors that inform the Port’s air quality planning through 2020 and beyond. The Report outlines the elements of the MAQIP Update effort, including specific proposed measures to reduce seaport-related diesel particulate matter (“DPM”) emissions, an Advanced Technology Program (“ATP”) focused on greenhouse gas (“GHG”) emissions, and public participation through reconvening the MAQIP Task Force.

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<sup>1</sup> The State has defined diesel particulate matter (“DPM”) as a toxic air contaminant and contributor to elevated risk for cancer and respiratory disease. In its 2008 Air Quality Policy Statement, the Board established a goal of reducing the cancer health risks related to the exposure of people to DPM from seaport-related mobile sources by 85% over the 2005 baseline by the year 2020. The Air Quality Policy Statement uses a proxy of 1:1 for DPM emissions to health risk. The MAQIP incorporates the Air Quality Policy Statement.

Foremost, the MAQIP prioritizes public health<sup>2</sup> in West Oakland through continued diesel emission reductions by the year 2020 using feasible, readily available, and cost-effective technologies including maximizing ships plugging in to the Port's Shore Power system. The MAQIP Update also includes the joint City of Oakland ("City")-Port West Oakland Truck Management Plan ("TMP") to address quality of life and air quality concerns in West Oakland related to truck parking and circulation. Furthermore, the MAQIP Update effort will look beyond 2020 to a new planning horizon – the year 2030 – and will identify and recommend opportunities to utilize grant-supported zero- and near-zero ("ZE/NZE") emissions technologies to support the State's year 2030 GHG emissions reduction targets (40% below 1990 levels by 2030).

## **II. BACKGROUND SETTING**

### Economic Importance of Goods Movement and Related Public Health Protection

The State has recognized goods movement as an important contributor to the California economy.<sup>3</sup> The California Air Resources Board ("ARB") estimated that California's freight system was responsible for 165 million tons of goods in 2011, valued at over \$690 billion, to markets in the United States, and over \$180 billion worth of freight exports to world markets.<sup>4</sup> In 2010, the Port estimated that its seaport, aviation, and real estate activities, along with its tenants and customers, generated more than 73,000 jobs, \$851 million in local business purchases and \$617 million in tax revenue in the Bay Area Region.<sup>5</sup>

At the same time, the State declared "the environmental impacts from goods movement activities must be reduced to ensure protection of public health."<sup>3</sup>

The Port recognizes its role in minimizing air pollution while promoting economic vitality and jobs. Thus, to address public health, the Board adopted the goal of reducing Port-related DPM emissions by 85% by 2020 through all practicable and feasible means.<sup>6</sup>

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<sup>2</sup> According to the December 2008 Air Resources Board "Diesel Particulate Matter (DPM) Health Risk Assessment for the West Oakland Community", the estimated lifetime cancer risk for residents in West Oakland from exposure to DPM emissions is three times higher than the estimated Bay Area background estimated cancer risk. The seaport's contribution is 16% (4% is UP Railroad, and 80% is non port and non UP railroad sources – primarily trucks).

<sup>3</sup> Declaration, 2005: *Goods Movement in California*, Alan C. Lloyd, PhD, Agency Secretary, California Environmental Protection Agency and Sunne Wright McPeak, Agency Secretary, Business, Housing and Transportation Agency.

<sup>4</sup> California Air Resources Board, Sustainable Freight Pathways to Zero- and Near-Zero Emissions Discussion Draft, "Background." April 2015.

<sup>5</sup> Martin Associates, *2010 Economic Impact of the Port of Oakland*, 2010.

<sup>6</sup> *Port of Oakland Maritime Air Quality Policy Statement*, March 18 2008 (Port Resolution 08057).

## Port-Specific Air Quality Regulation

In 2006, the ARB announced its intention to establish emissions regulations and health risk goals to protect public health from the impacts of ports and goods movement operations.<sup>7</sup> To achieve these goals, the State promulgated new regulations affecting the five main mobile sources associated with ports and goods movement: ships, commercial harbor craft (“HC”), cargo handling equipment (“CHE”) at ports and intermodal yards, heavy diesel trucks, and locomotives.

### Air Quality Plans in Oakland and San Pedro Bay Ports

The Port of Oakland responded to the new ARB air rules by partnering with neighborhood and business representatives and air quality regulators to develop the original MAQIP. The MAQIP planning process involved extensive public stakeholder participation which began in 2006 and comprised 35 stakeholders, including the West Oakland Environmental Indicators Project (“WOEIP”). Members of the MAQIP Task Force were selected through a public nomination process from community members, Port tenants, environmental advocacy groups, air quality and health agencies, and maritime-related businesses. The MAQIP Task Force had four co-chairs: the Executive Director of the Port, the Executive Officer of the Bay Area Air Quality Management District (“BAAQMD”), the Co-Chair of WOEIP, and the Executive Vice President of GSC Logistics, Inc. The Board approved the MAQIP in April 2009.

The MAQIP created a comprehensive 11-year policy and planning framework through the year 2020. MAQIP focuses on regulatory compliance, above-and-beyond emission reduction efforts, and improving public health in West Oakland.

In Southern California, the Port of Los Angeles and the Port of Long Beach (collectively “San Pedro Bay Ports”) developed a similar air quality plan - the Clean Air Action Plan (“CAAP”). The San Pedro Bay Ports developed the CAAP in 2006, and approved significant updates to the CAAP in November 2017.

Both the MAQIP and the CAAP have achieved significant reductions in DPM emissions, as shown in the table below.

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<sup>7</sup> State of California, Air Resources Board, Resolution 06-14, April 20, 2006.

***DPM Reductions in Tons per Year (“tpy”) at Oakland and San Pedro Bay Seaports from 2005 to 2015 (and 2015 TEUs)***

<b>Seaport</b>	<b>Year 2005 DPM Emissions (tpy)</b>	<b>Year 2015 DPM Emissions (tpy)</b>	<b>% Reduction</b>	<b>2015 Million TEUs</b>
<b>Port of Oakland</b>	261	63	-76%	2.3
<b>San Pedro Bay Ports</b>	1,008	265	-85%	15.4

Sources: Port of Oakland 2015 Emissions Inventory; Port of Los Angeles Air Quality Report Card, Port of Oakland, Port of Long Beach and Port of Los Angeles web sites

TEU = Twenty-foot Equivalent Unit, the unit of measure of cargo containers

Emission reductions from retrofitting ships, purchasing new equipment, installing electrical infrastructure, etc. cost the Ports, tenants, fleet operators (ships), truckers, and the State (through grants) hundreds of millions of dollars.

### **III. EXISTING AIR QUALITY COMMITMENTS**

Compliance with seaport environmental requirements is challenging. The Port owns the seaport land which it leases to private entities that, in turn, operate facilities that handle and promote cargo activity. The leases are subject to market forces. The Port does not own or operate the cargo handling operations or the mobile equipment that supports operations.

In addition to complying with numerous local, State, and federal air quality laws and regulations, the Port’s primary existing air quality commitments are:

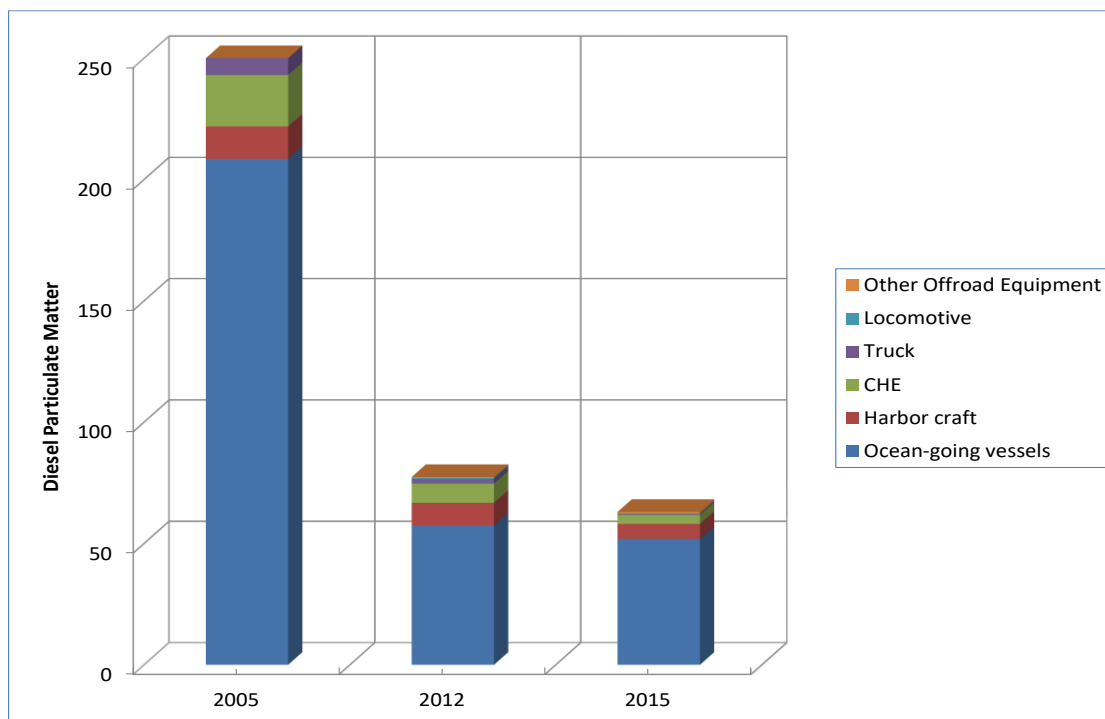
1. Reach MAQIP -85% DPM Reduction Goal by 2020;
2. Comply with Shore Power grant requirements;
3. Complete the West Oakland TMP with the City of Oakland; and
4. Conduct GHG Reduction Plans for projects on the OAB.

#### **MAQIP 85% DPM Reduction Goal Compared to 2005 Levels**

The Board established the goal to reduce cancer health risks related to the exposure of people to DPM from seaport-related mobile sources by 85% over the 2005 baseline by the year 2020. MAQIP programs and projects support this goal through regulatory compliance, early actions before regulations come into effect and by targeting emission reductions that exceed legally mandated requirements. The Port calculates MAQIP progress through periodic Emissions Inventory (“EI”) updates. For the year 2015, the EI showed a 98% reduction in truck-related DPM emissions and 76% reduction for all seaport sources from the 2005 baseline. Port staff are currently working on the year 2017 EI.

## Shore Power Regulation and Grant Requirements

Shore Power regulation and grant compliance is a priority because ocean-going vessels (“OGV”) are the largest source category for DPM in the Port’s emissions inventory as shown in the figure below:



Source: Port of Oakland 2015 Emissions Inventory

The Port’s grants used to fund a portion of the shore power infrastructure costs require emissions reductions higher than regulatory requirements (and do not account for alternative treatment systems); whereas ARB’s At-Berth Regulation requires 70% fleet plug-ins in 2017-2019, the grants generally require 80% in 2017-2019 (and 90% thereafter). The At Berth Regulation also allows exemptions that are not currently allowed with the grants.

The Port understands that ARB is in the process of evaluating amendments to the At Berth Regulation. Port staff through its routine analyses of shore power plug-ins has been informing ARB staff of ship side and dock side issues.

## MAQIP and Shore Power Performance and Gaps

As of 2015, the Port had achieved a 76% reduction of overall DPM emissions since 2005. To reach (and maintain) the MAQIP 85% DPM reduction target by 2020, the Port is modeling year 2020 and 2030 emissions to identify additional reduction measures. The modeling considers future low- and high-growth scenarios. Preliminary results (September 2017) show truck, locomotive and CHE contributing relatively small tons per year (tpy) of DPM to the Port inventory: – 0.35, 0.34 and 0.44 tpy, respectively – due to cleaner engines, fuels, and

technologies. In contrast, HC and OGV emissions remain substantial contributors in Years 2020 and 2030, and require ongoing efforts to sustain the MAQIP emissions reductions.

A combination of factors currently inhibits plug-in rates at the Port's required 80% grant performance level:

1. Up to 25% of the ships calling Oakland are not Shore Power-capable;
2. Infrequent callers and steamships are exempt from the "At-Berth Regulation;" and
3. Ship-side and dock-side equipment and operational issues inhibit compliance (about 5% decrease).

To monitor plug-in rates, marine terminal operators report to Port staff whenever a shore power-capable ship does not plug in. This allows Port staff to identify dockside issues that the Port and/or marine terminal operators may be able resolve such as providing an extender system for vaults. Port staff also receive schedules in advance from some fleet operators to identify whether ships are shore power capable before arriving in Oakland.

#### West Oakland TMP

The City and the Port have initiated the West Oakland TMP, as required by the 2012 OAB Initial Study/Addendum<sup>8</sup> to address impacts to air quality and quality of life caused by commercial truck parking and circulation in West Oakland residential streets. The West Oakland TMP includes numerous public meetings. The purpose of the public participation plan is to engage West Oakland residents, businesses, truck drivers, and other stakeholders to shape the substantive components of the TMP, including solutions to issues and problems. The Port and the City convened the first TMP community meeting on October 11, 2017, and had about 80 attendees. Public outreach in advance of the meeting included email, website, public libraries, ethnic community newspapers, and social media. The second TMP community meeting will take place on Saturday December 2, 2017, as a mobile workshop in West Oakland to observe street conditions. The Port and the City expect to finalize the West Oakland TMP in summer 2018. The West Oakland TMP will include actions to reduce parking and circulation impacts, such as improved signage, striping of curbs, and enforcement.

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<sup>8</sup> Mitigation Measure 4.3-7 of the 2012 Oakland Army Base ("OAB") Redevelopment SCA/MMRP, July 16, 2013.

## GHG Emissions Reduction Plans

Based upon a recent GHG emissions analysis,<sup>9</sup> the Port of Oakland contributes 0.3% to the Bay Area's regional GHG emissions.<sup>10</sup> Even though its GHG emissions are relatively low, the Port is analyzing GHG emissions co-benefits as part of the analysis of DPM emissions control measures, thereby integrating GHG emissions reductions into future emissions reduction strategies. For example, reductions are possible through replacement of fueled equipment with electric equipment and through improvements in terminal operational efficiency. Finally, as required by the OAB SCA/MMRP, each project developed as part of the master plan redevelopment at the former OAB must prepare a GHG Reduction Plan for approval by the City of Oakland, including the recent lease for the CenterPoint Oakland Development LLC.

### **IV. ADDITIONAL FACTORS SHAPING AIR QUALITY PLANNING**

In addition to existing air quality regulatory requirements and commitments, State rulemaking and GHG reduction targets are informing the Port's seaport air quality activities. The MAQIP Update will include projects to address any new State air quality rules and State GHG reduction targets.

#### New Air Quality Rules Being Developed by ARB

On March 23, 2017, ARB adopted Resolution No. 17-8, which requires ARB staff to take the following actions, among others:

- Within 18 months, develop amendments to existing "At-Berth Regulation" that will achieve up to 100% compliance by 2030 for LA Ports and Ports adjacent to top 10% most impacted areas pursuant to the California EnviroScreen ("CES")<sup>11</sup>;
- Within 24 months, develop amendments to the Cargo Handling Equipment regulations to achieve up to 100% compliance with Zero Emission Vehicle ("ZEV") requirements by 2030 for the Ports identified above; and
- Within one year, return to the ARB with concepts for an Indirect Source Rule ("ISR") to control pollution from large freight facilities, including ports, railyards, warehouses and distribution centers, as well as any alternatives to ISR capable of achieving similar levels of emission reductions.

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<sup>9</sup> Port of Oakland, Technical Memorandum: Port Emissions Inventories and their Role in the California State Implementation Plan, June 2017.

<sup>10</sup> Port of Oakland-related sources, including transit of OGVs from the outer buoys to the berth, emit approximately 0.25 million metric tonnes ("MMT") of GHG per year, normalized as carbon dioxide equivalents (CO<sub>2</sub>e). The BAAQMD 2017 Clean Air Plan tallies regional emissions of GHG to be 84.7 MMT CO<sub>2</sub>e.

<sup>11</sup> Although the seaport is not in the top 10% pursuant to CES, Port staff assume that ships calling at Oakland would be subject to any new ARB At Berth amendments.

## State GHG Reduction Targets and the Sustainable Freight Action Plan

In April 2015, Governor Brown issued Executive Order B-30-15, which established an interim year (Year 2030) GHG emissions reduction target of 40% below 1990 levels towards the State's 2050 goal of an 80% reduction below 1990 levels.

In July 2015, Governor Brown issued Executive Order B-32-15, which directed selected State agencies to develop an "integrated action plan" by July 2016 to "establish clear targets to improve freight efficiency, transition to zero emission technologies, and increase the competitiveness of California's freight system." In July 2016, State agencies completed the "Sustainable Freight Action Plan" to achieve the 40% GHGs reduction goal by 2030.

## AB 617

On July 26, 2017 Governor Brown approved AB 617, Nonvehicular Air Pollution: Criteria Air Pollutants and Toxic Air Contaminants. Although geared towards controlling emissions from stationary sources (e.g., refineries), implementation of this bill by ARB and BAAQMD includes identification of communities affected by a high cumulative exposure burden to toxic air contaminants (e.g., DPM) and criteria pollutants (e.g., NOx) by October 1, 2018. BAAQMD staff recently identified West Oakland as their number one AB 617 community. Other features include community air monitoring, and potentially expedited implementation of best available retrofit control technology.

## BAAQMD Proposals

Since August 2016, BAAQMD has been conducting an inquiry into tenant mobile sources and equipment. In July 2017, BAAQMD presented its concepts to the City of Oakland and the Port to implement near-zero emissions ("NZE") and zero emissions ("ZE") equipment projects at the seaport, including within the Port and City-owned portions of the OAB. ARB, BAAQMD, and the California Energy Commission ("CEC") are promoting NZE and ZE technologies by providing grants to purchase and demonstrate new equipment and technologies.

The Port has been actively participating in the BAAQMD work inquiry and proposal. On October 18, 2017, the Port submitted the following proposed list to BAAQMD for its review:

### Port-Proposed Emission Reductions

- Harbor Craft (HC): Emissions reductions from HC account for a large remaining part of the projected 2020 emissions in the Port's inventory. Reductions from this source would benefit the entire Bay Area because the tug fleet serves regional ports and terminals.
- Cargo Handling Equipment (CHE): Port staff proposes to work with a tenant and BAAQMD to prepare a Carl Moyer grant application to repower Rubber Tired Gantry ("RTG") cranes. The estimated cost to repower an RTG with a hybrid-diesel engine is \$400,000, of which the applicant match portion is 15%, or \$60,000 for each RTG. Additionally, the Port plans to work with tenants to pursue ARB Freight Facility GHG Reduction Fund support for demonstration of a ZE yard truck, top pick and battery-electric truck. The Freight Facility



grants require equipment owner and/or Port match funds. (See Freight Facility Grant and Budget, below.)

- Vessel retrofits for Ocean Going Vessels (OGV): To increase the use of shore power at the Port, more vessel retrofits are required. Each vessel retrofit costs approximately \$1 million. Port staff communicate directly with fleet operators to understand why ships do not plug in.
- Vessel Speed Reduction (“VSR”) for Ocean Going Vessels: A VSR program has benefits beyond air quality improvements, such as protection of marine mammals, especially the larger whale species (i.e., reducing the potential for mortality to whales feeding or resting in shipping lanes, etc.). By increasing efficiency, a VSR can also reduce GHG emissions from OGVs. VSR incentives can be in the thousands of dollars per vessel call; the Port averages about 1,500 ship calls per year. A funding mechanism needs to be identified.
- Alternative emissions control systems for OGV: Recognizing that not all vessels that call at the Port are equipped to utilize shore power, the Port is interested in barge-mounted emissions control systems. The barge systems in commercial development cost approximately \$6 million, and are more expensive for fleet operators to use to power ships at berth than shore power. Port staff are contacting vendors to investigate the feasibility of using these systems if and when they are allowable by ARB (for grant compliance).
- Shore power Vaults and Cable Reels: Cable reel extenders are an option at OICT to increase the use of shore power, as are additional shore power vaults. The Port is investigating these options to maximize ship plug-ins to shore power.
- Electrical System Upgrades and Improvements: Improvements to the electrical system are foundational for the transformation to a ZE and NZE platform. As a first step, Port staff propose to work with the BAAQMD (or other granting agencies) to identify specific funding opportunities to install a pilot onsite renewable energy generation and energy storage project (e.g. a solar canopy structure with potential battery storage) at the Port’s Harbor Facilities center. This concept would reduce GHG emissions associated with seaport activities, provide electrical resiliency for the Harbor Facilities center and potentially provide additional electrical capacity to support the use of ZE and NZE equipment use at other seaport facilities. On site generation was described in the Port’s June 2016 “Maritime Electric Strategic Assessment” as one of the potential solutions to meet the Port’s longer-term plans for supporting future electrification.

Port staff received feedback from ARB staff on this list recently; ARB staff requested that the Port also incentivize/encourage the use of ZE/NZE drayage trucks.

## **V. NEXT STEPS**

Leading up to the MAQIP Update, Port staff will reconvene the MAQIP Task Force in 2018. The MAQIP Task Force will develop action items and a schedule to update the April 2009 MAQIP for approval by the Board. Additional elements of the MAQIP Update will include an Advanced Technology Program and identifying funding opportunities. A preliminary schedule is provided.

### Public Participation – Reconvene MAQIP Task Force

The MAQIP Task Force will support the goal of sustaining an 85% reduction in health risk from DPM, review further air emissions reduction options, and assess which options may be feasible, readily available, and cost-effective.

### Advanced Technology Program (“ATP”)

The Port’s forward-looking measures include going “above and beyond” existing compliance obligations to align with the State’s 2030 GHG reduction targets. This includes developing demonstration projects to enable the Port to take advantage of ARB, BAAQMD, and potentially CEC grants promoting ZE and NZE technologies.

Port staff seeks tenants as partners to apply for grants and demonstrate equipment. However, tenants (who must comply with ARB’s CHE and drayage truck regulations) likely have recently upgraded their equipment, and thus do not need new equipment. Therefore, tenants require incentives such as fuel savings and/or fully funded, reliable equipment.

Port staff seek to understand emissions reduction solutions available to meet regulatory requirements and the State’s 2030 goals. For example, the following shows allowable emissions from drayage trucks:

**Drayage Truck Emission Factors (gram/brake horsepower-hour)  
Diesel engine**

Year	NOx Emission Factor (g/bhp-hr)	PM Emission Factor (g/bhp-hr)	Time Frame
1998	4	0.1	
2007	1.2	0.01	Required by January 1, 2014
2010	0.2	0.01	Required by January 1, 2023

Source: [www.dieselnet.com](http://www.dieselnet.com) and personal communication with BAAQMD staff

During this period, the Port will conduct studies to assess the various emissions sources and measures to gauge cost effectiveness of new technologies (e.g., What is the health benefit to the West Oakland community for electric versus diesel trucks in light of the current and 2023 requirements? What is the cost-benefit to Port tenants needing reliable drayage trucks to conduct business? What is the state of the electric drayage truck industry?).

### Freight Facility Grant and Budget

State agencies are currently soliciting proposals for ZE and NZE demonstration projects. Port staff are analyzing different grant programs sponsored by BAAQMD, ARB, and the CEC, and are participating in ARB’s Freight Facility workgroup. Port staff may also be able to utilize Alameda

County Transportation Commission (ACTC) Measure BB Air Quality funds as shown below. For purposes of preliminary budgeting, the table below presents the Port and tenant's portion of a prospective Freight Facility grant application.

<b>ZE Equipment Type</b>	<b>Count</b>	<b>Approximate Cost</b>	<b>50% ARB Match</b>	<b>Maximum ACTC Match (no more than 30% of project)</b>	<b>Approximate Port and Tenant Contribution</b>	<b>Potential Tenant Partner</b>
Yard Truck	1	\$375,000	\$187,500	\$112,500	\$75,000	Impact Transportation
Top Pick	1	\$1,800,000	\$900,000	\$540,000	\$360,000	TBD
Battery-Electric Truck	1	\$325,000	\$162,500	\$97,500	\$65,000	TBD
Total		\$2,500,000	\$1,250,000	\$750,000	\$500,000	

Note: TBD = to be determined

#### Schedule

Below is a tentative schedule for the MAQIP Update Effort:

<b>Action</b>	<b>Date</b>
Building the Port's Air Quality Team <ul style="list-style-type: none"> <li>- New port staff</li> <li>- Consultants</li> <li>- Tenants and fleet operators (ships)</li> <li>- Regulators and other public agencies</li> </ul>	Ongoing
Implementing MAQIP <ul style="list-style-type: none"> <li>- 2017 Emissions Inventory</li> <li>- Work with terminal operator, OICT, to use a shore power extender system at vaults where needed</li> </ul>	1 <sup>st</sup> Q 2018 Ongoing
Preparing a Truck Management Plan with the City of Oakland <ul style="list-style-type: none"> <li>- Second of five West Oakland community meetings</li> </ul>	2 <sup>nd</sup> Q 2018 December 2, 2017
Planning MAQIP beyond 2020 <ul style="list-style-type: none"> <li>- Convene Task Force</li> <li>- Conduct technical studies to support recommendations</li> <li>- Apply for funding from ARB's Zero Emission/Near Zero Emission Freight Facilities Grants</li> </ul>	2018 1 <sup>st</sup> Q 2018 Ongoing
Updating the Board and Public <ul style="list-style-type: none"> <li>- Conduct first periodic update</li> </ul>	1 <sup>st</sup> Q 2018
Presenting Recommendations for Board consideration and approval	2 <sup>nd</sup> Q 2018