



# South Coast Air Quality Management District

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February 24, 2012

Chris Cannon  
Director of Environmental Management  
Port of Los Angeles  
425 South Palos Verdes Street  
San Pedro, CA 90731

Dear Mr. Cannon:

## **Review of the Draft Environmental Impact Report/Statement (Draft EIR/EIS) for the Proposed Berths 302-306 (APL) Container Terminal Project**

The South Coast Air Quality Management District (AQMD) staff appreciates the opportunity to comment on the Draft EIR/EIS for the Proposed Berths 302-306 (APL) Container Terminal Project, and thanks the Port of Los Angeles (POLA) for accommodating our request on an extension past the comment deadline until February 24, 2012.

The proposed Project involves the expansion of the existing marine terminal from 291 to 347 acres and an increase of 1,250 linear feet of available wharf space. At completion, the projected container annual capacity will increase from 2.15 million TEUs to 3.20 million TEUs. As discussed in the Draft EIR/EIS, the proposed project would result in 390 annual vessel calls, 2,953 annual train trips, and 3.0 million annual truck trips or 8,342 truck trips per day at full operation. Based on the Draft EIR/EIS, the proposed Project will cause significant impacts after mitigation for construction and operation.

Under the proposed Project, the on-dock railyard capacity will be unchanged. The existing on-dock railyard consists of 8 sets of double track with a capacity of 1.04 TEUs per year (pg. 2-56). The proposed Project is inconsistent with the future expansion scenarios envisioned in the San Pedro Bay Ports Rail Study. The San Pedro Bay Ports Rail Study Update (Rail Enhancement Program) included an enhancement to Pier 300 (APL Terminal) which specified the addition of an extra set of rail tracks<sup>1</sup>. According to the San Pedro Bay Ports Rail Study Update, this enhancement will increase the on-dock rail capacity by approximately 600,000 TEUs per year. Maximizing use of on-dock rail

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<sup>1</sup> San Pedro Bay Ports Rail Study Update, December, 2006.

can reduce the number of drayage truck trips. The proposed Project will result in a significant increase in the number of drayage trucks. If the proposed Project increases on-dock rail capacity, off-site drayage truck trips (and the resulting emission and health impacts) to near and off-site railyards can be decreased.

While Alternative 6 is projected to increase the capacity of the existing on-dock railyard, its projected capacity is still below what was predicted in the San Pedro Bay Ports Rail Study. In order to address impacts from drayage trucks, the proposed Project should include the expansion of the on-dock railyard as envisioned in the San Pedro Bay Ports Rail Study.

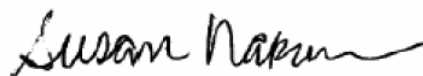
The localized NO<sub>2</sub> and health risk significant impacts from the proposed Project will impact residents and local workers that surround the proposed Project site and necessitate the lead agency to mandate additional mitigation measures. These findings of significance show that all feasible mitigation measures including zero emission technologies are necessary, and should be incorporated as enforceable project requirements.

In Attachment A, the SCAQMD staff has provided a discussion of changes to existing mitigation measures and some additional mitigation measures which the lead agency should implement. Attachment B includes a description of zero-emission container transport systems (ZECMS) with supporting evidences that zero-emission transport between the APL Terminal and near dock railyards is feasible early in the life of the proposed Project, specifically, between 2016 and 2020. The proposed Project should incorporate a mitigation measure or alternative to mitigate significant localized NO<sub>2</sub> health risk impacts to the surrounding community using zero-emission container movement between the marine terminals and the near-dock railyard.

The proposed Project is one of several major port projects that have either recently been approved or are currently going through the approval process that will more than double the current number of containers flowing through the ports. It is important that these projects are developed in a complementary and coordinated manner to achieve the long-term goal of reducing the significant air quality impacts the Ports of Los Angeles and Long Beach create in the South Coast Air Basin.

Pursuant to Public Resources Code Section 21092.5, please provide the SCAQMD staff with written responses to all comments contained herein prior to the adoption of the Final EIR/EIS. Further, staff is available to work with the lead agency to address these issues and any other questions that may arise. Please contact me, at (909) 396-3105, if you have any questions regarding the enclosed comments.

Sincerely,



Susan Nakamura  
Planning Manager

SN:EE  
Attachment

**ATTACHMENT A****CEQA Baseline**

- The Draft EIR/EIS should include a realistic baseline which accurately reflects the improvements in air quality that will occur, independent of the proposed project. The Draft EIR/EIS uses a CEQA baseline for determination of air quality impacts from criteria pollutants based on a 12-month period from July 2008 to June 2009 which corresponds to the release of the Notice of Preparation (NOP) for the proposed Project. For analysis purposes under Air Quality Impacts AQ-1 through AQ-5, and AQ-9, this baseline is held constant and compared to future years under the proposed Project. However, this approach uses a comparison between the proposed Project impacts and a baseline that is not reflective of future emission reductions from existing air quality rules and regulations. As mentioned in previously submitted comment letters<sup>2</sup>, the SCAQMD staff believes that CEQA not only allows but actually requires a determination of significant impacts that does not credit the project with unrelated improvements in air quality that will occur anyway. The lead agency did take this baseline approach when determining significance for cancer and other health risks of the proposed Project, and for consistency, this approach should be used when determining significance for regional criteria emissions.

The purpose of CEQA is to give the public and government agencies the information needed to make informed decisions. Not taking into account future emission reductions from existing air quality rules in the baseline results in the appearance that the proposed Project benefits air quality, while in fact the effect of existing rules and regulations is contributing most of the air quality benefits. CEQA's intent is to provide the public and decision makers the actual changes to the environment from the proposed Project.

**Zero Emission Container Transport System**

- The on-dock rail yard will not be large enough to handle all the containers imported at this terminal, and the number of annual truck trips which will be trucked to near or off-dock rail yards will increase by 250% (Appendix E1 - Table 1.7.3). Because of the significant NO<sub>2</sub> and health risk impacts from the proposed Project operations (including trucking activities) identified in the Draft EIR/EIS, CEQA requires the lead agency to implement all feasible mitigation (CEQA Guidelines 15126.4). As is described in Attachment B, the proposed project can include a measure that requires transport of containers using a zero-emission technology that does not create tailpipe emissions from the vehicle or system that is transporting containers. Zero-emission container transport technologies can be implemented beginning 2016 as follows:
  - By 2016, at least 25% of container transport between the APL terminal and the near-dock railyards shall be by zero-emission technology.
  - By 2020, 100% of container transport between the APL terminal and the near-dock railyards shall be by zero-emission technology.

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<sup>2</sup> SCAQMD letters dated November 30, 2011 and January 19, 2012, to Mr. Christopher Cannon on the Draft Environmental Impact Report: Southern California International Gateway

Considering the current levels of product development, it is clear that, if the lead agency provides a clear message to technology providers that zero emission will be needed and when, zero-emission container transport technologies can be commercialized in sufficient time to begin operational deployment between the APL terminal and the near-dock railyards between by 2016, with 100% deployment for such transport by 2020. (See Attachment B - Zero-Emission Container Transport). The measure described above will send a clear market signal to technology developers and allow this schedule to be met.

### **Project Alternatives**

- Under Alternative 6 – Proposed Project with Expanded On-Dock Railyard, all elements of the proposed Project will be developed with the addition of a redeveloped and expanded on-dock railyard. The existing on-dock railyard consists of 8 sets double track with a capacity of 1.04 TEUs per year (pg. 2-56). Under Alternative 6, one additional set of double tracks will be added increasing the capacity to 1.14 million TEUs per year (pg.2-56). SCAQMD staff considers this alternative to have benefits over the proposed Project because of the increase in on-dock rail capacity. However, the projected on-dock rail capacity of Alternative 6 still falls short of the expansion scenarios envisioned in the San Pedro Bay Ports Rail Study Update<sup>3</sup> for the Pier 300 on-dock railyard (APL Terminal).

The San Pedro Bay Ports Rail Study Update (Rail Enhancement Program) included an enhancement to Pier 300 which specified the addition of an extra set of rail tracks. According to the San Pedro Bay Ports Rail Study Update, this enhancement increased the on-dock rail capacity by approximately 600,000 TEUs per year. According to the Draft EIR/EIS, the increase in capacity under Alternative 6 is projected to be 100,000 TEUs per year (1.14 million minus 1.04 million TEUs).

Another area where Alternative 6 is inconsistent with the San Pedro Bay Ports Rail Study Update is that the Rail Study Update projects the on-dock rail utilization to be 38% once the planned enhancements are completed, while the on-dock rail utilization of Alternative 6 is estimated to be 32% (Appendix E1, Table 1.4-21). The lead agency needs to explain why there is a discrepancy between the San Pedro Bay Ports Rail Study Update planned enhancements to Pier 300 and the projections for Alternative 6 in Draft EIR/EIS, and if necessary re-evaluate the operational profile of Alternative 6.

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<sup>3</sup> San Pedro Bay Ports Rail Study Update, December, 2006.

**Mitigation Measures**

- *MM AQ-3: Fleet Modernization for On-road Trucks (used during construction)*

MM AQ-3 requires that all on-road heavy-duty diesel trucks used during construction should comply with the EPA 2007 on-road PM and NOx emission standards. MM AQ-3 specifies exceptions from this requirement for import haulers and earth movers. SCAQMD sees no reason for these exceptions. It has been five years since the 2007 on-road standards went into effect and even with the known slow turn-over of these trucks, it is very likely that trucks used for import haulers and earth movers, meeting the 2007 on-road standards are in service. The lead agency should remove these exceptions and require as part of this mitigation measure, use of the cleanest available trucks. Specifically, trucks used during construction should operate on engines with the lowest certified NOx emissions levels, and if the cleanest available truck does not meet the EPA 2007 on-road PM emission standards, then the lead agency shall require all trucks be equipped with CARB certified Level 3 DECS. Mitigation Measure MM AQ-3 should also apply during circumstances where a piece of compliant equipment becomes available during the timeframe of construction.

- *MM AQ-4: Fleet Modernization for Construction Equipment*

MM AQ-4 requires that prior to January 1, 2015, all off-road diesel-powered construction equipment greater than 50 horsepower meet Tier 3 non-road emission standards and be equipped with CARB certified Level 3 diesel emission control system (DECS). Beginning in January 1, 2015, the mitigation measure requires all off-road diesel-powered construction equipment greater than 50 horsepower meet Tier 4 non-road emission standards with CARB certified Level 3 DECS. This mitigation measure does not represent the cleanest technology available since Tier 3 certified construction equipment has been available since 2006, and construction equipment meeting Tier 4 non-road emission standards became available beginning 2011. Mitigation Measure MM AQ-4 should be revised to require all construction equipment to meet the cleanest off-road engine emission standard available, and be equipped with Level 3 CARB verified DECS.

- *MM AQ-11: Cleaner OGV Engines*

MM AQ-11 seeks to maximize the number of vessels calling at the APL terminal meeting the International Maritime Organization (IMO) January 1, 2016, NOx limit of 3.4 g/kW-hr (Tier 3). The SCAQMD staff supports this goal since it has a significant potential to decrease NOx emissions from ships, but the mitigation measure lacks any real commitment from the shipping line to actually reroute or purchase ships that meet the new IMO emission standard. Because the project will have significant regional and localized air quality impacts, the lead agency must implement additional feasible mitigation measures for all sources, including vessels. Additional vessel strategies should be incorporated into MM AQ-11 which includes incentives or requirements to preferentially route IMO-compliant Tier 3 vessels to the APL terminal. Mitigation measure MM AQ-11 should also be amended to include a minimum commitment on the percentage of ships calling at the proposed Project site which meet the new emissions standard.

- *MM AQ-12: OGV Engine Emissions Reduction Technology Improvements*

MM AQ-12 requires that the Tenant determine the feasibility of incorporating advanced emissions reduction technologies and/or design options when using or retrofitting existing ships bound for the proposed Project terminal. Similar to mitigation measure MM AQ-11, this measure lacks any real implementation commitment on the part of the Tenant to actually perform any retrofits on existing ships. In order for the proposed Project to benefit from this measure, mitigation measure MM AQ-12 should be amended to include a detailed schedule for operators to perform a feasibility study on retrofitting their existing ships, including a requirement to contact engine manufacturers, and a commitment on the percentage of ships calling at the proposed Project site which would be retrofitted to use the advance emission reduction technologies, once they are deemed feasible.

- *MM AQ-13: Yard Tractors at Berths 302-306 Terminal*  
*MM AQ-14: Yard Equipment at Berths 302-306 Railyard*  
*MM AQ-15: Yard Equipment at Berths 302-306 Terminal*

Mitigation measures MM AQ-13, MM AQ-14, and MM AQ-15 require yard tractors and other yard equipment to meet the most stringent U.S. EPA emissions standards by a specified date. Unfortunately, this would still result in diesel-powered equipment being used at the proposed Project site. Under Air Quality Impacts AQ-4: *Would the Operations Result in Off-site Ambient Air Pollutant Concentrations that Exceed a SCAQMD Threshold*, the lead agency concluded that NO<sub>2</sub> concentrations exceeded significant thresholds after mitigation. In addition, for Air Quality Impact AQ-7: *Would the Proposed Project Expose Receptors to Significant Levels of TACs*, the residential and occupational cancer risk remain significant after mitigation. Electric battery yard tractors are currently being tested at the Ports and if successful could reduce emissions NO<sub>x</sub> and DPM emissions (as compared to diesel-powered yard tractors) from the proposed Project. Other yard equipment such as existing diesel-powered rubber tire gantry cranes could be replaced with electric rail-mounted gantry cranes as a means of further reducing NO<sub>x</sub> and PM emissions (as compared to diesel-powered yard equipment). In order to reduce the impacts of Air Quality Impacts AQ-4 and AQ-7, mitigation measures MM AQ-13, MM AQ-14, and MM AQ-15 should contain a zero-emission yard tractor/yard equipment component.

- *Rail Mitigation Measure*

The Draft EIR/EIS does not contain any mitigation measures for rail operations. Instead the lead agency relies on existing CAAP measure RL-2 to further reduce emissions from Class 1 locomotives operating at the APL terminal. The CAAP control measure RL-2 relies on the existing CARB MOUs and the existing U.S. EPA 2008 locomotive engine rulemaking to achieve emission reductions from rail operations. While most of the switching and building of trains under the proposed Project is done by PHL, line haul locomotives do operate at the proposed Project site and total rail emissions represent the third highest contributor to NO<sub>x</sub> and PM<sub>2.5</sub> emissions, after mitigation. In order to reduce the impacts under Air Quality Impacts AQ-4 and AQ-7, the lead agency should add mitigation that requires accelerated introduction of Tier 4 line haul locomotives used at the APL on-dock railyard.

## **Proposed Project Emission Quantification Analysis and Assumptions**

- *Locomotive Emission Factors*

The Draft EIR/EIS references the U.S. EPA Technical Highlights Document from the 2008 locomotive emission standard rulemaking as being the source of emission factors used in the emission calculations for rail operations.<sup>4</sup> SCAQMD staff is very familiar with this document and our understanding is that the emission factors for future Tiers are not based on actual engine testing but are projections based on what the future locomotive Tiers are likely to achieve. These projections are not appropriate for estimating locomotive emissions when determining impacts under CEQA and can underestimate potential impacts from locomotives. The emission factors in future years should be based on the locomotive emission standards and a projected fleet mix based on natural turnover. Locomotive emission standards represent the “not to exceed level” and are more conservative than projected emission rates. The lead agency should re-calculate the locomotive emissions for future years using emission standards rather the projections provided by U.S. EPA.

- *Ocean Going Vessel Fuel Sulfur Content*

In the Draft EIR/EIS, the lead agency assumes in the unmitigated scenario for general cargo and container ships, a sulfur content of 0.1 percent out to 24 nm and 0.2 percent from 24 nm to 40 nm during the construction period (2012 to 2014) when shore-side cranes are delivered (pages 3.2-39 and 3.2-42). However, the SCAQMD staff considers this assumption to be less than conservative since there is no requirement that fuels with these sulfur contents be used by container or general cargo ships operating within California state waters. Beginning August 1, 2012, both CARB’s marine diesel fuel rule for ocean going vessels and the IMO fuel sulfur requirements under the federal Emission Control Area (ECA) specifications, limit the maximum fuel sulfur content to 1.0 percent. CARB’s regulation applies out to a distance of 24 nm, while the IMO requirements apply out to 200 nm. It isn’t until January 2014, when CARB requires ocean going vessels to use a maximum sulfur content of 0.2 percent that assumptions for lower sulfur content marine fuels are justified. Therefore, there is no reason to believe that all general cargo or container vessels will be using 0.2 percent sulfur when they are allowed a maximum limit of up to 1.0 percent. The unmitigated emission calculations for ocean going vessels during the construction period (i.e., 2012 to 2014) should be revised to reflect the higher conservative sulfur limits.

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<sup>4</sup> U.S. EPA “Technical Highlights: Emission Factors for Locomotives” EPA-420-F-09-025, 2009

- *AMP Construction Emissions*

In calculating operational emissions from hotelling, the lead agency assumes container ships will use AMP in the percentages and time frames which are required under CARB's Shore-side Power Regulation. In order to meet these percentages all or most of the berths at the proposed Project site must have AMP infrastructure installed. However, according to Appendix E1 Table 1.1-6, construction emissions were only calculated for the newly constructed Berth 306. In addition, the 2010 CAAP Update describes that the POLA will install AMP infrastructure for all berths at Pier 300 by the end of 2013 (page 92). This implies that the lead agency is only attributing the construction of AMP infrastructure at Berth 306 to the proposed Project, while in fact the infrastructure construction improvements for all the other berths (which are integral to the proposed Project) are going on at the same time as the construction activities for the proposed Project. This underestimates the construction emissions of the proposed Project and the lead agency should include the remaining berth AMP upgrades in the emission quantification analysis for the proposed Project.

- *Quantifying Mortality and Morbidity*

On page 3.2-60 of the DEIR, the lead agency describes the methodology that was used to determine when a mortality and morbidity analysis would be conducted for the proposed Project. Mortality is a measure of the number of deaths in a population, scaled to the size of that population, per unit time. Morbidity refers to the number of individuals who have contracted a disease during a given time period (the incidence rate) or the number who currently have that disease (the prevalence rate), scaled to the size of the population. The lead agency specifies that the POLA has determined that mortality and morbidity will be calculated when the incremental operational emissions would result in off-site 24-hour PM<sub>2.5</sub> concentrations that exceed the SCAQMD significance criterion of 2.5 µg/m<sup>3</sup>.”

The SCAQMD staff does not agree with the use a screening threshold of 2.5 µg/m<sup>3</sup> for determining mortality and morbidity. The SCAQMD's PM<sub>2.5</sub> significance threshold of 2.5 µg/m<sup>3</sup> is designed to determine the significance of localized impacts on nearby receptors. The PM<sub>2.5</sub> significance threshold of 2.5 µg/m<sup>3</sup> was not intended to be used as a screening tool to further analyze mortality and morbidity impacts and is too high. With a screening threshold this high, it is unlikely that any project would conduct a mortality and morbidity analysis.

The lead agency set precedent for conducting mortality and morbidity analyses in three of its own previous EIRs: TraPac, China Shipping, and San Pedro Waterfront EIRs. In all three cases there was no threshold used to determine if an analysis for mortality and morbidity would be done. The SCAQMD staff considers this to be sufficient precedent for the POLA to continue this practice for the proposed Project.



- *NO<sub>2</sub>/NO<sub>x</sub> ratio*

In the dispersion modeling files for NO<sub>x</sub> impacts, the analysis appears to be based on two different in-stack NO<sub>2</sub>/NO<sub>x</sub> ratios: 0.5 and 0.1. The U.S. EPA recommends a default ratio of 0.5 for stationary sources. It is also not clear whether this ratio applies to mobile sources. The SCAQMD staff recommends that the lead agency provide further clarification regarding this choice of in stack ratios.

- *Use of SIL as a significance threshold*

In determining the potential significance of annual PM 2.5 concentrations, the lead agency used the Significant Impact Level (SIL) of 0.3 ug/m<sup>3</sup>. Although the most recent SCAQMD guidance on CEQA thresholds does not list a value for PM<sub>2.5</sub> annual impacts, SCAQMD staff recommends that the ambient air quality standards be used rather than the SIL to determine significance under CEQA.

**ATTACHMENT B**  
**SCAQMD COMMENTS ON DRAFT EIR/EIS FOR THE PROPOSED BERTHS**  
**302-306 (APL) CONTAINER TERMINAL PROJECT**  
**ZERO-EMISSION CONTAINER TRANSPORT:**  
**NEEDS AND TECHNOLOGIES**

### **Overview**

SCAQMD comments regarding the Draft EIR/EIS for the Proposed Berths 302-306 (APL) Container Terminal Project propose a commitment by the lead agency to require deployment of zero-emission technologies to move containers between ports and the near-dock railyards. The specific technology or technologies used to implement this alternative would be determined by the lead agency. This alternative would be implemented according to the schedule set out in the comment, with deployment beginning by 2016. By 2020, all container moves between the APL Terminal and near-dock railyards would be by zero emission technologies.

Any of several types of zero-emission container movement systems could be used to implement this measure. As is described below, these include, but are not limited to, on-road technologies such as battery-electric trucks, fuel cell trucks, hybrid-electric trucks with all-electric range (AER) and zero-emission hybrid or battery-electric trucks with “wayside” power (such as electricity from overhead wires). The measure could also be implemented by fixed-guideway systems such as maglev or linear synchronous motor propulsion.

Such systems are not currently in use for full-scale port operations and, depending on the technology, may require different levels of additional development and optimization. But, as is described below, a variety of these technologies are being demonstrated, and there is substantial evidence that they can be made commercially available within a few years after commencement of proposed Project operation, particularly if the lead agency sends a market signal to technology developers by requiring the use of zero-emission technologies. In addition, many of these zero-emission technologies are expected to be operationally feasible to serve the APL Terminal. For example, electric trucks with adequate range, power and reliability -- such as are being developed and demonstrated at the Ports -- could fit into current operating procedures as a replacement for fossil fuel-powered trucks, and their implementation could be required and co-funded through mechanisms similar to those employed to implement the ports’ Clean Truck Program (see below). Drayage service to the proposed Project is particularly conducive to implementation of zero-emission trucking technologies because of the relatively short distance involved and because the near-dock railyards could be served by a relatively limited number of trucks compared to the total number serving the ports and region.

### **Reasons for Zero-Emission Transport**

As is described in the SCAQMD comment letter regarding the Draft EIR/EIS for the Proposed Berths 302-306 (APL) Container Terminal Project, deployment of zero-emission technologies for transport between the APL Terminal and the proposed Project will mitigate significant project impacts as required by CEQA.

In addition, zero emission transport is important for the following reasons:

- In the 2010 Update to the San Pedro Bay Ports Clean Air Action Plan, the ports underscored their commitment to air quality improvement by adopting San Pedro Bay Standards. These targets for port air quality programs are comprised of two components: 1) reduction in health risk from port-related diesel particulate matter (DPM) emissions in residential areas surrounding the ports, and 2) “fair share” reduction of port-related air emission to assist the region in achieving federal air quality standards. These components reflect the ports’ stated goals of reducing health risks to local communities from port-related sources, and reducing emissions to support the attainment of health-based ambient air quality standards on a regional level.

Specifically, the ports’ Health Risk Reduction Standard is to reduce the population-weighted cancer risk of ports-related DPM emissions by 85% by 2020, relative to 2005 conditions, in highly impacted communities located near port sources and throughout the residential areas in the port region. The San Pedro Bay Emission Reduction Standards are to, by 2014, reduce emissions by 22% for nitrogen oxides, 93% for sulfur oxides, and 72% for DPM; and to, by 2023, reduce emissions by 59% for nitrogen oxides, 93% for sulfur oxides and 77% for DPM.

While the ports have made significant progress toward meeting these goals, as reflected in each port’s annual emission inventories, emissions forecasts indicate that CAAP measures and existing emissions control regulations will not be adequate to achieve and maintain the San Pedro Bay Standards. Implementation of zero-emission technology options would provide significant benefits to the ports, bringing them closer to achieving the San Pedro Bay Standards, addressing community concerns about pollution from port operations and projects, and assisting the region in attaining National Ambient Air Quality Standards. The South Coast Air Quality Management District and the California Air Resources Board have determined that, in order to attain currently-adopted federal ozone standards, zero-emission technologies will need to be broadly deployed in transportation sources. Absent timely adoption of sufficient plans and measures to attain the national standards as required by the Clean Air Act, federal transportation funds for infrastructure projects will be jeopardized, and restrictions on construction of stationary sources will be imposed.

- Deployment of zero-emission technologies for the transport corridor between the APL Terminal and the near-dock railyards is particularly important for the following reasons:

- Emissions in this transport corridor occur relatively close to locations where people live, work and go to school.
  - These areas are also impacted by cumulative emissions from other port-related sources: ships, harbor craft, cargo handling equipment, locomotives and trucks.
  - Achieving emission reductions beyond current regulations and CAAP measures, as needed to attain the San Pedro Bay Standards, will be relatively challenging in the case of some port-related sources (e.g. vessel main engines) compared to further reducing emissions from other sources such as trucks.
  - The transport corridor to near dock rail yards is in an area where existing regulations and CAAP measures are projected to achieve a lower percentage level of risk reduction than other areas. *See* 2010 CAAP Update, Figure 2.2: Percent Reduction in DPM-Related Health Risk Between 2005 and 2020 for Areas Located Closest to the Ports (p.35).
  - The transport corridor to near dock rail yards--as a high volume, relatively short (approximately five mile)--route, is particularly suited to deployment of new technologies such as electric trucks, which ultimately could be deployed by the ports, and then in broader areas as technologies evolve.
- In addition to air quality benefits, utilization of zero-emission technologies could be a significant strategy for reducing greenhouse gas (GHG) emissions. Each port, in cooperation with their respective cities, has initiated a process to quantify, evaluate and implement strategies to reduce GHG emissions from their administrative operations as well as from port-related activities of their tenants and customers.
  - Finally, energy security (i.e. reducing dependence on foreign oil) is also a significant consideration as the ports transition into the future. Uncertainty about potential future supplies of oil and rising costs provide another reason for moving away from technologies that rely on petroleum to technologies that are powered by electricity, ideally produced using renewable energy sources.

### **Zero-Emission Container Transport Technologies**

A variety of zero-emission technologies can be available for deployment early in the life of the proposed Project if the port requires them. The following is a discussion of key technology options.

#### ***Zero-Emission Trucks***

Zero-emission trucks can be powered by grid electricity stored in a battery, by electricity produced onboard the vehicle through a fuel cell, or by “wayside” electricity from outside sources such as overhead catenary wires, as is currently used for transit buses and heavy mining trucks (discussed below). All technologies eliminate fuel combustion and utilize

electric drive as the means to achieve zero emissions and higher system efficiency compared to conventional fossil fuel combustion technology. Hybrid-electric trucks with all electric range can provide zero emissions in certain corridors and flexibility to travel extended distances (e.g. outside the region) powered from fossil fuels or fuel cells.

Vehicles employing electrified drive trains have seen dramatic growth in the passenger vehicle market in recent years, evidenced by the commercialization of various hybrid-electric cars, and culminating in the sale of all-electric, plug in, and range extended electric vehicles in 2011. A significant number of new electric light-duty vehicles will come on the market in the next few years. The medium- and heavy-duty markets have also shown recent trends toward electric drive technologies in both on-road and off-road applications, leveraging the light-duty market technologies and component supply base. Indeed, the California-funded Hybrid Truck and Bus Voucher Incentive Project (HVIP) website' currently lists more than 75 hybrid-electric on-road trucks and buses available for order from eight manufacturers.

### ***Battery-Electric Trucks***

Battery-electric vehicles operate continuously in zero-emissions mode by utilizing electricity from the grid stored on the vehicle in battery packs. Battery-electric technology has been tested, and even commercially deployed for years in other types of heavy-duty vehicles (e.g., shuttle buses). Technologically mature prototypes have recently become available to demonstrate in drayage truck applications. (TIAX, *Technology Status Report - Zero Emission Drayage Trucks*, 1 (June 2011)).

The Port of Los Angeles is testing the Balqon Nautilus XE30 battery-electric truck prototype. Early tests of the Balqon E-30 began in 2008 with a lead-acid battery pack. In subsequent manufacturer tests the truck was equipped with a larger and more advanced lithium-ion battery pack, and the port has stated it will demonstrate this upgraded vehicle commencing in fall of 2011. Manufacturer's tests of the upgraded vehicle have shown a maximum range of between 125 – 150 miles loaded, and dynamometer results indicate ability to climb a 15% grade while fully loaded for two hours. (TIAX, 7). The port demonstration will test performance in actual operations against these and other metrics.

The performance metrics being targeted by the manufacturer would be sufficient to meet the needs of service between near dock rail yards and the APL Terminal. These needs are relatively limited, primarily due to the short distance between the APL Terminal and near dock rail yards: approximately 10 miles round trip. This limits the required number of trucks, as well as their needed range and charging time.

***Number of Trucks.*** Regarding number of trucks needed, at full build out, at least 2,100,000 annual round trip truck trips are anticipated between proposed near dock rail yards and the ports -- an average of 5,753 per day. TIAX assumed that a Balqon truck would make 12 round trips per day, assuming three shifts per day (TIAX, 14). This would total 120 miles per day per truck (within the loaded range estimated by the manufacturer for a single charge), and would indicate a need for 480 trucks to fully serve the rail yards. Adding 8% to account for seasonal variation (TIAX, 9) indicates a need for 518 trucks to serve the near-dock yards. Balqon has estimated that it could produce as many as three trucks per day due to modular truck design, which would enable it to deliver more than 750 trucks per year. This would, in one year and for one manufacturer,

be well in excess of the fleet size needed to serve proposed near-dock railyards.

**Charging Time.** Regarding charging time, Balqon offers a 60kW charger that would require 4.5 hours for a full charge. Balqon is working on a 100kW charger that would reduce charging time, as well as the number of required chargers and peak electrical demand. (TIAX, 14). In addition, quick charge technologies are now being manufactured, e.g. by AeroVironment which are in use by Foothill Transit electric buses to allow continuous service for a set route. Such technologies could be adapted to allow charging of trucks in much less than one hour. In addition, various charging strategies are available that could further reduce time dedicated to charging. These include battery swapping and “opportunity charging.” (TIAX at 13). Even assuming a 4.5 hour charging time every day, however, would allow 12 round trips to near dock rail yards per day (TIAX at 14; assuming round-trip duration of 1.6 hours. (Id. at 15)).

**Implementation Time.** TIAX recommends 6 to 12 months of tests in real world drayage operations, followed by an assessment and an additional larger scale demonstration of 12 to 18 months duration. (TIAX, 20-21).

To the extent that in-use performance testing indicates a need for improvements such as greater range or gradability for a battery-electric truck such as Balqon, resolving such technical issues is, in general, a matter of appropriately sizing and engineering key components—notably the battery. A variety of battery sizes are feasible, although there are trade-offs such as weight and cost. The limited range requirements of service to near dock rail yards will, however, minimize the impact of any such trade-offs.

Given these factors, it is expected that battery-electric trucks can be developed and manufactured in sufficient time and quantities to fully serve near dock rail yards by 2016, even if modifications in response to demonstration tests are required.

**Costs.** As with most new technologies, capital costs are higher for electric-drive trucks compared to conventional diesel trucks. However, operating and maintenance (O&M) costs of electric-drive trucks can be significantly lower, due to higher vehicle fuel economy (reduced fuel costs per energy used) and lower maintenance costs. TIAX calculated a ten-year cost for the Balqon truck, including capital cost of truck, operation and maintenance, at \$363,841 - \$391,233, about \$30,000 - \$60,000 more than the \$335,041 cost for a diesel truck. This differential cost is, however, well within the amount of government incentive funding for relatively clean technologies that has been provided in the past for vehicles such as LNG trucks, and which is currently available (see below). Cost of charging infrastructure would vary greatly based on conventional or quick charging, and charging strategy (e.g. whether battery swapping and opportunity charging occur). TIAX estimated costs of one approach at between \$26.4 and 30.4 million for a fleet of 720 trucks (TIAX, 14) -- well in excess of the number needed to serve near-dock railyards. Again, various government funding programs have been and continue to be available for installation of charging infrastructure.

Since the electric drayage truck is still in its early commercialization phase, the costs are expected to come down as the technology matures, unit volumes increase and economies of scaled production and supply take effect. Balqon estimates that with large scale

purchase commitments and its partnership with Winston Battery Limited, the largest heavy-duty lithium battery manufacturer in China, battery costs will come down to half their current costs.

***Operational Issues.*** The ports have devoted substantial resources to developing and demonstrating electric trucks in part because they would fit well into current operating modes, with minimal or no need for new transportation infrastructure such as roads or new fixed guideway systems. Operational issues thus are expected to be manageable.

It should also be noted that the successful deployment of nearly 900 natural gas drayage trucks since 2008 indicates that the drayage industry can adapt to operational changes and adapt to new fueling procedures and limitations. Most of these natural gas drayage trucks are routinely being refueled at a small number of public stations located near the ports, although some motor carriers are installing onsite natural gas refueling stations. Refueling can take longer than diesel, and during peak times, the waiting time at the limited number of natural gas fueling stations can exceed one hour. Motor carriers have been able to make adjustments to this process. Weight and payload considerations significantly restrict the amount of onboard energy that LNG drayage trucks can carry compared to diesel trucks. However, in a local delivery application such as drayage, LNG trucks can provide plenty of driving range to meet daily operational requirements. In these ways and others, drayage truckers using natural gas rigs have been able to accommodate fuel-related changes in operational requirements. (TIAX, 16).

***Implementation Mechanisms.*** The ports have shown ability to craft programs to transition on-road trucks to new technologies. The successful Clean Trucks Program provides one model of a feasible mechanism to do this for the near-dock railyards related drayage. Through progressive bans of older vehicles and funding and fee mechanisms to provide incentives, the ports succeeded in transitioning from relatively old diesel truck drayage to thousands of new diesel trucks, and nearly 900 LNG trucks. The number of vehicles needed in connection with near-dock railyards is far less. In addition, through approval conditions on the marine terminal project, the lead agency has the ability to ensure cooperative actions by the applicant to assist in the transition.



Figure 1 Balqon Electric Battery Truck

### ***Fuel Cell Battery-Electric Trucks***

Fuel cell vehicles utilize an electrochemical reaction of hydrogen and oxygen in fuel cell “stacks” to generate electricity onboard a vehicle to power electric motors. Fuel cells are typically combined with battery packs, potentially with plug-in charging capability, to extend the operating range of a battery-electric vehicle. Because the process is combustion free, there are no emissions of criteria pollutants or CO<sub>2</sub>.

Fuel cell vehicles are less commercially mature than battery-electric technologies, but have been successfully deployed in transit bus applications, and are beginning to be deployed in passenger vehicles. The Port of Los Angeles recently awarded Vision Motor Corporation (Vision) of El Segundo, California a contract to outfit fifteen battery electric trucks with fuel cells for demonstration purposes. Total Transportation Services, Inc. (TTSI), a port drayage company, has stated an intent to buy 100 “Tyranos” fuel cell Class 8 trucks from Vision for \$27 million, subject to an initial vehicle (which was delivered on July 22, 2011) performing as expected. TTSI also stated it may acquire an additional 300 vehicles. TTSI intends to test the initial truck for 18 months by using it to haul containers between the ports, rail yards and distribution facilities.

Vision estimates that its fuel cell electric battery trucks would have an operating range of 200 miles on a single charge, with the proposed 20 kg of hydrogen storage and 130 kWh battery pack, while at the same time lowering operating and maintenance costs as compared to diesel-powered trucks. The company’s engineers report the vehicle has a rated gradability of 13% when fully loaded at 80,000 GVWR; this should enable it to meet all grades that will be encountered in short-haul drayage. (TIAX, 7).

TIAX recommends an 18 month demonstration period in drayage operations, followed by an assessment and a further large scale demonstration for 12 to 18 months. (TIAX, 21). Given these factors, it is expected that fuel cell battery-electric trucks can be developed and manufactured in sufficient time and quantities to fully serve near-dock railyards before 2016, even if modifications in response to demonstration tests are required.



The discussions above regarding number of vehicles needed, operational issues and implementation mechanisms are generally applicable to fuel cell trucks, although hydrogen fueling time would be less than Balqon truck charging time, and would be similar to fueling time for current LNG trucks. (TIAX, 17). Per vehicle combined capital and operating costs, as well as fueling infrastructure costs, are projected by TIAX to be higher than for the Balqon truck, although costs could be below the TIAX projections if certain cost reductions expected by Vision are realized, and if cost of fueling infrastructure is recovered through revenue sales. (TIAX, 12, 15). In addition, as noted above, Vision does have a private purchaser with a potential sale of at least 100 units.



Figure 2 Vision Zero-Emission Fuel Cell Battery Electric Truck

### ***Hybrid-Electric with All-Electric Range (AER) Trucks***

Hybrid vehicles combine a vehicle's traditional internal combustion engine with an electric motor. Hybrid-electric heavy-duty trucks that improve fuel mileage are in commercial operation today. Hybrid-electric technologies can also be designed to allow all electric propulsion for certain distances, similar to the Chevrolet Volt passenger automobile which is currently being marketed. The large vehicle drive-train manufacturer Meritor has developed such a heavy-duty truck and it is being demonstrated by Walmart Inc. in the Detroit area. This "dual mode" vehicle was developed as part of a U.S. Department of Energy program. Besides the advantages of increased range flexibility, dual-mode hybrid trucks can incorporate smaller battery packs as compared to those for all-battery electric trucks. This saves weight and cost while increasing range.

The Meritor truck is powered solely by battery power (i.e. produces zero emissions) at speeds less than 48 mph. (<http://walmartstores.com/sustainability/9071.aspx>). This speed is likely sufficient to serve proposed near-dock railyards drayage needs. The vehicle can maintain zero-emission operation for 20 miles, sufficient for two round trips to near dock rail yards with zero emissions, but the vehicle could be coupled with plug-in charging capability. The latter would open the potential for 24-hour zero-emission operation using existing quick-charge technologies. Battery capacity could also be augmented in production units, based on specific needs.



Figure 3: Dual-Mode Hybrid (Meritor)

The discussions above regarding number of vehicles needed, operational issues and implementation mechanisms are generally applicable to hybrid AER trucks. Costs for commercially available units are unknown at this time, but would likely be slightly more than conventional hybrids as larger battery packs would be needed for the electric only mode. The incremental cost of a hybrid AER truck compared to a diesel truck is anticipated to be approximately \$50,000-70,000 depending on the capacity of the battery pack. This incremental cost is similar for LNG trucks which were successfully funded through a combination of grants for the Ports' Clean Truck Program (see below).

Since this technology is currently being demonstrated and is similar to hybrid electric technologies that are currently being marketed, it is expected that hybrid AER trucks could be deployed in a similar timeframe as full battery-electric trucks. As with the other zero-emission technologies described here, a key need to ensure timely deployment is a clear message from the ports to technology developers that such technologies will be required.

#### ***Trucks With Wayside Power (e.g. "Trolley Trucks")***

As noted above, given the relatively short distance between the ports and near dock rail yards, several types of zero-emission trucks can feasibly be made available in coming years. One largely existing technology that could be used to serve this need, as well as move trucks regionwide, is wayside power to power motors and/or charge vehicle batteries. Wayside power from overhead catenary wires is commonly provided to on-road transit buses, and has been used for heavy mining trucks. Other potential wayside power technologies that serve the same purpose include linear induction, which can charge batteries from electromagnetic systems in roadbeds without a physical connection or exposed wires.

An example of how wayside power is feasible would be to outfit a battery-electric or hybrid AER truck with a connection to overhead catenary wires. Many cities operate electric transit buses that drive on streets with overhead wires, as well as streets without them. In such cities, "dual-mode" buses have capability to disconnect from the overhead wire and drive like a conventional bus. In Boston and other cities, such buses are propelled "off wire" by diesel engines. In Rome, such buses are propelled off wire by battery power to the same electric motors used on wire. The batteries are charged as the

bus operates on the wired roadways. Figure 4 shows a dual-mode electric and battery-electric transit bus with detachable catenary connection in Rome, Italy.<sup>5</sup>



Figure 4 Dual-Mode Battery Electric Transit Bus (Rome)

The global technology manufacturer Siemens has developed a prototype truck to catenary wire connection for this purpose. Figure 5 shows a photo of this system on a prototype roadway in Germany. The truck is a hybrid electric with zero emission all electric operation when operated under the overhead wire. The truck automatically senses the wire which allows the driver to raise the pantograph connection while driving at highway speeds. The pantograph automatically retracts when the truck leaves the lane with catenary power. The powered lane can be shared by cars and traditional trucks. The truck may be operated off the powered lane propelled by a diesel engine, or could be configured with battery or fuel cell power sources.



Figure 5 Truck Catenary (Siemens)

As applied to hybrid AER trucks, wayside power could provide zero-emission operation and battery charging on key transport corridors, allowing the vehicle to operate beyond such corridors in zero-emission mode. As the battery is depleted, the vehicle would have the flexibility for extended operation on fossil fuel power.

As existing technologies long used in the transit bus sector, an application of wayside power for trucks would be technologically feasible and could be implemented relatively soon. Siemens retrofitted existing trucks for its prototype road in Germany.

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<sup>5</sup> Other proposals have been evaluated and awarded by the SCAQMD and the CEC to develop catenary trucks and hybrid trucks with AER. Similarly, in 2010, Volvo announced an award by the Swedish Energy Agency to develop a “slide in” technology for both automobiles and trucks which would provide wayside power from the road to the vehicle using a connection from the bottom of the vehicle to a slot in the roadway (<http://www.energimyndigheten.se/en/Press/Press-releases/New-initiatives-in-electrical-vehicles/>).

The key feasibility and cost issues presented by wayside power are associated with need for power infrastructure such as overhead catenary wires. Rights of way must have room for such infrastructure, although they could be limited to key corridors and still provide the battery charging benefits described above. Cost of overhead catenary wires would have to be estimated by corridor as it varies by circumstance, e.g. based on available space, but would likely be from one to a few million dollars per mile. Operational cost benefits due to reduced fuel and maintenance costs for electric technologies would offset a portion of these costs. Based on communications with Siemens and other equipment manufacturers, AQMD technology advancement staff concludes it would be feasible to deploy catenary electric trucks within a few years and early in the life of the near-dock railyards.

### ***Fixed-Guideway Systems***

Fixed guideway systems, as the name implies, are mechanisms that move the containers on rails, magnetic levitation tracks, or other fixed structures. An example of a fixed guideway zero-emission container movement system in use today is an electric locomotive pulling a train of containers. Such electric locomotives receive power from overhead catenaries or electric third rails, and are used for freight transport in Europe, Asia and other locations, but not in the United States. Figure 6 shows an electric freight locomotive in Europe.



Figure 6 European Electric Freight Locomotive

The fixed guideway approach would consist of development of infrastructure to move containers between the APL Terminal and the near-dock railyards using magnetic levitation, linear motor technologies, or catenary/third rail power. Unless existing rail lines could be utilized without impeding other operations, the guideways would be purpose-built, which would likely require right-of-way acquisition. Several technology developers have proposed to the ports to use linear motors to propel containers on purpose-built fixed guideway systems, including maglev systems. Under this approach, containers would be loaded onto specialized shuttles conveyed between port terminals and the near-dock railyards. In another variation, electric or diesel trucks would interact with ports and rail terminals as conventional trucks do today, but would be propelled on certain roads by linear synchronous motors in the roadbed. Linear motors propel vehicles using electromagnetic force created by a wire coil embedded in the road.

Light rail train and subway lines have operated for years using linear motor technology, and it is expected that, given sufficient resources, this technology can technologically be adapted for freight movement. The staffs of the two ports have, however, focused their zero-emission technology development and demonstration efforts on truck technologies and, recently, technologies to move line-haul rail. (*See, Roadmap for Moving Forward with Zero Emission Technologies*, presented by port staffs on July 7, 2011 at a joint meeting of the Harbor Commissions of the Ports of Long Beach and Los Angeles). The port staffs have stated concerns about (1) congestion on existing rail lines if they are used to move containers between the ports and near-dock railyards, and (2) about cost and operational feasibility of creating new types of fixed guideway systems. Regarding the latter, the port staffs have cited the results of a "Request for Concepts and Solutions" (RFCS) the ports issued in conjunction with the Alameda Corridor Transportation Authority to design, build, finance and operate a zero emission container movement system (ZECMS). The seven responses to the RFCS included six fixed-guideway systems and one truck-based system (hybrid truck with all electric range).

The responses to the RFCS were reviewed by a panel chosen by the Keston Institute at USC, which determined that none of the proposals demonstrated that the intended ZECMS objectives would be achieved. The Keston panel stated that, prior to selection and deployment of any system, additional testing needs to be carried out in an environment that simulates actual container handling operations. The panel also concluded that a ZECMS would have difficulty competing economically with conventional truck drayage.

It should be noted, however, that the Keston panel did not conclude that zero-emission transport is infeasible, and, indeed, concluded that it is technologically feasible. As the panel stated:

*"(T)he panel believes that the submissions illustrate that the concept of a ZECMS is well within the realm of technological feasibility and that potentially viable technologies either already exist or could believably be available within a relatively short timeframe. In other words, a ZECMS is, or could be shortly, technically feasible."*

(The panel also noted that the one truck technology proposed—hybrid trucks with all electric range—had achieved the target level of technology readiness for selection and deployment.<sup>6</sup>)

A key issue found by the Keston panel for fixed guideway systems was that the solicitation prohibited any public funding of, or government requirement for, zero-emission technologies, even during the initial development and startup phase. The panel said:

*In light of the capital intensive nature of fixed guideway systems and the best case assumptions regarding growth in container volume, market share, capital costs,*

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<sup>6</sup> The panel stated: "*Although not strictly a 'zero emission' technology in all operational modes, the panel believes that the hybrid truck has achieved the equivalent of TRL 8. Under the assumption that hybrid trucks would be operating in the electric mode in the port environs, this technology would be viewed as compliant with the goal of removing combustion emissions from port operations.*"

*and system availability used in many of the proposers' analyses, the panel believes that, absent other drivers (e.g., environmental regulations or a subsidy provided by the Ports or others), a ZECMS will have difficulty competing economically with conventional truck drayage, particularly given the rapid advances being made in hybrid-electric vehicles and their inherent flexibility and scalability. . . . The RFCS was quite clear that a ZECMS would be in direct competition with the existing system of truck drayage, so that it had to match or improve the total economic value it offered compared to the existing system—the Ports would not provide any subsidy nor would they compel port users to use the ZECMS.*

It should be noted, however, that public funding has in the past been considered appropriate to develop and deploy new clean technologies, including by the ports, and such funding is and will likely continue to be available in the future (see below). In addition, the JPA and ports have clear authority, which they have exercised in the past, to require and incentivize use of new technologies.

### ***Rail***

In addition to implementing zero-emission technologies such as electric trucks to move containers between the APL Terminal and the near-dock railyards, the measure proposed by SCAQMD would require the ports to take actions to evaluate and demonstrate zero-emission technologies for line-haul locomotives. Zero-emission electric locomotives are an existing technology in use around the world for freight and passenger transport. One issue to be addressed in implementing such technology in Southern California would be the transition to non-electrified track outside of the region. One potential solution is to switch between electric and diesel locomotives at the edge of the region. It should be noted, however, that the railroads have in the past objected to the time, expense and railyard space needed to switch to cleaner locomotives when trains enter this region. A second major issue is the expense of electrification infrastructure such as overhead catenary wires, and the cost of electric locomotives.

Among the technologies to be evaluated under this alternative would be technologies that could eliminate the need for catenary wires, or to switch locomotives at the edge of the electrified region. These include dual-mode locomotives, such as are currently in use for passenger trains; battery tender cars to provide power to locomotives in certain areas; and hybrid-electric locomotives with all electric range. Finally, linear synchronous motor (LSM) technology has the potential to move trains on existing rail lines that are retrofitted with such technology.

### **Zero Emission Implementation Timeline Overview**

A Gantt chart of the likely zero-emission technologies is shown in Figure 7, which illustrates expected timeframes for development, validation and evaluation of technologies. The timeframes are based on status of the specific technologies, and on typical timeframes for the referenced actions. These timeframes are based on proposals received for such technologies as well as technical experience by the Technology

Advancement Office at the SCAQMD. Although each technology provider and manufacturer may describe these phases differently, the cycles are all on the order of five to seven years from development to commercialization. The development phase includes design and non-recurring engineering activities for the prototype technology. This phase also typically includes limited testing or simulation in preparation for field trials. The validation phase is testing and demonstration of the technology in the field, including data collection for design changes and optimization. During this phase, the technology design is tested to the actual performance standards (e.g., towing capability, gradability, speed, etc.). The final fleet evaluation phase includes multiple units in actual fleet or real-world use with potential for accelerated durability testing to gauge maintenance and reliability issues. During this phase, testing is conducted to ensure safety as well as working with the appropriate agencies for commercial certification.

It should be noted that the development phases for many of the truck projects were already initiated in 2008-2009 through efforts at the Ports, the SCAQMD and the DOE. The last phase of “evaluation” includes durability and certification activities, which may lengthen the phase depending on the field-trial experiences. Timeframes could also be shortened if sufficient funding is applied to increase resources toward that effort by the manufacturer. However, considering the current levels of product development and uncertainty, it is clear that, given sufficient clarity of purpose, all described technologies can be commercialized by 2016-2020, with some at earlier dates.

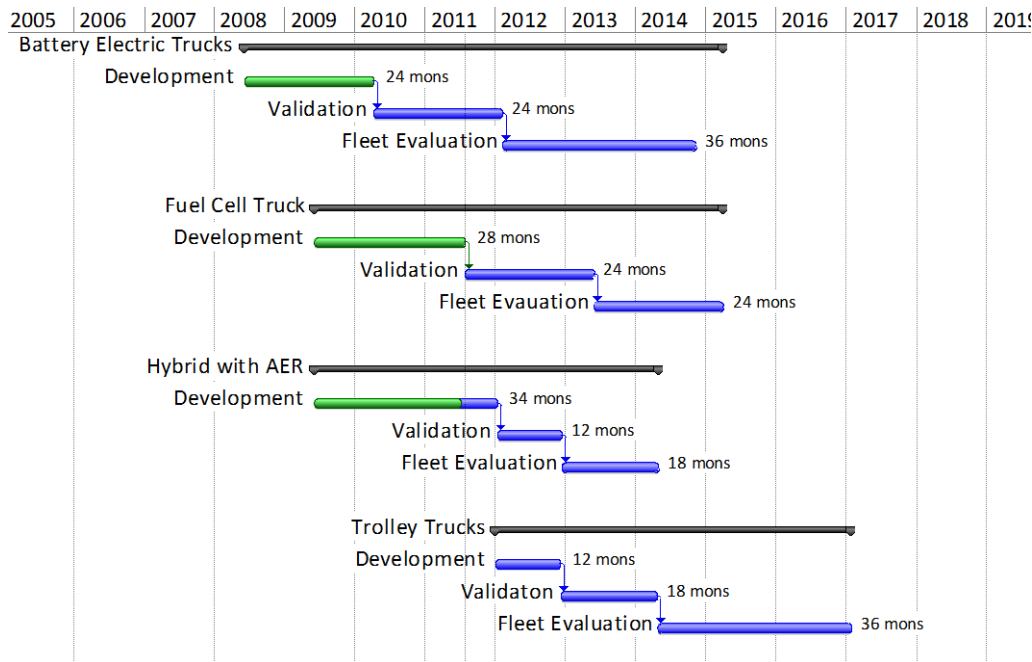


Figure 7: Commercialization Timeframes For Zero Emission Truck Technologies

**Financing Support for Zero-Emission Technologies**

A key aspect of technology development and commercialization is initiating and ensuring activities by technology manufacturers. Government can play a critical role by ensuring a market for the end product (e.g. by adopting emission control requirements), and by offsetting the typically high cost of technology development and initial deployment through funding incentives. This strategy has been used in Europe for zero-emission technologies, which is why manufacturers are working on zero-emission trucks, namely Siemens and Volvo. State and local governments in California have a long history of

successfully requiring and incentivizing deployment of new technologies. Actions by the ports to require and incentivize clean technologies are thus of critical importance.

As noted above, the ports have implementation mechanisms such as project approval conditions and port rulemaking that can require transition to new technologies. In addition, a variety of sources exist for development and incentive funding. Potential sources of funding for air quality technologies include, but are not limited to, the ports, AQMD, and the future tenant. State and local governments have a long history of incentivizing cleaner technologies through collaborative efforts. A recent example is the partnership with CARB, the Port of Los Angeles, the Port of Long Beach, U.S. Department of Energy, California Energy Commission and U.S. EPA for the buydown of the cleaner but more expensive natural gas trucks as part of the Ports Clean Truck Program. The AQMD utilized the existing Proposition 1B incentive of \$50,000 per truck but augmented this with an additional \$50,000 through grants from the U.S. Department of Energy, California Energy Commission and U.S. EPA as well as AQMD funds and the Ports. With the \$100,000 incentive, fleets and independent operators were able to offset the higher cost of natural gas trucks which are approximately \$150,000 – 170,000. Through this collection of incentives, the AQMD was successfully able to purchase over 690 natural gas trucks as part of the Ports' Clean Truck Program.

Other funding examples include the Hybrid Voucher Incentive Program (HVIP), which provides \$20,000 per hybrid truck, including all-electric technologies. The AQMD further supplemented the HVIP by adding \$1.5M for vehicles deployed in the South Coast Region. In May 2011, the California Energy Commission added an additional \$4M to the HVIP to further incentivize electric vehicles making the per-truck funding \$40,000 to \$50,000. A list of currently available incentives for heavy-duty zero-emission trucks is included in the table below.

Although some of these programs may not be in place at the time of the project initiation, it is anticipated that, given market demand, similar or renewed funding will be available.

### **Conclusion**

Based on the above, there is substantial evidence to conclude that zero emission technologies can be deployed in the 2016 to 2020 timeframe (or earlier) to move containers between the APL Terminal and near-dock railyards — if the port requires such deployment.



Incentive Program	Sunset Date	Project Category	Current Maximum Potential Funding/Credit Amounts
Carl Moyer Program	2015	New Purchase	25% of Total Purchase Price (Up to Cost-Effectiveness Limit of \$16,640 per ton)
		Repower	\$30,000 per truck
Proposition 1B	2013	Replacement	\$60,000 per truck
		Repower	\$30,000 per truck
HVIP	2015	New Purchase	\$25,000 per truck (33 - 38K GVWR)
			\$30,000 per truck (>38K GVWR)
Hybrid and Electric Trucks and Infrastructure Act (S. 1285)	Proposed to end by Dec. 2015	New Purchase	\$24,000 per truck