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**File #:**2023-0295

**DATE:** December 5, 2023

**SUBJECT:**

**PRESENTATION ON THE FIRST BIENNIAL STATUS REPORT ON ZERO EMISSIONS HEAVY-DUTY TRUCKS IN ACCORDANCE WITH THE MARITIME CLEAN AIR STRATEGY TRUCK OBJECTIVE 1E.**

**EXECUTIVE SUMMARY:**

The Board of Port Commissioners adopted the Maritime Clean Air Strategy (MCAS) on October 12, 2021. During the October 2021 Board meeting, the Board directed staff to provide a biennial status report to the Board regarding zero-emission heavy-duty trucks. This agenda item and presentation (Attachment A) represents the first biennial status report since the MCAS was adopted. The report out to the Board will include an update on the following:

- California Heavy-Duty Truck Regulations;
- Zero Emission Heavy-Duty Truck Technology and Availability;
- Heavy-Duty Truck Activity at the District's Marine Cargo Terminals; and
- District Zero-Emission Truck Initiatives

**RECOMMENDATION:**

Receive the presentation on the First Biennial Status Report on Zero Emission Heavy-Duty Trucks in accordance with Truck Objective 1E of the Maritime Clean Air Strategy

**FISCAL IMPACT:**

This agenda has no fiscal impact. Funds for the Electric Clean Truck Program (\$1,080,000) were approved by the Board in the Economic Recovery Program.

**COMPASS STRATEGIC GOALS:**

This agenda item supports the following Strategic Goal(s).

- A Port that the public understands and trusts.
- A thriving and modern maritime seaport.
- A Port with a healthy and sustainable bay and its environment.
- A Port that is a safe place to visit, work and play.

**DISCUSSION:**

The Board of Port Commissioners adopted the Maritime Clean Air Strategy (MCAS) on October 12, 2021. The MCAS includes a vision of “Health Equity for All” and contains thirty-eight near-term objectives to reduce emissions from maritime-related activities. Ambitiously, the MCAS aims to achieve 40 percent zero-emission truck trips to the District’s marine cargo terminals in 2026 and 100 percent zero-emission heavy-duty truck trips by the end of 2030. During the October 2021 Board meeting, the Board directed staff to provide a biennial status report to the Board regarding zero-emission heavy-duty trucks. Specifically, MCAS Truck Objective 1E states: “Provide biennial status report to the Board of Port Commissioners to review the truck baseline, reforecasting, feasibility, state of technology, elasticity, health studies, and funding availability, to better understand the transition to zero emission truck technology. The biennial status report is also an opportunity to relook at specific goals and objectives, analyze various signposts and potentially make changes.”

This agenda item represents the first biennial status report and presentation (Attachment A) since the MCAS was adopted. The report out to the Board will include an update on the following:

- California Heavy-Duty Truck Regulations;
- Zero Emission Heavy-Duty Truck Technology and Availability;
- District Heavy-Duty Truck Activity; and
- District Zero-Emission Truck Initiatives

An evaluation of the elasticity of the District’s maritime cargo was presented to the Board in May 2022. Likewise, the District’s Heath Risk Assessment (HRA) was presented to the Board in June 2022. These studies have not been updated and will not be presented as part of this agenda item.

California Heavy-Duty Truck Regulations

Simultaneous to the development of the MCAS, the California Air Resources Board (CARB) was drafting new regulations for heavy-duty trucks. Notable was the adoption of the Advanced Clean Truck (ACT) regulation in 2020, which requires manufacturers of medium- and heavy-duty trucks to sell zero-emission trucks in increasing proportions of their total truck sales in California.<sup>1</sup> Zero-emission trucks are those that produce no tailpipe emission, including battery electric trucks and hydrogen fuel cell trucks. For heavy-duty trucks which typically transport cargo to/from seaports, the proportion of zero-emission sales begins at five percent in 2024 and escalates to 40 percent in 2035. The regulation is currently being amended to require 100 percent of truck sales to be zero-emission beginning in 2036.

While the ACT regulation focuses on the supply side of zero-emission truck sales, the Advanced Clean Fleet (ACF) regulation, adopted by CARB in April 2023 requires trucking companies to utilize zero-emission trucks.<sup>2</sup> Consistent with Governor Newsom’s Executive Order N-79-20, which set a goal for drayage trucks that commonly service seaports to be zero emission by 2035, the ACF regulation requires a phased adoption of zero-emission trucks, culminating in 100 percent of trucks transporting cargo at California seaports being zero emission in 2035.

Certain trucks, such as auto carrier trucks or trucks which operate with a Power Take Off unit that also visit seaports, are exempt from the specific requirements described above. However, if a

company that owns and operates 50 or more trucks or has \$50 million or more in annual revenue, the ACF regulation considers these as High Priority Fleets. According to the regulation, High Priority Fleets are required to convert their trucks to zero emissions by 2042. As a result, if a company meets the definition of a High Priority Fleet, they would have a longer regulatory schedule to transition to zero emission.

Additional regulations recently adopted or amended by CARB include the Heavy-Duty Inspection and Maintenance Program (HD I/M) regulation as well as the Transportation Refrigeration Unit (TRU) regulation. The HD I/M regulation requires diesel trucks to undergo periodic emissions testing to ensure that they are operating appropriately.<sup>3</sup> The 2022 TRU regulatory amendment strengthens the emission standards for trucks, containers, trailers, and generator sets that utilize refrigeration equipment powered by diesel engines.<sup>4</sup> All of the aforementioned regulations, except for the ACT regulation, require reporting, record-keeping, and/or compliance verification by seaports such as the District or its tenants.

Zero-Emission Heavy-Duty Truck Technology and Market Availability

Nearly all the traditional manufacturers of heavy-duty trucks, as well as newer manufacturers such as Tesla and Nikola, are producing zero-emission trucks. At the present time, the zero-emission heavy-duty truck population in California is estimated to be fewer than 200 trucks.<sup>5</sup> Since the ACT regulation sets the first regulatory standard for 5% of truck sales to be zero emission in 2024 and the ACF regulation begins to require use of zero-emission trucks, the population of zero-emission trucks is expected to grow.

Table 1 below showcases the manufacturers with zero-emission battery electric trucks available through California’s Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP). Although there may be other manufacturers building and testing heavy-duty trucks, the vehicles in the HVIP program have been certified by CARB to meet certain requirements that qualify them for incentive funding. While the Tesla Semi truck is not in the HVIP program, trucks have been delivered to customers and are currently operating in California.

Table 1. Commercially Available Battery Electric Truck Characteristics

Make	Model	Range (miles)	Typical Time to Charge (hours)*
BYD	8TT	125	2.5
BYD	8TT Extended Range	200	3.5
Freightliner	eCascadia (Tandem)	220	1.5
Kenworth	T680e	150	3
Lion	Lion 8 Tractor	250	1.5
Nikola	TRE BEV	330	1.5
Peterbilt	579 EV	150	3
Tesla	Semi	500	0.5
Volvo	VNRe 6x2	175	1
Volvo	VNRe 6x4	275	1.5

\* Typical time to charge represents the period of time to recover 80 percent of the battery capacity. For the Tesla Semi, the time to charge is reported as the time it takes to recover 70% of the battery capacity.

According to the manufacturers of the battery electric trucks listed in Table 1, they can travel between

125 to 500 miles with a full gross vehicle weight rating of 82,000 pounds. The actual distance travelled may be less than advertised by manufacturers based on weather conditions, the physical terrain along the route of travel, and driver behavior. The Nikola and Tesla trucks showcase the furthest mileage capability due to larger battery capacities. Larger battery packs will increase the overall weight of the vehicle. The common empty vehicle weight, known as curb weight, of battery electric trucks ranges between 22,000 pounds to 29,000 pounds. Compared to their diesel counterparts, the average diesel curb weight is 17,000 pounds. Because there is an 80,000-pound weight limit for vehicles which travel over the road (82,000 pounds for zero-emission vehicles), the higher curb weight of a battery electric truck results in less payload capacity. Lastly, based on manufacturer information, charging time can take between 30 minutes to three hours depending on the power of the charger and the charging rate accepted by the truck.

Table 2 showcases the hydrogen fuel cell electric trucks that are eligible for voucher incentives in the HVIP catalog.

Table 2. Hydrogen Fuel cell electric Trucks

Make	Model	Range (miles)
Hyzon	HyHD8	350
Hyundai	Xcient	400
Nikola	TRE FCEV	500

It is important to note that hydrogen fuel cell trucks are just emerging and can be classified as in a demonstration/pilot phase of development ahead of market readiness.<sup>6</sup> These vehicles require hydrogen as a fuel source and can be fueled in a similar timeframe to a diesel truck-approximately 15 to 20 minutes. Published material regarding curb weight of hydrogen fuel cell trucks is limited. Estimates for curb weight vary between 21,000<sup>7</sup> pounds to 26,000<sup>8</sup> pounds. Although still not on par to the weight of a diesel truck, hydrogen fuel cell trucks offer the opportunity to travel further than battery electric trucks based on a similar curb weight, which means a hydrogen fuel cell truck can transport more payload over a greater distance.

Infrastructure to support both battery electric trucks as well as hydrogen fuel cell trucks involved in goods movement is minimal and reflective of the limited number of zero-emission trucks in operation. Both fuel types can be sited at private depots where trucks are domiciled or at public stations to service the general population. Fleet operators with access to property may choose to construct their own charging infrastructure. However, fleets with site constraints (e.g., small spaces and locations with limited access to high power requirements) or those without dedicated property may have to rely on publicly available charging. In San Diego County, there is one location in Otay Mesa where heavy-duty charging equipment is publicly available. Over the past several months, the emergence of new businesses exclusively focused on providing publicly available charging is occurring. For example, the company WattEV recently opened an electric truck stop at the Port of Long Beach, which provides access to charging as well as access to electric trucks.

There are three hydrogen fueling locations in California with the ability to provide fuel to hydrogen fuel cell trucks.<sup>9</sup> It is doubtful that all but the largest trucking fleets involved in goods movement would construct their own hydrogen fueling stations because of the costs. Therefore, hydrogen fuel cell trucks will likely rely on publicly available stations once developed. With the recent funding from the

United States Department of Energy, California will receive \$1.2 billion to accelerate production of green hydrogen and expand hydrogen-based projects throughout the state. As a result, more hydrogen fueling stations are expected to be developed in the coming years.

Meanwhile, data included in the San Diego Association of Government's (SANDAG's) Draft Medium- and Heavy-Duty Zero Emission Vehicle Blueprint Needs Assessment Report indicates that by 2030, over 9,000 chargers will be needed to support a future population of medium- and heavy-duty battery electric vehicles operating in the county. Of the 9,000 chargers, approximately 1,600 are estimated to be public. Furthermore, SANDAG estimates that an additional 46 hydrogen fueling stations will be needed to fuel hydrogen fuel cell vehicles by the end of the decade.<sup>10</sup>

### Heavy-Duty Truck Activity at the District's Marine Cargo Terminals

An accounting of truck activity at the marine cargo terminals for calendar year 2022 is based on data collection and discussions with District tenants. During 2022, approximately 101,229 (Tenth Avenue Marine Terminal=61,478; National City Marine Terminal=39,751) heavy-duty trucks transported cargo to/from the District's marine cargo terminals. Truck calls consisting of zero-emission trucks represent less than one percent of all truck calls to the terminal. During the adoption of the MCAS, a baseline of 100,000 diesel and natural gas trucks was established for projecting the transition to zero-emission trucks. The data from 2022 showcases that the amount of truck activity at the terminals fluctuates based on cargo volumes.

To more accurately account for truck activity at the District's marine cargo terminals, a system to track truck calls to the terminals has been developed in accordance with MCAS Truck Objective 1D. A truck tracking system was created to achieve three critical needs:

- Identify the number of zero-emission truck calls to the marine cargo terminals to measure progress to achieve MCAS zero-emission truck goals;
- Comply with applicable CARB regulations which require the District to report, retain records, and/or verify the compliance status of trucks which enter the marine cargo terminals; and
- Replace manual truck reporting processes conducted by the District to streamline staff workloads.

As a result, District staff from the Information Technology, Maritime, Harbor Police, and Planning departments collaborated to develop a system to track trucks that visit the marine cargo terminals and improve processes to expedite data collection. The truck tracking system utilizes license plate reader cameras and external databases of vehicle information to populate a database of trucks with pertinent information such as the vehicle make, model, year, and fuel type. Information related to the owner or the driver of the vehicle is not collected.

Furthermore, a mobile application was developed for use by the security personnel located at the marine terminals. The application allows security to confirm an accurate license plate of an incoming truck, verify compliance with state regulations, and identify project cargo associated with the vehicle. As noted, the new regulations discussed previously require the District or its tenants to verify the compliance status of incoming trucks that transport cargo and to either report or retain records on trucking activity. Using the unique license plate of the incoming vehicles, the truck tracking system can validate the compliance status of the truck against CARB databases. If a truck is not compliant

with state regulations, the truck will be prohibited from entering the terminal. Compliant truck visits will be reported to CARB as required.

As the truck tracking system is relatively new, a full dataset representing the unique number of trucks and a summary of their calls is not available across both terminals. Data representing truck activity at TAMT demonstrates that between January 2023 through October 2023, there have been 49,125 recorded truck calls made by 2,125 unique trucks, two of which are zero emission trucks. Zero-emission truck trips represent less than one percent of all calls to the terminal. As further data is collected at the National City Marine Terminal, a more accurate report of truck activity will be made available. While the unique number of trucks which operate at the terminal will become known as more data is collected, there are three zero-emission trucks owned and operated by Pasha which transport vehicles to/from the marine terminal.

### District Zero-Emission Truck Initiatives

District staff have been actively engaged in a variety of initiatives to encourage adoption of zero-emission trucks. The following summary will highlight the District’s Zero-Emission Truck Initiatives.

#### *Technical Assistance and Outreach*

To help truck operators prepare for the transition to zero-emission trucks, the District has conducted educational outreach, a summary of which is provided in Table 3. The purpose of these events was to provide education regarding zero-emission trucks and infrastructure, regulations, and funding opportunities.

Table 3. Educational Outreach Events Provided to Truck Operators

Event	Partners	Date(s)
Truck Outreach at TAMT	Environmental Health Coalition, CALSTART, APCD, SDG&E	February 15, 2023 April 24, 2023 June 26, 2023 June 28, 2023
Trucker Roundtable	World Trade Center San Diego	February 23, 2023
SDG&E EV Fleet Day	SDG&E	April 6, 2023
Otay Mesa EV Ride & Drive	Harbor Trucking Association	April 7, 2023
Chula Vista EV Ride and Drive	CALSTART	October 20, 2023

Further, the District launched a Technical Assistance Program during 2023 aimed at providing one-on-one coaching to truck operators who regularly visit the marine terminals.

#### *Incentives*

Because of the cost discrepancy between a new diesel truck (~\$125,000) and a new battery electric truck (~\$400,000) or hydrogen fuel cell truck (>\$500,000), incentives are needed for truck operators to procure these vehicles. During 2022, the District worked with the San Diego County Air Pollution Control District (APCD) to establish a Zero-Emission Pilot Incentive Program. Leveraging \$4M administered by APCD to fund zero-emission trucks which regularly operate within the Portside Community, the District offered additional funding with a budget just over \$1M to truck operators who visit the marine cargo terminals. Through the APCD program, a truck operator could obtain up to \$250,000 in assistance per truck to procure a heavy-duty zero-emission truck. The District’s

contribution is to be determined based on the truck operator’s needs. The program opened to applications in January 2023.

Additionally, there are other funding programs across California to help alleviate the high cost of zero-emission trucks. Table 4 lists additional incentive programs for zero-emission trucks and infrastructure.

Table 4.

Program	Agency	Category	Funding (Per vehicle)
Hybrid Voucher Incentive Program	CARB	Zero-Emission Trucks	\$150,000 - \$186,000
Innovative Small E-Fleets	CARB	Zero-Emission Trucks	Up to \$288,000
VW Mitigation Trust	CARB	Zero-Emission Trucks	Up to \$200,000
San Diego APCD	San Diego APCD	Zero-Emission Trucks	Up to \$250,000
Energy Infrastructure Incentives for Zero Emission Commercial Vehicles (Energize)	CEC	Infrastructure	Charging Infrastructure: up to \$750,000 Hydrogen Infrastructure: up to \$4M
Power Your Drive for Fleets	SDG&E	Infrastructure	TBD based on site considerations

Although the District’s incentive program has garnered interest from truck operators, truck operators who visit the terminals have not committed to the program. Based on discussion with truck operators, there is still apprehension about the unknown costs of owning and operating these vehicles, such as insurance, the availability of infrastructure, and the logistics of operating these vehicles if their daily routes require the need for opportunity charging to complete high mileage. The District will continue discussions with trucking companies on providing incentives to acquire and use zero-emission trucks.

*Infrastructure*

Recognizing that infrastructure is critical to increase adoption of zero-emission trucks, District staff released a Request for Proposals to design, build, operate, and maintain a zero-emission truck stop on one or more of three adjacent parcels at the intersection of 19th Street and Tidelands Avenue in National City (located on District Tidelands). Together, the sites comprise approximately 13 acres. The future zero-emission truck stop is intended to provide preferential charging for trucks calling to/from the District’s marine cargo terminals. Once developed, the site will be the first all-electric heavy-duty truck stop in San Diego County. Two proposer teams were selected as finalists, and they presented their concepts to the Board of Port Commissioners at the November 13, 2023 Board meeting and received direction to modify their proposals. It is anticipated that the Board will enter into an Exclusive Negotiating Agreement with one of the proposers in early 2024.

Meanwhile, District staff have also been actively engaged throughout the region to support a network of charging and fueling hubs to support zero-emission trucks. Recently, staff entered into a Memorandum of Agreement with Caltrans to work cooperatively toward the mutual goal and shared vision of developing sustainable transportation and freight projects to support the San Diego region. Similarly, the District has been working with SANDAG and project partners such as the Environmental Health Coalition on a Regional Medium- and Heavy-Duty Zero Emission Vehicle

Blueprint to guide the region as goods movement and transit fleets transition to zero-emission technology.

### *Policy Goals*

The District understands that there are challenges for truck operators to overcome to procure zero-emission vehicles. One challenge expressed by truck operators and District tenants is a potential decrease in payload capacity for a zero-emission trucks due to the heavier curb weight of the vehicle. Transporting less cargo results in the need for more truck trips, which may burden communities with additional truck traffic and increase the cost of transporting a similar amount of cargo.

Compared to the average curb weight of a diesel truck that weighs 17,000 pounds, a battery electric trucks weighs approximately 5,000 to 12,000 pounds more depending on the capacity of the battery pack. Although not well documented, hydrogen fuel cell trucks also weigh more, by approximately 5,000 to 9,000 pounds. As a result, the District has been advocating for an increase in the weight allowance for heavy-duty trucks. California already allows 2,000 extra pounds for alternative fueled vehicles, increasing the overall weight from 80,000 pounds to 82,000 pounds. However, because of the extreme difference in weight between a traditional truck and a zero-emission truck, further weight allowance may be needed to provide a comparable payload capacity between the two types of trucks. The District has been discussing increasing the weight allowance of vehicles over-the-road with impacted jurisdictions and Caltrans.

### Summary

As discussed in this biennial status report, zero-emission heavy-duty trucks are still an emerging technology involved in freight transport. With the adoption of new regulations in California requiring the sale and the transition to zero-emission trucks, the population of these vehicles will grow. Along with the high cost of zero-emission trucks, insufficient infrastructure (particularly public stations), heavy curb weights, range limitations for longer routes, existing procurement cycles for truck operators, and a general lack of knowledge about zero-emission trucks are barriers preventing adoption. The District will continue to work with the trucking operators that visit the marine cargo terminals to overcome these challenges.

### **General Counsel's Comments:**

The Office of the General Counsel has reviewed this agenda as presented to it and approves it as to form and legality.

### **Environmental Review:**

The proposed informational presentation, including without limitation, a presentation on the first biennial status report on zero emissions heavy-duty trucks in accordance with MCAS Truck Objective 1E, does not constitute a project under the definition set forth in California Environmental Quality Act (CEQA) Guidelines Section 15378 because there is not a potential to result in a direct or indirect physical change in the environment. Therefore, the proposed informational presentation is not subject to CEQA and no further action under CEQA is required.



The proposed informational presentation complies with Section 87 of the Port Act. The Port Act was enacted by the California Legislature and is consistent with the Public Trust Doctrine. Consequently, the proposed informational presentation is consistent with the Public Trust Doctrine.

The proposed informational presentation does not allow for development, as defined in Section 30106 of the California Coastal Act, or new development, pursuant to Section 1.a. of the District's Coastal Development Permit Regulations. Therefore, issuance of a Coastal Development Permit or an exclusion finding is not required.

**Diversity, Equity, and Inclusion Program:**

This agenda sheet has no direct DEI impact on District workforce or contract reporting at this time.

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**Attachment(s):**

**Attachment A: Draft Presentation**

<sup>1</sup> Advanced Clean Truck Regulation: <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/fro2.pdf>

<sup>2</sup> Advanced Clean Fleet Regulation: <https://ww2.arb.ca.gov/rulemaking/2022/acf2022>

<sup>3</sup> Heavy-Duty Vehicle Inspection and Maintenance Program:

<https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/hdim2021/hd-imfroatta1.pdf>

<sup>4</sup> Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate: <https://ww2.arb.ca.gov/rulemaking/2021/tru2021>

<sup>5</sup> California Zero-Emission Vehicle Population Dashboard. Accessed: November 10, 2023.

<https://californiahvip.org/industryinitiatives/#cazevdashboard>

<sup>6</sup> CARB. Heavy-Duty FY 2023-24 Long-Term Heavy-Duty Investment Strategy:

[https://ww2.arb.ca.gov/sites/default/files/2023-10/fy2023-24lctfundingplan\\_appd.pdf](https://ww2.arb.ca.gov/sites/default/files/2023-10/fy2023-24lctfundingplan_appd.pdf)

<sup>7</sup> Hyundai Xcient Specifications. [https://hyundai-hm.com/wp-content/uploads/2020/10/XCIENT-Fuel-Cellcatalog\\_print.pdf](https://hyundai-hm.com/wp-content/uploads/2020/10/XCIENT-Fuel-Cellcatalog_print.pdf)

<sup>8</sup> <https://tfltruck.com/2023/09/first-drive-the-2024-nikola-fuel-cell-ev-semi-truck-is-better-than-i-expected/>

<sup>9</sup> CARB. 2022 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development. <https://ww2.arb.ca.gov/sites/default/files/2022-09/AB-8-Report-2022-Final.pdf>

<sup>10</sup> SANDAG (2023). Draft Medium- and Heavy-Duty Zero Emission Vehicle Blueprint Needs Assessment Report. <https://www.sandag.org/projects-and-programs/innovative-mobility/clean-transportation/regional->