

Attachment B

Updated Analysis Regarding Increased
Manufacturer Zero-Emission Vehicles Sales
Requirements

This attachment provides staff's analysis and rationale regarding the increased manufacturer ZEV sales requirements as described in staff's proposed modifications.

Including Class 2b-3 pickups beginning in the 2024 model year

In the original proposal, Class 2b-3 pickup trucks were excluded from deficit calculations until the 2027 model year. As part of staff's proposed modifications to the proposed Advanced Clean Trucks regulation, staff propose to remove the "Pickup Exclusion" as specified in section 1963.1(a)(1) in the original regulation text. This change means Class 2b-3 pickup sales generate deficits beginning in the 2024 model year.

In recent months since the Notice and Staff Report were released, manufacturers have made numerous announcements regarding zero-emission pickup trucks. These include Tesla unveiling their medium-duty Cybertruck in November 2019, Nikola announcing the Nikola Badger, a pickup available as either battery-electric or fuel cell electric, and General Motors announcing a battery-electric Hummer (Tesla, 2019; Nikola, 2020; GMC, 2020). These announcements are in addition to previous electric pickup announcements from Ford, Rivian, and Bollinger Motors. Some of these are in the Class 2b-3 category and some are light duty.

The Tesla Cybertruck and the Bollinger Motors B1 and B2 are anticipated to be classified as Class 2b-3 vehicles (Bollinger Motors, 2020a; Bollinger Motors, 2020b; Tesla, 2019). It is unclear whether the other announced electric pickups will be classified as medium-duty vehicles or light-duty vehicles, but because battery-electric vehicles tend to weigh more than a conventional counterpart, it is foreseeable that some will have a GVWR above 8,500 lb. and be classified as medium-duty vehicles. However, these examples illustrate the growing feasibility of electric drive trains for this vehicle configuration including those sold with pick-up beds. In addition, some of these ZE pickups are being advertised at lower prices than staff projected in the Staff Report while having larger batteries than staff projected in the Staff Report. This indicates staff may have been conservative in forecasting vehicle prices for Class 2b-3 vehicles as staff assumed these vehicles would be manufactured at higher cost due to smaller scale production, while these announcements are for large-scale production.

In general, these new announcements support increasing the sales for vehicles in the Class 2b-3 category by including pickups starting in 2024 rather than delaying the requirement for several years. Increasing sales in this category appears feasible and is necessary to better protect public health, to meet climate targets, and is consistent with Board direction and many public comments seeking to increase ZEV sales.

Increasing Class 2b-3 vehicle group percentage requirements

In the original proposal, the manufacturer ZEV sales requirement for Class 2b-3 vehicles started at 3 percent in 2024 model year and ramped up steadily to 15 percent in 2030 model year. As part of staff's proposed modifications, the percentage requirements would increase as illustrated in Table 1.

Table 1: Proposed Class 2b-3 Vehicle Group ZEV Percentage Requirements

Model Year	Class 2b-3 Group
2024	5%
2025	7%
2026	10%
2027	15%
2028	20%
2029	25%
2030	30%

In 2024-2026 model years, staff is moving the requirements proposed at the December Board Hearing forward one year. At this point, most major manufacturers have plans to launch ZE products prior to 2024 model year in the United States or Europe (Ford, 2020; FCA, 2019; Daimler, 2019; Daimler, 2020a). These early product launches before the 2024 model year will allow manufacturers to bank more credits than anticipated in the original staff analysis. Additionally, these early product launches will support the overall ZEV marketplace – as major manufacturers launch these products, their dealerships and service networks will begin supporting ZEVs and the manufacturers will start ZEV-focused marketing, education, and outreach. The large number of ZEVs launched before the regulation begins, the more established ZEV marketplace, and the increased amount of banked credits support higher ZEV sales requirements in the earlier years and is consistent with Board direction and many public comments seeking to increase the number of ZEVs deployed.

In the 2027-2030 model years, the proposed ZEV percentage requirements are increased further and ramp up to 30% by 2030. As described before, a number of manufacturers have made announcements indicating feasibility of zero-emission pickup trucks. As pickup trucks make up the majority of Class 2b-3 sales into California, the increased feasibility for that category supports increased requirements for the overall category. In addition, Rivian recently announced that a portion of the 100,000 vehicles ordered by Amazon will be vans in the Class 2b-3 category (Rivian, 2020). These new announcements show there is growing demand for ZEVs in this category as they become available.

Increasing Class 4-8 vehicle group percentage requirements

In the original proposal, the manufacturer ZEV sales requirement for Class 4-8 vehicles started at 7 percent in 2024 model year and ramped up to 50 percent in 2030, with higher increases in the later years. In staff's proposed modifications, the percentage requirements would increase as shown in Table 2.

Table 2: Proposed Class 4-8 Vehicle Group ZEV Percentage Requirements

Model Year	Class 4-8 Group
2024	9%
2025	11%
2026	13%
2027	20%
2028	30%
2029	40%
2030	50%

In 2024-2026 model years, staff is proposing to move the requirements proposed at the December Board Hearing forward one year without changing the start date. At this point, most major manufacturers have plans to launch ZE products prior to 2024 model year in the United States (Daimler, 2017; Daimler 2018; Daimler, 2020b; Kenworth, 2020; Mack, 2020; Navistar, 2019; Peterbilt, 2020; Toyota, 2020; Volvo, 2020). These early product launches before the 2024 model year will allow manufacturers to bank more credits than anticipated. Additionally, these early product launches will support the overall ZEV marketplace – as major manufacturers launch these products, their dealerships and service networks will begin supporting ZEVs and the manufacturers will start ZEV-focused marketing, education, and outreach. The large number of ZEVs launching before the regulation begins, the more established ZEV marketplace, and the increased amount of banked credits support higher ZEV sales requirements in the earlier years, which is consistent with Board direction and many public comments seeking an increase to the number of ZEVs deployed.

From 2027-2030 model years, staff is maintaining the 50 percent requirement in 2030 model year and smoothing out the percentage requirements leading up to the 2030 model year. This change will increase the overall number of ZEVs deployed in this category by 2030.

Increasing Class 7-8 tractor group percentage requirements

In the original proposal, the manufacturer ZEV sales requirement for Class 7-8 tractors started at 3 percent in 2024 model year and ramped up steadily to 15 percent in 2030

model year. For this group, staff proposes to increase the percentage requirements as shown in Table 3.

Table 3: Proposed Class 7-8 Tractor Group ZEV Percentage Requirements

Model Year	Class 7-8 Tractor Group
2024	5%
2025	7%
2026	10%
2027	15%
2028	20%
2029	25%
2030	30%

The sales requirements for Class 7-8 tractors are being increased in part to better align the Proposed Advanced Clean Trucks Regulation with San Pedro Bay Ports 2017 Clean Air Action Plan Update (SPBP, 2017). The Clean Air Action Plan sets a goal of a 100 percent ZE drayage fleet by 2035. The population of drayage trucks at the Ports of Los Angeles and Long Beach is estimated at about 16,000 in 2020 and is expected to increase over time (CARB, 2017). The sales percentages in the initial staff proposal were not sufficient to meet the goals of the Port’s Clean Air Action Plan. These increased sales through 2030, combined with increase sales requirements past 2030, will generate enough ZE tractor sales to meet a 100% drayage fleet goal statewide. Furthermore, as tractors are the highest emitting vehicles, increasing the number of zero-emission tractors deployed will reduce greenhouse gas and criteria emissions. ZE tractor deployments will simultaneously benefit disadvantaged communities burdened by truck and freight emissions consistent with Board direction and many public comments.

Simultaneously, manufacturers continue to demonstrate and prepare product launches for ZE tractor trailers. Major manufacturers including Freightliner, Peterbilt, and Volvo have committed to launching ZE tractors prior to 2024 model year and ZE manufacturers including Tesla, Nikola, and XOS are planning to enter the tractor trailer market (Nikola, 2020; TTNews; 2018; Tesla, 2020). While there are still a lack of commercially available tractors today, these announcements indicate there will be several models available prior to the initial sales requirement.

Lastly, in the past six months, a number of studies and analyses evaluating total cost of ownership for ZE tractor trailer combinations have been published that were not incorporated into the original staff proposal. Organizations including Atlas Public Policy, the Hydrogen Council, ICF International, Lawrence Berkeley National Laboratory, the North American Council for Fuel Efficiency, and the University of California Los Angeles have published reports evaluating the costs of zero-emission tractor trailers versus their

diesel counterparts (Atlas, 2020; Hydrogen Council; 2020; ICF, 2019; LBNL, 2019; NACFE, 2019b; UCLA, 2019). Nearly all of these reports come to similar conclusions – while zero-emission tractors have a greater upfront cost due to higher vehicle costs and the costs of installing infrastructure, their lower fuel costs and maintenance savings lead to lower overall total costs of ownership. By the time the proposed ACT regulation’s requirements begin in 2024 MY, ZE tractors are projected to be cost competitive and improve further as costs continue to decline. In addition, these studies find many tractors operate on short haul or regional duty cycles which are well suited for electrification in the near-term. The conclusions of various studies are summarized the Union of Concerned Scientists’ report, “Ready to Work” (UCS, 2019).

The need for ZE tractors to satisfy the Ports’ drayage goals as well as California’s emission goals, the studied economic viability of ZE tractors, and the increasing certainty of commercialized ZE products supports higher requirements for Class 7-8 tractors.

Increasing percentage requirements past 2030 model year

In the original proposal, the manufacturer ZEV sales requirements remained flat after 2030 model year. Staff proposes to continue increasing the ZEV percentage requirements through 2035 model year as shown in Table 4.

Table 4: Proposed ZEV Percentage Requirements after 2030 model year

Model Year	Class 2b-3 Group [±]	Class 4-8 Group	Class 7-8 Tractors Group
2031	35%	55%	35%
2032	40%	60%	40%
2033	45%	65%	40%
2034	50%	70%	40%
2035 and beyond	55%	75%	40%

Increasing the requirements past the 2030 model year better aligns the Proposed Advanced Clean Trucks Regulation with the state’s long-term goals as the Board directed during the December 12 Hearing. In 2018, Governor Brown issued Executive Order B-55-18 establishing a goal of net carbon neutrality for California no later than 2045. Meeting this goal will require significant emissions reductions in all sectors including medium- and heavy-duty transportation. Maximizing the number of zero-emission trucks deployed in California will be a key component to meeting the state’s carbon neutrality goal. By increasing the sales numbers past 2030, the Proposed Regulation will put California on a clearer pathway to achieve carbon neutrality by 2045.

Class 7-8 tractors sales estimates indicate 55-60 percent of tractor sales are in a sleeper cab configuration (NACFE, 2019a, CARB, 2019). Sleeper cab tractors are generally used for line-haul applications which involves long distance interstate travel. Because these vehicles travel long distances and infrequently return to a single base, there are more challenges in terms of vehicle capabilities and require a new infrastructure network nationally. For this reason, staff proposes to keep the Class 7-8 tractor ZEV percentage requirement flat at 40 percent of total tractor sale instead of continuing to ramp up the requirements. Staff will continue to evaluate the development of ZE tractor technology and infrastructure network development. The Board can adjust the requirements in the future when it is determined to be appropriate.

References

1. (Atlas, 2020) Atlas Public Policy, Assessing Financial Barriers to Adoption of Electric Trucks, 2020. (web link: <https://atlaspolicy.com/wp-content/uploads/2020/02/Assessing-Financial-Barriers-to-Adoption-of-Electric-Trucks.pdf>)
2. (Bollinger Motors, 2020a) Bollinger Motors, Bollinger B1, 2020. (web link: <https://bollingermotors.com/bollinger-b1/>)
3. (Bollinger Motors, 2020b) Bollinger Motors, Bollinger B2, 2020. (web link: <https://bollingermotors.com/bollinger-b2/>)
4. (CARB, 2017) California Air Resources Board, EMFAC 2017 Database (web link: <https://www.arb.ca.gov/emfac/2017/>).
5. (CARB, 2019) California Air Resources Board, Appendix E: Zero-Emission Truck Market Analysis, 2019. (web link: <https://ww3.arb.ca.gov/regact/2019/act2019/appe.pdf>)
6. (Daimler, 2017) Daimler, Daimler Trucks launches E-FUSO and all-electric heavy-duty truck Vision One, 2017. (web link: <https://media.daimler.com/marsMediaSite/en/instance/ko.xhtml?oid=30010405&rellid=1001&resultInfoTypeld=175&ls=L2VuL2luc3RhbmNIL2tvLnhodG1sP29pZD0zMDAxMDQ1OSZyZWxJZD02MDgyOSZmcm9tT2lkPTMwMDEwNDU5JmJvcmlcnM9dHJ1ZSZyZXN1bHRJbmcZvVHlwZUIkPTQwNjl2JnZpZXdUeXBIPWxpc3Qmc29ydERIZmluaXRpb249UFVCTEITSEVEX0FULTImdGh1bWJTY2FsZUluZGV4PTAmcm93Q291bnRzSW5kZXg9NQ!!&rs=10#toRelation>)
7. (Daimler 2018) Daimler, Daimler Trucks sets up global E-Mobility Group and presents two new electric trucks for the U.S. market, 2018. (web link: https://media.daimler.com/marsMediaSite/en/instance/print/Daimler-Trucks-sets-up-global-E-Mobility-Group-and-presents-two-new-electric-trucks-for-the-US-market.xhtml?oid=40507313&ls=L3NIYXJjaHJlc3VsdC9zZWZyY2hyZXN1bHQueGh0bWw_c2VhcmNoU3RyaW5nPWVjYXNjYWRpYSZzZWZyY2hJZD0wJnNIYXJjaFR5cGU9ZGV0YWlsZWQmcmVzdWx0SW5mb1R5cGVJZD0xNzUmYm9yZGVycy10cnVIJnRodW1iU2NhbgVJbmcRleD0wJnJvd0NvdW50c0luZGV4PTUmdmlld1R5cGU9dGh1bWJzJnNvcnREZWZpbml0aW9uPVBVQkxJU0hFRF9BVC0y&rs=26)
8. (Daimler, 2019) Daimler, Electrified segment founder: the new Mercedes-Benz eSprinter, 2019. (web link: <https://media.daimler.com/marsMediaSite/en/instance/ko.xhtml?oid=45225215&ls=L2VuL2luc3RhbmNIL2tvLnhodG1sP29pZD05MjY2MjYyJnJlbElkPTYwODI5JmZyb21PaWQ9OTI2Njl2MiZib3JkZXJzPXRydWUmcmVzdWx0SW5mb1R5cGVJZD00MDYyNiZ2aWV3VHlwZT1saXN0JnNvcnREZWZpbml0aW9uPVBVQkxJU0hFRF9BVC0yJnRodW1iU2NhbgVJbmcRleD0wJnJvd0NvdW50c0luZGV4PTU!&rs=11>)
9. (Daimler, 2020a) Daimler, The new Mercedes-Benz Vito and eVito Tourer: attractive upgrade for the van with the star, 2020. (web link: <https://media.daimler.com/marsMediaSite/en/instance/ko.xhtml?oid=45877104&ls=L2VuL2luc3RhbmNIL2tvLnhodG1sP29pZD05MjY2MjYyJnJlbElkPTYwODI5JmZyb21PaWQ9OTI2Njl2MiZib3JkZXJzPXRydWUmcmVzdWx0SW5mb1R5cGVJZD00MDYyNiZ2aWV3VHlwZT1saXN0JnNvcnREZWZpbml0aW9uPVBVQkxJU0h>

- [FRF9BVC0yJnRodW1iU2NhbGVJbmRleD0wJnJvd0NvdW50c0luZGV4PTU!&rs=1\)](https://www.fca.com/na/en/press-releases/2019/04/04/fca-press-release-2019-04-04-world-preview-of-the-ducato-electric.aspx)
10. (Daimler, 2020b) Daimler, Off to school in an electric bus: Daimler Trucks subsidiary delivers 50 fully-electric school buses for the state of Virginia, 2020. (web link: <https://media.daimler.com/marsMediaSite/en/instance/ko/Off-to-school-in-an-electric-bus-Daimler-Trucks-subsiary-delivers-50-fully-electric-school-buses-for-the-state-of-Virginia.xhtml?oid=45394413>)
 11. (FCA, 2019) Fiat Chrysler of America, World preview of the Ducato Electric, 2019 (web link: <https://www.fcagroup.com/en-US/media-center/fca-press-release/2019/april/Pages/world-preview-of-the-ducato-electric.aspx>)
 12. (Ford, 2020) Ford, Ford to Offer All-Electric Transit; U.S.-Made, Zero-Emissions Van to Join All-Electric Mustang Mach-E and F-150 in Lineup, 2020. (web link: <https://media.ford.com/content/fordmedia/fna/us/en/news/2020/03/03/ford-to-offer-all-electric-transit.html>)
 13. (GMC, 2020) GMC, A Quiet Revolution Is Coming – First Ever GMC Hummer EV, 2020. (web link: <https://www.gmc.com/electric-truck/hummer-ev>)
 14. (Hydrogen Council, 2020) Hydrogen Council, Path to Hydrogen Competitiveness – A Cost Perspective, 2020. (web link: <https://hydrogencouncil.com/wp-content/uploads/2020/01/Path-to-Hydrogen-Competitiveness-Full-Study-1.pdf>)
 15. (ICF, 2019) ICF International, Comparison of Medium-Duty and Heavy-Duty Technologies in California, 2019. (web link: <https://caletc.com/wp-content/uploads/2019/12/ICF-Truck-Report-Final-December-2019.pdf>)
 16. (Kenworth, 2020) Kenworth, Kenworth Announces Collaboration with Dana on Electric Truck Powertrain Development, 2020. (web link: <https://dana.mediaroom.com/2020-01-08-Kenworth-Announces-Collaboration-with-Dana-on-Electric-Truck-Powertrain-Development>)
 17. (LBNL, 2019) Lawrence Berkeley National Lab, Clean Truck Standards Consistent with Carbon Neutrality Are Economically and Environmentally Compelling, 2019. (web link: <https://www.arb.ca.gov/lists/com-attach/108-act2019-WzoHYIlnVSsCZ1U6.zip>)
 18. (Mack, 2020) Mack, Mack Trucks Demonstrates Mack® LR Electric Model for New York City Department of Sanitation, 2020. (web link: <https://www.macktrucks.com/mack-news/2020/mack-trucks-demonstrates-mack-lr-electric-model-for-new-york-city-department-of-sanitation/>)
 19. (NACFE, 2019a) North American Council for Fuel Efficiency, Regional Haul, 2019 (web link: <https://nacfe.org/regional-haul/>)
 20. (NACFE, 2019b) North American Council for Fuel Efficiency, Viable Class 7/8 Electric, Hybrid, and Alternative Fuel Tractors, 2019 (web link: <https://nacfe.org/future-technology/viable-class-7-8/>)
 21. (Navistar, 2019) Navistar, Navistar Launches New Business Unit, NEXT eMobility Solutions, 2019. (web link: <https://news.navistar.com/2019-10-28-Navistar-Launches-New-Business-Unit-NEXT-eMobility-Solutions>)
 22. (Nikola, 2020a) Nikola, Nikola unveils the Nikola Badger Pickup, 2020. (web link: <https://nikolamotor.com/press-releases/nikola-unveils-the-nikola-badger-pickup-73.pdf>)

23. (Nikola, 2020b) Nikola, Nikola Corporation, a Global Leader in Zero Emissions Transportation Solutions, to Be Listed on NASDAQ Through a Merger With VectoIQ, 2020. (web link: https://nikolamotor.com/press_releases/nikola-corporation-a-global-leader-in-zero-emissions-transportation-solutions-to-be-listed-on-nasdaq-through-a-merger-with-vectoIQ-74)
24. (Peterbilt, 2020) Peterbilt, Peterbilt Selects Meritor as Primary Supplier of Integrated Battery Electric Systems for Models 579EV and 520EV, 2020. (web link: <https://www.peterbilt.com/about/news-events/news-releases/peterbilt-selects-meritor-primary-supplier-integrated-battery>)
25. (Rivian, 2020) Rivian, Comments on the Control of Air Pollution from New Motor Vehicles: Heavy-Duty Standards Advanced Notice of Proposed Rulemaking, 2020. (web link: <https://www.regulations.gov/contentStreamer?documentId=EPA-HQ-OAR-2019-0055-0272&attachmentNumber=1&contentType=pdf>)
26. (SPBP, 2017) San Pedro Bay Ports, Clean Air Action Plan 2017, November 2017. (web link: <https://kentico.portoflosangeles.org/getmedia/a2820d01-54f6-4f38-a3c5-81c228288b87/2017-final-caap-update>)
27. (Tesla, 2019) Tesla, Re: Support for a Stronger Advanced Clean Trucks Rule, 2019. (web link: <https://www.arb.ca.gov/lists/com-attach/120-act2019-VyMFZIAiWWYEWdY.pdf>)
28. (Tesla, 2020) Tesla, Press Kit, 2020. (web link: <https://www.tesla.com/presskit>)
29. (TTNews, 2018) Transport Topics, Thor Trucks to Launch New Entry in Battery-Electric Class 8 Market, 2018. (web link: <https://www.ttnews.com/articles/thor-trucks-launch-new-entry-battery-electric-class-8-market>)
30. (Toyota, 2020) Toyota, Toyota and Hino to Jointly Develop Heavy-Duty Fuel Cell Truck, 2020. (web link: <https://global.toyota/en/newsroom/corporate/32024083.html>)
31. (UCS, 2019) Union of Concerned Scientists, Ready to Work – Now is the Time for Heavy-Duty Electric Vehicles, 2019. (web link: <https://www.ucsusa.org/sites/default/files/2019-12/ReadyforWorkFullReport.pdf>)
32. (UCLA, 2019) University of California Los Angeles, Zero-Emission Drayage Trucks – Challenges and Opportunities for the San Pedro Bay Ports, 2019. (web link: https://innovation.luskin.ucla.edu/wp-content/uploads/2019/10/Zero_Emission_Drayage_Trucks.pdf)
33. (Volvo, 2020) Volvo Trucks, Volvo Trucks North America Demonstrates Pilot All-Electric VNR Models as Part of Volvo LIGHTS Innovation Showcase, 2020. (web link: <https://www.volvotrucks.us/news-and-stories/press-releases/2020/february/all-electric-vnr-models/>)