Submitted via: www.regulations.gov

August 2, 2022

Environmental Protection Agency
EPA West (Air Docket)
Mail Code 6102T
1200 Pennsylvania Ave. NW, Room B108
Washington, DC 20460
Docket Nos. EPA-HQ-OAR-2022-0330; EPA-HQ-OAR-2022-0331; EPA-HQ-OAR-2022-0332

Re: Comments of Environmental and Public Health Organizations in Support of California's Waiver Requests for the Heavy-Duty Vehicle and Engine Emission Warranty and Maintenance Provisions, *Docket No. EPA-HQ-OAR-2022-0330*; Advanced Clean Trucks, Zero Emission Airport Shuttle, and Zero-Emission Power Train Certification, *Docket No. EPA-HQ-OAR-2022-0331*; and "Omnibus" Low NO_X Regulation, *Docket No. EPA-HQ-OAR-2022-0332*.

Thank you for the opportunity to comment on California's waiver requests for its Heavy-Duty Vehicle and Engine Emission Warranty and Maintenance Provisions (the "Warranty Amendments"); Advanced Clean Trucks (ACT), Zero Emission Airport Shuttle (ZEAS), and Zero-Emission Power Train (ZEP) Certification regulations (collectively, the "MHD ZEV rules"); and Omnibus Low NO_X Regulation (the "Omnibus rule") (collectively, "California's clean trucks rules"). California's clean trucks rules meet the standards of Clean Air Act (CAA) Section 209(b). The undersigned environmental and public health organizations urge the U.S. Environmental Protection Agency (EPA) to grant California's waiver requests in full.

Curtailing heavy-duty vehicle and engine pollution is essential to protecting human health, communities, and our planet. For this reason, it is imperative that EPA follow decades-long precedent and fully approve California's three waiver requests.

For more than 50 years, such waivers have allowed states to protect their citizens by adopting emission standards that exceed those set at the federal level. These state-level emission standards are critical, especially for frontline communities. More than 40% of Americans—over 137 million people—live in places that have received failing grades for unhealthy levels of ozone or particulate matter (PM) in their air.[1] Thirteen of the 14 counties that have received failing grades on all three PM and ozone air quality indicators measured by the American Lung Association (ALA) are in California.[2] And, this burden falls heavily on people of color, who are 3.6 times more likely to live in a county with failing grades on all three air quality indicators.[3] For decades, environmental justice advocates have called for an end to the disparate impacts and burdens these frontline communities continue to experience. Anything less than fully granting these

[1] Am. Lung Ass'n, *State of the Air 2022* 11 (2022), https://www.lung.org/getmedia/74b3d3d3-88d1-4335-95d8-c4e47d0282c1/sota-2022.pdf.
[2] *Id.* at 19. The three air quality indicators measured by the ALA are daily particulate matter pollution, annual particulate matter pollution, and ozone pollution.
[3] *Id.* at 11.

waivers ignores those calls and runs contrary to this administration's stated commitment to environmental justice as a top priority.

The impacts of granting these waivers are profound. For example, the Omnibus rule, once fully implemented, would cut medium- and heavy-duty vehicle[4] nitrogen oxides (NO_X) emissions by 90% by 2027, resulting in approximately 3,900 avoided premature deaths and over 3,150 avoided hospitalizations through 2050, translating to a total statewide health benefit of over $36 billion from 2024 through 2050.[5] The ACT rule is projected to reduce NO_X emissions by 27.9 tons per day, fine particulate matter ($PM_{2.5}$) emissions by 0.85 tons per day, and carbon dioxide (CO_2) pollution by 2.9 million metric tons by 2040.[6]

As set out in our detailed comments below, California's regulations meet the requirements of Clean Air Act Section 209, and we urge EPA to grant waivers in full for the MHD ZEV rules and Omnibus rule, and issue a determination that the Warranty Amendments are within the scope of an existing waiver. Many of the materials cited in these comments are attached as exhibits and are listed in the "List of Attachments" below.

Respectfully submitted,

Scott Hochberg
Staff Attorney
Center for Biological Diversity

For Center for Biological Diversity

Jonathan Lewis
Senior Counsel and Director of Transportation Decarbonization

Jay Duffy
Attorney
Clean Air Task Force

For Clean Air Task Force and National Parks Conservation Association

Andy Su
Transportation Legal Fellow

Ann Jaworksi
Staff Attorney

[4] California classification of heavy-duty vehicles is similar but not identical to the federal classification of heavy-duty vehicles. Federal rules classify vehicles from 8,501 pounds to 19,500 pounds as "light heavy-duty" vehicles, while California's regulations classify vehicles from 8,501 pounds to 14,000 pounds as "medium-duty" vehicles, and vehicles from 14,001 pounds to 19,500 pounds as "light heavy-duty" vehicles. Clean Air Act § 209(b) Waiver and § 209(e) Authorization Request Support Document Submitted by the California Air Resources Board, In the Matter of California's Request for Waiver Pursuant to Clean Air Act Section 209(b) and for Authorization Pursuant to Clean Air Act Section 209(e) for California's "Omnibus" Regulation (Jan. 31, 2022), Doc. ID EPA-HQ-OAR-2022-0332-0009, at 3 (hereinafter "Omnibus Rule Waiver Request").

[5] Omnibus Rule Waiver Request at 2; California Air Resources Board (CARB), *Facts About The Low NO_X Heavy Duty Omnibus Regulation* 1, https://ww2.arb.ca.gov/sites/default/files/classic/msprog/hdlownox/files/HD_NOx_Omnibus_Fact_Sheet.pdf.

[6] CARB, *15-Day Notice Attachment C: Updated Costs and Benefits Analysis for the Proposed Advanced Clean Trucks Regulation*, at 3 tbl.I-1 (Apr. 28, 2020), https://ww3.arb.ca.gov/regact/2019/act2019/30dayattc.pdf; Clean Air Act § 209(b) Waiver Request Support Document Submitted by the California Air Resources Board, In the matter of California's Request for Waiver Pursuant to Clean Air Act Section 209(b) for California's Advanced Clean Trucks, Zero Emission Airport Shuttle, and Zero-Emission Powertrain Regulations (Dec. 20, 2021), Doc. ID EPA-HQ-OAR-2022-0331-0003, at 2–3 (hereinafter "MHD ZEV Rules Waiver Request").

Environmental Law & Policy Center

For Environmental Law & Policy Center

Alice Henderson
Director and Senior Attorney
Environmental Defense Fund

For Environmental Defense Fund

Scott Nelson
Attorney
Public Citizen Litigation Group

For Public Citizen

Sanjay Narayan
Managing Attorney
Sierra Club Environmental Law Program

For Sierra Club

TABLE OF CONTENTS

I. BACKGROUND 6
A. Overview of the Omnibus Rule 6
B. Overview of the Advanced Clean Trucks, Zero Emission Airport Shuttle, and Zero-Emission Power Train Certification Regulations 7
1. Advanced Clean Trucks Rule 7
2. Zero Emission Airport Shuttle Regulation 10
3. Zero-Emission Power Train Certification Regulation 11
C. Overview of the Heavy-Duty Vehicle and Engine Emission Warranty and Maintenance Provisions 11
D. California's Clean Trucks Rules Will Reduce Harmful Pollution from Medium- and Heavy-duty Vehicles—Especially in Communities of Color and Low-Income Communities. 13
II. LEGAL STANDARD FOR REVIEW OF WAIVER REQUESTS 16
A. The CAA Tightly Constrains EPA's Review of California's Waiver Requests. 16
B. Section 209(b)(1)(C)'s "Consistency" Criterion Requires that California's Regulations Be Technologically Feasible within the Lead Time Provided, Giving Due Consideration to Costs, and that They Not Impose Inconsistent Certification Procedures; It Does Not Require California to Provide Four Years of Lead Time and Three Years of Stability. 19
1. Statutory Text and Structure 20
2. Administrative Precedent 24
III. EPA MUST GRANT CALIFORNIA'S WAIVER REQUESTS UNDER SECTION 209(b) OF THE CAA. 31
A. California Continues to Need a Separate Motor Vehicle Emissions Control Program to Meet the State's Compelling and Extraordinary Conditions. 31
B. EPA Must Grant the Waiver for the Omnibus Rule. 35
1. California's Protectiveness Determination for the Omnibus Rule is Not Arbitrary or Capricious. 35
a) Numerical Stringency of Current Test Procedures 37
b) Additional Lab Test Procedures 38
c) In-use Requirements 38
d) Warranty and Lifetime Mileage Adjustments 39
2. California's Omnibus Rule is Consistent with Section 202(a) of the CAA. 40
C. EPA Must Grant Waivers for the Advanced Clean Trucks, Zero Emission Airport Shuttle, and Zero-Emission Power Train Certification Regulations. 42
1. California's Protectiveness Determination for the MHD ZEV Rules is Not Arbitrary or Capricious. 42
2. California's MHD ZEV Rules are Consistent With Section 202(a) of the CAA. 43
a) Manufacturer Product Development and Commitments Reveal that Zero-Emission Technologies are Already Feasible and Cost-Competitive in Medium- and Heavy-Duty Market Segments. 44
b) Private Fleet Commitments Reveal that Zero-Emission Technologies are Already Feasible and Cost-Competitive in Medium- and Heavy-Duty Market Segments. 51
c) Recent MHD ZEV Cost Estimates Support Feasibility of ZEVs Across Vehicle Segments. 53

d) Current Nationwide Market Projections Indicate that the California Regulations Are Feasible. 59
e) State-level Programs and Investments Will Support the MHD Sector in Achieving Compliance with the California Regulations. 61
f) Other State and Federal Commitments Support the Feasibility of California's Standards. 61
D. EPA Must Grant the Waiver for the Warranty Amendments. 64
1. The Warranty Amendments Meet the Requirements of Being Within the Scope of an Existing Waiver. 64
2. Alternatively, the Warranty Amendments Meet the Requirements of Section 209(b)(1). 65
IV. CONCLUSION 66

LIST OF ATTACHMENTS 67

I. BACKGROUND

Since 1968, California has requested and has been granted waivers from Clean Air Act preemption for state vehicle emission regulations more than 100 times.[7] These regulations have covered a broad range of pollutants, including greenhouse gases (GHGs), NO_X, carbon monoxide (CO), hydrocarbons, and CO_2. Waivers have also been granted for California's evaporative standards, certification procedures, assembly-line procedures, onboard refueling vapor recovery (ORVR) standards, numerous test procedures, and zero-emission vehicle (ZEV) regulations.

California has made great strides in curbing air pollution through holistic policies, including vehicle regulations.[8] However, the state continues to experience disproportionate health impacts from vehicle traffic.[9] Consistent with the growth of the auto industry, the Section 209 waiver remains a vital tool in protecting the health and welfare of Californians.

Other states have likewise benefited from this time-tested and effective federal-state partnership. As of today, 17 other states have adopted California regulations for a vehicle class or classes.[10] States that follow California's lead on vehicle emission regulations are able to ease the burden on their communities to comply with other federal air quality standards. For 50 years, the waiver process has proven to be a highly effective partnership between EPA and the states, and a successful tool for promoting cost-effective and protective pollution reduction policies.

A. Overview of the Omnibus Rule

The Omnibus rule is an iteration of, and improvement on, older California emission control rules. It establishes more stringent NO_X and PM exhaust emission standards for new model year (MY) 2024 and subsequent medium- and heavy-duty diesel and Otto-cycle engines used in vehicles over 14,000 lbs Gross Vehicle Weight Rating (GVWR), and new medium-duty diesel-cycle and Otto-cycle engines used in vehicles between 10,001 and 14,000 lbs GVWR.

The Omnibus rule establishes durability demonstration program requirements, including an extended break-in period, standardized aging cycles, and an update of the required aging hours to

---

[7] *See* CARB, *Pollution standards authorized by the California waiver: a crucial tool for fighting air pollution now and in the future*, https://ww2.arb.ca.gov/sites/default/files/2019-09/California_Waiver_General-Background-091719.pdf; EPA, *Vehicle Emissions California Waivers and Authorizations*, https://www.epa.gov/state-and-local-transportation/vehicle-emissions-california-waivers-and-authorizations.

[8] CARB, *California Greenhouse Gas Emissions for 2000 to 2014 – Trends of Emissions and Other Indicators* (2016), https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2014/ghg_inventory_trends_00-14_20160617.pdf.

[9] *See* Am. Lung Ass'n, *State of the Air 2022*, at 11–13, 16. *See also* Beate Ritz et al., *Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California* (June 12, 2009), https://www.arb.ca.gov/research/apr/past/04-323.pdf; Douglas Houston et al., *Disparities in Exposure to Automobile and Truck Traffic and Vehicle Emissions Near the Los Angeles–Long Beach Port Complex*, Am. J. Public Health, 104(1): 156–164 (2014), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3910024/; EDF, *Air Pollution's Unequal Impacts in the Bay Area* (Mar. 31, 2021), https://www.edf.org/airqualitymaps/oakland/health-disparities.

[10] Laura Bliss, *Six States Adopt Clean Truck Rule*, Transport Topics (Jan. 6, 2022), https://www.ttnews.com/articles/six-states-adopt-clean-truck-rule; CARB, *States that Have Adopted California's Vehicle Standards under Section 177 of the Federal Clean Air Act* (May 13, 2022), https://ww2.arb.ca.gov/sites/default/files/2022-05/%C2%A7177_states_05132022_NADA_sales_r2_ac.pdf.

full useful life. The rule also accommodates concerns raised by engine manufacturers by incorporating requested modifications to the requirements for heavy-duty on-board diagnostic systems. The rule holds manufacturers to extended useful life periods for heavy-duty engines used in heavy-duty vehicles.

The Omnibus rule updates California's preexisting emissions averaging, banking, and trading programs for medium- and heavy-duty engines. The rule also establishes emissions warranty requirements for 2027 and subsequent model years for heavy-duty engines and vehicles exceeding 14,000 lbs GVWR.

The rule also amends California's heavy-duty in-use compliance program, establishes optional powertrain certification procedures for heavy-duty hybrid vehicles, and amends California's heavy-duty vehicle idling requirements and medium-duty engine provisions. Finally, the rule establishes compliance flexibilities and exemptions.

The Omnibus rule is expected to cut NO_X emissions from new medium- and heavy-duty trucks by roughly 75% below current standards beginning in 2024, and by 90% in 2027. These emission reductions will amount to $36 billion in statewide health benefits from 3,900 avoided premature deaths and 3,150 avoided hospitalizations between 2024 and 2050, with benefits outweighing costs by more than eight times. The rule constitutes the largest reduction in NO_X emissions in California's State Strategy for the State Implementation Plan (SIP), leading to reductions in ground-level ozone (smog) and harmful secondary PM. It would have the largest benefits in areas near heavy truck traffic—more often home to people of color and lower income populations who suffer disproportionately from harmful truck pollution.[11]

B. Overview of the Advanced Clean Trucks, Zero Emission Airport Shuttle, and Zero-Emission Power Train Certification Regulations

1. Advanced Clean Trucks Rule

The ACT rule requires medium- and heavy-duty (MHD) ZEVs or near zero-emission vehicles (NZEVs) to make up an increasing portion of vehicle sales in California beginning in MY 2024. The sales requirements are defined separately for different vehicle classes and provide for manufacturers to phase-in MHD ZEVs, with increasingly higher ZEV sales percentages required through MY 2035:

Table 1: ACT Manufacturer ZEV Sales Requirements[12]

MY	Class 2b–3	Class 4–8	Class 7–8
2024	5%	9%	5%
2025	7%	11%	7%

[11] Omnibus Rule Waiver Request at 2; CARB, *Facts About The Low NO_X Heavy Duty Omnibus Regulation*, at 1.
[12] *See* MHD ZEV Rules Waiver Request at 8 tbl. III-1.

2026	10%	13%	10%
2027	15%	20%	15%
2028	20%	30%	20%
2029	25%	40%	25%
2030	30%	50%	30%
2031	35%	55%	35%
2032	40%	60%	40%
2033	45%	65%	40%
2034	50%	70%	40%
2035 and beyond	55%	75%	40%

The regulation applies to truck manufacturers that certify vehicles in weight Classes 2b through 8 (GVWR exceeding 8,500 pounds). Manufacturers selling 500 or fewer vehicles in these classes in California are exempt. The ACT rule also requires that the powertrains used to propel ZEVs and NZEVs meet the requirements of California's Zero-Emission Powertrain (ZEP) Certification regulation beginning in MY 2024.

The ACT rule operates through a credit and deficit accounting system that applies weight class modifiers to account for differences in emissions, with larger emissions footprints corresponding to larger weight-class modifiers:

Table 2: ACT Weight Class Modifiers[13]

	Vehicles in Class 2b–3	Class 4–5 Vehicles in the Class 4–8 Group	Class 6–7 Vehicles in the Class 4–8 Group	Class 8 Vehicles in the Class 4–8 Group	Vehicles in the Class 7 and 8 Tractor Group
Weight Class Modifier	0.8	1	1.5	2	2.5

Through the ACT rule's credit and deficit accounting system, manufacturers incur deficits starting in MY 2024 as a product of their total volume of on-road MHD truck sales in the state, the manufacturer ZEV sales requirement percentages (Table 1), and the weight class modifiers (Table 2). Manufacturers earn credits by producing and delivering for sale ZEVs and NZEVs.

[13] *Id.* at 9 tbl. III-3.

These credits are also adjusted based on the weight class modifiers in Table 2.[14] Deficits from Class 2b–3 and Class 4–8 can be satisfied with ZEV and NZEV credits from any vehicle group,[15] giving manufacturers flexibility to produce more ZEVs in one group and fewer in others. Class 7–8 tractor deficits can be satisfied only with credits from the Class 7–8 tractor group.

Manufacturers were able to begin earning early credits in MY 2021, and credits generated prior to MY 2024 can be used until the end of MY 2030. Credits generated in MY 2024 and thereafter expire five model years after being generated. The ACT rule includes specific provisions regarding compliance reporting and credit retirement restrictions.[16]

If a manufacturer has insufficient credits to offset deficits during a given model year, the manufacturer has until the end of the next model year to offset the outstanding deficit with ZEV credits. Manufacturers can sell or trade credits among themselves, and small manufacturers that are exempt from the rule may elect to participate and generate ZEV credits to be banked, traded, or sold.

The ACT rule is expected to achieve significant reductions in emissions of NO_X and $PM_{2.5}$. By 2031, it is projected to reduce NO_X emissions by 6.9 tons per day and $PM_{2.5}$ emissions by 0.24 tons per day. By 2040, it is projected to reduce NO_X emissions by 27.9 tons per day and $PM_{2.5}$ emissions by 0.85 tons per day. The rule will also reduce CO_2 pollution by 0.5 million metric tons annually by 2031 and 2.9 million metric tons annually by 2040.[17] All of these reductions will assist California in attaining air quality standards and meeting climate change goals. They will also reduce cumulative risk of mortality and morbidity from mobile source emissions, particularly for those living in high-pollution areas such as the South Coast air basin, the area that "suffers the highest population-weighted exposure to ozone and the fourth highest population-weighted exposure to annual average fine particle concentrations in the United States."[18] The ACT rule is also expected to bring job growth, particularly in the construction and transportation industries.[19] The California Air Resources Board (CARB) conducted a detailed cost-benefit analysis of the ACT rule, projecting an overall cumulative benefit of $11.2 billion

[14] NZEV credits are worth up to 75% of ZEV credits and can be used to meet up to half of annual deficits. *Id.* at 8, 10.
[15] Credits for Class 2b–3 vehicles may be earned under either the Advanced Clean Cars regulation or the ACT rule, but not both. *Id.* at 10.
[16] For a summary of the reporting and credit retirement restrictions, see MHD ZEV Rules Waiver Request at 10–11; Claire Buysse & Ben Sharpe, ICCT, *California's Advanced Clean Trucks Regulation: Sales Requirements for Zero-Emission Heavy-Duty Trucks* 6 (July 2020), https://theicct.org/sites/default/files/publications/CA-HDV-EV-policy-update-jul2020.pdf.
[17] CARB, *15-Day Notice Attachment C: Updated Costs and Benefits Analysis for the Proposed Advanced Clean Trucks Regulation* 3 tbl.I-1 (Apr. 28, 2020), https://ww3.arb.ca.gov/regact/2019/act2019/30dayattc.pdf; MHD ZEV Rules Waiver Request at 2–3. Carbon dioxide emissions are measured in terms of carbon dioxide equivalent (CO_{2e}) emissions, as explained in *id.* at 2 n.8.
[18] Buysse & Sharpe (2020), at 7; CARB, *Staff Report: Initial Statement of Reasons, Proposed Advanced Clean Trucks Regulation*, at ES-4 (Oct. 22, 2019).
[19] Buysse & Sharpe (2020), at 7.

between 2020 and 2040,[20] with a substantial portion of the savings resulting from reduced fuel costs. As the CAA authorizes other states to adopt California's motor vehicle standards under Section 177, and five additional states have already adopted the ACT rule with numerous other states in various stages of consideration, the nationwide emission reductions and economic benefits of the rule are expected to be substantially greater than the state benefits calculated by CARB.[21]

2. Zero Emission Airport Shuttle Regulation

The ZEAS rule sets increasing zero-emission fleet composition requirements for airport shuttle fleet owners that service California's 13 largest airports. Airport shuttles are commercial vehicles with GVWR of 8,501 pounds or greater that transport passengers, in fixed destination routes, to or from a regulated airport.[22] Shuttles may include, for example, vehicles with stops at locations such as rental car facilities, on-airport or off-airport parking, hotels, or other tourist destinations.[23] Regulated shuttles include those based or housed within 15 miles of a regulated airport that have round trip routes equal to or less than 30 miles.[24] The ZEAS rule's in-use fleet requirements are:

- At least 33% of the fleet must be ZEAS by December 31, 2027;
- At least 66% of the fleet must be ZEAS by December 31, 2031; and
- 100% of the fleet must be ZEAS by December 31, 2035.

Certain vehicles are exempt from the regulation,[25] and for MY 2026 and beyond, the regulation requires that regulated vehicles with GVWRs exceeding 14,001 pounds be certified and approved for sale pursuant to the ZEP Certification rule (described below).

By 2031, the ZEAS rule is projected to reduce NO_X emissions by 7.60 tons per year, $PM_{2.5}$ emissions by 0.15 tons per year, and GHG emissions by 81 metric tons per day. By 2040, the rule is projected to reduce NO_X emissions by 9.99 tons per year, $PM_{2.5}$ emissions by 0.17 tons per

[20] CARB, *15-Day Notice Attachment C*, at 23.
[21] *See, e.g.*, Jeff Houk et al., ICCT, *Fact Sheet: Benefits of Adopting California Medium- and Heavy-Duty Vehicle Regulations Under Clean Air Act Section 177* (Nov. 2021), https://theicct.org/wp-content/uploads/2021/12/state-level-hdv-emissions-reg-FS-oct21.pdf.
[22] MHD ZEV Rules Waiver Request at 2.
[23] CARB, *Zero-Emission Airport Shuttle Regulation Factsheet* (Oct. 2019), https://ww2.arb.ca.gov/sites/default/files/2019-10/asb_reg_factsheet.pdf.
[24] *Id.*
[25] For example, fleets may operate conventional "reserve" shuttles less than 3,000 miles per year. Additionally, shuttle operation during a natural disaster, power grid outage, or other designated state of emergency is not subject to the regulation. *Id.*

year, and GHG emissions by 107 metric tons per day.[26] Over its lifetime, the ZEAS rule is expected to save shuttle fleet owners over $30 million.[27]

3. Zero-Emission Power Train Certification Regulation

The ZEP Certification rule, which builds upon certification requirements set forth in California's Heavy-Duty Phase 2 Greenhouse Gas regulation and is "based largely on expected best practices of market leaders,"[28] sets optional emission standards and certification requirements for MY 2021 and subsequent MHD ZEVs.[29] The ZEP Certification rule was intended to "help reduce variability in the quality and reliability of heavy-duty zero-emission technology, ensure information regarding heavy-duty electric and fuel-cell vehicles (and their powertrains) are [sic] effectively and consistently communicated to purchasers, and accelerate progress towards greater vehicle repairability."[30]

Both the ACT and ZEAS rules now require medium- and heavy-duty vehicles regulated by those rules to be powered by powertrains that are certified in accordance with the ZEP Certification rule. The ZEP Certification rule's procedures and requirements include: battery capacity testing for battery-based powertrains, powertrain monitoring and diagnostic strategy information, repairability provisions, standardized connector and communications compatibility with scan tools, warranty and recall requirements, labeling requirements, and other vehicle certification requirements.[31]

CARB has not separately quantified the emissions benefits directly attributable to the ZEP Certification rule. Because the benefits depend on specific measures that incorporate the regulation's procedures and requirements, the emissions benefits from the ACT and ZEAS rules reflect the benefits of the ZEP Certification rule.

C. Overview of the Heavy-Duty Vehicle and Engine Emission Warranty and Maintenance Provisions

Heavy-duty diesel-powered vehicles and their engines are significant sources of NO_X and $PM_{2.5}$ in California, accounting for approximately 45% of total statewide NO_X and 19% of total

---

[26] CARB, *Staff Report: Initial Statement of Reasons, Proposed Zero Emission Airport Shuttle Regulation* IV-12, IV-14 & IV-15 (Dec. 31, 2018), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/asb/isor.pdf?_ga=2.134001678.1616211794.1659032161-816871787.1658070881.

[27] *Id.* at VIII-13, tbl.VIII-1; CARB, *California Air Resources Board Approves Comprehensive Effort to Clean Up Airport Shuttles* (June 27, 2019), https://ww2.arb.ca.gov/news/california-air-resources-board-approves-comprehensive-effort-clean-airport-shuttles.

[28] CARB, *Staff Report: Initial Statement of Reasons, Proposed Zero-Emission Powertrain Certification Regulation*, Docket No. EPA-HQ-OAR-2022-0331-0011, at ES-1 (Dec. 31, 2018) (hereinafter "ZEP Certification Rule ISOR").

[29] The ZEAS rule also covers incomplete medium-duty vehicles, which are medium-duty vehicles that do not have the primary load-carrying device or container installed.

[30] ZEP Certification Rule ISOR at ES-3.

[31] For more details on these requirements, see MHD ZEV Rules Waiver Request at 13–16.

statewide PM emitted by mobile sources.[32] These vehicles and their engines have been subject to emission standards since MY 2007. The 2018 HD Warranty Amendments lengthen the warranty period for these vehicles and their engines for 2022 and subsequent model years.

California's pre-existing emissions warranty provisions required manufacturers to warrant that applicable vehicles comply with the state's emission standards for at least five years, 100,000 miles, or 3,000 hours of engine operation (whichever occurred first).[33] A warranty had to cover "major" or "basic" engine components, but not necessarily the emissions control system components. The Warranty Amendments for MY 2022 and later heavy heavy-duty engines lengthened this period to five years or 350,000 miles (whichever comes first) and included longer durations for other types of heavy-duty engines as well. The Warranty Amendments eliminate the 3,000 hours of engine operation category.

California also had pre-existing minimum allowable maintenance schedules for emissions control components. Before engine manufacturers can legally sell diesel engines, the engines must pass a "durability demonstration program," which simulates the deterioration of the engine over time.[34] The data generated from this test helps to assure regulators that the engine will still pass emissions requirements at the end of its lifecycle. California had limited the frequency and extent of repairs manufacturers could perform while the engines were undergoing this testing, so the test reflected an accurate view of deterioration. The allowable maintenance schedule also affects the warranty, as state regulations provide that emissions warranty coverage ends after the first scheduled replacement of any emissions-related component.[35] Therefore, in order to prevent manufacturers from scheduling more frequent component replacements (thus ending the warranty period), California had to align these maintenance schedules with the newly extended warranty period. The 2018 Warranty amendments further limit the maintenance schedules for many engine components.[36]

According to CARB, the Warranty Amendments will lead to NO_X reductions of 274 tons per year and PM reductions of three tons per year by 2030.[37] CARB also determined that the extended warranty periods would avoid 40 premature fatalities.[38]

---

[32] Clean Air Act § 209(b) Waiver Request Support Document Submitted by the California Air Resources Board, In the Matter of California's Request for Waiver Action Pursuant to Clean Air Act Section 209(b) for 2018 Amendments to the California Emissions Warranty and Maintenance Provisions for 2022 and Subsequent Model Year On-Road Heavy-Duty Diesel Engines and Heavy-Duty Diesel Vehicles With Gross Vehicle Weight Ratings Exceeding 14,000 Pounds, Doc. ID EPA-HQ-OAR-2022-0330-0004, at 1 (hereinafter "Warranty Amendments Waiver Request").
[33] Warranty Amendments Waiver Request at 6.
[34] *Id*. at 7.
[35] 13 Cal. Code Regs. § 2036(d)(3).
[36] *See, e.g.*, Warranty Amendments Waiver Request at 11–13.
[37] *Id*. at 2.
[38] *Id.* at 27.

D. California's Clean Trucks Rules Will Reduce Harmful Pollution from Medium- and Heavy-duty Vehicles—Especially in Communities of Color and Low-Income Communities.

The health burden from truck and bus pollution is substantial, causing adverse health impacts in utero, in infants and children, and in adults and the elderly—with those who live closest to our nation's roads and highways, ports, distribution centers, freight depots, and other well-known sources of truck pollution facing the greatest harms.[39] EPA has estimated that, nationwide, 72 million people live within 200 meters of a truck freight route, and relative to the rest of the population, people of color and those with lower incomes are more likely to live near truck routes.[40] In Southern California, more than 1.2 million people live within 500 feet of a freeway.[41] This is despite the fact that the state of California recommends avoiding placing homes, as well as schools, daycares, playgrounds, or medical facilities, within 500 feet of a freeway or high-traffic road, citing the risk to public health near these roadways.[42]

In particular, NO_X emissions emitted from medium- and heavy-duty trucks and buses increase levels of ozone, because ground-level ozone forms when there are high concentrations of ambient NO_X and volatile organic compounds (VOCs) and when solar radiation is high.[43] NO_X emissions (along with other gaseous precursors such as VOCs and sulfur oxides (SO_X)) also impact PM by forming secondary particles through atmospheric chemical reactions.[44] Reductions in NO_X emitted from heavy-duty vehicles would therefore result in reduced ambient levels of ozone and PM and improved health and environmental outcomes.[45]

Medium- and heavy-duty vehicles are particularly notable contributors to PM and criteria air pollutants. For example, CARB found that commercial trucks and buses are responsible for more than 70% of NO_X emissions from on-road mobile sources.[46] In addition, the International Council on Clean Transportation (ICCT) found that for urban driving, the NO_X emissions from one

---

[39] *See, e.g.*, S. Riley et al., *Proximity to Major Roadways is a Risk Factor for Airway Hyper-Responsiveness in Adults*, Can. Respir. J., 19(2):89–95 (2012); R. McConnell et al., C*hildhood Incident Asthma and Traffic-Related Air Pollution at Home and School*, Envtl. Health Perspect., 118(7):1021-6 (2010); Peter Huynh et al., *Residential Proximity to Freeways is Associated with Uncontrolled Asthma in Inner-City Hispanic Children and Adolescents*, J. Allergy (Cairo), 1–7 (2010); J. Chang et al., *Repeated Respiratory Hospital Encounters Among Children with Asthma and Residential Proximity to Traffic*, Occup. Envtl. Med., 66(2):90–8 (2009); M.T. Salam et al., *Recent Evidence for Adverse Effects of Residential Proximity to Traffic Sources on Asthma*, Curr. Opin. Pulm. Med., 14(1):3–8 (2008).

[40] 87 Fed. Reg. 17,414, 17,451 (Mar. 28, 2022).

[41] Tony Barboza, *Freeway pollution travels farther than we thought. Here's how to protect yourself*, L.A. Times (Dec. 30, 2017), https://www.latimes.com/local/california/la-me-freeway-pollution-what-you-can-do-20171230-htmlstory.html

[42] CARB, *Air Quality and Land Use Handbook: A Community Health Perspective* 4 (Apr. 2005), https://ww3.arb.ca.gov/ch/handbook.pdf. *See also*, CARB, *Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways* (Apr.17, 2017), https://ww2.arb.ca.gov/resources/fact-sheets/strategies-reduce-air-pollution-exposure-near-high-volume-roadways.

[43] *See* EPA, Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards—Draft Regulatory Impact Analysis 171 (Mar. 2022), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10144K0.pdf.

[44] *See id.* at 174.

[45] *See* 87 Fed. Reg. at 17,417.

[46] *See* CARB, *California Air Resources Board Staff Current Assessment of the Technical Feasibility of Lower NO_X Standards and Associated Test Procedures for 2022 and Subsequent Model Year Medium-Duty and Heavy-Duty Diesel Engines* 1 (2019), https://www.arb.ca.gov/msprog/hdlownox/white_paper_04182019a.pdf.

line-haul truck are equivalent to the emissions from 100 cars for each mile driven.[47] Nationally, these vehicles are the largest contributor to mobile-source emissions of NO_X, making up about 32% of NO_X emissions from on- and off-road mobile sources.[48] This pollution has a quantifiable impact on human health and life: a recent study by researchers at George Washington University and the Environmental Defense Fund (EDF) found that, in the Bay Area alone, more than 2,500 lives are lost and 5,200 children develop asthma every year due to traffic-related air pollution exposure.[49]

Air pollution has become so significant that the resulting public health burdens are "now estimated to be on a par with other major global health risks such as unhealthy diet and tobacco smoking, and air pollution is now recognized as the single biggest environmental threat to human health."[50] Researchers at the University of Chicago studied the impact of air pollution on life expectancy, and found that "the deadly effects of $PM_{2.5}$ on the heart, lungs, and other systems have a more devastating impact on life expectancy than communicable diseases like tuberculosis, behavioral killers like cigarette smoking, and even war."[51]

As a result of housing discrimination and other unjust policies, communities of color and low-income communities constitute a higher percentage of the population near roads and highways and therefore suffer disproportionately from this harmful pollution.[52] According to ALA's 2022 State of the Air report, people of color are more than three and a half times more likely to breathe the most polluted air than white people.[53] A report by Moving Forward Network found that, on average, Asian and Black Americans are exposed to $PM_{2.5}$ pollution that is 56% and 44% higher, respectively, than white Americans.[54] And an EDF analysis of the Bay Area found that neighborhoods with higher percentages of residents of color experienced double the rate of asthma from nitrogen dioxide (NO_2)—a pollutant often used as a marker for transportation-related pollution.[55]

---

[47] See Huzeifa Badshah et al., ICCT, *Current State of NO_X Emissions from In-Use Heavy-Duty Diesel Vehicles in the United States* 14 (Nov. 2019), https://theicct.org/publication/current-state-of-nox-emissions-from-in-use-heavy-duty-diesel-vehicles-in-the-united-states/.

[48] *See* EPA, *EPA Announces the "Clean Trucks Plan"* 2 (Aug. 2021), https://www.epa.gov/system/files/documents/2021-08/420f21057.pdf. Data is from MOVES3 for onroad and nonroad sectors and 2017 National Emissions Inventory (NEI) for all other mobile sectors.

[49] Veronica Southerland et. al., *Assessing the Distribution of Air Pollution Health Risks within Cities: A Neighborhood-Scale Analysis Leveraging High-Resolution Data Sets in the Bay Area*, 129 CA. Env. Health Pers. 1, 9 (Mar. 2021), https://ehp.niehs.nih.gov/doi/10.1289/EHP7679.

[50] World Health Organization (WHO), *WHO Global Air Quality Guidelines* xiv (2021), https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf.

[51] *See* Ken Lee & Michael Greenstone, *Air Quality Life Index Annual Update* 2, U. Chi. Energy Policy Inst. (Sept. 2021), https://aqli.epic.uchicago.edu/wp-content/uploads/2021/08/AQLI_2021-Report.EnglishGlobal.pdf.

[52] Gregory M. Rowangould, *A Census of the US Near-Roadway Population: Public Health and Environmental Justice Considerations*, Transportation Research Part D 25, 59–67 (2013), https://www.sciencedirect.com/science/article/pii/S1361920913001107.

[53] Am. Lung Ass'n, *State of the Air 2022*, at 11.

[54] Jimmy O'Dea, Moving Forward Network, *Zero-Emissions Technology for Freight: Heavy-Duty Trucks, Tools to Advocate for Zero-Emissions Technology* 9 (Oct. 2020), http://www.movingforwardnetwork.com/wp-content/uploads/2020/10/MFN_ZeroEmissionToolkit-1.pdf.

[55] EDF, *Air Pollution's Unequal Impacts in the Bay Area* (Mar. 31, 2021) https://www.edf.org/airqualitymaps/oakland/health-disparities.

Heavy-duty diesel vehicle emissions are often identified as among the largest sources of pollution disparity, disproportionately affecting racial and ethnic minorities across geographies and demographics.[56] Recent work using satellite data to assess the health burdens from NO_2 pollution in 52 cities across the U.S. found that diesel traffic is the dominant source of disparities—across race, ethnicity, and income—with the second highest inequalities observed in Los Angeles. The study concluded that a 62% reduction in on-road diesel traffic would decrease these inequalities by 37%, noting that heavy-duty diesel vehicle emissions, specifically, contribute to the majority of these NO_2 inequalities.[57]

Medium- and heavy-duty vehicles are responsible for significant NO_X, $PM_{2.5}$, and black carbon emissions around ports, railyards, warehouses, distribution centers, airports, and other places where trucks congregate and idle.[58] Again, many discriminatory policies have led to the siting of these facilities near communities of color that face higher rates of underlying health conditions as a result of the cumulative burden from air pollution and other factors.[59]

Commercial diesel trucks also take an especially heavy toll on California neighborhoods along their routes. A 2017 study used Google street-view vehicles equipped with fast-response measurement devices to repeatedly sample every street in a 30-km^2 area of Oakland, developing the largest urban air quality data set of its type.[60] The data showed that transportation-related air pollution (*e.g.,* black carbon and NO_X) was much higher—in some cases double—on a freeway that is a designated truck route (I-880) compared to another freeway in the same city where trucks are prohibited (I-580).[61] Another study near the Port of Oakland also found that black carbon levels measured along truck routes were higher compared to measurements at most other sites, including those near industrial facilities, other highways, and on residential streets.[62] Studies have combined these fine scale assessments with electronic health records in the health care systems serving the population in Oakland (Sutter Health and Kaiser Permanente) and find that these elevated levels of NO_2 and black carbon are associated with higher rates of

---

[56] C.W. Tessum et al., *$PM_{2.5}$ Polluters Disproportionately and Systemically Affect People of Color in the United States*, Sci. Adv. 7: eabf4491 (2021).
[57] M.A.G. Demetillo et al., *Space-based Observational Constraints on NO_2 Air Pollution Inequality from Diesel Traffic in Major US Cities*, Geophysical Research Letters, 48, e2021GL09433 (2021), https://doi.org/10.1029/2021GL094333.
[58] *See e.g.*, CARB, *Emissions Impact of Recent Congestion at California Ports* (Sept. 13, 2021), https://ww2.arb.ca.gov/sites/default/files/2021-09/port_congestion_anchorage_locomotives_truck_emissions_final_%28002%29.pdf; South Coast AQMD, *South Coast AQMD Governing Board Adopts Warehouse Indirect Source Rule* (Aug./Sept. 2021), http://www.aqmd.gov/home/research/publications/august-september-2021/indirect-source-rule.
[59] A. Nardone et al., *Associations Between Historical Residential Redlining and Current Age-Adjusted Rates of Emergency Department Visits Due to Asthma Across Eight Cities in California: an Ecological Study*, Lancet Planet Health, 4(1):e24-e31 (2020); M.L. Miranda et al., *Making the Environmental Justice Grade: The Relative Burden of Air Pollution Exposure in the United States*, Int'l J. Env't Rsch. & Pub. Health, 8: 1755–71 (2011); Ihab Mikati et al. *Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status*, Am. J. Pub. Health, 108, no. 4: 480–85 (Apr. 2018), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5844406/.
[60] Joshua S. Apte et. al, *High-Resolution Air Pollution Mapping with Google Street View Cars: Exploiting Big Data*, Env't Sci. & Tech., 51, 12, 6999–7008 (2017), https://pubs.acs.org/doi/pdf/10.1021/acs.est.7b00891.
[61] *Id.* at 7004.
[62] Julien J. Caubel et al., *A Distributed Network of 100 Black Carbon Sensors for 100 Days of Air Quality Monitoring in West Oakland, California*, Env't Sci. & Techn. 53, 7564–73 (2019), https://pubs.acs.org/doi/10.1021/acs.est.9b00282.

cardiovascular events,[63] asthma emergency room visits and hospitalizations,[64] and adverse pregnancy outcomes.[65] Estimated effects of NO_2 and black carbon on preeclampsia were highest among non-Latina Black mothers.

Studies show that swift and significant reductions in vehicle emissions, and a shift to ZEVs, could help protect Californians, especially those near concentrated levels of heavy-duty vehicle emissions. Analysis by scientists at EDF, Harvard Chan School of Public Health, and University of North Carolina, using state of the art fine scale air quality modeling and health impact assessment methods, found that electrification of medium- and heavy-duty diesel vehicles would have significant benefits in New York City (NYC) at a census tract scale.[66] Full electrification of the sector in the New York area would prevent $2.4 billion in health damages every year by 2040 (248 deaths, 173 childhood asthma emergency department (ED) visits), much of it directly due to the NO_2 reduction health benefits.[67] Census tracts with 97% minority populations bear more than 35% of total childhood asthma ED visits attributable to medium- and heavy-duty vehicles, despite being only 19% of the population.[68] This means that disadvantaged populations in NYC could experience significant benefits of medium- and heavy-duty electrification. A transition to zero-emitting vehicles in California could similarly benefit disadvantaged populations.

This evidence points to the need for additional measures to curb the health-harming air pollution from medium- and heavy-duty vehicles. Advanced aftertreatment technology has brought significant tailpipe reductions over the last few decades. But these studies highlight that California still needs significant reductions in NO_X emissions to adequately protect communities that live near major roadways and to meet health-based ozone standards. The regulatory programs for which California has requested waivers here are critical components of the state's air quality improvement strategy.

II. LEGAL STANDARD FOR REVIEW OF WAIVER REQUESTS

A. The CAA Tightly Constrains EPA's Review of California's Waiver Requests.

In recognition of California's serious air pollution problems and its long-standing leadership and expertise in vehicle emission control regulation, Congress enacted an exception to federal preemption in 1967, allowing California to adopt and enforce its own emission standards upon the grant of a waiver of preemption from EPA.[69] Section 209(b) of the CAA establishes

---

[63] Stacey E. Alexeeff et al., *High-Resolution Mapping of Traffic Related Air Pollution with Google Street View Cars and Incidence of Cardiovascular Events within Neighborhoods in Oakland, CA*, Env't Health 17.38, 1–13 (2018).
[64] Stacey E. Alexeeff et al., *Google Street View Car Measurements of Traffic Related Air Pollution within Neighborhoods and Asthma-Related Emergency Department Visits and Hospitalizations*, Env't Epidemiology 3 (2019): 406–07, https://journals.lww.com/environepidem/Fulltext/2019/10001/Google_Street_View_car_measurements_of_traffic.1240.aspx
[65] Dana E. Goin et al., *Hyperlocalized Measures of Air Pollution and Preeclampsia in Oakland, California*, Env't Sci. & Tech. 55.21: 14710–19 (2021).
[66] Jonathan Buonocore et al., *Distribution of Air Quality Health Benefits of MHEV Policies: New York* (2022) (slide presentation).
[67] *Id*. at 5.
[68] *Id*.
[69] 42 U.S.C. § 7543(b). Under Section 177 of the Clean Air Act, states that have EPA-approved nonattainment plan provisions for national ambient air quality standards are also entitled to adopt standards identical to California's

California's presumptive entitlement to a waiver,[70] directing that the EPA Administrator *"shall"* grant a waiver of preemption "if the State determines that the State standards will be, in the aggregate, at least as protective of public health and welfare as applicable Federal standards."[71] The Administrator may deny a waiver only if he specifically finds that: (1) "the determination of the State is arbitrary and capricious," (2) California "does not need such State standards to meet compelling and extraordinary conditions," or (3) "such State standards and accompanying enforcement procedures are not consistent with section [202(a)]" of the Act.[72]

The legislative history of Section 209(b), EPA's prior decisions on waiver requests, and case law clearly establish that the statutory language tightly constrains EPA's review of the three waiver requests at issue here. EPA's review of California's waiver requests must be highly deferential. On multiple occasions since it first adopted the waiver provision in 1967, Congress has affirmed its intent to grant California significant autonomy to pursue motor vehicle regulations that go beyond those of the federal government. In 1977, Congress amended Section 209(b) to expand California's flexibility, allowing the state to set standards that are, "*in the aggregate*, at least as protective of public health and welfare as applicable Federal standards."[73] The House Committee report on the change explained:

> The Committee amendment is intended to ratify and strengthen the California waiver provision and to affirm the underlying intent of that provision, i.e., to afford California the broadest possible discretion in selecting the best means to protect the health of its citizens and the public welfare.[74]

The Committee report also highlighted the deferential standard of review EPA must use in reviewing California's waiver requests:

> The Administrator … is not to overturn California's judgment lightly. Nor is he to substitute his judgment for that of the State. There must be clear and compelling evidence that the State acted unreasonably in evaluating the relative risks of various pollutants in light of the air quality, topography, photochemistry, and climate in that State, before EPA may deny a waiver.[75]

Judicial decisions echo this need to accord deference to California's regulatory needs and expertise. The D.C. Circuit Court of Appeals has emphasized on several occasions that "Congress consciously chose to permit California to blaze its own trail with a minimum of

---

vehicle emission standards. *Id.* § 7507. States that choose to adopt California standards under Section 177 must adopt the standards at least two years before commencement of the regulated model year. *Id.*

[70] *See Motor & Equipment Mfrs. Ass'n. v. EPA*, 627 F.2d 1095, 1120–21 (D.C. Cir. 1979) (*"MEMA I"*) (discussing legislative history and explaining the presumption of California's entitlement to a waiver).

[71] 42 U.S.C. § 7543(b)(1).

[72] *Id.* § 7543(b)(1)(A)–(C); *MEMA I*, 627 F.2d at 1120 (describing the Administrator's duty under Section 209(b) as "an imperative").

[73] 42 U.S.C. § 7543(b)(1) (emphasis added); *see also Ford Motor Co. v. EPA*, 606 F.2d 1293, 1301 (D.C. Cir. 1979).

[74] H.R. Rep. No. 294, 95th Cong., 1st Sess. 301–02 (1977), as quoted in *MEMA I*, 627 F.2d at 1110.

[75] H.R. Rep. No. 294, 95th Cong., 1st Sess. 302 (1977), as quoted in *MEMA I*, 627 F.2d at 1122 n.54.

federal oversight"[76] and that "Congress has decided to grant California the broadest possible discretion in adopting and enforcing standards for the control of emissions from new motor vehicles."[77]

To achieve Congress's mandate to give significant deference to California, EPA must limit its review of waiver requests to the specific criteria enumerated in Section 209(b). As EPA itself noted in 1975:

> Congress meant to ensure by the language it adopted that the Federal government would not second-guess the wisdom of state policy here…. "The law makes it clear that the waiver request cannot be denied unless the specific findings designated in the statute can properly be made."[78]

The D.C. Circuit has affirmed this approach, cautioning that EPA may not exceed the narrow inquiry authorized by Section 209(b) by reading new requirements into the statute or by examining potential conflicts between California's regulations and other federal laws. In rejecting petitioners' argument that EPA was required to consider their constitutional and antitrust attacks on the California standards at issue, the court explained in *MEMA I*:

> [T]here is no such thing as a "general duty" on an administrative agency to make decisions based on factors other than those Congress expressly or impliedly intended the agency to consider. The general principles of administrative law and procedure call upon an agency to give reasoned consideration to all facts and issues relevant to the matter at hand, but the determination of what is relevant turns in the first instance on analysis of the express language of the statute involved and the content given that language by implication from the structure of the statute, its legislative history, and the general course of administrative practice since its enactment. An administrative agency has no charter apart from the framework constructed by that analysis to enforce or otherwise consider whatever suits its or someone else's fancy.[79]

The court reinforced that conclusion twenty years later in *MEMA II*, reasoning that the statutory language "sets forth the *only* waiver standards with which California must comply" and cited the extensive legislative history indicating that EPA was not to question California's policy judgments.[80] In reviewing the three waiver requests at issue here, then, EPA may not consider factors beyond those specifically enumerated in Section 209(b).

---

[76] *Ford Motor Co.*, 606 F.2d at 1297.
[77] *MEMA I*, 627 F.2d at 1128.
[78] 40 Fed. Reg. 23,102, 23,103–04 (May 28, 1975) (quoting 39 Fed. Reg. 17,458 (Aug. 31, 1971)); *accord* 78 Fed. Reg. 2,112, 2,115 (Jan. 9, 2013) ("EPA has recognized that the intent of Congress in creating a limited review based on the section 209(b)(1) criteria was to ensure that the federal government did not second-guess state policy choices.").
[79] *MEMA I*, 627 F.2d at 1116.
[80] *Motor & Equip. Mfrs. Ass'n v. Nichols*, 142 F.3d 449, 462–63 (D.C. Cir. 1998) ("*MEMA II*") (emphasis added).

Finally, any opponent of these waivers bears the burden of disproving California's presumptive entitlement to them. As the D.C. Circuit has made clear, "California's regulations, and California's determination that they comply with the statute…are presumed to satisfy the waiver requirements," and "the burden of proving otherwise is on whoever attacks them."[81] Thus, EPA may not deny the waiver requests unless these opponents meet their burden of showing that the statutory criteria of Section 209(b) have not been met.

B. Section 209(b)(1)(C)'s "Consistency" Criterion Requires that California's Regulations Be Technologically Feasible within the Lead Time Provided, Giving Due Consideration to Costs, and that They Not Impose Inconsistent Certification Procedures; It Does Not Require California to Provide Four Years of Lead Time and Three Years of Stability.

CARB has determined that the heavy-duty vehicle standards that are the subject of the current waiver requests are, in fact, feasible within the lead time allowed in the standards.[82] This is enough to show consistency with Section 202(a).

As EPA correctly states in its notices, Section 209(b)(1)(C)'s requirement that California's standards be "consistent with section 202(a)"[83] pertains to whether there is "inadequate lead time to permit the development of the necessary technology giving appropriate consideration to the cost of compliance within that time period or if the Federal and State test procedures impose inconsistent certification procedures."[84] The D.C. Circuit endorsed this traditional interpretation of the consistency requirement in *MEMA II*, explaining:

> In the waiver context, section 202(a) "relates in relevant part to technological feasibility and to federal certification requirements." *Ford Motor Co. v. EPA,* 196 U.S. App. D.C. 386, 606 F.2d 1293, 1296 n.17 (D.C. Cir. 1979); *see also MEMA I*, 627 F.2d at 1101, 1111. The "technological feasibility" component of section 202(a) obligates California to allow sufficient lead time to permit manufacturers to develop and apply the necessary technology. *See American Motors Corp. v. Blum*, 195 U.S. App. D.C. 396, 603 F.2d 978, 981 (D.C. Cir. 1979). The federal certification component ensures that the Federal and California test procedures do not "impose inconsistent certification requirements." Waiver of Federal Preemption, 46 Fed. Reg. 26,371, 26,372 (1981). Neither the court nor the agency has ever interpreted compliance with section 202(a) to require more. *See, e.g.*, *MEMA I*, 627 F.2d at 1101, 1111; *Ford Motor Co.*, 606 F.2d at 1296 n.17;

[81] *MEMA I*, 627 F.2d at 1121.
[82] CARB found that "the ACT, the ZEAS, and the ZEP Certification regulations are consistent with section 202(a) because the required technology is already commercially available." MHD ZEV Rules Waiver Request at 36; *see also id*. at 31–36. CARB made a similar finding as to the Omnibus Rule, *see* Omnibus Rule Waiver Request at 52–72, and as to the Warranty Amendments, *see* Warranty Amendments Waiver Request at 20–23.
[83] 42 U.S.C. § 7543(b)(1)(C).
[84] 87 Fed. Reg. at 35,766 (Omnibus rule); 87 Fed. Reg. at 35,770 (ACT rule); 87 Fed. Reg. at 35,762 (Warranty Amendments).

> *American Motors Corp.*, 603 F.2d at 981; Waiver of Federal Preemption, 46 Fed. Reg. at 26372.[85]

The *MEMA II* court also emphasized that "section 209(b) does not require California to establish perfect compliance with the CAA to obtain a waiver" and that "California's consistency is to be evaluated 'in the aggregate,' rather than on a one-to-one basis."[86] EPA should employ this traditional interpretation of Section 209(b)(1)(C)'s consistency requirement when considering the three waiver requests at issue here.

The Agency must reject the argument, presented by some members of the Truck and Engine Manufacturers Association, that it may not grant waivers unless California's heavy-duty vehicle and engine standards provide the same four years of lead time and three years of stability required of some federal standards by Section 202(a)(3)(C). This flawed interpretation of the consistency requirement runs contrary to the CAA's text and structure, to congressional intent, and to a long history of administrative practice and judicial decisions.

Quite simply, Section 209(b)(1)(C)'s requirement that California's standards be "consistent" with Section 202(a) does not mean that they must satisfy requirements "identical" to those that Section 202(a) imposes on some federal standards. Merriam-Webster defines "consistency" as "agreement or harmony of parts or features to one another"[87] and "the ability to be asserted together without contradiction"[88]; "consistent" is synonymous with "compatible."[89] Therefore, a plain reading of Section 209(b)(1)(C)'s consistency criterion requires not a review for identicality, but an inquiry to determine whether California's standards would undermine or contradict the purpose and effect of Section 202(a).

1. Statutory Text and Structure

First, an examination of the relevant statutory text and structure shows that Section 209(b)(1)(C)'s cross-reference to "section 202(a)" does not sweep in the fixed lead time and stability requirements of Section 202(a)(3)(C). When Congress first added the waiver provision in 1967,[90] Section 202(a) read in its entirety:

> The Secretary shall by regulation, *giving appropriate consideration to technological feasibility and economic costs*, prescribe as soon as practicable standards, applicable to the emission of any kind of substance, from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause or contribute to, or are likely to cause or to contribute to, air pollution which endangers the health or welfare of any persons, and such

[85] *MEMA II*, 142 F.3d at 463.
[86] *Id.* at 463–64.
[87] *Consistency*, https://www.merriam-webster.com/dictionary/consistency (last accessed Aug. 2, 2022).
[88] *Id.*
[89] *Consistent*, https://www.merriam-webster.com/dictionary/consistent (last accessed Aug. 2, 2022).
[90] When first enacted in 1967, the waiver provision appeared in the statute as Section 208(b). P.L. 90-148 § 208(b). Although it was subsequently moved to Section 209(b), the language of the consistency requirement itself ("such State standards and accompanying enforcement procedures are not consistent with section 202(a) of this title") has remained unchanged.

> standards shall apply to such vehicles or engines whether they are designed as complete systems or incorporate other devices to prevent or control such pollution.[91]

EPA's traditional interpretation of the consistency requirement accords with the 1967 statute's language that regulations should reflect "appropriate consideration to technological feasibility and economic costs." That original statutory text embodies Congress's intent that California retain considerable discretion in administering its own motor vehicle emissions control program to meet its unique air quality goals and needs.

Congress added additional subparagraphs to Section 202(a) in subsequent amendments. However, the text and structure of these new provisions further demonstrates that Congress never intended for California's standards to have to conform to each specific requirement that Section 202(a) imposes on EPA, as many of them could not logically apply to California.

In 1977, for example, Congress added several new lengthy and prescriptive subparagraphs specific to heavy-duty vehicles and motorcycles.[92] Those new provisions, which spanned two-and-a-half pages in the Statutes at Large, set forth a host of new requirements, including:

- specified numerical reductions in emissions and the model years by which standards must achieve them (*e.g.*, 90% reduction of hydrocarbon emissions by 1983);[93]
- a prohibition on the Administrator revising emission standards based on findings that conflicted with those of the National Academy of Sciences;[94]
- a requirement that EPA submit a report to Congress on the health effects and cost effectiveness of its standards, manufacturers' research and development efforts, and fuel economy effects;[95]
- a requirement that the Administrator conduct a study on the effects of air pollutants emitted from heavy-duty vehicles and engines and publish it in the Federal Register by June 1, 1979;[96] and
- a directive that the Administrator regulate motorcycles as heavy-duty vehicles unless he or she promulgated a rule reclassifying them as light-duty vehicles or regulating them as their own class.[97]

Included in the numerous new subparagraphs that Congress added onto Section 202(a) was a four-year lead time and three-year stability requirement—the precursor to the statutory language currently found in Section 202(a)(3)(C).[98]

On their face, however, the myriad new provisions in the 1977 amendments were simply irrelevant to California, and it would be illogical to import them into Section 209(b)(1)(C)'s

---

[91] P.L. 90-148 § 202(a), 81 Stat. 499 (emphasis added).
[92] *See generally* P.L. 95-95 § 224(a), 91 Stat. 765–67.
[93] P.L. 95-95 § 224(a), 91 Stat. 765 (adding subparagraph 3(A)(ii)(I) to CAA § 202(a)).
[94] P.L. 95-95 § 224(a), 91 Stat. 766 (adding subparagraph 3(C) to CAA § 202(a)).
[95] *Id.* (adding subparagraph 3(D) to CAA § 202(a)).
[96] P.L. 95-95 § 224(a), 91 Stat. 766–67 (adding subparagraph 3(E)(i) to CAA § 202(a)).
[97] P.L. 95-95 § 224(a), 91 Stat. 767 (adding subparagraph 3(F) to CAA § 202(a)).
[98] P.L. 95-95 § 224(a), 91 Stat. 766 (adding subparagraph 3(B) to CAA § 202(a)).

consistency inquiry, absent any indication that Congress intended them to constrain California's ability to set its own emission standards. It would be absurd, for example, to think that Congress meant to require California to publish a report in the Federal Register before it could receive a waiver for its motor vehicle emission control programs.

Similarly, the current language of Section 202(a)(3)(A)(i) requires EPA to set standards for heavy-duty vehicles and engines for four specific pollutants—hydrocarbons, NO_X, PM, and CO—that "reflect the greatest degree of emission reduction achievable."[99] This, too, cannot apply to California, because under Section 209 the protectiveness of California's standards are assessed "in the aggregate," meaning that the state has discretion to regulate some pollutants more stringently than others based on its own judgment and unique needs, so long as it determines that, on the whole, its program is at least as protective of public health and welfare as the federal standards.[100]

The D.C. Circuit has affirmed this understanding, concluding in *Ford Motor Company v. EPA* that Congress intended to permit California to impose individual pollutant standards that might be less stringent than the relevant federal standards:[101]

> The House Committee recognized "California's longstanding belief that stringent control of oxides of nitrogen emission from motor vehicles may be more essential to public health protection than stringent control of carbon monoxide," and was aware that it might be technologically difficult to meet both the NO_X standards California desired and the federal CO standard. Accordingly, Section 209(b) was rewritten to permit California to obtain a waiver of federal preemption so long as it determines that its emission control standards would be, "In the aggregate, at least as protective of public health and welfare as applicable Federal standards." The result was to permit California to address its NO_X problem while easing up somewhat on CO requirements.[102]

That same year, in *MEMA I*, the court again confirmed that Section 202(a)(3)(A)(i) does not apply to California, explaining that "[u]nder the 1977 amendments, California need only determine that its standards will be 'in the aggregate, at least as protective of public health and

---

[99] 42 U.S.C. § 7521(a)(3)(A)(i).
[100] 42 U.S.C. § 7543(b)(1).
[101] 606 F. 2d 1293, 1304 (D.C. Cir. 1979).
[102] *Id.* at 1297 (quoting CAA § 209(b), 42 U.S.C § 7543(b); H.R. Rep. No. 95-294, 95th Cong., 1st Sess. 301–02 (1977)). *See* H.R. Rep. No. 95-294 at 23 ("The amendment thus confers broad discretion on the State of California to weigh the degree of health hazards from various pollutants and the degree of emission reduction achievable for various pollutants with various emission control technologies and standards."); *id.* at 301–02 (explaining that "the Committee anticipated the possibility that California's 1978 and later model year standards might be more stringent than the Federal standard for NO_X, but less stringent than the Federal standard for CO"). *See also* 123 Cong. Rec. 27071 (1977) (Rep. Rogers (D-FL) entering into the record the "Clean Air Conference Report (1977): Statement of Intent; Clarification of Select Provisions," which explained that "for example, California will be able to get a waiver for its 1982 model year standards considered as a package, even though the California CO standard may be less stringent than the applicable federal CO standard. . . . [b]ecause California's 1982 NO_X standard is more stringent than the federally mandated NO_X standard for that year").

welfare than applicable Federal standards,' rather than the 'more stringent' standard contained in the 1967 Act."[103]

It is clear that the other subparagraphs of Section 202(a)(3) do not apply to California either. Section 202(a)(3)(A)(ii) authorizes EPA to establish classes or categories of vehicles or engines for purposes of regulation "under this paragraph" (*i.e.*, Section 202(a)(3), the paragraph governing heavy-duty vehicles), on which California does not rely as authority to establish its own classes of heavy-duty vehicles or engines.[104] Section 202(a)(3)(B)(i) authorizes EPA to promulgate revised standards for heavy-duty trucks,[105] and Section 202(a)(B)(ii) specifically requires that NO_X emission standards for MY 1998 and later not exceed 4.0 gbh[106]—a provision that, if applied to California, would conflict with Congress's intent to grant the state "broad discretion"[107] to set individual pollutant standards that might differ from the federal standards, as outlined above.[108] Similarly, Section 202(a)(3)(D) requires EPA to "study the practice of rebuilding heavy-duty engines," and authorizes the Agency to prescribe rebuilding standards "[o]n the basis of that study and other information available to the Administrator"[109]—provisions that also would conflict with Congress's intent to grant the state significant autonomy to pursue its own motor vehicle regulations. Finally, Section 202(a)(3)(E) provides for the promulgation of motorcycle standards by EPA, "in the same manner as heavy-duty vehicles and engines…unless the Administrator promulgates a rule reclassifying motorcycles as light-duty vehicles."[110] Section 202(a)(3)(E) further provides that, if EPA does promulgate standards for emissions from motorcycles as a separate class or category, the Agency "shall consider the need to achieve equivalency of emission reductions between motorcycles and other motor vehicles to the maximum extent possible."[111] Not only has California never claimed this provision as authorization to regulate motorcycles under state law, but it, too, would conflict with Congress's intent to grant the state broad discretion to set individual pollutant standards that might differ from the federal standards.

Given the clear inapplicability of these subparagraphs to California, it would torture the text of the statute to suggest that Section 202(a)(3)(C) somehow *does* apply, despite any indication in the text or legislative history that Congress intended to so constrain the state. In fact, at the very same time it expanded Section 202(a) in 1977, Congress modified the waiver provision (to its current form) to grant even *more* flexibility to California.[112] As the D.C. Circuit has recognized,

---

[103] 627 F.2d at 1110.
[104] *See* 42 U.S.C. § 7521(a)(3)(A)(ii).
[105] *See id*. § 7521(a)(3)(B)(i).
[106] *See id*. § 7521(a)(3)(B)(ii).
[107] *See* H.R. Rep. No. 95-294 at 23.
[108] *See MEMA I*, 627 F.2d at 1110.
[109] *See* 42 U.S.C. § 7521(a)(3)(D).
[110] *See id.* § 7521(a)(3)(E).
[111] *Id.*
[112] *See* P.L. 95-95 § 207, 91 Stat. 755 (amending Section 209(b) to require that protectiveness be determined "in the aggregate"); H.R. Rep. No. 294, 95th Cong., 1st Sess. 301–02 (1977), as quoted in *MEMA I*, 627 F.2d at 1110 ("The Committee amendment is intended to ratify and strengthen the California waiver provision and to affirm the underlying intent of that provision, i.e., to afford California the broadest possible discretion in selecting the best means to protect the health of its citizens and the public welfare.").

"In 1977, . . . Congress determined to give California more leeway to tailor its emission control program to its particular problems."[113] Viewed in light of the full context of the 1977 amendments, reading the four-year lead time and three-year stability requirements into Section 209(b)(1)(C)'s consistency requirement would contravene Congress's intent.

Moreover, the higher federal stringency requirement of Section 202(a)(3)(A) ("greatest degree of emission reduction achievable"), as compared to the state stringency requirement of Section 209 (where protectiveness is analyzed "in the aggregate"), helps explain why Congress required EPA to provide heavy-duty manufacturers four years of lead time and three years of stability, while imposing no such mandate on California. To comply with the federal standards, manufacturers must achieve "the greatest degree of emission reduction" through the application of technology that may not yet be developed.[114] Since this substantive requirement does not bind California, the policy rationale for the fixed lead time and stability periods in Section 202(a)(3)(C) does not apply either.

Similarly, the lack of a fixed lead time or stability requirement for California's standards demonstrates Congress's desire to have the state continue to serve as a "laboratory" by requiring less than four years lead time if the state identified a technology that could feasibly be phased in sooner in California's smaller, subnational market.[115] As CARB's feasibility demonstrations show, that is exactly what the state has done here. California's clean trucks rules rely on technologies that are already in use and can be deployed today, without redesign, to achieve swift and significant emission reductions that protect the health of Californians.

2. Administrative Precedent

EPA's previous assessments of heavy-duty waiver requests have overwhelmingly, and with only one exception, relied on the traditional consistency approach and have not imposed the fixed lead time and stability requirements of Section 202(a)(3)(C).[116] EPA has also used the traditional

[113] *Ford Motor Co.*, 606 F.2d at 1294.
[114] *See* 42 U.S.C. § 7521(a)(1).
[115] *See, e.g.*, 49 Fed. Reg. 18,887, 18,894 (May 3, 1984) (medium-duty standards beginning with MY 1985) ("Historically, EPA has granted waivers allowing the introduction of new technology in California prior to its introduction nationwide. For example, as discussed above, EPA waived preemption of the standard requiring the introduction of catalysts in California a year prior to their introduction nationally. In so doing, the Administrator noted that this 'phase-in' of technology serves the purposes of the Act: 'It is my judgment that [this approach] best serves the total public interest and the mandate of the statute. It promotes continued momentum toward installation of control systems meeting the statutory standards, while minimizing risks incident to national introduction of a new technology. This option also offers the opportunity to gain experience with production of catalyst systems for a full range of automobiles by requiring catalysts of a portion of each model introduced by each manufacturer in the State of California.") (citing 38 Fed. Reg. 10,317, 10,319 (Apr. 26, 1973)).
[116] *See, e.g.*, Decision document associated with 70 Fed. Reg. 50,322 (Aug. 26, 2005), Docket No. EPA-HQ-OAR-2004-0132-0045, at 11 (Aug. 19, 2005) ("2005 HD Decision Document"); 69 Fed. Reg. 59,920, 59,922 (Oct. 6, 2004); 53 Fed. Reg. 7,021 (Mar. 4, 1988); 52 Fed. Reg. 20,777, 20,778 (June 3, 1987); 46 Fed. Reg. 36,742 (July 15, 1981); 46 Fed. Reg. 26,371, 26,372–73 (May 12, 1981); 42 Fed. Reg. 31,637, 31,638 (June 22, 1977); 42 Fed. Reg. 31,639, 31,640 (June 22, 1977).

consistency approach when reviewing California's medium-duty[117] standards.[118] EPA has continually applied this technological feasibility test as a specific fact-based determination tied to the individual circumstances of each waiver request.[119]

A recent example is EPA's review of the waiver request for California's 2007 HD emission standards. EPA stated that consistency with Section 202(a) relates to technological feasibility, the time that the Administrator "finds necessary to permit the development and application of the relevant technology, considering the cost of compliance within that time."[120] The Administrator must "first determine whether adequate technology already exists, or if it does not, whether there is adequate time to develop and apply the technology before the standards go into effect."[121] EPA noted that the Administrator's determination of whether there is adequate time also includes his determination of whether the "the costs of developing and applying the technology within that time is feasible."[122] EPA noted that prior EPA waiver decisions are "in accord with this position."[123]

Not only has EPA used the traditional consistency approach to lead time and not applied a fixed lead time requirement, but the Agency has previously granted medium- and heavy-duty waivers to California for standards that had less than four years of lead time.[124]

---

[117] California medium-duty standards often cover vehicles that are classified as heavy-duty by the EPA. *See, e.g.*, 63 Fed. Reg. 18,403, 18,404 n.1 (Apr. 15, 1998) (The LEV MDV program for which California seeks a waiver included "MDVs which are typically large trucks and other vehicles up to 14,000 lbs Gross Vehicle Weight Rating." EPA does not have a medium-duty vehicle category, but classifies heavy-duty vehicles between 8,501 and 14,000 lbs. GVWR as light heavy-duty vehicles.); 43 Fed. Reg. 15,490, 15,491 n.6 (Apr. 13, 1978) ("The EPA definition of light-duty truck, however, does not include vehicles which have an actual curb weight of greater than 6000 pounds or which have a basic vehicle frontal area in excess of 46 square feet. Thus, some vehicles within the CARB medium-duty vehicle class will be heavy-duty vehicles for Federal purposes."); 43 Fed. Reg. 1,829, 1,830 n.9 (Jan. 12, 1978) ("The EPA definition of light-duty truck, however, does not include vehicles which have an actual curb weight of greater than 6,000 pounds or which have a basic vehicle frontal area in excess of 46 square feet. Thus, some vehicles within the CARB medium-duty vehicle class will be heavy-duty vehicles for Federal purposes.").
[118] *See, e.g.*, 63 Fed. Reg. 18,403, 18,404 (Apr. 15, 1998); 43 Fed. Reg. 15,490, 15,491 (Apr. 13, 1978); 43 Fed. Reg. 1,829 (Jan. 12, 1978). *See also* 49 Fed. Reg. 18,887, 18,888 (May 3, 1984); 43 Fed. Reg. 29,615 (July 10, 1978).
[119] *See, e.g.*, 49 Fed. Reg. 18,887, 18,894 (May 3, 1984) (finding that "[i]n view of these facts [the discussion of available technology], I cannot find that the manufacturers have met their burden of establishing that the 1985 particulate standards are technologically infeasible").
[120] 2005 HD Decision Document, at 10–11 (citing Section 202(a)(2) as the standard).
[121] *Id.* at 10.
[122] *Id.* at 10–11.
[123] *Id.* at 11 (citing as examples 49 Fed. Reg 1,887, 1,895 (May 3, 1994); 43 Fed. Reg. 32,182, 32,183 (July 25, 1978); 41 Fed. Reg. 44,209, 44,213 (Oct. 7, 1976)).
[124] *See, e.g.*, 77 Fed. Reg. 9,239 (Feb. 16, 2012) (granting waiver for HD Truck Idling standards for MY 2008, adopted Sept. 1, 2006); 46 Fed. Reg. 26,371 (May 12, 1981) (granting waiver for amendments to heavy-duty emission standards beginning in MY 1982, adopted Apr. 23, 1980); 43 Fed. Reg. 1829 (Jan. 12, 1978) (granting waiver for medium-duty standards for MYs 1979–1982, adopted in 1977); 42 Fed. Reg. 31,637 (June 22, 1977) (granting waiver for heavy-duty standards beginning in MY 1980, adopted Oct. 5, 1976); 36 Fed. Reg. 8,172 (Apr. 30, 1971) (granting waiver for standards beginning in MY 1973, adopted Nov. 18, 1970); 34 Fed. Reg. 7,348 (May 6, 1969) (granting waiver for heavy-duty standards beginning in MY 1970, adopted Nov. 20, 1968). *See also* 49 Fed. Reg. 18,887 (May 3, 1984) (granting waiver for medium-duty standards beginning in MY 1985, adopted Aug. 1982).

As evidenced by the past waiver determinations outlined above, the Administrator's 1994 decision granting a waiver for California's medium-duty standards,[125] which applied a four-year lead time requirement, does not represent a long-standing agency interpretation. The 1994 decision was an isolated example that departed from the statutory text, legislative history, and interpretive case law by incorrectly determining that California standards must satisfy the specific requirements of Section 202(a)(3)(C). Even as it reached this incorrect result, EPA recognized that California standards are inconsistent with Section 202(a) "if there is inadequate lead time to permit the development of the technology necessary to meet those requirements, giving appropriate consideration to the cost of compliance within that time frame."[126] Although EPA correctly identified the traditional consistency test, the Agency erred by then "applying the rationale of [*American Motors Corp. v.*] *Blum*" to determine that Section 202(a)(3)(C)'s fixed lead time requirement applied to California.[127] *Blum* does not support, and certainly does not require EPA to make, this determination. *Blum* did not address Section 202(a)(3)(C), and Section 202(b)(1)(B), the statutory provision at issue in that case, was clearly distinct from Section 202(a)(3)(C).

Blum arose in the light-duty context, where Congress enacted a provision specifically to protect two small auto manufacturers—American Motors Corporation and Avanti—who were entirely dependent on other larger manufacturers for needed technology. The pertinent portion of the statute—Section 202(b)(1)(B), which is not at issue here—imposed a two-year lead time requirement for "manufacturer[s] whose production … was less than three hundred thousand light-duty motor vehicles world-wide."[128] EPA granted California a waiver for an emissions standard with a shorter lead time and the petitioners sued, claiming that the California rule was inconsistent with CAA Section 202(b)(1)(B).

The court recognized that Section 209(b) refers to consistency with Section 202(a)(2), not 202(b), but concluded that "[w]e think the effect of this congressional mandate is to assimilate or incorporate in section 202(a)(2) the proviso of section 202(b)(1)(B)."[129] It ruled that the two-year lead time in Section 202(b)(1)(B) applied to the waiver request.

Importantly, the *Blum* court did not hold that all subsections or subparagraphs of Section 202 apply to California through Section 209(b)(1)(C)'s consistency requirement.[130] Instead, through its application of the traditional consistency test, the court concluded that the specific circumstances surrounding Congress's adoption of Section 202(b)(1)(B) required a determination that that provision had been effectively "assimilate[d] or incorporate[d]" into Section 202(a)(2).[131] In *MEMA II*, the D.C. Circuit interpreted *Blum* as holding that the analysis of "lead time for implementation of the [] standard was governed by section 202(a)(2)" and that not

[125] Decision document associated with 59 Fed. Reg. 48,625 (Sept. 22, 1994), Docket No. EPA-HQ-OAR-2022-0332-0020 (Sept. 16, 1994) ("1994 Decision Document").
[126] *Id*. at 21.
[127] *Id* at 32 (citing *Am. Motors Corp. v. Blum*, 603 F.2d 978 (D.C. Cir. 1979)).
[128] *Blum*, 603 F.2d at 979 (citing CAA § 202(b)(1)(B)).
[129] *Id.* at 981.
[130] *See MEMA II*, 142 F.3d at 464 n.14 ("[The *Blum*] decision did not suggest that all of the subsections of section 202 were incorporated into subsection (a) for the purposes of assessing a California waiver application.").
[131] *Blum*, 603 F.2d at 981.

allowing two years of lead time in that case was "inconsistent with 202(a)(2)."[132] *Blum* did not change the traditional consistency test, but simply held that the specific history and statutory structure of Section 202(b)(1)(B) was relevant to determining consistency with Section 202(a)(2) for the particular waiver at issue in that case. EPA should undertake the same fact-specific determination here and find that Section 202(a)(3)(C) involves different factual circumstances that warrant the opposite outcome from *Blum*. As discussed in detail below, Section 202(b)(1)(B) was intended to address a unique situation in which two small manufacturers needed additional lead time due to their dependent relationship on larger manufacturers for the requisite technology. This dependent relationship was a national issue that applied equally within California and nationwide. Section 202(a)(3)(C), by contrast, was not intended to address any such narrow factual circumstance. As discussed above, EPA undertaking a fact-specific determination in assessing consistency would also align with the statutory text and structure and with Congressional intent.

Section 202(b)(1)(B) was meant to address a narrow and highly fact-specific problem not relevant to Section 202(a)(3)(C). Section 202(b)(1)(B) gave two small manufacturers two years of additional lead time to comply with the federal standards. *Blum* outlined the specific situation that Congress determined required additional lead time for these two specific manufacturers. The court quoted bill sponsor Senator Nelson's description of the unique factual circumstance that required additional lead time for small manufacturers:

> It is agreed by everyone without any exception that I know of, that *American Motors has a special problem* because, unlike the big three automakers, it does not design and build its own pollution control systems. It must purchase this technology from General Motors, Ford, or Chrysler. Once it has purchased the technology *it must modify and adapt the system* to its own product line. This requires between 1 and 2 years. Consequently, *American Motors Corp. is unavoidably behind in the pollution abatement timetable from the very beginning*.[133]

This legislative history illuminates that Section 202(b)(1)(B) was intended to address a narrow and specific circumstance in which two small manufacturers were entirely dependent on other larger manufacturers for needed technology. This was not a circumstance where it was simply difficult or challenging to develop the adequate technology, but it was a "special problem" in which the companies were "unavoidably" behind the compliance timeline.[134] Congress and EPA understood that this problem was limited in scope and did not apply universally to all manufacturers, because the small manufacturers may "experience lead time problems substantially different from those of other domestic manufacturers."[135] In contrast, Section 202(a)(3)(C) was not intended to address a very narrow and unique lead time concern.

---

[132] *MEMA II*, 142 F.3d at 464 n.14.
[133] *Blum*, 603 F.2d at 980 (citing Statement of Sen. Nelson, 123 Cong. Rec. S9231 (daily ed. June 9, 1977) (emphasis added in *Blum*)).
[134] *Id.*
[135] *Id.* (emphasis removed).

Importantly, the small manufacturer-dependent scenario that Section 202(b)(1)(B) was intended to address was a national issue that applied in California with the same force. In other words, the two small manufacturers would face the same lead time-related compliance challenges in California as they would nationally. Because of this dynamic, it was logical for *Blum* to hold that Section 202(b)(1)(B) should be incorporated into Section 202(a)(2), as Section 202(b)(1)(B) bore directly on whether California's standards provided the two manufacturers the lead time "necessary to permit the development and application of the requisite technology."[136] In contrast, Section 202(a)(3)(C) is not based on the same narrow factual scenario that created the national lead time problem for certain small manufacturers. EPA[137] and Congress[138] have long recognized that California standards can be more stringent than federal standards, as manufacturers can more easily and more quickly, and with lower cost, roll out new technology in the smaller and limited California market than in the much larger national market.

Further, because Section 202(b)(1)(B) had a limited manufacturer applicability and limited time frame, incorporating it into the consistency determination did not frustrate the purposes of the waiver provision in the way that requiring California standards to comply with Section 202(a)(3)(C) would. Congress intended that the provision would cover only American Motors Corp. and Avanti.[139] Section 202(b)(1)(B) also gave only two years of additional lead time to these two manufacturers, as Congress understood that they would "require[] between 1 and 2 years" of additional lead time in order to obtain the requisite technology from larger manufacturers and add that technology to their products.[140] Section 202(b)(1)(B) was specifically intended to be of limited applicability and for a short and definite period of time. Thus, *Blum*'s holding that Section 202(b)(1)(B) applied to California standards impacted only two manufacturers and two model years. The court's decision had no effect on the rest of the auto industry, as every other manufacturer still had to comply with the California standards. Therefore, applying Section 202(b)(1)(B) to California did not undermine Congress's intent that

---

[136] *Id.* at 981 (citing CAA § 202(a)(2)).

[137] *See, e.g.*, 49 Fed. Reg. 18,887, 18,894–95 (May 3, 1984) (medium-duty standards beginning with MY 1985) ("Historically, EPA has granted waivers allowing the introduction of new technology in California prior to its introduction nationwide. For example, as discussed above, EPA waived preemption of the standard requiring the introduction of catalysts in California a year prior to their introduction nationally. In so doing, the Administrator noted that this 'phase-in' of technology serves the purposes of the Act: 'It is my judgment that [this approach] best serves the total public interest and the mandate of the statute. It promotes continued momentum toward installation of control systems meeting the statutory standards, while minimizing risks incident to national introduction of a new technology. This option also offers the opportunity to gain experience with production of catalyst systems for a full range of automobiles by requiring catalysts of a portion of each model introduced by each manufacturer in the State of California.' 38 Fed. Reg. 10,317, 10,319 (Apr. 26, 1973)."); 46 Fed. Reg. 22,032, 22,035 (Apr. 15, 1981) (EPA noting that the "risks and costs inherent in attempting to certify an engine family for sale in the forty-nine States… cannot be equated with the risks and costs of attempting to produce complying vehicles for the limited California market").

[138] *See, e.g.*, 113 Cong. Rec. 32,478 (Nov. 14, 1967) (Remarks of Sen. Murphy) (California "will act as a testing agent for various types of controls."); S. Rep. No. 90–403 at 33 (July 15, 1967) (highlighting that one benefit of the waiver preemption for California is "when California and the Federal Government have differing standards, the general consumer of the Nation will not be confronted with increased costs associated with new control systems").

[139] *Blum*, 603 F.2d at 980 (citing Statement of Sen. Nelson, 123 Cong. Rec. S9233 (daily ed. June 9, 1977)).

[140] *Id.* (citing Statement of Sen. Nelson, 123 Cong. Rec. S9231 (daily ed. June 9, 1977)).

California serve as "a kind of laboratory for innovation" from which "the entire country would benefit."[141]

In contrast, Section 202(a)(3)(C) applies universally to all manufacturers and all future model years within the national market. This is in stark contrast to the extremely limited scope of Section 202(b)(1)(B). If consistency with Section 202(a) required full compliance with Section 202(a)(3)(C), it would severely limit California's ability to be a "laboratory for innovation," in direct contradiction of Congress's intent to allow California significant flexibility in designing its emission control programs to meet its own unique needs. Congress intended that the waiver provisions would allow California to apply technology in the state market before the national market as a "testing agent for various types of controls" and that "the country as a whole [would] be the beneficiary of this research."[142]

For the above reasons, EPA in 1994 incorrectly relied on *Blum*, which presented a distinctly different factual scenario, and wrongly determined that Section 209 requires California standards to provide the precise lead time specified in Section 202(a)(3)(C). In fact, EPA has since reconsidered its 1994 determination about the extent of Section 202(a)(3)(C)'s applicability. A letter from EPA to California in 2000, in the context of reviewing California's on-highway heavy-duty engine supplemental requirements for MY 2005, indicated the Agency was reevaluating the 1994 decision.[143] EPA acknowledged that it had addressed the "applicability of the lead time requirement in a previous waiver of federal preemption,"[144] but told California that it intended to "conduct a new evaluation of this issue" and would "evaluate all arguments…in regard to whether the lead time provisions of the Act apply to California."[145] EPA also stated its intention to "evaluate the applicability of the stability requirement in Section 202(a)(3)(C)," which EPA had not previously determined.[146] The Agency explained that there were "important reasons" for reviewing its interpretation so as to "avoid the possibility" that EPA would "inappropriately limit California's discretion in establishing its requirements."[147] EPA did not ultimately take final action in relation to the California regulations at issue in the 2000 letter, but its discussion makes clear that it did not consider the 1994 decision as having settled the question.

In a 2012 decision, EPA determined that the requirements of Section 202(a)(3)(C) are irrelevant to the "consistency" inquiry under a comparable provision, 209(e)(2)(A)(iii).[148] The 2012 decision was in the context of a Section 209(e) nonroad engine and vehicle authorization request, which has a consistency requirement in Section 209(e)(2)(A)(iii).[149] That provision requires

---

[141] *Engine Mfrs. Ass'n, ex rel. Certain of its Members v. EPA*, 88 F.3d 1075, 1080 (D.C. Cir. 1996) (quoting *MEMA I*, 627 F.2d at 1111).
[142] 113 Cong. Rec. 32,478 (Nov. 14, 1967) (Remarks of Sen. Murphy).
[143] Letter from Margo Oge, Director EPA Office of Transportation and Air Quality, to Michael Kenny, CARB Executive Officer (Oct. 24, 2000).
[144] *Id.*
[145] *Id.*
[146] *Id.*
[147] *Id.*
[148] 77 Fed. Reg. 9,239, 9,249 (Feb. 16, 2012).
[149] 42 U.S.C. § 7543(e)(2)(A)(iii) ("No such authorization shall be granted if the Administrator finds that— . . . (iii) California standards and accompanying enforcement procedures are not consistent with this section.").

consistency with Section 209(b)(1)(C), which EPA has interpreted as requiring the Agency to review "nonroad authorization requests under the same 'consistency' criteria that are applied to motor vehicle waiver requests."[150] Thus, EPA undertakes the same traditional consistency analysis as in the Section 209(b) waiver context, in which standards must be consistent with 202(a) by allowing adequate "lead time to permit the development of the necessary technology giving appropriate consideration to the cost of compliance within that time."[151] EPA has long applied the same traditional consistency test in both the Section 209(b)(1)(C) and Section 209(e)(2)(A)(iii) contexts.[152]

In the 2012 proceeding, the American Trucking Association (ATA) argued that EPA should deny California's authorization request for a proposed alternative power supply (APS) rule for diesel heavy-duty vehicles, which provided less than two full years of lead time,[153] because "CARB ha[d] not complied with the lead time and stability requirements of section 202(a)(3)(C)."[154] EPA concluded otherwise, stating that ATA's "comment . . . does not comport with the section 209 criteria."[155] Specifically, EPA determined that "the lead-time inquiry EPA undertakes relates to technological feasibility," and "consistency with section 202(a) requires the Administrator to first determine whether adequate technology already exists; or if it does not, whether there is adequate time to develop and apply the technology before the standards go into effect."[156] Indeed, the Agency emphasized that, beyond this limited inquiry, "EPA then has no further inquiry into lead-time, because no additional requirement is imposed by the section 209 criteria."[157] As EPA noted, "this construction accords with congressional intent."[158] Applying this test, EPA determined that California had "demonstrated that all three compliance options are currently technologically feasible," and that no party had presented any evidence of infeasibility.[159] EPA granted the authorization request.[160]

---

[150] 77 Fed. Reg. at 9,241 (citing 59 Fed. Reg. 36,969 (July 20, 1994)). *See also* 59 Fed. Reg. 36,969, 36,983 (EPA determined "it is reasonable and effects Congressional intent to interpret 'consistent with this section' in [209(e)(2)(A)(iii)] to include all of section 209, including section 209(b)(1)(C). Hence, EPA believes that it should review nonroad authorization requests under the same 'consistency' criterion that it reviews motor vehicle waiver requests.").

[151] 77 Fed. Reg. at 9,241.

[152] *Compare* decision document associated with 70 Fed. Reg. 50,322 (Aug. 26, 2005), Docket No. EPA-HQ-OAR-2004-0132-0045, at 11 (Aug. 19, 2005) (Section 202(b)(1)(C) consistency requires that the Administrator "determine whether adequate technology already exists, or if it does not, whether there is adequate time to develop and apply the technology before the standards go into effect."), *with* 77 Fed. Reg. 9,239, 9,249 (Feb. 16, 2012) (Section 209(e)(2)(A)(iii) consistency requires that the Administrator "determine whether adequate technology already exists; or if it does not, whether there is adequate time to develop and apply the technology before the standards go into effect."), *and* 59 Fed. Reg. 36,969, 36,983 (July 20, 1994) (Section 209(e)(2)(A)(iii) consistency requires "[]adequate lead time to permit the development of technology necessary to meet those requirements, giving appropriate consideration to the cost of compliance within that time frame.").

[153] CARB adopted the 2008 Truck Idling Requirement, including the APS requirements, on September 1, 2006 and the APS requirements applied starting on January 1, 2008 to all diesel-fueled commercial motor vehicles with a GVWR greater than 10,000 pounds when operated in California. *See* CARB Truck Idling Support Document at 3, 8, Docket No. EPA-HQ-OAR-2010-0317-0003.

[154] 77 Fed. Reg. at 9,249.

[155] *Id.*

[156] *Id.*

[157] *Id.*

[158] *Id.* (citing H.R. Rep. No. 95–294, 95th Cong., 1st Sess. 301 (1977)).

[159] 77 Fed. Reg. at 9,249.

[160] *Id*. at 9,249–50.

In the years since 1994, EPA has applied the traditional consistency test with no mention of Section 202(a)(3)(C) and no implication that consistency requires any fixed lead time requirement. For example, when EPA reviewed the waiver request for California's 2007 heavy duty emission standards, the Agency used the traditional consistency test to determine whether there was sufficient lead time "necessary to permit the development and application of the relevant technology, considering the cost of compliance within that time."[161]

The 1994 decision's conclusion about lead time was wrong when it was written and is wrong today. In the 28 years since, neither Congress nor EPA has done anything to approve or ratify its conclusion—or the reasoning in *Blum*—and, indeed, EPA reached the opposite conclusion in 2012 in the APS diesel truck authorization described above. In the current context, the 1994 decision must be disregarded because it conflicts with the statutory text and structure and with congressional intent.

III. EPA MUST GRANT CALIFORNIA'S WAIVER REQUESTS UNDER SECTION 209(b) OF THE CAA.

California's waiver requests meet each of the three conditions of CAA Section 209(b) and should be granted. We discuss compliance with the subparts of Section 209(b) below.

A. California Continues to Need a Separate Motor Vehicle Emissions Control Program to Meet the State's Compelling and Extraordinary Conditions.

EPA has consistently acknowledged that California experiences "compelling and extraordinary conditions" that warrant the state's need to adopt its own motor vehicle emissions control program. Indeed, EPA has *never* disputed California's need to reduce emissions of criteria pollutants as it relates to the Section 209(b)(1)(B) inquiry. Because California continues to face significant and serious air pollution challenges, the state continues to need its own motor vehicle control program to meet its compelling and extraordinary conditions. Thus, EPA must conclude that Section 209(b)(1)(B) is satisfied for the three waiver requests at issue here.

EPA's review under Section 209(b)(1)(B) relates to "California's need for its program, as a whole, for the class or category of vehicles being regulated" (the traditional interpretation), "as opposed to its need for individual standards."[162] Indeed, EPA has recognized that California's need is not dependent on the program achieving specific levels of improvement in air quality.[163] Rather, Congress intended for EPA to defer to California's judgments regarding whether to regulate specific pollutants[164] and how stringently to regulate them, within the tightly constrained

[161] 2005 HD Decision Document at 10 (citing Section 202(a)(2) as the standard).
[162] 76 Fed. Reg. 34,693, 34,697 (June 14, 2011).
[163] 79 Fed. Reg. 46,256, 46,262 (Aug. 7, 2014) ("But nothing in section 209(b)(1)(B) calls for California to quantify specifically how its regulations would affect attainment of the national ambient air quality standards in the state. . . . [T]he relevant question is whether California needs its own motor vehicle pollution program to meet compelling and extraordinary conditions, and not whether the specific standards that are the subject of this waiver request are necessary to meet such conditions.").
[164] *See* 43 Fed. Reg. 25,729, 25,735 (June 14, 1978).

boundaries that Section 209(b) places on the Agency's review.[165] The traditional interpretation of Section 209(b)(1)(B) comports with the statutory text and Congressional intent.[166]

California continues to experience some of the worst air quality in the nation. The South Coast and San Joaquin Valley Air Basins are in non-attainment of the national ambient air quality standards for $PM_{2.5}$ and ozone.[167] The South Coast has never met *any* of the federal ozone standards established pursuant to the Clean Air Act.[168] According to CARB, heavy-duty trucks are the largest source of NO_X emissions in the state, contributing nearly a third of all statewide NO_X emissions as well as more than a quarter of total statewide diesel PM emissions.[169] In fact, heavy-duty vehicles represent the largest source of NO_X emissions reductions needed to attain the 2015 8-hour ozone National Ambient Air Quality Standards (NAAQS), and California's air quality regulations, like those at issue here, are central to the state's attainment strategy for the South Coast Air Basin.[170] These facts support the conclusion that California continues to have compelling and extraordinary conditions for which it needs a separate program.

The freight industry in California has seen a rapid and accelerated boom in recent years, in part due to increased online purchasing as a result of the COVID-19 pandemic. San Bernardino County, which is partly located in the South Coast, has seen some of the most rapid expansion of goods movement over the last five years. New warehouses and distribution centers pop up every day, and heavy-duty diesel trucks are typically the trucks transporting these goods around the region.[171] Roughly 50% of all imports from Asia come through the Southern California ports, and many of these imports are trucked to inland warehouses.[172]

---

[165] *See* 49 Fed. Reg. 18,887, 18,891 (May 3, 1984) (quoting 41 Fed. Reg. 44,209, 44,210 (Oct. 7,1970)) (EPA deferring to California's decision to require even marginal improvements of air quality in adopting diesel particulate emission standards for 1985 and later model year passenger cars, light-duty trucks, and medium-duty vehicles). *See also supra* Section II.

[166] *See generally* 87 Fed. Reg. 14,332, 14,358–62 (Mar. 14, 2022) (explaining how the traditional interpretation is consistent with the "text, structure and congressional intent and purpose of section 209(b)"). *See also* 76 Fed. Reg. at 34,697.

[167] EPA, *Current Nonattainment Counties for All Criteria Pollutants*, https://www3.epa.gov/airquality/greenbook/ancl.html (data current as of June 30, 2022).

[168] *See* 40 C.F.R. § 81.305 (2021).

[169] CARB, *Facts About the Low NO_X Heavy-Duty Omnibus Regulation*.

[170] *See* South Coast Air Quality Management District, *Draft 2022 Air Quality Management Plan*, Appendix V, Attachment 3, at 3, http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/combined-appendix-v.pdf?sfvrsn=8.

[171] *See, e.g.*, Jeff Horseman, *Inland Empire is Warehouse Central, But How Did it Happen?*, The Press Enterprise, (Sept. 29, 2021), https://www.pe.com/2021/09/29/inland-empire-is-warehouse-central-but-how-did-it-happen/ (freight boom in San Bernardino County); U.S. International Trade Commission, *The Impact of the COVID-19 Pandemic on Freight Transportation Services and U.S. Merchandise Imports*, https://www.usitc.gov/research_and_analysis/tradeshifts/2020/special_topic.html (impact of COVID on trade).

[172] Bill Mongelluzzo, *Top US Port Gateways Expand Share of Asian Imports*, Journal Of Commerce Online (Aug. 31, 2018), https://www.joc.com/port-news/us-ports/port-los-angeles/top-us-port-gateways-expand-share-asian-imports_20180831.html.

California also faces compelling and extraordinary climate change impacts.[173] With each passing year, the dangers of climate change and health-harming air pollution become more and more clear. Climate change worsens the effects of local pollutants: in addition to a severe increase in deadly wildfires and accompanying particulate pollution, increasing heat favors the formation of additional ozone, putting compliance with the ozone NAAQS further out of reach.[174]

Although EPA does not need to consider the projected results of the individual regulations in determining whether California needs a separate program under Section 209(b)(1)(B), the record shows how effective the new rules will be in helping the state address its serious air quality and climate change problems. Increased stringency for NO_X, PM and CO_2 emission standards is long overdue and is essential for California to meet its SIP commitments and to protect public health.

The Omnibus Rule

This rule establishes "the next generation of criteria pollutant (specifically, nitrous oxide (NO_X) and particulate matter (PM)) exhaust emission standards and other emission related requirements for new 2024 and subsequent model year on-road medium- and heavy-duty engines and vehicles."[175]

CARB explains that:

> The Regulation constitutes the single largest NO_X control measure in California's current SIP strategy, and will reduce NO_X emissions in California by approximately 17.4 tons per day (tpd) statewide by 2031, and by 45.2 tpd statewide, by 2050. NO_X emissions in the South Coast Air Basin and in the San Joaquin Valley Air Basin are projected to decrease by 5.2 and 4.3 tpd, respectively, by 2031.[176]

---

[173] 87 Fed. Reg. at 14,365 (concluding that "climate-change impacts in California are 'compelling and extraordinary conditions'"). *See also* California's Fourth Climate Change Assessment, California's Changing Climate 2018: A Summary of Key Findings from California's Fourth Climate Change Assessment 3 (California is "one of the most 'climate-challenged' regions of North America."), https://www.energy.ca.gov/sites/default/files/2019-11/20180827_Summary_Brochure_ADA.pdf; U.S. Glob. Change Rsch. Program, *Vol. II, Impacts, Risks and Adaptation in The United States: Fourth National Climate Assessment*, Chapter 25 (Southwest) (David Reidmiller et al., eds., 2018) (The impact of climate change is exacerbating California's recent record-breaking fire seasons, multi-year drought, heat waves, and flood risk, and explains the particular threat from sea level rise and ocean acidification because California has "the most valuable ocean-based economy in the country."), https://nca2018.globalchange.gov/; Declaration of Elizabeth Scheehle at B-019- B-024, *Union of Concerned Scientists v. NHTSA* (D.C. Cir. No. 19-1230) (Chief of the Research Division of the California Air Resources Board discussing climate change impacts on California), https://www.edf.org/sites/default/files/71_NGOs_and_States_Statutory_Addendum_and_Standing_Declarations_11-24-20.pdf; Declaration of Jay Chamberlin at B-27-B-32, *Union of Concerned Scientists v. NHTSA* (D.C. Cir. No. 19-1230) (Chief of the Natural Resources Division of the California Department of Parks and Recreation discussing impacts of climate change on California's state parks), https://www.edf.org/sites/default/files/71_NGOs_and_States_Statutory_Addendum_and_Standing_Declarations_11-24-20.pdf.

[174] *See* 87 Fed. Reg. at 14,350–51 (describing interaction of GHG and criteria pollution).

[175] 87 Fed. Reg. 35,765, 35,766.

[176] Omnibus Rule Waiver Request at 2.

The Warranty Amendments[177]

CARB explains that: "On-road heavy-duty diesel vehicles that exceed 14,000 pounds GVWR are a significant source of emissions of oxides of nitrogen (NO_X) and particulate matter ($PM_{2.5}$) in California, contributing approximately 45 percent of the total statewide NO_X and 19 percent of the total statewide PM emitted by mobile sources in California."[178]

In terms of emissions reductions:

> The 2018 HD Warranty Amendments are projected to reduce statewide NO_X and PM emissions by 0.75 tons per day (tpd) and 0.008 tpd respectively, by 2030. NO_X emissions are projected to decrease in the South Coast Air Basin and in the San Joaquin Valley Air Basins by 0.24 and 0.18 tpd, respectively, by 2030.[179]

The Advanced Clean Trucks Rule

The ACT regulation, adopted by the Board on January 26, 2021, requires that manufacturers produce and sell increasing quantities of medium- and heavy-duty ZEVs and NZEVs in California.[180]

This rule will result in reductions in NO_X, PM, and GHGs. CARB explains that:

> The ACT regulation is projected to reduce emissions of oxides of nitrogen (NO_X) by 6.9 tons per day (tpd), emissions of particulate matter ($PM_{2.5}$) by 0.24 tpd, and emissions of GHGs by 0.5 million metric tons (MMT) per year of carbon-dioxide equivalent emissions (CO_{2e}) by 2031. By 2040, the ACT regulation is projected to reduce NO_X emissions by 27.9 tpd, $PM_{2.5}$ emissions by 0.85 tpd, and GHG emissions by 2.9 MMT per year of CO_{2e}.

And, as noted above, the ACT rule's GHG reductions will help reduce the risk of wildfire-based particulate matter and heat-induced ozone pollution in California.

The Zero Emission Airport Shuttle and Zero Emission Powertrain Certification Regulations

The ZEAS rule sets steadily increasing fleet composition requirements for airport shuttle fleet owners that service the 13 largest California airports. By December 31, 2035, 100% of regulated airport shuttle fleets must be zero-emission.[181]

---

[177] Under the CAA and *MEMA I*, the need criterion does not apply to the CARB Warranty Amendments because those are enforcement procedures, not standards. *MEMA I*, 627 F.2d at 1113–14, 1122, 1124.
[178] Warranty Amendments Waiver Request at 1.
[179] *Id.* at 2.
[180] MHD ZEV Rules Waiver Request at 1–2.
[181] *Id.* at 2.

The ZEP Certification rule establishes both optional emission standards and certification requirements for 2021 and subsequent MY medium- and heavy-duty ZEVs, including heavy-duty battery electric and heavy-duty fuel cell vehicles, and the zero emission powertrains installed in such vehicles. The optional emission standards associated with the ZEP Certification rule have been effectively superseded by the mandatory emission standards associated with the ACT and ZEAS rules.[182]

As CARB explains:

> The ZEAS regulation is projected to reduce emissions of NO_X by 7.60 tons per year (tpy), emissions of $PM_{2.5}$ by 0.15 tpy, and emissions of GHGs by 81 MMT per day of CO_{2e} by 2031. By 2040, the ZEAS regulation is projected to reduce emissions of NO_X by 9.99 tpy, emissions of $PM_{2.5}$ by 1.7 tpy, and emissions of GHGs by 107 MMT per day of CO_{2e}. CARB has not quantified the emissions benefits directly attributable to the ZEP Certification regulation, because it has determined that such benefits would be dependent upon specific measures that incorporate that regulation's procedures and requirements.[183]

In sum, California still needs a separate motor vehicle emissions control program in order to meet compelling and extraordinary circumstances. EPA must therefore find that Section 209(b)(1)(B) has been satisfied for each of the three waiver requests at issue here.

B. EPA Must Grant the Waiver for the Omnibus Rule.

1. California's Protectiveness Determination for the Omnibus Rule is Not Arbitrary or Capricious.

In evaluating California's protectiveness determination, EPA must consider California's motor vehicle emission standards "in the aggregate."[184] In addition, the statute states that "[i]f each State standard is at least as stringent as the comparable applicable Federal standard, such State standard shall be deemed to be at least as protective of health and welfare as such Federal standards."[185]

California made its protectiveness finding for the Omnibus rule in CARB Resolution 20-23, which states:

> [T]he regulations adopted herein will not cause California motor vehicle and off-road engine emission standards, in the aggregate, to be less protective of public health and welfare than applicable federal standards.

This determination is well-founded in the record. EPA has previously granted waivers to California's heavy-duty and medium-duty engine and vehicle emission regulations, and those protectiveness determinations establish the broader context of California's emission control

[182] *Id.*
[183] *Id.* at 3.
[184] 42 U.S.C. § 7543(b)(1).
[185] *Id*. § 7543(b)(2).

program. Specifically, California's pre-existing emission standards and emissions-related requirements—which form a base of motor vehicle emission controls on which the clean trucks rules expand—are, in the aggregate, at least as protective as the corresponding federal standards. For example, EPA has previously granted waivers for California heavy-duty regulations for pre-existing diesel engine standards[186] and Otto-cycle engine standards,[187] as well as for various regulations applicable to heavy-duty diesel engines and vehicles[188] and heavy-duty Otto-cycle engines and vehicles,[189] including California's OBD regulations,[190] heavy-duty diesel in-use compliance regulation,[191] emissions warranty and recall programs,[192] heavy-duty diesel engine idling regulation,[193] off-road compression engine emission standards,[194] and certification procedures for hybrid-electric buses and heavy-duty vehicles.[195]

On top of this, California's Omnibus rule is significantly more stringent than the comparable federal emission standards, which do not contain either of the Omnibus rule's more stringent primary NO_X or PM exhaust emission standards.

EPA last updated its heavy-duty PM and NO_X standards in 2001, a rule which, when fully phased in by 2013, required *new* heavy-duty trucks to average 0.2 g NO_X per brake-horsepower-hour (g NO_X/bhp-hr). In 2008, CARB introduced a one-of-a-kind fleet program to accelerate turnover of virtually all *in-use* heavy-duty trucks in the state to meet this standard by January 1, 2023.[196]

In 2013, California introduced voluntary low-NO_X standards (0.1, 0.05, and 0.02 g NO_X/bhp-hr), recognizing a need to drive beyond EPA's regulatory targets. Those voluntary standards were further supported by incentives. Between 2008 and 2015, the state spent nearly $3 billion to fund the demonstration and deployment of vehicles that could achieve the standards,[197] and from 2017–2021 the state spent an additional $120 million through its incentive programs solely on

[186] 70 Fed. Reg. 50,322 (Aug. 26, 2005).
[187] 75 Fed. Reg. 70,238 (Nov. 17, 2010).
[188] 69 Fed. Reg. 59,920 (Oct. 6, 2004); 53 Fed. Reg. 7,021 (Mar. 4, 1988); 52 Fed. Reg. 20,777 (June 3, 1987); 49 Fed. Reg. 39,731 (Oct. 10, 1984); 46 Fed. Reg. 36,742 (July 15, 1981); 46 Fed. Reg. 26,371 (May 12, 1981); 43 Fed. Reg. 36,679 (Aug. 18, 1978); 42 Fed. Reg. 31,639 (June 22, 1977); 36 Fed. Reg. 8,172 (Apr. 30, 1971).
[189] 69 Fed. Reg. 59,920 (Oct. 6, 2004), 53 Fed. Reg. 7,022 (Mar. 4, 1988), 53 Fed. Reg. 6,197 (Mar. 1, 1988), 49 Fed. Reg. 39,731 (Oct. 10, 1984), 46 Fed. Reg. 36,742 (July 15, 1981), 46 Fed. Reg. 26,371 (May 12, 1981), 43 Fed. Reg. 20,549 (May 12, 1978), 42 Fed. Reg. 31,637 (June 22, 1977), 42 Fed. Reg. 31,639 (June 22, 1977), 36 Fed. Reg. 8,172 (Apr. 30, 1971), 34 Fed. Reg. 7,348 (May 6, 1969), and 33 Fed. Reg. 10,160 (July 16, 1968).
[190] 81 Fed. Reg. 78,143 (Nov. 7, 2016); 73 Fed. Reg. 52,042 (Sept. 8, 2008); 77 Fed. Reg. 73,459 (Dec. 10, 2012); 81 Fed. Reg. 78,149 (Nov. 7, 2016).
[191] 82 Fed. Reg. 4,867 (Jan. 17, 2017).
[192] 44 Fed. Reg. 61,096 (Oct. 23, 1979); 49 Fed. Reg. 43,502 (Oct. 29, 1984); 55 Fed. Reg. 28,823 (July 13, 1990); 70 Fed. Reg. 50,322 (Aug. 26, 2005).
[193] 77 Fed. Reg. 9,239 (Feb. 16, 2012); 82 Fed. Reg. 4,867 (Jan. 17, 2017).
[194] 75 Fed. Reg. 8,056 (Feb. 23, 2010).
[195] 78 Fed. Reg. 44,112 (July 23, 2013).
[196] *See* CARB, *Statewide Truck and Bus Regulations*, https://www.arb.ca.gov/regact/2008/truckbus08/truckbus08.htm.
[197] South Coast Air Quality Management District et al., *Petition to EPA for Rulemaking to Adopt Ultra-Low NO_X Exhaust Emission Standards for On-Road Heavy-Duty Trucks and Engines* 9 (June 3, 2016), https://www.epa.gov/sites/default/files/2016-09/documents/petition_to_epa_ultra_low_nox_hd_trucks_and_engines.pdf.

heavy-duty trucks achieving at least a 0.02 g NO_X/bhp-hr standard,[198] with substantial additional investment from the Volkswagen settlement, not to mention hundreds of millions of dollars in funding through the federal Diesel Emissions Reduction Act helping to incentivize the deployment of low-NO_X and zero-emission vehicles.

In California's 2016 State Implementation Plan, lower NO_X standards for heavy-duty trucks and a "Lower In-Use Emission Performance Level" were noted as critical strategies to meet the state's 2031 air quality targets.[199] These twin pillars form the basis of California's Omnibus rule, a comprehensive regulatory strategy to reduce real-world NO_X emissions from medium- and heavy-duty trucks.

The Omnibus rule includes a number of distinct areas of regulation simultaneously to rectify a central problem with the regulation of heavy-duty trucks: the emissions reductions in lab tests do not translate to lasting on-road reductions over vehicle lifetimes in real-world duty cycles.[200] To address this, the rule includes changes to: numerical stringency of existing test procedures for NO_X and PM; lab test procedures; in-use verification; and warranty and vehicle lifetime adjustments. Each of those changes are described below, in comparison to the current federal program. Taken both individually and in total, these changes will not cause California's new motor vehicle emission program to become less protective of public health than the current federal requirements.

a) Numerical Stringency of Current Test Procedures

The certified levels of NO_X and PM emissions for medium- and heavy-duty engines are measured via the transient federal test procedure (FTP) and the supplemental steady-state emissions test (SET) procedure. Compared to the current average federal requirements on the FTP/SET cycles, the Omnibus Rule achieves a 75% reduction in NO_X emissions in 2024 and a

---

[198] CARB, *Strategies for Reducing Emissions from On-Road Heavy-Duty Trucks: 2022 AQMP Mobile Source Working Group* 35 (Jan. 26, 2020), http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/printer-friendly-combind-hd-trucks-carb-biz-aqmp-presentations-1-26-21.pdf?sfvrsn=14 (*see* Slide 69, "Total Investment–Near Zero and Zero Emission Trucks (2017 to present)").

[199] CARB, *Proposed 2016 State Strategy for the State Implementation Plan* 45–50 (May 17, 2016), https://ww3.arb.ca.gov/planning/sip/2016sip/2016statesip.pdf.

[200] Concern about diesel emission controls' reliability on 2007/2010-compliant engines were raised at least as far back as 2013 in a report funded by the South Coast Air Quality Management District. Wayne Miller et al., *In-Use Emissions Testing and Demonstration of Retrofit Technology for Control of On-Road Heavy-Duty Engines* (Sept. 2013) at Executive Summary, https://lazerinitiative.org/resources/in-use-emissions-testing-and-demonstration-of-retrofit-technology-for-control-of-on-road-heavy-duty-engines-2/. CARB followed up with a more extensive demonstration of the failure of diesel emission controls to effectively reduce emissions in many on-road cycles. CARB, *Staff Report: Initial Statement of Reasons, Proposed Proposed Amendments to the Exhaust Emissions Standards and Test Procedures for 2024 and Subsequent Model Year Heavy-Duty Engines and Vehicles, Heavy-Duty On-Board Diagnostic System Requirements, Heavy-Duty In-Use Testing Program, Emissions Warranty Period and Useful Life Requirements, Emissions Warranty Information and Reporting Requirements, and Corrective Action Procedures, In-Use Emissions Data Reporting Requirements, and Phase 2 Heavy-Duty Greenhouse Gas Regulations, and Powertrain Test Procedures* at ES-5 (June 23, 2020) ("Omnibus ISOR"). https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hdomnibuslownox/isor.pdf.

90% reduction in 2027.[201] For PM, the Omnibus rule reduces the limit by 50% compared to current federal requirements.

b) Additional Lab Test Procedures

CARB has documented that heavy-duty engines quickly exceed manufacturers' emissions specifications by as much as 700% in real-world duty cycles. To deal with this, the Omnibus rule has two lab test cycle requirements that the current federal standards do not. The first is an additional requirement on engine idling. While California first introduced the Clean Idle standard for diesel engines in 2008, the federal program has no such requirement. In addition to updating the Clean Idle standard, the Omnibus rule introduces a new low-load test cycle, meant to capture emissions under low-load and low-speed urban driving operations where today's emission controls are most frequently operating at suboptimal efficiency.[202] These test procedures are required for all medium- and heavy-duty diesel engines. Because there is no current analogous federal requirement, by definition these requirements are more protective.

c) In-use Requirements

The current federal in-use testing program requires that an engine not exceed a certain level of emissions within a specific range of engine operation (the so-called "not to exceed" [NTE] requirement), as measured by a portable emissions measurement system (PEMS) on the vehicle. However, with a significant number of exemptions related to engine and emissions control operating conditions, as well as changes to the way in which modern diesel engines operate, a significant amount of engine operation and its associated emission data is removed from the dataset used to measure compliance with the current heavy-duty in-use testing (HDIUT) requirements, making the current federal HDIUT program inadequate in ensuring that HD engines' emissions are well-controlled under a wide range of in-use operating conditions.[203]

In the Omnibus rule, California sought to address this deficiency by revising their regulations to ensure that real-world operation of emission control performance is accurately represented in their test procedures. As a result, CARB adopted a new HDIUT program based on a "moving average window" (MAW) approach used in Europe.

By changing in-use test procedures, CARB's regulations are much more accurate at detecting the non-compliant operation of current emission control systems. The Omnibus rule better ensures

---

[201] These reductions refer to the full useful life for light- and medium-heavy-duty diesel engines as well as heavy-duty Otto-cycle engines, and to the intermediate useful life of 435,000 miles for heavy-heavy-duty diesel engines. *See* CARB, Omnibus ISOR, at ES-8.

[202] *See, e.g.*, Yu Jiang et al., *Characterizing Emission Rates of Regulated Pollutants from Model Year 2012 + Heavy-Duty Diesel Vehicles Equipped with DPF and SCR Systems*, 619–620 Sci. Total Env't 765 (Apr. 1, 2018), https://www.sciencedirect.com/science/article/abs/pii/S0048969717331789?via%3Dihub.

[203] EPA has explained that because measurements of emissions occurring below certain torque, power, and speed values are currently excluded from consideration, as are data occurring in certain ambient conditions or when aftertreatment temperatures are below a certain level, less than 10% of the data collected during a typical in-use test is actually subject to EPA's current in-use emission standards. 87 Fed. Reg. at 17,472. Moreover, EPA found that emissions are high during many of the excluded periods of operation, and that low load operation–which is often excluded due to aftertreatment temperature drops below the exclusion criteria–could account for more than half of a vehicle's NO_X emissions during a typical workday. *Id.*

that emission reductions observed in the lab test procedures are translated in-use under a broader range of operating conditions in the real world, particularly under the low-load operations likely to be experienced in urban environments. These conditions represent both a significant local public health hazard and a blind spot in current federal regulations, making CARB's adjustment to the HDIUT program significantly more protective of public health than the current federal requirements.

d) Warranty and Lifetime Mileage Adjustments

California has long used emissions warranty periods and regulatory useful lifetime periods to ensure the certified emission performance is maintained throughout most of an engine's life and as tools to clarify to consumers, manufacturers, and the vehicle service industry the rights, liability, and responsibilities regarding engine and emissions controls. In the case of both light- and heavy-duty vehicles, California's warranty requirements predate those at the federal level.[204]

The federal warranty requirements have not been adjusted in over 40 years.[205] Since then, engine technology and durability have improved significantly. Heavy-duty diesel engines last well beyond the current regulatory useful lifetime, with 90% of engines lasting nearly double the current regulatory requirement, and 50% of Class 8 engines nearly triple.[206] This mismatch extends to the warranty period, where the federal standard 100,000-mile warranty requirement is only a very small fraction of the expected lifetime of the engine and is well behind typical manufacturer warranties and extended warranties of 250,000 and 500,000 miles. Many diesel trucks in port drayage service have 1,000,000 miles or more on their odometers.

In 2018, CARB approved increases to heavy-duty vehicle warranties, applicable beginning in MY 2022. These were followed by adjustments to both warranty length and full useful life (FUL) in the Omnibus rule. For HHDD engines, an intermediate useful life (IUL) requirement was also added, to provide more protection regarding in-use emission performance.

The useful life is critical to ensure adequate demonstration by the manufacturer that emissions controls are functional for the life of the engine. The warranty period is equally important to minimize tampering or disrepair, and it shifts the cost of failures onto the manufacturer rather than the vehicle owner or end user, which increases the likelihood that the repairs will be made by the end user given the associated costs. Survey data has shown that there is a significant

[204] 13 Cal. Code Regs § 2039 (Dec. 14, 1978) ("Emission Control System Warranty Regulations"); 47 Fed. Reg. 49,802 (Nov. 2, 1982); 49 Fed. Reg. 24,320 (June 12, 1984).
[205] 48 Fed. Reg. 52,170 (Nov. 16, 1983).
[206] B10 is defined as the mileage before which 10% of the fleet will require a major repair, overhaul, or replacement. Similarly, B50 is defined as the mileage before which 50% of the fleet will require a major repair, overhaul, or replacement. Data on the B10/B50 statistics are presented by CARB at CARB, *Proposed Heavy-Duty Vehicle (HDV) Warranty Period Amendments, Public Workshop* 14 (July 12, 2017), https://ww2.arb.ca.gov/sites/default/files/classic/msprog/hdlownox/files/workshop071217/warrantyws_presentation.pdf.

interest on the part of vehicle owners in coverage that better reflects the operational lifetime of the vehicle.[207]

Federal warranty and useful life periods are woefully out of date and are inconsistent with the real-world operation of modern diesel engines. The Omnibus rule significantly increases both the warranty and useful life length as compared to the federal periods, which increases the likelihood that engines will maintain their certified emission performance over their entire life in the real world. In addition to requiring manufacturers to design more durable emission control systems the new requirements also reduce costs for operators to keep their engines properly maintained and operating. In doing so, CARB's Omnibus requirements are again more protective than the existing federal requirements.

In sum, it was not arbitrary or capricious for California to determine that the Omnibus rule will not cause California motor vehicle and off-road engine emission standards, in the aggregate, to be less protective of public health and welfare than applicable federal standards. This is especially clear where, as here, the standards in the Omnibus rule meet the requirements of Section 209(b)(2) as being at least as stringent as the comparable applicable federal standard. California's waiver request for the Omnibus rule clearly satisfies the protectiveness criterion under Section 209(b)(1)(A).

2. California's Omnibus Rule is Consistent with Section 202(a) of the Clean Air Act.

In analyzing the Omnibus rule's consistency with Section 202(a) under the consistency criterion of Section 209(b)(1)(C), EPA's inquiry is limited to whether California's standards present "inadequate lead time to permit the development of the necessary technology giving appropriate consideration to the cost of compliance within that time period or if the Federal and State test procedures impose inconsistent certification procedures,"[208] such that California's program would become infeasible.

California has provided a thorough and well-supported demonstration that the Omnibus rule standards are feasible for the model years to which they apply and would not make California's motor vehicle program inconsistent with Section 202(a).[209] As California notes, medium- and heavy-duty diesel engines can meet all of the Omnibus rule's standards through several reasonably available technologies, including: engine technologies such as improved engine calibration, cylinder deactivation, and variable valve actuation; technologies to improve the performance of Selective Catalytic Reduction (SCR) systems, such as bypass valves, improved catalyst formulations, advanced architectures and other improvements to aftertreatment systems; and engine designs, including the opposed piston engine.[210] Otto-cycle engines can meet the

[207] Barbi Kerschner & David Barker, *Survey and Analysis of Heavy-Duty Vehicle Warranties in California*, prepared for CARB by the Institute for Social Research, at vii-ix (Dec. 2017), https://ww3.arb.ca.gov/regact/2018/hdwarranty18/apph.pdf.
[208] 87 Fed. Reg. at 35,766–67 (Omnibus rule); 87 Fed. Reg. at 35,770 (ACT rule); 87 Fed. Reg. at 35,762 (Warranty Amendments).
[209] *See generally* Omnibus Rule Waiver Request at 52–77.
[210] *Id.* at 54–55.

Omnibus rule's standards through technologies increasing the efficacy of three-way-catalysts, including higher cell density and thinner wall design, insulation providing better passive heat retention, high oxygen storage material, and advanced air/fuel ratio controls.[211]

MY 2024–2026 NO_X Standards: Diesel engines can meet the Omnibus rule's NO_X standards for MY 2024 through 2026 without any redesign of existing engines, through engine calibration strategies that reduce cold-start emissions and currently available exhaust aftertreatment systems.[212] Southwest Research Institute (SwRI) and the Manufacturers of Emission Controls Association have conclusively demonstrated that those technologies permit compliance with a 0.02 g/bhp-hr tailpipe NO_X emission standard by modern heavy-duty diesel engines.[213] And gasoline fueled Otto-cycle engines can meet those standards through "minor improvement to three-way catalysts, air-fuel ratio controls and other engine calibration strategies."[214] Manufacturers have already certified CNG and LPG-fueled Otto-cycle engines to a 0.02 g/BHP-hr NO_X standard.[215]

MY 2027 NO_X Standards: California has shown that medium- and heavy-duty diesel engines can meet the Omnibus rule's NO_X standards for MY 2027 onwards.[216] SwRI has demonstrated that a technology package based on engine calibration strategies, cylinder deactivation, and an advanced aftertreatment system will produce diesel-engine NO_X emissions that meet the Omnibus rule's standards.[217] Subsequent research by SwRI shows that additional modifications to diesel engines' aftertreatment system can produce NO_X emissions below the Omnibus rule's requirements.[218] Those analyses indicate, moreover, that these technologies permit compliance without significant increases in GHGs.[219] And Achates Power's opposed-piston engine, which is currently being deployed commercially, has also shown emissions below the Omnibus rule's standards.[220] Otto-cycle engines have been certified to levels indicating that they can meet the MY 2027 NO_X standard with only "minor refinements to existing compliance technologies."[221]

---

[211] *Id.* at 55–56.
[212] *Id.* at 56.
[213] *Id.* at 57.
[214] *Id.* at 58.
[215] *Id.*
[216] *Id.* at 11 (stating standards applicable to different engines across different test procedures, and at different useful-life stages, can be met through combinations of the available technologies described above); *id.* at 59 (stating compliance may primarily be achieved through "combinations of improved engine calibration strategies…; hardware strategies …; insulation and packaging of exhaust aftertreatment components; and advanced aftertreatment system architectures").
[217] *Id.* at 59–61.
[218] Memo from James Sanchez to Docket EPA-HQ-OAR-2019-0055 (May 3, 2022), https://www.epa.gov/system/files/documents/2022-05/epa-hq-oar-2019-0055-1082-docket-memo-testing-2022-05-03.pdf (describing results of emissions testing after (1) replacing zone-coated catalyzed soot filter with separate diesel oxidation catalyst and diesel particulate filter and (2) improving diesel exhaust fluid mixing with exhaust for an underfloor SCR).
[219] Omnibus Rule Waiver Request at 61.
[220] *Id.* at 62. *See also* Achates Power, *Near-Zero Heavy-Duty Diesel Engine Enters Fleet Service* (Apr. 6, 2022), https://achatespower.com/wp-content/uploads/2022/04/Achates-Power-Ultralow-NOx-Heavy-Duty-Diesel-Engine-Enters-Fleet-Service.pdf.
[221] Omnibus Rule Waiver Request at 62.

PM Standards: Existing medium- and heavy-duty diesel and Otto-cycle engines can all meet the Omnibus rule's PM emission standard for MY 2024 onwards with no, or very limited, modifications. Indeed, most diesel engines are already certifying to emissions levels below that standard,[222] and Otto-cycle engines are meeting the Omnibus rule's PM standard using extant technology.[223]

CARB's assessment of costs shows that compliance with the Omnibus rule only minimally increases vehicle purchase prices.[224] The Omnibus rule's averaging, banking, and trading provisions provide flexibilities that further ensure its achievability and reduce its cost—allowing, for example, manufacturers to utilize credits generated through early certification.[225]

Finally, the Omnibus rule imposes test procedures that are consistent with federal certification requirements.[226] For these reasons, EPA cannot find that the Omnibus rule would make California's motor vehicle emission program inconsistent with Section 202(a), nor is the Omnibus rule itself inconsistent with Section 202(a).

C. EPA Must Grant Waivers for the Advanced Clean Trucks, Zero Emission Airport Shuttle, and Zero-Emission Power Train Certification Regulations.

1. California's Protectiveness Determination for the MHD ZEV Rules is Not Arbitrary or Capricious.

California determined that the MHD ZEV rules "will not cause California motor vehicle emission standards, in the aggregate, to be less protective of public health and welfare than applicable federal standards."[227] This finding is well-supported in the record and there is no basis upon which to find CARB's determination arbitrary and capricious.

As CARB explains, the MHD ZEV rules "are more stringent than any applicable federal requirements, because there are no comparable federal requirements."[228] As CARB also notes, neither the federal standards nor California's pre-existing motor vehicle emissions program require medium- and heavy-duty vehicles and engines to meet zero emission standards, and

---

[222] *Id.* at 58 (noting that CARB certification data "indicates that 93 percent of 2019 MY heavy-duty diesel engine families certified to PM levels at or below 0.004 g/bhp-hr").
[223] *Id.* (noting that "92 percent of MY heavy-duty Otto-cycle engine families certified to the optional low NO_X standards … have PM certification levels below 0.005 g/bhp-hr").
[224] *Id.* at 71–72 ("[T]he incremental lifetime cost for a heavy-duty vehicle powered by a 2031 MY heavy-duty Otto-cycle engine is $710, representing 0.7 percent of the purchase price," "the incremental lifetime cost for a medium-duty vehicle powered by a 2031 MY medium-duty diesel engine is $4355, which represents 8.3% of the purchase price, and the incremental lifetime costs for light-, medium-, and heavy-duty diesel engines are $5773, $6347, and $6057, respectively," 3.5–10% of those vehicles' purchase prices).
[225] *Id.* at 21–23, 63.
[226] *Id.* at 72, 77 (stating that "CARB is not aware of any instances in which a manufacturer is precluded from conducting one set of tests on a medium-duty or heavy-duty engine or vehicle to determine compliance with both California and federal requirements," and noting no issue regarding incompatibility between California and federal test procedures, because the Amendments harmonize California's certification test requirements for 2024 and subsequent model diesel-fueled APUs with the corresponding federal certification test requirements).
[227] MHD ZEV Rules Waiver Request at 19–21.
[228] *Id.*; *See also* 74 Fed. Reg. 32,744, 32,755 (July 8, 2009) ("Indeed, California standards may be most clearly 'at least as protective' when they are compared in the absence of Federal emission standards.").

therefore the adoption of the MHD ZEV rules could not render California's motor vehicle emission standards, in the aggregate, to be less protective than the federal standards.[229] As noted herein, the MHD ZEV rules will reduce emissions of NO_X and PM statewide, and so by definition are more protective of public health and welfare than the less rigorous federal standards. CARB has shown that the MHD ZEV rules will help California reduce heavy-duty vehicle criteria pollutant emissions and improve public health, and therefore that they could not possibly cause California's motor vehicle emissions program, "which relies upon protectiveness determinations that EPA has previously determined were not arbitrary and capricious"[230] to become less protective than federal standards.

2. California's MHD ZEV Rules are Consistent With Section 202(a) of the CAA.

California's MHD ZEV rules will not cause California's medium- and heavy-duty vehicles program to become infeasible, because medium- and heavy-duty ZEV technology is feasible and cost-effective and because these regulations do not impose inconsistent certification requirements.[231]

Given technological advancements and substantial investments and commitments in the public and private sectors, greater adoption of zero-emission technologies is clearly feasible within the timelines required by California's regulations. California's ACT rule phases in MHD ZEV sales requirements between MY 2024 and MY 2035, from 5–9% of total sales (depending on vehicle class) in MY 2024 up to 40–75% of total sales (depending on vehicle class) by MY 2035. Similarly, California's ZEAS rule phases in in-use fleet composition requirements, requiring 33% of the relevant public and private airport shuttle fleet to be zero-emissions by the end of 2027, 66% by the end of 2031, and 100% by the end of 2035.

These specific requirements are feasible and achievable. A 2021 analysis by M.J. Bradley & Associates concluded that at least 60% of medium- and heavy-duty trucks and buses are already highly suited to electrification with currently available EV models.[232] And a recent EDF White Paper, *The Opportunity for Electrification of Medium- and Heavy-Duty Vehicles*, demonstrated the feasibility of nationwide standards that would require 40% ZEV sales by MY 2029 for new class 4–8 single unit trucks and class 8 short haul tractors, and 80% ZEV sales by MY 2029 for new school and transit buses.[233] The ACT rule's MY 2029 ZEV requirements are 40% for Class 4–8 trucks and 25% for Class 2b–3 trucks and Class 7–8 tractors—in line with what EDF's assessment found to be cost-competitive and feasible not only in California (which leads the nation in MHD ZEV sales), but nationwide.

---

[229] MHD ZEV Rules Waiver Request at 19–21.
[230] *Id.* at 19.
[231] The certification consistency criterion is inapplicable to the ACT, ZEAS, and ZEP regulations. *See* MHD ZEV Rules Waiver Request at 39 (inapplicable as there are no analogous federal requirements, meaning that engine manufacturers are not precluded from complying with both California and federal test requirements with one test engine or vehicle).
[232] Dana Lowell & Jane Culkin, M.J. Bradley & Associates, *Medium- and Heavy-Duty Vehicles: Market Structure, Environmental Impact, and EV Readiness* (July 2021).
[233] EDF, Comment re Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards, Docket ID No. EPA-HQ-OAR-2019-0055 at 2 (May 16, 2022) (hereinafter "EDF Heavy-Duty Comment"); EDF, *The Opportunity for Near-Term Electrification of Medium- and Heavy-Duty Vehicles* (May 2022).

As detailed below, momentum for MHD ZEV development and production is accelerating rapidly, both in California and beyond. Rapid manufacturer product development, private fleet commitments, numerous recent cost studies, nationwide market trends, MHD ZEV programs within California, and recent federal and state investments and actions all demonstrate the technological feasibility and cost-competitiveness of ZEVs. This evidence shows that California's regulations are entirely consistent with the requirements of Section 202(a).

a) Manufacturer Product Development and Commitments Reveal that Zero-Emission Technologies are Already Feasible and Cost-Competitive in Medium- and Heavy-Duty Market Segments.

Manufacturers are already planning, testing, and manufacturing a wide array of MHD zero-emission technologies, indicating that California's regulations are clearly feasible and that manufacturers are in a strong position to comply within the lead time provided. EPA should consider manufacturers' vehicle offerings, plans, and commitments when considering a waiver for California's regulations under Section 209(b)(1)(C), as they offer direct evidence of technological feasibility.

Examples of manufacturer announcements and commitments within the MHD ZEV sector are numerous. At the Advanced Clean Transportation Expo in May 2022, manufacturers such as Cummins and Navistar committed to deploying zero-emission technologies at a pace consistent with or more rapid than California's regulations. Cummins CEO Tom Linebarger stressed the need "to move faster for the sake of our kids and grandkids,"[234] and Navistar CEO Mathias Carlbaum suggested that "[b]y 2030…50% of all trucks by volume will be BEVs."[235] Navistar's CEO reiterated to reporters that "[w]e believe 50% of our sales will be electric by 2030," and that 100% of sales would be ZEVs by 2040.[236] Other manufacturers have indicated similar plans and timelines. For example, Daimler Trucks expects 60% of its truck sales to be zero-emissions by 2030,[237] and Volvo expects 50% of its truck sales to be zero-emissions by 2030.[238] Manufacturers have also specifically said they can meet California's standards. PACCAR's Chief Technology Officer stated at a recent investor conference that the company "will meet [the standards in the California and EPA rules] with class leading products."[239] These estimates—from the manufacturers themselves—clearly align with or surpass the ACT rule's manufacturer ZEV sales requirements. For example, in 2030, the ACT rule requires that ZEV sales make up 30% of Class 2b–3 vehicles, 50% of Class 4–8 vehicles, and 30% of Class 7–8

[234] Jack Roberts, *Cummins CEO: Get on the Path to Net-Zero Emissions*, HDT Truckinginfo (May 12, 2022), https://www.truckinginfo.com/10170751/cummins-ceo-get-on-the-path-to-net-zero-emissions.
[235] Jack Roberts, *Navistar CEO Calls for Long-Term Commitment to Net Zero*, HDT Truckinginfo (May 12, 2022), https://www.truckinginfo.com/10170459/navistar-ceo-calls-for-long-term-commitment-to-get-to-net-zero.
[236] Alan Ohnsman, *Big Rigs Going Electric as Navistar, Cummins, Daimler Rev Up Next-Generation Trucks*, Forbes (May 13, 2022), https://www.forbes.com/sites/alanohnsman/2022/05/13/big-rigs-going-electric-as-navistar-cummins-daimler-rev-up-next-generation-trucks/?sh=5daf4f25419d.
[237] Deborah Lockridge, *What Does Daimler Truck Spin-Off Mean for North America?*, Truckinginfo (Nov. 11, 2021), https://www.truckinginfo.com/10155922/what-does-daimler-truck-spin-off-mean-for-north-america.
[238] Deborah Lockridge, *Volvo: Take the Leap in Electrification*, Truckinginfo (Oct. 12, 2021), https://www.truckinginfo.com/10153752/volvo-take-the-leap-in-electrification.
[239] John Rich, PACCAR CTO, PACCAR investor conference, video recording at minute 28 (June 1, 2022), https://www.paccar.com/investors/investor-conference/.

vehicles—values clearly in line with what manufacturers are planning for and see as achievable.[240]

According to ACEEE, "growing numbers of electric truck and bus models are reaching the market or are scheduled to be on the market soon, with models ranging from heavy-duty pickup trucks to 18-wheel tractor-trailers."[241] The pace of innovation in this sector has accelerated in recent years. In 2016, Oak Ridge National Laboratory identified just eight commercially available medium- and heavy-duty ZEV options.[242] By 2019 this number had grown more than tenfold. Research by the Union of Concerned Scientists (UCS) in 2019 provides what EPA has referred to as "a snapshot of BEVs in the heavy-duty truck and bus markets."[243] According to this "snapshot," by 2019 there were already at least 82 different MHD ZEV models: 34 trucks and 48 buses.[244] And by MY 2020, the market had grown even larger. EPA's research conducted for the 2022 Heavy-Duty Engine and Vehicle Standards proposal reveals that by 2020, the number of ZEVs available for purchase climbed to at least 177 unique makes and models from 52 producers in regulatory classes 3–8.[245] Globally, CALSTART has estimated that there were approximately 433 zero-emission truck and bus models available in 2020, and expects this to grow to 544 models by the end of 2022.[246] Many of these vehicles are already on the road. According to CALSTART, as of December 2021, 1,215 Class 2b through 8 ZEVS have been deployed in the United States across over 163 fleets.[247] And as of December 31, 2018, there were already over 110 zero-emission airport shuttles in operation or on order in California.[248]

These models are not limited to certain categories, but span the range of vehicle classes, with zero-emission technologies achievable and feasible even for long-haul applications, particularly beyond MY 2027. ACEEE noted over a year ago that "many manufacturers are now road-testing electric tractor prototypes for hauls significantly longer than 100 miles…Daimler, Peterbilt, Tesla, and Volvo seem to be furthest along, but several other companies are also developing products."[249] The pattern of driving for many long-haul routes also supports a path to achieving zero emissions. According to a recent report by the North American Council for Freight Efficiency (NACFE), about half of all Class 8 tractors engaged in regional-haul applications

---

[240] MHD ZEV Rules Waiver Request at 8, Tbl.III-1.
[241] Steven Nadel & Peter Huether, ACEEE, *Electrifying Trucks: From Delivery Vans to Buses to 18-Wheelers* iv (June 2021).
[242] Paige Jadun et al., NREL, *Electrification Futures Study: End-Use Electric Technology Cost and Performance Projections through 2050* 20 (2017), https://www.nrel.gov/docs/fy18osti/70485.pdf (citing Alicia K. Birky et al., Oak Ridge National Laboratory, *Transportation Electrification Beyond Light Duty: Technology and Market Assessment* (Sept. 2017), https://info.ornl.gov/sites/publications/Files/Pub72938.pdf).
[243] 87 Fed. Reg. at 17,595; EPA, Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards: Draft Regulatory Impact Analysis, at 58–59 (Mar. 2022). *See also* UCS, *Ready for Work: Now Is the Time for Heavy-Duty Electric Vehicles* (2019), https://www.ucsusa.org/resources/ready-work.
[244] *Id.*
[245] *See* Angela Cullen, HD2027 Proposed Changes to Heavy-Duty Greenhouse Gas Emissions—Memorandum to Docket, at 2, Docket No. EPA-HQ-OAR-2019-0055 (Nov. 2021); 87 Fed. Reg. at 17,595.
[246] CALSTART, *New Data Tracks 26% Growth of Zero-Emission Truck and Bus Model Availability Globally in Midst of Economic, Supply Chain Challenges*, https://calstart.org/new-data-tracks-growth-of-zero-emission-truck-and-bus-model-availability-globally-in-midst-of-economic-supply-chain-challenges/.
[247] Al-Alawai Baha et al., CALSTART, *Zeroing In on Zero-Emission Trucks* (Jan. 2022), https://calstart.org/wp-content/uploads/2022/02/ZIO-ZETs-Report_Updated-Final-II.pdf.
[248] MHD ZEV Rules Waiver Request at 33.
[249] Nadel & Huether (2021), at 18.

(range of about 200 miles) could already switch to battery-electric technology "with minimal or no impact on operations, productivity, or efficiency."[250] The Federal Motor Carrier Safety Administration also has several restrictions on the driving hours for long-haul trucks. The maximum continuous driving allowed without a 30-minute mandatory break is 8 hours (approximately 450 miles), meaning that "a range of 500 miles will be sufficient to cover the maximum allowed continuous driving."[251] Long-range tractor models, including at least one with a range of up to 500 miles, are scheduled to enter the market soon.[252] For example, Tesla's Semi, expected to hit the market next year, will have a range of 500 miles at highway speed, and will be powered by a new solar-powered high-speed DC charging system that will supply about 400 miles of electricity in 30 minutes.[253] Moreover, nearly 80% of freight in the United States is transported less than 250 miles, meaning that 500-mile range is not necessary for all long-haul applications.[254] Daimler's Mercedes-Benz brand has started customer testing a new long-haul truck, the eActros LongHaul, which has a 310-mile range and should be ready for production by 2024.[255] Hydrogen Fuel Cell Electric Vehicles (FCEVs) are also scheduled to enter the heavy-duty truck market in 2022, and will provide an alternative to BEVs that may be attractive in long-haul applications.[256]

Manufacturers have formed alliances to encourage policies hastening ZEV deployment. The National Zero-Emission Truck (ZET) Coalition is a group of America's biggest truck equipment manufacturers, suppliers, and key stakeholders, such as Cummins, Daimler, PACCAR, Eaton, Tesla, and Rivian. The ZET Coalition has been advocating for federal charging and refueling infrastructure and increased federal investments and incentive programs to help drive the near-term production of ZEV trucks and buses in the United States.[257] The European Automobile Manufacturers Association—which includes Scania, Daimler Truck AG, Ford Trucks, and Volvo Group, among others—together with the Potsdam Institute for Climate Impact Research, has pledged that by 2040 all new commercial vehicles sold must be fossil free.[258] And the Zero Emission Transportation Association (ZETA)—a coalition of major businesses including electric vehicle manufacturers, power companies, and many others—has urged adoption of ambitious

[250] Jack Roberts, *Half of All Regional-Haul Trucks Could Go Electric Now*, Truckinginfo (May 5, 2022), https://www.truckinginfo.com/10169971/half-of-all-regional-haul-trucks-could-go-electric-now; *see also* North American Council for Freight Efficiency, *Electric Trucks Have Arrived: The Use Case for Heavy-Duty Regional Haul Tractors* (May 2022), https://nacfe.org/wp-content/uploads/edd/2022/05/HD-Regional-Haul-Report-FINAL.pdf.
[251] Amol Phadke et al., *Why Regional and Long-Haul Trucks are Primed for Electrification Now* 5, Lawrence Berkeley National Laboratory (Mar. 2021).
[252] Nadel & Huether (2021), at v.
[253] John O'Dell, *Elon Musk Unveils Superfast, 500-mile Range Tesla Semi-Truck*, trucks.com (Nov. 17, 2017), https://www.trucks.com/2017/11/17/elon-musk-unveils-tesla-electric-semi-truck/.
[254] *Id.*
[255] Mike De Socio, *Keep Your Eyes on These 9 Electric Truck and Van Companies in 2021*, GreenBiz (Jan. 4, 2021), https://www.greenbiz.com/article/keep-your-eyes-these-9-electric-truck-and-van-companies-2021.
[256] Chris Randall, *Hyzon to Deliver 18 FC Trucks to Hylane*, Electrive.com (Apr. 11, 2022), https://www.electrive.com/2022/04/11/hyzon-to-deliver-18-fc-trucks-to-hylane/#:~:text=Delivery%20of%20the%20vehicles%20is,part%20of%20Hylane%27s%20mobility%20model.
[257] CALSTART, *National Zero-Emission Truck Coalition Statement of Principles* (June 2020), https://calstart.org/zet-statement-of-principles-6-17-20/.
[258] ACEA & Potsdam Institute for Climate Research, *Joint Statement: The Transition to Zero-Emission Road Freight Transport* (Dec. 2020), https://www.acea.auto/uploads/publications/acea-pik-joint-statement-the-transition-to-zero-emission-road-freight-trans.pdf.

policies to support medium- and heavy-duty electrification, including multi pollutant standards under the Clean Air Act.[259] These industry efforts show that manufacturers are ready, willing, and able to ramp up their production of MHD ZEVs.

The numbers of MHD ZEVs on the market and on the road are certain to increase further, confirming the feasibility of the California regulations. "[G]iven the dynamic nature of the BEV market, the number and types of vehicles available are changing fairly rapidly,"[260] as evidenced by the increasing frequency of new MHD ZEV product announcements and commitments by manufacturers. A non-exhaustive sampling of manufacturer actions and commitments is included below in Table 3.

Table 3: Manufacturer Commitments for MHD ZEV Production

Manufacturer	**Commitments or actions**
Daimler Trucks	● Expects 60% of truck sales to be ZEVs by 2030.[261] ● Announced goals of selling only carbon neutral commercial vehicles across all markets by 2039.[262] ● Freightliner division currently taking orders for all-electric eCascadia and eM2 trucks.[263] ● Freightliner division has developed electric versions of Cascadia Class 8 tractor, M2 Class 6 medium-duty chassis, and MT50 medium-duty step van.[264] ● Freightliner Electric Innovation Fleet has been operating at customer sites, totaling over one-million miles of operation as of October 2021.[265] ● Partnered with NextEra Energy Resources and BlackRock Renewable Power in January 2022 to invest approximately $650 million to design, develop, install, and operate a nationwide charging network for M/HD BEV and hydrogen fuel cell trucks.[266] ● Full line of ZEV commercial vehicles could be ready by 2027.[267] ● Built the first prototypes of the battery-electric long-distance truck eActros LongHaul and plans to test them on public roads this year.[268]

[259] *See* Zero Emission Transportation Association website, https://www.zeta2030.org.
[260] 87 Fed. Reg. at 17,595.
[261] Deborah Lockridge, *What Does Daimler Truck Spin-Off Mean for North America?*
[262] Rachel MacIntosh et al., EDF, *Electric Vehicle Market Update* 29 (Apr. 2022) ("EDF EV Market Update"); David Cullen, *Daimler to Offer Carbon Neutral Trucks by 2039* (Oct. 25, 2019), https://www.truckinginfo.com/343243/daimler-aims-to-offer-only-co2-neutral-trucks-by-2039-in-key-markets.
[263] *Id.*
[264] *Id.*
[265] *Id*.; Daimler Truck, *One Million Real-World Electric Miles: Freightliner's Battery Electric Customer Fleets Reach Important Milestone* (Oct. 5, 2021), https://northamerica.daimlertruck.com/PressDetail/one-million-real-world-electric-miles-freightliner-s-2021-10-05.
[266] EDF EV Market Update at 29; Heavy Duty Trucking, *Daimler Truck Plans to Create Nationwide Truck Charging Network*, Truckinginfo (Jan. 31, 2022), https://www.truckinginfo.com/10160673/daimler-truck-plans-to-create-nationwide-truck-charging-network.
[267] Reuters, *Daimler Trucks Labour Chief Wants Clean Tech Investments in Germany* (Feb. 13, 2021), https://www.reuters.com/article/us-daimler-trucks-divestiture-idUSKBN2AD0EO.
[268] Chris Randall, *Daimler Truck Reveals First eActros LongHaul Prototype*, electrive.com (May 30, 2022), https://www.electrive.com/2022/05/30/daimler-truck-reveals-first-eactros-longhaul-prototype/.

	• Daimler's Mercedes-Benz division unveiled a new electric-fuel cell truck, the GenH2, which has potential to drive more than 600 miles before refueling and should be commercially available by 2025.[269]
Envirotech Vehicles Inc.	• Investing $280.7 million in manufacturing all-electric, ZEVs and zero-emission drive trains for medium to heavy-duty commercial vehicles.[270]
General Motors	• In January 2021, launched BrightDrop, which focuses on electric first-to-last-mile products, software, and services. Working with FedEx to add up to 20,000 ZEVs to the fleet.[271] • Will release two all-electric models in 2021.[272]
Ford	• In 2022, increased its planned investment in EVs and autonomous vehicles from $11 billion to over $50 billion through 2026.[273] • Invested $100 million to upgrade its Kansas City Assembly Plant and hired 150 new employees to build its electric E-Transit cargo van, which began shipping out in early 2022.
Lion Electric Company	• Started work on a new factory in early 2022 that will "represent the largest dedicated production site for zero-emission medium and heavy-duty vehicles in the U.S. upon its completion, with an expected annual production capacity of up to 20,000 vehicles per year,"[274] a nine-fold increase in production capacity.[275]
Mack Trucks	• Added production of Mack LR Electric model as part of $84 million site overhaul.[276]
Navistar	• Launched NEXT eMobility solutions unit to focus on electrification in truck and school bus markets.[277] • Developed prototype electric school bus and electric truck.[278]

[269] De Socio, *Keep Your Eyes on These 9 Electric Truck and Van Companies in 2021*.
[270] EDF EV Market Update at 58, Appendix D; Andrew Moreau, *Electric-Vehicles Firm Going to Osceola Plans to Invest Millions, Hires 800 Workers*, Arkansas Democrat Gazette (Feb. 23, 2022), https://www.arkansasonline.com/news/2022/feb/23/electric-vehicles-firm-going-to-osceola/.
[271] EDF EV Market Update at 29; General Motors, *GM Launches BrightDrop, a New Business That Will Electrify and Improve the Delivery of Goods and Services* (Jan. 12, 2021), https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2021/jan/ces/0112-brightdrop.html.
[272] EDF EV Market Update at 29.
[273] Aishwarya Nair et al., *Ford boosts EV spending to $50 billion, sets up new Model e unit*, Reuters (Mar. 2, 2022), https://www.reuters.com/business/autos-transportation/ford-run-ev-ice-businesses-separately-2022-03-02/.
[274] *Id.*
[275] Alejandro de la Garza, *U.S. School Buses May Never Be the Same Thanks to Biden's Infrastructure Plan*, Time (Nov. 15, 2021), https://time.com/6117544/electric-school-buses/.
[276] EDF EV Market Update at 61, Appendix D; Pamela Stroka-Holzmann, *Mack Trucks Completes $84M Plant Renovation in Lehigh County*, Lehigh Valley Live (Oct. 2, 2020), https://www.lehighvalleylive.com/allentown/2020/10/mack-trucks-completes-84m-plant-renovation-in-lehigh-county.html.
[277] EDF EV Market Update at 29.
[278] *Id.*; Navistar, *Navistar Launches New Business Unit*, NEXT eMobility Solutions (Oct. 28, 2019), https://news.navistar.com/2019-10-28-Navistar-Launches-New-Business-Unit-NEXT-eMobility-Solutions.

	● Launched fully electric International eMV series in August 2021.[279] ● Developing properties in Texas that will invest more than $275 million in electrification efforts.[280] ● Announced goals of ZEVs comprising 50% of sales volume by 2030, achieving 100% zero-emissions by 2040 across all operations, and achieving carbon neutrality by 2050.[281] ● Parent company Traton added more than $1 billion to its investment plans in electric mobility research and development.[282]
Nikola Motor Company	● Has over 9,000 orders for its hydrogen semi trucks.[283]
PACCAR's Kenworth & Peterbilt divisions	● Partnering with Dana for electric truck powertrain development.[284] ● Kenworth, Peterbilt, and DAF brands now have over 60 alternative-fuel trucks being tested in real-world applications across North America and Europe.[285] ● Has delivered hydrogen fuel cell Kenworth T680 trucks for field and performance testing.[286] ● Orders in the last three months of 2021 tripled over previous orders, with customers in 44 states.[287] ● Kenworth's T680E battery-electric refuse hauler rolled off the production line in Renton, WA in June.[288]
Blue Bird	● U.S. bus maker unveiled an electric Class 5–6 custom chassis developed in cooperation with Lightning eMotors. The fully electric commercial vehicle

[279] EDF EV Market Update at 29; Navistar, *Navistar Launches New Electric International eMV Series, Now in Production and Available to Order* (Aug. 31, 2021), https://news.navistar.com/2021-08-31-Navistar-Launches-New-Electric-International-R-eMV-TM-Series,-Now-in-Production-and-Available-to-Order.
[280] EDF EV Market Update at 29.
[281] Navistar presentation at the Advanced Clean Trucks (ACT) Expo, Long Beach, CA (May 9–11, 2022); *see also* EDF Heavy-Duty Comment at 8.
[282] Geerte de Lombaerde, *Traton Boosting its Trucking Electrification Investments*, Fleet Owner (Mar. 16, 2022), https://www.fleetowner.com/emissions-efficiency/article/21236316/traton-adding-to-electrification-investments.
[283] Sebastian Blanco, *Anheuser-Busch's Order for 800 Nikola Hydrogen Trucks is a Play for Younger Beer Drinkers*, Forbes (May 3, 2018), https://www.forbes.com/sites/sebastianblanco/2018/05/03/anheuser-busch-800-nikola-hydrogen-trucks/?sh=3f74aba74d4c.
[284] EDF EV Market Update at 29.
[285] Josh Fisher, *Paccar Tests More Zero-Emission Trucks Ahead of 2021 Production*, FleetOwner (July 30, 2020), https://www.fleetowner.com/emissions-efficiency/article/21137951/paccar-tests-more-zeroemission-trucks-ahead-of-2021-production.
[286] *Id.*
[287] Scooter Doll, *Kenworth Says Electric Truck Orders Have Tripled the Past Three Months, Quoting Customers in 44 States*, Electrek (Jan. 14, 2022), https://electrek.co/2022/01/14/kenworth-says-electric-truck-orders-have-tripled-the-past-three-months-quoting-customers-in-44-states/.
[288] Heavy Duty Trucking, *Kenworth T680E Battery-Electric Vehicle Rolls Out of Kenworth Renton Plant* (June 9, 2022), https://www.truckinginfo.com/10174186/kenworth-t680e-battery-electric-vehicle-rolls-out-of-kenworth-renton-plant

	chassis should enable a range of different fully electric vehicles including last-mile delivery step vans, motorhomes, and other specialty vehicles.[289]
Proterra	• Announced a $76 million investment in new zero-emission electric transit and commercial ZEV manufacturing operations.[290]
Rivian	• Has received orders from Amazon for 100,000 ZEVs, an order worth over $4 billion.[291]
Tesla	• Investing $1 billion in Gigafactory, to produce a range of ZEVs including the Tesla Semi Truck.[292] • As of 2018, Tesla had about 2,000 Semi pre-orders,[293] and pre-orders have continued.[294]
Volvo	• Using nearly $45 million in CARB grant funding, launched Volvo LIGHTS, focused on "providing a range of vehicle, charging, and workforce development innovations" in the HD ZEV market. Innovations include "new lithium-ion battery chemistries that increase energy density by more than 20 percent and prevent premature degradation to reduce cost, as well as multiple truck configurations with all-electric ranges of up to 250 miles."[295] • Currently taking orders for the electric Mack refuse truck[296] and its FH, FM, and FMX heavy electric trucks.[297] • Committed to selling 50% zero-emission trucks globally by 2030.[298]

[289] Carrie Hampel, *Blue Bird Expands into Class 5–6 Commercial Vehicles*, electrive.com (May 23, 2022), https://www.electrive.com/2022/05/23/blue-bird-expands-into-class-5-6-commercial-vehicles/.
[290] EDF EV Market Update at 62; South Carolina Office of the Governor, *Proterra Expanding South Carolina Operations with New EV Battery System Manufacturing Facility in Spartanburg County* (Dec. 14, 2021), https://governor.sc.gov/news/2021-12/proterra-expanding-south-carolina-operations-new-ev-battery-system-manufacturing.
[291] Fred Lambert, *Amazon Unveils its Rivian-made Electric Delivery Van with Cool Interior*, Electrek.com (Oct. 8, 2020), https://electrek.co/2020/10/08/amazon-rivian-electric-delivery-van-unveil-interior/.
[292] EDF EV Market Update at 41; Rebecca Hennes, *Tesla's New $1b 'Gigafactory' Will Open Near Austin, with Musk Calling it an 'Ecological Paradise,'* Houston Chronicle (July 23, 2020), https://www.chron.com/news/houston-texas/article/Tesla-Texas-gigafactory-Austin-Abbott-Musk-15428792.php.
[293] Luke Stangel, *Tesla Semi Picks Up Another Big Backer, the Country's Second-Largest Grocery Chain*, Silicon Valley Business Journal (Nov. 19, 2018), https://www.bizjournals.com/sanjose/news/2018/11/19/tesla-semi-big-customers-albertsons-tsla.html (noting pre-order announcement by Elon Musk).
[294] *See, e.g.*, Suvrat Kothari, *Tesla Semi: Everything We Know in May 2022*, TopElectricSUVs (Apr. 30, 2022), https://topelectricsuv.com/news/tesla/tesla-semi-all-we-know-feb-2022/#Large_order_book (noting Tesla's "large order book" including orders for 100 trucks by PepsiCo, 40 trucks by Anheuser-Busch, 130 trucks by Walmart, at least 150 trucks by Pride Group Enterprises, and 50 trucks plus plans to reserve "thousands more" by EV Semi-Fleet).
[295] EDF EV Market Update at 29; Volvo LIGHTS, About Volvo LIGHTS (last accessed Aug. 2, 2022), https://www.lightsproject.com/about/.
[296] EDF EV Market Update at 29.
[297] Chris Randall, *Volvo Trucks Opens Books for Full Range of Heavy Electric Trucks*, electrive.com (May 2, 2022), https://www.electrive.com/2022/05/02/volvo-trucks-has-begun-accepting-orders-for-heavy-electric-trucks/.
[298] Deborah Lockridge, *Volvo: Take the Leap in Electrification*.

	• Goal of having 100% of truck and bus sales be zero-emission by 2040.[299]
Workhorse	• Has received orders from UPS and DHL for 950 electric trucks and 63 delivery vans, respectively.[300]

While the above table includes a sample of relevant product announcements and commitments, CALSTART's Zero-Emission Technology Inventory (ZETI) tool offers additional information regarding MHD ZEV commercial availability. The ZETI tool shows rapid growth in the number of zero-emission medium- and heavy-duty models in the United States and Canada, with more manufacturers entering the market and the number of available ZEV models exceeding 200.[301] Manufacturers know that MHD ZEV deployment is eminently feasible within the timelines set forth in California's regulations and are actively working to meet those timelines. Manufacturer announcements regarding substantial near-term MHD ZEV development are clear evidence of both technological and cost feasibility. Given the number and breadth of these announcements, any objections that California's regulations are infeasible must be rejected.

b) Private Fleet Commitments Reveal that Zero-Emission Technologies are Already Feasible and Cost-Competitive in Medium- and Heavy-Duty Market Segments.

Medium- and heavy-duty fleet managers' commitment to their own environmental goals and recognition of the increasingly favorable economics of ZEVs lends support to the fact that California's regulations are entirely feasible. A 2018 survey of fleet managers listed "sustainability and environmental goals" as the primary motivator for transitioning to ZEVs, with "lower cost of ownership" as the second most important factor.[302] In fact, "[l]arge corporate fleets are responsible for much of the early momentum in commercial MHD fleet electrification…driven by corporate sustainability commitments and a desire to achieve operational savings."[303] These cost and sustainability motivations exist independent of regulatory requirements, and the speed and breadth of these commitments create significant demand for ZEVs and support the fact that ZEV requirements such as California's are clearly feasible.

[299] OEM Off-Highway Editorial Staff, *Volvo Group Focuses on Electrification and Emissions Reduction Strategy*, OEM Off-Highway (Nov. 19, 2020), https://www.oemoffhighway.com/trends/electrification/press-release/21203695/volvo-group-global-volvo-group-focuses-on-electrification-and-emissions-reduction-strategy.

[300] Steve Hanley, *UPS Places Order for 950 Workhorse N-GEN Electric Delivery Vans*, CleanTechnica (June 20, 2018), https://cleantechnica.com/2018/06/20/ups-places-order-for-950-workhorse-n-gen-electric-delivery-vans/; DHL, *DHL Expands Green Fleet with Addition of New Electric Delivery Vans* (Feb. 4, 2019), https://www.prnewswire.com/news-releases/dhl-expands-green-fleet-with-addition-of-new-electric-delivery-vans-300787322.html.

[301] CALSTART, *ZETI Analytics*, *Model Availability to Follow Upward Trajectory,* https://globaldrivetozero.org/tools/zeti-analytics/ (see table titled "Growth of Models Available by Region and OEMS by Region Trending Upwards").

[302] *See* 87 Fed. Reg. 17,596; Nadel & Huether (2021), at 10–11.

[303] NESCAUM, Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan: A Policy Framework to Eliminate Harmful Truck and Bus Emissions, Draft for Public Comment 16 (Mar. 10, 2022) ("NESCAUM Action Plan").

According to EDF's Electric Fleet Deployment & Commitment List (attached to these comments), 191 commercial fleets have already ordered or deployed more than 165,800 medium- and heavy-duty electric vehicles.[304] These orders cover the full range of medium- and heavy-duty applications—from last-mile delivery vehicles to trucks intended to cover longer distances—and include major fleet orders such as UPS's order of 10,000 Class 4 cargo vans and significant orders and/or deployments of Class 8 tractors by Amazon, UPS, PepsiCo, DHL, Sysco, and Anheuser-Busch, totaling over 3,200 trucks.[305] United Rentals ordered 500 F-150 Lightnings and 30 E-Transit vans from Ford with delivery beginning in late 2022[306] and Penske Truck Leasing ordered 750 units of Ford's E-Transit battery-electric van.[307] Walmart just announced it will buy 4,500 EVs from Canoo with the option to purchase up to 10,000 units.[308] Walmart and PepsiCo have both placed orders with Tesla for its upcoming electric Semi, for 130 and 100 trucks, respectively. Foodservice giant Sysco signed a letter of intent with Daimler Truck North America to deploy up to nearly 800 battery-electric Freightliner eCascadia Class 8 tractors by 2026.[309] In total, at least 5,000 ZEV Class 8 tractors have been ordered or deployed.[310] These wide-ranging commitments and deployments evidence significant ZEV momentum within the MHD sector.

In addition to orders already placed, companies with heavy-duty fleets are announcing their commitments to a zero-emissions future. At least 75 commercial fleets, both large and small, have announced fleet-level commitments to increased ZEV penetration and/or reduced carbon emissions.[311] Several of these commitments include aims to reduce carbon emissions by one-third to one-half by 2030.[312] Amazon, PepsiCo, FedEx, and Walmart all plan to reach net zero carbon emissions across their businesses by 2040, including their long-haul tractor operations.[313] AT&T plans to be carbon neutral even earlier, by 2035.[314] Anheuser-Busch plans to reduce carbon emissions by 25% by 2025, and FedEx is committed to 50% of its pickup and delivery fleet purchases being electric by 2025 and 100% by 2030.[315] They cannot meet these goals without

---

[304] This number includes all vehicles in Class 2b–8, the classes covered by California's regulations. *See* EDF, Electric Fleet Deployment & Commitment List, https://docs.google.com/spreadsheets/d/1l0m2Do1mjSemrb_DT40YNGou4o2m2Ee-KLSvHC-5vAc/edit#gid=2049738669.

[305] *See id.*

[306] Scooter Doll, *United Rentals Agrees to Purchase 500 F-150 Lightnings and 30 E-Transits from Ford Pro*, Electreck (May 10, 2022), https://electrek.co/2022/05/10/united-rentals-agrees-to-purchase-500-f-150-lightnings-and-30-e-transits-from-ford-pro/

[307] Jordyn Grzelewski, *Penske Truck Leasing Orders 750 All-Electric E-Transit Vans from Ford*, Detroit News (Apr. 18, 2022), https://www.detroitnews.com/story/business/autos/ford/2022/04/18/penske-truck-leasing-orders-750-all-electric-e-transit-vans-ford/7359952001/.

[308] Akash Srirum, *Walmart to Electrify its Delivery Fleet with Canoo EVs*, Reuters (July 12, 2022), https://www.reuters.com/business/retail-consumer/walmart-expand-its-delivery-fleet-with-evs-canoo-2022-07-12/.

[309] Heavy Duty Trucking, *Sysco to Buy up to 800 Freightliner eCascadia Trucks* (May 19, 2022), https://www.truckinginfo.com/10171990/sysco-announces-intent-to-buy-800-freightliner-ecascadia-trucks.

[310] EDF, Electric Fleet Deployment & Commitment List.

[311] *Id.*

[312] *Id.*

[313] *Id.*; FedEx Newsroom, *FedEx Commits to Carbon-Neutral Operations by 2040* (Mar. 3, 2021), https://newsroom.fedex.com/newsroom/Sustainability2021/.

[314] EDF, Electric Fleet Deployment & Commitment List.

[315] *Id.*

purchasing substantial numbers of MHD ZEVs, further supporting manufacturers' commitment and ability to comply with the California regulations within the lead time provided.

In a recent survey of nearly 250 U.S.-based fleets that have used clean fuels and vehicles, nearly 85% said that their use of clean vehicle technologies would grow over the next five years.[316] The breadth and scale of these announcements indicates that greater MHD ZEV deployment is considered both technologically and economically feasible by a large range of fleet managers.

c) Recent MHD ZEV Cost Estimates Support Feasibility of ZEVs Across Vehicle Segments.

Declining costs for MHD ZEVs also support the feasibility of California's regulations. EPA has noted that "[t]he lifetime total cost of ownership (TCO)...is likely a primary factor for heavy-duty fleets considering BEV purchases."[317] As Daimler Truck AG's chief technology officer explained, "[i]n the very moment that the customer starts benefiting more from a zero-emission truck than from a diesel truck, there is no reason to buy the diesel truck anymore."[318] Numerous recent cost studies estimate that at least some categories of MHD ZEVs have already reached TCO parity with their diesel counterparts, and more categories will reach TCO parity prior to 2027. These studies support the feasibility of California's ZEV sales phase-in schedules.

As EPA has noted, an ICCT estimate from 2019 concluded that at least some MHD ZEVs could reach cost parity in the "early 2020s."[319] Several other recent studies show that transit buses, refuse trucks, school buses, and Class 4–7 short-haul rigid trucks such as delivery and utility vehicles—categories that make up approximately 47% of the entire HD market—either have already reached TCO parity with their diesel counterparts (for some vehicle categories), or will do so by 2027 (for nearly all categories). And a study by Roush Industries found that across most of those same categories, electric vehicles are projected to have lower upfront costs than their diesel counterpoints by 2027.[320] Research shows that Class 2b and 3 vehicles with a 200-mile range are sufficient for most uses within this vehicle class,[321] and an ICCT estimate from 2022

---

[316] Jack Roberts, *On the Glide Path to Net Zero*, HDT Truckinginfo (May 10, 2022), https://www.truckinginfo.com/10170224/on-the-glide-path-to-net-zero.
[317] 87 Fed. Reg. at 17,596.
[318] Cristina Commendatore, *Daimler Truck to Ramp Down ICE Spending, Focus on ZEVs*, Fleetowner (May 25, 2021), https://www.fleetowner.com/technology/article/21165073/daimler-truck-to-ramp-down-ice-spending-focus-on-zevs.
[319] *See* 87 Fed. Reg. at 17,596 (citing Dale Hall & Nic Lutsey, ICCT, *Estimating the Infrastructure Needs and Costs for the Launch of Zero-Emission Trucks* (Aug. 2019), https://theicct.org/wp-content/uploads/2021/06/ICCT_EV_HDVs_Infrastructure_20190809.pdf).
[320] Vishnu Nair et al., Roush Industries for EDF, *Technical Review of: Medium and Heavy-Duty Electrification Costs for MY 2027–2030* (Feb. 2, 2022).
[321] *See* Austin L. Brown et al., *Driving California's Transportation Emissions to Zero,* U. of Calif. Institute of Transportation Studies Research Report, at 204 (Apr. 2021) (finding that in California, daily driving of Class 2b and 3 vehicles has been reported to average 61.7 miles, with an upper threshold of 250 miles); Kevin Wlakowicz et al., *Fleet DNA Project Data Summary Report*, NREL (Aug. 2014) (In a study of 94 delivery vans, 90% had daily driving distance below 100 miles, with a maximum of 260 miles.); North American Council for Freight Efficiency, *Guidance Report: Electric Trucks Where They Make Sense* 45 (May 2018), https://nacfe.org/wp-content/uploads/edd/2018/04/NACFE_CBEV_FULL_050118.pdf (98% of Class 3 through 6 vehicles had a daily range below 150 miles.).

found that BEV200 Class 2b and 3 vans are already cheaper to own over a 5-year period than their diesel counterparts and by 2023 will reach TCO parity with gasoline vehicles.[322]

Other MHD categories are not far behind. The National Renewable Energy Lab (NREL) looked at all classes and segments of medium- and heavy-duty vehicles and concluded that with continued improvements in vehicle and fuel technologies, ZEVs can reach TCO parity no later than 2035 for all segments, including long-haul trucks.[323] Several long-haul ZEVs are currently in development, and cost studies find that TCO parity is not far off for even the largest HD ZEVs that travel long distances. As shown in Table 4 below, several studies estimate that TCO parity will be achieved as early as 2030–2035 for long-haul rigid trucks and 2025–2030 for long-haul tractors.[324] A recent study by the Mission Possible Partnership, with input from over 50 companies and 20 organizations "representing the entire trucking value chain" found that most zero-emissions HD vehicles are expected to reach TCO superiority between 2025 and 2034.[325] Manufacturers have confirmed these cost parity projections as well. Navistar noted recently that ZEV long-haul trucks will reach cost parity with diesel by 2027, and all other heavy-duty vehicles will reach cost parity before 2025.[326] Daimler anticipates its BEVs to reach TCO parity with traditional diesel vehicles by 2025.[327]

Table 4 below includes TCO parity estimates from recent literature.

[322] Eamonn Mulholland, ICCT, *Cost of Electric Commercial Vans and Pickup Trucks in the United States through 2040* 13, 17 (Jan. 2022), https://theicct.org/wp-content/uploads/2022/01/cost-ev-vans-pickups-us-2040-jan22.pdf.
[323] Catherine Ledna et al., NREL, *Decarbonizing Medium- & Heavy-Duty On-Road Vehicles: Zero-Emission Vehicles Cost Analysis* (Mar. 2022), https://www.nrel.gov/docs/fy22osti/82081.pdf.
[324] ICCT (2019), ZEV Alliance (2020), ANL (2021), EDF/MJB (2021), CARB (2021), and NREL (2022) all find TCO parity reached for long-haul tractors at least by 2035. Only BEAN (2021) and NREL (2021) find TCO parity for long-haul tractors to be achieved later than 2035 (between 2040 and 2050). For long-haul rigid trucks, both studies that provide estimates find similar timelines for TCO parity—EDF/MJB (2021) estimates after 2030 and NREL (2022) estimates between 2030–2035.
[325] Mission Possible Partnership et al., *Making Zero-Emissions Trucking Possible* 3, 10 (July 2022) https://missionpossiblepartnership.org/wp-content/uploads/2022/07/Making-Zero-Emissions-Trucking-Possible.pdf.
[326] Mathias Carlbaum, Navistar President & CEO, presentation at the Advanced Clean Trucks (ACT) Expo, Long Beach, CA (May 9–11, 2022); *see also* EDF Heavy-Duty Comment at 11.
[327] Deborah Lockridge, *What Does Daimler Truck Spin-Off Mean for North America*, HD Truckinginfo.com (Nov. 11, 2021), https://www.truckinginfo.com/10155922/what-does-daimler-truck-spin-off-mean-for-north-america.

Table 4: Projections for When MHD ZEVs Reach TCO Parity with Conventional Vehicles

	ICCT 2019[328]	ZEV Alliance 2020[329]	BEAN 2021[330]	NREL 2021[331]	ANL 2021[332]	EDF/MJB 2021[333]	CARB 2021[334]	EDF/Roush 2022[335]	NREL 2022[336]	ICCT (2022)[337]
Transit buses, primarily Class 8			Before 2024					2027		
Refuse trucks, primarily Class 8			Before 2025			Before 2025	Before 2025	2027		
Vans, Class 2b-3						Before 2025	Before 2025	2027 (Class 3 delivery van)	2026[338]	2020-2035 (based on range)
Short-haul rigid trucks Class 4-7 (*e.g.*, delivery, utility)	2020-2025	2027 (Class 7 Cargo)	2022-2026	2020 (Class 4 Delivery)	2023 (Class 4 Delivery)	Before 2025 (Delivery Vans & Trucks, Service Vans)	Before 2025	2027 (Class 5 delivery truck and shuttle bus, Class 7 delivery truck)	2026-2035	
Short-haul rigid trucks Class 8 (*e.g.*, delivery, utility)			2028			Before 2025				

[328] Hall & Lutsey (2019).
[329] Dan Welch et al., International ZEV Alliance, *Moving Zero-Emission Freight Toward Commercialization*, (Oct. 2020), https://www.zevalliance.org/zero-emission-freight-2020/.
[330] Ehsan Sabri Islam et al., Argonne National Laboratory (ANL), *A Detailed Vehicle Modeling & Simulation Study Quantifying Energy Consumption and Cost Reduction of Advanced Vehicle Technologies Through 2050* (Oct. 1, 2021), https://anl.app.box.com/s/xzhqi4x5sw3anw6rbgz7f67l6ti0qikd (using ANL's BEnefit ANalysis modeling); *see also* ANL, Vehicle Systems & Mobility Group, BEAN (last accessed July 27, 2022), https://vms.taps.anl.gov/tools/bean/.
[331] Chad Hunter et al., NREL, *Spatial and Temporal Analysis of the Total Cost of Ownership for Class 8 Tractors and Class 4 Parcel Delivery Trucks* (Sept. 2021), https://www.nrel.gov/docs/fy21osti/71796.pdf.
[332] Andrew Burnham et al., ANL, *Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains* (Apr. 2021), https://publications.anl.gov/anlpubs/2021/05/167399.pdf.
[333] Lowell & Culkin (2021).
[334] These CARB estimates include California incentives. CARB, *Draft Advanced Clean Fleets Total Cost of Ownership Discussion Document*, Advanced Clean Fleet Workshop (Sept. 9, 2021), https://ww2.arb.ca.gov/sites/default/files/2021-08/210909costdoc_ADA.pdf.
[335] Nair et al. (2022).
[336] Ledna et al. (2022).
[337] Mulholland (2022).
[338] This estimate is for a BEV150 for 100–249 mile use. All ranges achieve TCO parity before 2035.

Short-haul tractors, primarily Class 8			2028-2033	2023	2027	Before 2025	Before 2025			
School buses, primarily Class 6-7			Before 2026					2027		
Long-haul rigid trucks, Class 4-8						After 2030 (Class 3-7 Box Trucks)			2030-2035	
Long-haul tractors, primarily Class 8	By 2030 (FCEV 2025-2028)	After 2030	2040-2045	After 2050	2031	Before 2025	Before 2025		2030-2035	

These studies all indicate that TCO parity is not far off for all classes. ICCT considered many of these cost studies to develop a summary of literature that includes consensus estimates for when Class 4–8 HD ZEVs will reach TCO parity, as shown in the table below:[339]

Summary of literature on ZEV market details

	Segment	Share of HDV sales	Year of TCO parity between ZEVs and ICEVs	Upfront cost ratio of ZEVs to ICEVs in 2027	Market readiness
Fast	**Transit buses** primarily class 8	1.3%	Before 2025	1-1.1	Mature market, depot charging
	Refuse trucks primarily class 8	0.7%	Before 2025	1.1-1.15	Small-scale commercialization, depot charging
	Short-haul rigid trucks class 4-7 (e.g., delivery, utility)	40.1%	2022 (Class 4) -2027 (Class 7)	0.9-1.5	Small-scale commercialization, depot charging
Medium	**Short-haul rigid trucks** class 8 (e.g., delivery, utility)	15.7%	2028	1.45-6	Approaching commercialization, depot charging
	Short-haul tractors primarily class 8 (e.g., drayage, beverage)	8.6%	2025-2033	1.3-1.8	Approaching commercialization, depot charging
	School buses primarily class 6-7	4.9%	2026	1.25	Mature market, depot charging, some limitations in rural areas
	Other buses (e.g. shuttle buses, regional transit)	3.3%	2027-2030	1-1.2	Mixed charging requirements
Slow	**Long-haul rigid trucks** class 4-8	2.5%	After 2030		Mixed charging requirements
	Long-haul tractors primarily class 8	15.0%	No Consensus	2-2.4	Approaching range-limited commercialization, requires significant publicly accessible charging

Not shown: Motorhomes (8.0% of sales).

Sources: ANL, ANL's BEAN tool, NREL (2021), NREL (2022), EDF, CARB, ZEV Alliance

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

23

[339] This table summarizing ZEV cost literature is derived from: Sara Kelly et al., ICCT, *ICCT Comments on EPA's Proposed Heavy-Duty Engine and Vehicle Standards* 23 (May 10, 2022), https://theicct.org/wp-content/uploads/2022/04/public-webinar_10May2022.pdf.

One reason for these favorable TCO projections is that upfront MHD ZEV prices have been declining as "[b]attery prices have been consistently reducing more rapidly than projections," and lower battery prices mean that MHD ZEVs will reach cost parity sooner.[340] Projected battery costs have fallen so significantly that a Roush Industries report notes that "battery cost projections made in 2017–2018 are already obsolete."[341] As battery costs and MHD ZEV prices continue to decline, more fleet managers will seek to add ZEVs to their medium- and heavy-duty fleets. In 2010, battery pack costs were over $1,000/kWh, but have fallen dramatically to approximately $132/kWh in 2021.[342] Costs are expected to continue this downward trajectory, "reaching $100/kWh between 2023 and 2025 and $61–72/kWh by 2030. Auto manufacturers have endorsed these projections."[343] Other analysis has projected battery costs falling to $100/kWh by 2025[344] and in the range of $59-68/kWh by 2027.[345] BNEF projects battery pack prices will drop to approximately $80/kWh in 2026 and $60/kWh in 2029, down from $295/kWh in 2016,[346] and Ford has targeted $80/kWh by 2030.[347]

Battery prices have fallen for many reasons, including greater manufacturing scale and technological improvements such as improved quality and material substitution. Industry and government have made substantial investments in developing the battery manufacturing sector and lowering battery costs. Many manufacturers are making strides toward significant domestic battery production, with an expected 13 new battery cell gigafactories opening in the United States by 2025,[348] further supporting this downward trend. Automakers have also announced research and production partnerships aimed at securing ready supplies of batteries and developing less expensive batteries.[349] For example, Daimler recently announced a battery technology partnership through which the company will work with lithium-ion battery manufacturer and developer Contemporary Amperex Technology Co. Limited (CATL) for its supply of lithium-ion battery packs and to jointly work toward designing and developing next-generation battery cells and packs specifically for trucks.[350] Additionally, in its Energy Storage Grand Challenge, DOE announced a goal to reduce battery cost to $80/kWh by 2030 for 300-mile range EVs.[351] The Bipartisan Infrastructure Law also includes additional funds aimed at

[340] Phadke et al. (2021), at 8.
[341] Nair et al. (2022), at 44, Figure 15.
[342] EDF EV Market Update at 10. These 2021 battery pack price estimates are based on BloombergNEF. *Id.* at 20.
[343] *Id.* at 10.
[344] Peter Wiedenhoff et al., Boston Consulting Group, *What the Shift to Zero-Emission Vehicles Means for Commercial Transportation* (Mar. 22, 2022); Hunter et al. (2021), at 10 (Sept. 2020).
[345] Nair et al. (2022), at 36.
[346] BNEF, Electric Vehicle Outlook 2021 (2021), https://about.bnef.com/electric-vehicle-outlook/.
[347] EDF EV Market Update at 20; Colin McKerracher, *Hyperdrive Daily: The EV Price Gap Narrows*, Bloomberg (May 25, 2021), https://www.bloomberg.com/news/newsletters/2021-05-25/hyperdrive-daily-the-ev-price-gap-narrows; Todd Gillespie, *Rising Battery Costs Hit Carmakers, Threaten Climate-Change Path*, Bloomberg Green (Nov. 30, 2021), https://www.bloomberg.com/news/articles/2021-11-30/even-the-battery-boom-can-t-escape-world-s-supply-chain-woes.
[348] EDF EV Market Update at 21; Fred Lambert, *13 Battery Gigafactories Coming to the US by 2025—Ushering New Era of US Battery Production*, Electrek (Dec. 27, 2021), https://electrek.co/2021/12/27/13-battery-gigafactories-coming-us-2025-ushering-new-era/.
[349] EDF EV Market Update at 23.
[350] Commendatore (2021).
[351] EDF EV Market Update at 20; DOE, *Department of Energy Releases Energy Storage Grand Challenge Roadmap* (Dec. 21, 2020), https://www.energy.gov/articles/department-energy-releases-energy-storage-grand-challenge-roadmap.

"expand[ing] the processing and manufacturing of advanced batteries, including for EVs and the electric grid."[352] These federal funds include: $3 billion for battery material processing; $3 billion for battery manufacturing and recycling; $10 million for the Lithium-Ion Battery Recycling Prize; $60 million for Battery Recycling RD&D; $50 million for state and local programs; and $15 million for Collection Systems for Batteries.[353] Advances in battery recycling technology are likely to lead to additional decreases in battery prices. A report by Roush Industries also details additional advancements in battery systems, such as lithium iron phosphate batteries, dry battery electrode coating processes, and tabless anodes, which will lead to greater efficiency and reduced costs for ZEVs.[354] Finally, volatility in diesel and gasoline prices would likely make MHD ZEVs more attractive, and sustained high prices could allow for TCO parity even sooner.

Moreover, charging infrastructure is developing alongside ZEV development and demand, further supporting the feasibility of California's regulations. The Biden Administration has already allocated $7.5 billion toward charging infrastructure.[355] California has approved a three-year, $1.4 billion plan focused on zero-emission technologies, with a significant portion of this allocation focused on infrastructure development, including for MHD vehicles.[356] And manufacturers are investing as well. For example, Daimler Truck North America recently partnered with NextEra Energy Resources and BlackRock Renewable Power to invest approximately $650 million to design, develop, install, and operate a nationwide charging network for medium- and heavy-duty BEV and hydrogen fuel cell trucks.[357] Cost studies such as Roush (2022) and ICCT (2019) have found that even if fleets bear high infrastructure costs, TCO parity is not far off, with ICCT (2019) concluding that overall fleet ownership costs will generally favor electric trucks over conventional trucks by 2030.[358] In California specifically, numerous projects are focused on developing infrastructure to support a significant medium- and heavy-duty vehicle fleet, including funding for research projects and loans and grants for installation of EV charging stations.[359] California's 2021–2023 investment plan, for example, includes more than $2 billion over three years for ZEVs and charging, with a significant portion allocated specifically to HDVs.[360] Volvo Trucks, together with partners including Western Truck Center, is developing a publicly accessible medium- and heavy-duty electric vehicle charging network that connects several of California's largest metropolitan areas, with a $2 million award

[352] EDF EV Market Update at 17.
[353] *Id.*
[354] Vishnu Nair & Gary Rogers, *Reducing Medium- and Heavy-Duty Fuel Consumption and Criteria Pollutants*, Roush Industries (Sept. 2021).
[355] EDF EV Market Update at 25.
[356] Dan Mihalascu, *California Investing $1.4B in EV Charging and Hydrogen Stations*, InsideEVs (Nov. 26, 2021), https://insideevs.com/news/550670/california-zev-infrastructure-investment/.
[357] *Id*. at 29; Heavy Duty Trucking, *Daimler Truck Plans to Create Nationwide Charging Network*, HDT Truckinginfo (Jan. 31, 2022), https://www.truckinginfo.com/10160673/daimler-truck-plans-to-create-nationwide-truck-charging-network.
[358] Hall & Lutsey (2019), at i; Nair et al. (2022).
[359] For a list of various California infrastructure programs, see CARB, *Zero Emission Vehicle (ZEV) Infrastructure Topics, Medium- & Heavy-Duty Vehicle Resources*, https://ww2.arb.ca.gov/zero-emission-vehicle-zev-infrastructure-topics.
[360] Melanie Curry, *CA to Vastly Increase Investments in Zero Emission Vehicles and Infrastructure*, Cal StreetsBlog (Oct. 1, 2021), https://cal.streetsblog.org/2021/10/01/ca-to-vastly-increase-investments-in-zero-emission-vehicles-and-infrastructure/; California Energy Commission, *2021–2023 Investment Plan Update for the Clean Transportation Program* 11 (Dec. 2021).

from the California Energy Commission under its Bestfit program for innovative charging solutions.[361]

EPA should consider these numerous relevant studies pointing to cost projections for MHD ZEVs in the classes and time periods covered by California's regulations as clear evidence of their feasibility. Not only are these regulations technologically and economically feasible, the increased ZEV deployment they will support is both attractive to fleet managers and necessary to achieving industry's stated climate goals. The cost studies show that some MHD ZEVs are already cost competitive, and that cost parity for *all* MHD ZEVs is not far behind.

d) Current Nationwide Market Projections Indicate that the California Regulations Are Feasible.

Drawing from TCO parity estimates and other factors, current market analyses project rapid growth in nationwide MHD ZEV sales throughout 2020, at rates consistent with or outpacing the requirements under California's regulations, as shown in Table 5 below. These include:[362]

- Boston Consulting Group (BCG) observes that "change is unfolding at electrifying speed in the commercial vehicle industry," driven by economics and policies.[363] BCG predicts BEV sales in the range of 19–23% and FCEV sales in the range of 3–6%, with a central estimate of 25% ZEV sales nationwide by 2030 (and 10% ZEVs by 2025). Even in its conservative scenario, zero-emission commercial vehicle sales would reach 6% in 2025 and 15% in 2030.

- NREL's "Decarbonizing Medium- and Heavy-Duty On-Road Vehicles" report finds that "[ZEVs] can reach total-cost-of-driving parity with conventional diesel vehicles by 2035 for all medium- and heavy-duty (MD/HD) vehicle classes," with smaller trucks and short-haul trucks achieving cost parity soon.[364] The analysis

[361] News Release, *Volvo Trucks Building Electrified Charging Corridor in California*, Heavy Duty Trucking (July 14, 2022), https://www.truckinginfo.com/10176830/volvo-trucks-constructing-electrified-charging-corridor.
[362] Two additional studies are outdated and/or inaccurate and therefore are not included in Table 4—AEO 2021 and the NREL Electrification Futures Study (EFS). The AEO 2021 report should not be relied upon in understanding HD ZEV market development, as it greatly underestimates the number of electric MD and HD vehicles that will be sold in 2027—at only 485 vehicles—completely inconsistent with existing state policies and private sector commitments. EIA, Annual Energy Outlook 2021, Table 49: Freight Transportation Energy Use (last accessed Aug. 2, 2022), https://www.eia.gov/outlooks/archive/aeo21/tables_ref.php. The National Energy Modeling System (NEMS) used for the AEO 2021 report does not factor in TCO in calculating vehicle sales demand, does not appear to reflect the latest projected battery costs, and imposes exogenous maximum zero-emission technology penetration of 10%. EIA, *Transportation Sector Demand Module of the National Energy Modeling System: Model Documentation* (Dec. 2020), https://www.eia.gov/outlooks/aeo/nems/documentation/transportation/pdf/m070(2020).pdf; National Energy Modeling System input file "Max Share of Each Fuel Type" corresponding to parameter "EFSHXG" for formula (199) as discussed in *id.* at 108. NEMS input files can be found at: https://www.eia.gov/outlooks/aeo/info_nems_archive.php. Similarly, because NREL's EFS was completed in 2017, it does not account for all the significant advancements in the HD ZEV market. For instance, it assumes that battery costs decline such that they reach $135/kWh by 2050, a much slower pace than has been demonstrated in the real world. In fact, according to BNEF, the average lithium-ion battery pack cost was $137/kWh in 2020, down from $295/kWh in 2016. BNEF, Electric Vehicle Outlook 2021.
[363] Wiedenhoff et al. (2022).
[364] Ledna et al. (2022), at 2.

concludes that "demand for ZEV could rise rapidly...once cost parity is reached" and that ZEV sales could reach 42% by 2030.[365]

- ACT Research's "Charging Forward Update" report projects that BEVs will reach 21% of Class 4–8 nationwide sales by 2027.[366]
- BNEF's Electric Vehicle Outlook 2021 states that "in urban duty cycles, battery electric trucks of any size become the cheapest option for several use cases in the 2020s," with "battery electric trucks becoming a viable option for heavy-duty long-haul operations" by the late 2020s.[367] BNEF's Economic Transition Scenario projects that U.S. HD ZEV sales will reach 5% in 2027 for commercial HDVs and 38% in 2027 for buses.

Table 5: Recent Studies with Market Projections for MHD ZEVs

Market Projection	Percent National MHD ZEV Sales
ACT Research "Charging Forward Update"	24% by 2027 for Class 4–8 commercial vehicles
NREL "Decarbonizing Medium and Heavy-Duty On-road Vehicles"	42% by 2030 for Class 3–8 vehicles
Boston Consulting Group "What the Shift to Zero-Emission Vehicles Means for Commercial Transportation"	25% by 2030 (range of 21% to 29%)
IEA Global EV Outlook	8% for trucks and 20% for buses by 2030 under Stated Policies Scenario
BNEF Electric Vehicle Outlook 2021	5% for trucks and 38% for buses by 2027

These studies provide *national* MHD ZEV sales estimates, which California would be expected to outpace given that it has historically accounted for a large percentage of nationwide MHD ZEV sales, even absent regulatory percent-of-sales requirements. For example, a 2021 analysis by ICCT found that 42% of cumulative MHD ZEVs sold through 2020 in the United States and Canada have been in California.[368] While increasing adoption of MHD ZEVs in other states means that California's overall percentage of the nationwide market will likely fall,[369] California

[365] *Id*. at 3.
[366] Jennifer McNealy, ACT Research, *ACT Research Releases Updated BEV and FCEV Study & Adoption Forecasts for NA CV Markets* (Feb. 7, 2022), https://content.actresearch.net/blog/nacev-act-research-releases-updated-bev-and-fcev-study-adoption-forecasts-for-na-cv-markets.
[367] BNEF, *Electric Vehicle Outlook 2021*.
[368] Ben Sharpe & Claire Buysse, ICCT, *Zero-Emission Bus and Truck Market in the United States and Canada: A 2020 Update* 5 (May 21, 2021), https://theicct.org/publication/zero-emission-bus-and-truck-market-in-the-united-states-and-canada-a-2020-update/.
[369] *See, e.g.*, Alliance for Automotive Innovation, *Electric Vehicle Sales Dashboard* (last accessed Aug. 2, 2022), https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard (showing change over time in California's percentage of nationwide light-duty ZEV sales, from 53% in 2015 to 35% in 2021).

would still be expected to meet or exceed nationwide MHD ZEV penetration projections, all of which find substantial MHD ZEV penetration to be feasible.

e) State-level Programs and Investments Will Support the MHD Sector in Achieving Compliance with the California Regulations.

California has enacted a series of programs and policies that will support greater deployment of MHD ZEVs and that underscore the feasibility of the regulations for which the state seeks a waiver. California's 2021–2022 budget, for example, includes $4 billion in ZEV-related funding.[370] Specific to medium and heavy duty vehicles, California has made a multi-agency investment commitment of $3.9 billion over three years,[371] and the state is funding several grant and incentive programs aimed at supporting MHD zero-emission technologies. The Blueprints for MD/HD ZEV Infrastructure Project has allocated $3 million in grant funds for planning "blueprints" that will identify actions and milestones needed for implementation of MD/HD ZEVs and the related electric charging and/or hydrogen refueling infrastructure, and has funded eight projects so far.[372] The EnergIIZE Commercial Vehicles program, "[t]he nation's first incentive project for zero-emission truck and bus charging and hydrogen refueling infrastructure," has already awarded $50 million and has authority for up to $276 million in awards through 2026.[373]

Government and private incentives will also support the MHD sector in California. Numerous state-level grants and incentive programs have been established to cover incremental costs of purchasing MD and HD ZEVs, including Heavy-Duty Low Emission Vehicle Replacement and Repower Grants, Low Emission Truck and Bus Purchase Vouchers, Alternative Fuel and Vehicle Incentives, Heavy Duty Vehicle Emissions Reduction Grants, and the Medium- and Heavy-Duty ZEV Financing Program.[374] Utilities and private entities have established incentive programs as well, including significant vehicle and infrastructure rebates and charging rate reductions for EVs.[375] All of these incentives, which are available now, will further reduce the cost of compliance with California's regulations in the early years and beyond.

f) Other State and Federal Commitments Support the Feasibility of California's Standards.

California is not an outlier in planning for greater deployment of ZEVs in the medium- and heavy-duty vehicle sector to achieve critical air quality improvements. EPA has noted that "[o]utside California, several states have signaled interest in shifting to heavy-duty ZEV technologies and/or establishing specific goals to increase the heavy-duty electric vehicle

---

[370] Esther Odufuwa, *CalACT - CEC's Clean Transportation Program Medium- and Heavy-Duty Funding Activities*, California Energy Commission Presentation (Apr. 2022).
[371] *Id.*
[372] California Energy Commission, *Blueprints for MD/HD ZEV Infrastructure Project*, https://www.energy.ca.gov/solicitations/2020-07/gfo-20-601-blueprints-medium-and-heavy-duty-zero-emission-vehicle; Odufuwa (Apr. 2022), at 10.
[373] *Id.* at 10; CALSTART, *$16M for Commercial Zero-Emission Vehicle Infrastructure Awarded in Seconds*, https://calstart.org/16m-for-commercial-zero-emission-vehicle-infrastructure-awarded-in-seconds-june-24-2022/.
[374] Alternative Fuels Data Center, *California Laws and Incentives*, https://afdc.energy.gov/laws/state_summary?state=CA.
[375] *Id.*

market."[376] In fact, 17 states plus the District of Columbia have signed a Memorandum of Understanding (MOU) targeting ZEV sales equaling 30% of all MHDV sales by 2030 and 100% of all MHDV sales by 2050,[377] and five states in addition to California have adopted the ACT rule.[378] Additionally, goals have been announced, commitments made, regulations passed, or financial incentives provided (such as rebates or funding) *specific to the medium- and heavy-duty sector* in at least 39 states plus the District of Columbia.[379] These medium- and heavy-duty sector programs are in addition to many broader state and local programs targeted at ZEV adoption generally (across all vehicle sectors), which exist in all 50 states[380] and include: medium- and heavy-duty or diesel emissions reduction funding, rebates, or HDV replacement grants in states such as Delaware, Idaho, Indiana, Iowa, Michigan, Montana, New Mexico, Ohio, South Dakota, Texas, and Wyoming;[381] allowance for HD ZEVs to exceed weight limits in Arizona; ZEV school and/or transit bus programs and incentives in Illinois, Minnesota, Missouri, Oklahoma, Texas, West Virginia, and Wisconsin; and a diesel refuse truck replacement program in Nebraska.[382] Other states have been forming regional-specific collaborations aimed at MHD ZEV adoption. For example, Illinois, Indiana, Michigan, Minnesota, and Wisconsin recently signed an MOU establishing the Regional Electric Vehicle Midwest Coalition (REV Midwest), which "aims to create [a] cohesive regional framework to accelerate the transition to electric vehicles."[383] One of REV Midwest's three key goals is to accelerate medium- and heavy-duty fleet electrification.[384] These state actions provide strong support for the feasibility of MHD ZEV technologies, both now and in the future.

The federal government has also recognized that MHD ZEV technology is feasible now and that even greater deployment is achievable. President Biden recently signed Executive Order 14,057, directing the federal government to transition to 100% ZEV acquisitions for all federal fleets (including MHDVs) by 2035.[385] The ZEV transition within the federal fleet is already underway,

---

[376] 87 Fed. Reg. at 17,598.
[377] NESCAUM, *Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding*, https://www.nescaum.org/documents/mhdv-zev-mou-20220329.pdf/.
[378] States that have adopted the ACT rule include New York, New Jersey, Washington, Oregon, and Massachusetts. *See* Electric Trucks Now, *States Are Embracing Electric Trucks*, https://www.electrictrucksnow.com/states.
[379] *See* DOE, *Federal and State Laws and Incentives, Alternative Fuels Data Center* (last accessed July 29, 2022), https://afdc.energy.gov/laws (tracking federal, state, and local laws and commitments within all ZEV sectors).
[380] Information on regulations and programs in all states is available in *id*., and from the NC Clean Energy Technology Center, *Database of State Incentives for Renewables and Efficiency* (last accessed Aug. 1, 2022), https://programs.dsireusa.org/system/program.
[381] Many of these programs are funded as part of the Volkswagen Environmental Trust/Volkswagen settlement.
[382] This list is compiled from information available at DOE, *Federal and State Laws and Incentives, Alternative Fuels Data Center* (last accessed Aug. 2, 2022), https://afdc.energy.gov/laws. It does not include the vast array of programs and incentives available in states that have signed the MOU or adopted ACT rules.
[383] EDF EV Market Update at 16; Regional Electric Vehicle Midwest Coalition, *Memorandum of Understanding Between Illinois, Indiana, Michigan, Minnesota, and Wisconsin* 1 (Sept. 30, 2021), https://www.michigan.gov/documents/leo/REV_Midwest_MOU_master_737026_7.pdf.
[384] *Id.*
[385] U.S. Office of the Federal Chief Sustainability Officer, *100% Zero-Emission Vehicle Acquisitions by 2035, Including 100% Light-Duty Acquisitions by 2027, Federal Sustainability Plan* (last accessed May 10, 2022), https://www.sustainability.gov/federalsustainabilityplan/fleet.html; The White House, Executive Order on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, Executive Order 14,057, Section 102(a)(ii) (Dec. 8, 2021), https://www.whitehouse.gov/briefing-room/presidential-actions/2021/12/08/executive-order-on-catalyzing-clean-energy-industries-and-jobs-through-federal-sustainability/.

with the General Services Administration (GSA) doubling the amount of ZEV medium- and heavy-duty models available to federal agencies.[386] Individual agencies will develop and annually update their own ZEV fleet strategies to meet the target in the Executive Order, and already have been directed to "maximiz[e] acquisition and deployment of zero-emission light-, medium-, and heavy-duty vehicles where the General Services Administration…offers one or more zero-emission vehicle options for that vehicle class."[387]

The federal government has also committed significant funds toward achieving increased MHD ZEV development and demand, which will further accelerate the pace of innovation.[388] The Infrastructure Investment and Jobs Act of 2021 (the "Bipartisan Infrastructure Law") "provides critical funding for states to accelerate MHD vehicle electrification."[389] DOE has also increased funding for ZEV research, allocating $127 million in funding to industry through its SuperTruck 3 program, "focused for the first time on reducing costs and improving durability in hydrogen and battery electric trucks."[390]

---

[386] The White House, *Fact Sheet: Vice President Harris Announces Actions to Accelerate Clean Transit Buses, School Buses, and Trucks* (Mar. 7, 2022), https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/07/fact-sheet-vice-president-harris-announces-actions-to-accelerate-clean-transit-buses-school-buses-and-trucks/ (noting increase in GSA models available).

[387] White House, Executive Order on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, Executive Order 14,057, Section 204 (Dec. 8, 2021), https://www.whitehouse.gov/briefing-room/presidential-actions/2021/12/08/executive-order-on-catalyzing-clean-energy-industries-and-jobs-through-federal-sustainability/.

[388] For a list of ZEV-related programs funded by the Bipartisan Infrastructure Law, see DOE, *Bipartisan Infrastructure Law (Infrastructure Investment and Jobs Act of 2021), Alternative Fuels Data Center* (last accessed Aug. 2, 2022), https://afdc.energy.gov/laws/infrastructure-investment-jobs-act. *See also* The White House, *Fact Sheet: The Bipartisan Infrastructure Deal* (Nov. 6, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/06/fact-sheet-the-bipartisan-infrastructure-deal/; NESCAUM Action Plan at 18.

[389] *Id.* Examples of programs that the law will fund include: EPA's Clean School Bus Program with $5 billion over the next five years (FY 2022–2026) to replace conventional school buses with ZEV models; the Department of Transportation's (DOT) Low-No Program with $5.5 billion toward purchases of low- or no-emission transit vehicles, "more than 10 times greater than the previous five years of funding;" and DOT's Grants for Buses and Bus Facilities Program with $5.1 billion over the next five years to support modernizing and electrifying bus fleets. *See* EPA, *Clean School Bus Program Funding* (last accessed Aug. 2, 2022), https://www.epa.gov/cleanschoolbus; Federal Transit Administration, News Release, *Biden-Harris Administration and the U.S. Department of Transportation Announce Nearly $1.5 Billion in Grants Funded by the Bipartisan Infrastructure Law to Modernize Bus Fleets and Facilities* (Mar. 7, 2022), https://www.transit.dot.gov/about/news/biden-harris-administration-and-us-department-transportation-announce-nearly-15-billion; Federal Transit Administration, *President Biden and the U.S. Department of Transportation Announce $409 Million for 70 Transportation Projects in 39 States* (Mar. 14, 2022), https://www.transit.dot.gov/about/news/president-biden-and-us-department-transportation-announce-409-million-70-transportation; Federal Transit Administration, *Fiscal Year 2021 Buses and Bus Facilities Projects* (last accessed Aug. 2, 2022), https://www.transit.dot.gov/funding/grants/fiscal-year-2021-buses-and-bus-facilities-projects.

[390] The White House, *Fact Sheet: Vice President Harris Announces Actions to Accelerate Clean Transit Buses, School Buses, and Trucks* (Mar. 7, 2022), https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/07/fact-sheet-vice-president-harris-announces-actions-to-accelerate-clean-transit-buses-school-buses-and-trucks/. Multiple other governmental and industry research projects are focused on ZEVs, including: Advanced Research on Integrated Energy Systems (providing a real-world environment for testing large battery and fuel cell electric trucks); Million Mile Fuel Cell Truck consortium (developing cost effective technology with industry for next generation fuel cells); and 21st Century Truck Partnership (launching a new electrification tech team focused on removing barriers to wide-scale truck electrification and deploying technology to improve freight efficiency).

In sum, the evidence supporting the feasibility of the MHD ZEV rules is overwhelming. In light of rapid manufacturer product development, private fleet commitments, nationwide market trends, numerous recent cost studies, and recent federal and state investments and actions, any opponents of these waiver requests would not be able to establish that California's programs are infeasible. Thus, EPA cannot find that the MHD ZEV rules are not consistent with Section 202(a).

D. EPA Must Grant the Waiver for the Warranty Amendments.

As described in Part I.C above, the 2018 HD Warranty Amendments lengthen the warranty period for on-road heavy-duty vehicles and their engines for 2022 and subsequent model years. They also limit the allowable maintenance schedules for certain components in order to prevent unnecessary maintenance and repairs on these engines, which would void the newly lengthened warranty period. The Warranty Amendments clearly meet the requirements of being within the scope of an existing waiver. In the alternative, they meet the requirements for a new waiver under Section 209(b)(1).

1. The Warranty Amendments Meet the Requirements of Being Within the Scope of an Existing Waiver.

EPA has consistently stated that if California amends a previously waived standard, that change may be included within the scope of the previous waiver if it does not undermine California's determination that its standards, in the aggregate, are at least as protective of public health and welfare as comparable federal standards; the change does not affect the consistency of California's standards with Section 202(a); and the change raises no new issues affecting the Agency's previous waiver determination.[391]

First, the Warranty Amendments do not alter or undermine California's determination that its standards are at least as protective of public health and welfare as the federal standards. The Warranty Amendments do not reduce the stringency of California's pre-existing requirements, for which EPA already granted a waiver. In fact, they establish requirements for all classes of heavy-duty vehicles that are more stringent than the comparable federal requirements. Moreover, the newly established minimum allowable maintenance schedules for emissions related parts are more restrictive regarding allowable repairs and replacements than the federal schedules. Finally, CARB considered this issue when approving the Warranty Amendments, and it concluded that, in the aggregate, the Amendments were not less protective than federal requirements.[392] CARB's considerations were not arbitrary or capricious. And on this point CARB's determination is afforded great deference.[393]

---

[391] *See, e.g.*, 45 Fed. Reg. 54,130 (Aug. 14, 1980); 46 Fed. Reg. 36,742 (July 15, 1981); 75 Fed. Reg. 44,948, 44,4951 (July 30, 2010).

[392] CARB, Proposed Amendments To California Emission Control System Warranty Regulations And Maintenance Provisions For 2022 And Subsequent Model Year On-Road Heavy-Duty Diesel Vehicles And Heavy-Duty Engines With Gross Vehicle Weight Ratings Greater Than 14,000 Pounds And Heavy-Duty Diesel Engines In Such Vehicles, Resolution 18-24, at 12, EPA-HQ-OAR-2022-0330-0013 (June 28, 2018).

[393] *See, e.g.*, *MEMA I*, 627 F.2d at 1106.

Second, the Warranty Amendments do not affect consistency with Section 202(a). The Warranty Amendments do not alter the calculus of lead time or technological feasibility. They do not affect the stringency of the regulations nor require that manufacturers develop or install new components; indeed, manufacturers may comply with the Warranty Amendments with their existing components. Additionally, a large sector of the vehicle fleet *already complies* with the new requirements in the Warranty Amendments. As CARB noted in its review, "40 percent of light and medium-heavy heavy-duty diesel vehicles already have emissions warranty periods exceeding 110,000 and 185,000 miles, and 40 percent of heavy heavy-duty diesel vehicles already have emissions warranty periods exceeding 450,000 miles."[394] Thus, large segments of the vehicle market in 2019 already met requirements far above what is required by the Warranty Amendments.

The Warranty Amendments also reflect an appropriate consideration of the cost of compliance. CARB concluded that the Amendments "would result in incremental cost increases to manufacturers of $149 to $217 for light heavy-duty diesel vehicles, $437 to $633 for medium heavy-duty diesel vehicles, and $240 to $348 for heavy heavy-duty diesel vehicles. The net costs for vehicle purchasers (which account for savings attributable due to the Amendments) were estimated as $28 to $108 for light heavy-duty diesel vehicles, $82 to $315 for medium heavy-duty diesel vehicles, and $45 to $173 for heavy heavy-duty diesel vehicles."[395] CARB concluded that the Amendments were technologically feasible, considering the costs of compliance within the lead time provided.

The other element of the Section 202(a) analysis concerns the consistency of California and federal test procedures. CARB found no indication that a manufacturer would be unable to meet both sets of requirements with a single vehicle, which demonstrates the consistency of the requirements.

Third, there are no "new issues" presented by the Warranty Amendments. The Amendments modify and extend the length of warranty periods for which EPA had already granted a waiver, and they modify the minimum allowable maintenance schedules to align with those warranty periods. They do not introduce new, more stringent standards or impose additional requirements on manufacturers. This area and mode of regulation fit squarely within the areas CARB has regulated in the past. Consequently, the Warranty Amendments fall within the scope of EPA's previously granted waiver.

2. Alternatively, the Warranty Amendments Meet the Requirements of Section 209(b)(1).

If EPA determines that the Warranty Amendments do not fall within the scope of a previously granted waiver, it should grant a new waiver to cover the Amendments. EPA cannot deny the waiver unless it makes one of the limited findings that can support denial.[396] No basis exists to deny such a waiver.

---

[394] Warranty Amendments Waiver Request at 21.
[395] *Id.* at 22–23.
[396] 42 U.S.C. § 7543(b)(1).

The Warranty Amendments do not affect the stringency of California's emission standards. Instead, they establish warranty and maintenance requirements that are equally or more stringent than the federal ones for such engines and vehicles. Thus the Warranty Amendments do not cause California's motor vehicle emissions program as a whole to be less protective than EPA's, and EPA cannot deny the waiver request under Section 209(b)(1)(A).

Moreover, as explained above in Section III.A, California still needs a separate motor vehicle emission control program to meet compelling and extraordinary circumstances. That need, and those conditions, are not affected by the Warranty Amendments. Thus there is no basis to deny this waiver request under the "need" criterion of Section 209(b)(1)(B).

Finally, the Warranty Amendments are consistent with Section 202(a). This factor traditionally describes technological feasibility, given the cost of compliance.[397] CARB concluded in its Waiver Request Support Document that the Warranty Amendments are feasible, and no commenter during the proposed rulemaking suggested otherwise.[398] As explained in detail above, Section 202(a)(3)(C) does not require a fixed lead time, provided the other statutory considerations are met. Thus under Section 209(b)(1)(C), EPA cannot deny the waiver on the consistency prong.

Should EPA decline to issue a determination that the Warranty Amendments are within the scope of a previous waiver, the Agency must grant a new CAA waiver for them.

IV. CONCLUSION

California's Heavy-Duty Vehicle and Engine Emission Warranty and Maintenance Provisions, Advanced Clean Trucks, Zero Emission Airport Shuttle, and Zero-Emission Power Train Certification Regulations, and Omnibus Low NO_X Regulation are essential to protecting the public health in California and are fully consistent with federal law. We urge EPA to grant California's waiver requests in full.

[397] 49 Fed. Reg. 18,887, 18,892 (May 3, 1984).
[398] Warranty Amendments Waiver Request at 21.

LIST OF ATTACHMENTS

Volume 1

1. CEA & Potsdam Institute for Climate Research, *Joint Statement: The Transition to Zero-Emission Road Freight Transport* (Dec. 2020)

2. Al-Alawai Baha et al., CALSTART, *Zeroing In on Zero-Emission Trucks* (Jan. 2022)

3. ANL, Vehicle Systems & Mobility Group, BEAN

4. Alicia K. Birky et al., ORNL, *Transportation Electrification Beyond Light Duty: Technology and Market Assessment* (Sept. 2017)

5. Sebastian Blanco, *Anheuser-Busch's Order for 800 Nikola Hydrogen Trucks is a Play for Younger Beer Drinkers*, Forbes (May 3, 2018)

6. BNEF, *Electric Vehicle Outlook 2021* (2021)

Volume 2

7. Austin L. Brown et al.*, Driving California's Transportation Emissions to Zero*, Univ. of Calif. Institute of Transportation Studies Research Report (Apr. 2021)

8. Andrew Burnham et al., ANL, *Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains* (Apr. 2021)

9. Claire Buysse & Ben Sharpe, ICCT, *California's Advanced Clean Trucks Regulation: Sales Requirements for Zero-Emission Heavy-Duty Trucks* (July 2020)

10. CALSTART, *ZETI Analytics, Model Availability to Follow Upward Trajectory*

Volume 3

11. CALSTART, *National Zero-Emission Truck Coalition Statement of Principles* (June 2020)

12. CALSTART, *New Data Tracks 26% Growth of Zero-Emission Truck and Bus Model Availability Globally in Midst of Economic, Supply Chain Challenges*

13. CARB, *15-Day Notice Attachment C: Updated Costs and Benefits Analysis for the Proposed Advanced Clean Trucks Regulation* (Apr. 28, 2020)

14. CARB, *California Air Resources Board Approves Comprehensive Effort to Clean Up Airport Shuttles* (June 27, 2019)

15. CARB, *Draft Advanced Clean Fleets Total Cost of Ownership Discussion Document*, Advanced Clean Fleet Workshop (Sept. 9, 2021)

16. CARB, *Staff Report: Initial Statement of Reasons, Proposed Advanced Clean Trucks Regulation* (Oct. 22, 2019)

17. CARB, *Zero Emission Airport Shuttle Regulation Factsheet* (Oct. 2019)

18. CARB, *Zero Emission Vehicle (ZEV) Infrastructure Topics, Medium- & Heavy-Duty Vehicle Resources*

19. Cristina Commendatore, *Daimler Truck to Ramp Down ICE Spending, Focus on ZEVs*, Fleetowner (May 25, 2021)

20. David Cullen, *Daimler to Offer Carbon Neutral Trucks by 2039* (Oct. 25, 2019)

21. Angela Cullen, HD2027 Proposed Changes to Heavy-Duty Greenhouse Gas Emissions—Memorandum to Docket (Docket No. EPA-HQ-OAR-2019-0055) (Nov. 2021)

22. Daimler Truck, *One Million Real-World Electric Miles: Freightliner's Battery Electric Customer Fleets Reach Important Milestone* (Oct. 5, 2021)

23. Alejandro de la Garza, *U.S. School Buses May Never Be the Same Thanks to Biden's Infrastructure Plan*, Time (Nov. 15, 2021)

24. Geerte de Lombaerde, *Traton Boosting its Trucking Electrification Investments*, Fleet Owner (Mar. 16, 2022)

25. Mike De Socio, *Keep Your Eyes on These 9 Electric Truck and Van Companies in 2021*, GreenBiz (Jan. 4, 2021)

26. DHL, *DHL Expands Green Fleet with Addition of New Electric Delivery Vans* (Feb. 4, 2019)

27. DOE, *Department of Energy Releases Energy Storage Grand Challenge Roadmap* (Dec. 21, 2020)

28. DOE, *Vehicle Technologies Office, Federal Consortium for Advanced Batteries* (FCAB)

29. Scooter Doll, *Kenworth Says Electric Truck Orders Have Tripled the Past Three Months, Quoting Customers in 44 States*, Electrek (Jan. 14, 2022)

30. Scooter Doll, *United Rentals Agrees to Purchase 500 F-150 Lightnings and 30 E-Transits from Ford Pro*, Electreck (May 10, 2022)

31. EDF, Comment re Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards, 87 Fed. Reg. 17,414, Docket ID No. EPA-HQ-OAR-2019-0055 (May 16, 2022)

32. EDF, *The Opportunity for Near-Term Electrification of Medium- and Heavy-Duty Vehicles* (May 2022)

33. FedEx Newsroom, *FedEx Commits to Carbon-Neutral Operations by 2040* (Mar. 3, 2021)

34. Josh Fisher, *Paccar Tests More Zero-Emission Trucks Ahead of 2021 Production*, FleetOwner (July 30, 2020)

35. General Motors, *GM Launches BrightDrop, a New Business That Will Electrify and Improve the Delivery of Goods and Services* (Jan. 12, 2021)

36. Todd Gillespie, *Rising Battery Costs Hit Carmakers, Threaten Climate-Change Path*, Bloomberg Green (Nov. 30, 2021)

Volume 4

37. Jordyn Grzelewski, *Penske Truck Leasing Orders 750 All-Electric E-Transit Vans from Ford*, Detroit News (Apr. 18, 2022)

38. D. Hall & N. Lutsey, ICCT, *Estimating the Infrastructure Needs and Costs for the Launch of Zero-Emission Trucks* (Aug. 2019)

39. Carrie Hampel, *Blue Bird Expands into Class 5–6 Commercial Vehicles*, electrive.com (May 23, 2022)

40. Steve Hanley, *UPS Places Order for 950 Workhorse N-GEN Electric Delivery Vans*, CleanTechnica (June 20, 2018)

41. Heavy Duty Trucking, *Daimler Truck Plans to Create Nationwide Truck Charging Network*, HDT Truckinginfo (Jan. 31, 2022)

42. Heavy Duty Trucking, *Kenworth T680E Battery-Electric Vehicle Rolls Out of Kenworth Renton Plant* (June 9, 2022)

43. Heavy Duty Trucking, *Sysco to Buy up to 800 Freightliner eCascadia Trucks* (May 19, 2022)

44. Rebecca Hennes, *Tesla's New $1b 'Gigafactory' Will Open Near Austin, with Musk Calling it an 'Ecological Paradise,'* Houston Chronicle (July 23, 2020)

45. Chad Hunter et al., NREL, *Spatial and Temporal Analysis of the Total Cost of Ownership for Class 8 Tractors and Class 4 Parcel Delivery Trucks* (Sept. 2021)

Volume 5

46. Ehsan Sabri Islam et al., ANL, *A Detailed Vehicle Modeling & Simulation Study Quantifying Energy Consumption and Cost Reduction of Advanced Vehicle Technologies Through 2050* (Oct. 1, 2021)

47. Paige Jadun et al., NREL, *Electrification Futures Study: End-Use Electric Technology Cost and Performance Projections through 2050* (2017)

48. Sara Kelly et al., ICCT, *ICCT Comments on EPA's Proposed Heavy-Duty Engine and Vehicle Standards* (May 10, 2022)

49. Suvrat Kothari, *Tesla Semi: Everything We Know in May 2022*, TopElectricSUVs (Apr. 30, 2022)

50. Fred Lambert, *13 Battery Gigafactories Coming to the US by 2025—Ushering New Era of US Battery Production*, Electrek (Dec. 27, 2021)

Volume 6

51. Fred Lambert, *Amazon Unveils its Rivian-made Electric Delivery Van with Cool Interior*, Electrek.com (Oct. 8, 2020)

52. Catherine Ledna et al., NREL, *Decarbonizing Medium- & Heavy-Duty On-Road Vehicles: Zero-Emission Vehicles Cost Analysis* (Mar. 2022)

53. Deborah Lockridge, *Volvo: Take the Leap in Electrification*, Truckinginfo (Oct. 12, 2021)

54. Deborah Lockridge, *What Does Daimler Truck Spin-Off Mean for North America?*, Truckinginfo.com (Nov. 11, 2021)

55. Dana Lowell & Jane Culkin, M.J. Bradley & Associates, *Medium- and Heavy-Duty Vehicles: Market Structure, Environmental Impact, and EV Readiness* (July 2021)

56. Rachel MacIntosh et al., EDF, *Electric Vehicle Market Update* (Apr. 2022)

57. Colin McKerracher, *Hyperdrive Daily: The EV Price Gap Narrows*, Bloomberg (May 25, 2021)

58. Dan Mihalascu, *California Investing $1.4B in EV Charging and Hydrogen Stations*, InsideEVs (Nov. 26, 2021)

59. Mission Possible Partnership et al., *Making Zero-Emissions Trucking Possible* (July 2022)

Volume 7

60. Andrew Moreau, *Electric-Vehicles Firm Going to Osceola Plans to Invest Millions, Hires 800 Workers*, Arkansas Democrat Gazette (Feb. 23, 2022)

61. Eamonn Mulholland, ICCT, *Cost of Electric Commercial Vans and Pickup Trucks in the United States through 2040* (Jan. 2022)

62. North American Council for Freight Efficiency, *Electric Trucks Have Arrived: The Use Case for Heavy-Duty Regional Haul Tractors* (May 2022)

63. North American Council for Freight Efficiency, *Guidance Report: Electric Trucks Where They Make Sense* (May 2018)

64. Vishnu Nair & Gary Rogers, Roush Industries, *Reducing Medium- and Heavy-Duty Fuel Consumption and Criteria Pollutants* (Sept. 2021)

Volume 8

65. Aishwarya Nair et al., *Ford boosts EV spending to $50 billion, sets up new Model e unit*, Reuters (Mar. 2, 2022)

66. Vishnu Nair et al., Roush Industries for EDF, *Technical Review of: Medium and Heavy-Duty Electrification Costs for MY 2027–2030* (Feb. 2, 2022)

67. Navistar, *Navistar Launches New Business Unit*, NEXT eMobility Solutions (Oct. 28, 2019)

68. Navistar, *Navistar Launches New Electric International eMV Series, Now in Production and Available to Order* (Aug. 31, 2021)

69. NESCAUM, *Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan: A Policy Framework to Eliminate Harmful Truck and Bus Emissions*, Draft for Public Comment (Mar. 10, 2022)

70. John O'Dell, *Elon Musk Unveils Superfast, 500-mile Range Tesla Semi-Truck*, trucks.com (Nov. 17, 2017)

71. OEM Off-Highway Editorial Staff, *Volvo Group Focuses on Electrification and Emissions Reduction Strategy*, OEM Off-Highway (Nov. 19, 2020)

72. Alan Ohnsman, *Big Rigs Going Electric as Navistar, Cummins, Daimler Rev Up Next-Generation Trucks*, Forbes (May 13, 2022)

73. Navistar Presentation at the Advanced Clean Trucks (ACT) Expo, Long Beach, CA (May 9–11, 2022)

74. NC Clean Energy Technology Center, *Database of State Incentives for Renewables and Efficiency* (last accessed Aug. 1, 2022)

Volume 9

75. Amol Phadke et al., LBNL, *Why Regional and Long-Haul Trucks are Primed for Electrification Now* (Mar. 2021)

76. Chris Randall, *Daimler Truck Reveals First eActros LongHaul Prototype*, electrive.com (May 30, 2022)

77. Chris Randall, *Hyzon to Deliver 18 FC Trucks to Hylane*, Electrive.com (Apr. 11, 2022)

78. Chris Randall, *Volvo Trucks Opens Books for Full Range of Heavy Electric Trucks*, electrive.com (May 2, 2022)

79. Reuters, *Daimler Trucks Labour Chief Wants Clean Tech Investments in Germany* (Feb. 13, 2021)

80. Jack Roberts, *Cummins CEO: Get on the Path to Net-Zero Emissions*, HDT Truckinginfo (May 12, 2022)

81. Jack Roberts, *Half of All Regional-Haul Trucks Could Go Electric Now*, HDT Truckinginfo (May 5, 2022)

82. Jack Roberts, *Navistar CEO Calls for Long-Term Commitment to Net Zero*, HDT Truckinginfo (May 12, 2022)

83. Jack Roberts, *On the Glide Path to Net Zero*, HDT Truckinginfo (May 10, 2022)

84. South Carolina Office of the Governor, *Proterra Expanding South Carolina Operations with New EV Battery System Manufacturing Facility in Spartanburg County* (Dec. 14, 2021)

85. Akash Srirum, *Walmart to Electrify its Delivery Fleet with Canoo EVs*, Reuters (July 12, 2022)

86. Luke Stangel, *Tesla Semi Picks Up Another Big Backer, the Country's Second-Largest Grocery Chain*, Silicon Valley Business Journal (Nov. 19, 2018)

87. Pamela Stroka-Holzmann, *Mack Trucks Completes $84M Plant Renovation in Lehigh County*, Lehigh Valley Live (Oct. 2, 2020)

88. The White House, Executive Order on America's Supply Chains, Executive Order 14,017 (Feb. 24, 2021)

89. UCS, *Ready for Work: Now Is the Time for Heavy-Duty Electric Vehicles* (2019)

90. Volvo LIGHTS, About Volvo LIGHTS

91. Dan Welch et al., International ZEV Alliance, *Moving Zero-Emission Freight Toward Commercialization* (Oct. 2020)

92. Peter Wiedenhoff et al., Boston Consulting Group, *What the Shift to Zero-Emission Vehicles Means for Commercial Transportation* (Mar. 22, 2022)

Volume 10

93. Kevin Wlakowicz et al., NREL, *Fleet DNA Project Data Summary Report* (Aug. 2014)

94. Am. Lung Ass'n, *State of the Air 2022* (2022)

95. Stacey E. Alexeeff et al., *High-Resolution Mapping of Traffic Related Air Pollution with Google Street View Cars and Incidence of Cardiovascular Events within Neighborhoods in Oakland, CA*, Env't Health 17.38 (2018).

96. Joshua S. Apte et. al, *High-Resolution Air Pollution Mapping with Google Street View Cars: Exploiting Big Data*, Env't Sci. & Tech., 51, 12, 6999–7008 (2017)

97. CARB, *Air Quality and Land Use Handbook: A Community Health Perspective* (Apr. 2005)

98. CARB, *Facts About The Low NO_X Heavy Duty Omnibus Regulation*

Volume 11

99. WHO, *WHO Global Air Quality Guidelines* (2021)

100. Julien J. Caubel et al., *A Distributed Network of 100 Black Carbon Sensors for 100 Days of Air Quality Monitoring in West Oakland, California*, *Env't Sci. & Techn.*, 53, 7564–73 (2019)

101. Demetillo, M. A. G. et al., *Space-based Observational Constraints on NO_2 Air Pollution Inequality from Diesel Traffic in Major US Cities*, Geophysical Research Letters, 48, e2021GL09433 (2021)

102. EDF, *Air Pollution's Unequal Impacts in the Bay Area* (Mar. 31, 2021)

103. CARB, *Emissions Impact of Recent Congestion at California Ports* (Sept. 13, 2021)

104. Dana E. Goin et al., *Hyperlocalized Measures of Air Pollution and Preeclampsia in Oakland, California*, Env't Sci. & Tech. 55.21: 14710–19 (2021)

Volume 12

105. Jimmy O'Dea, Moving Forward Network, *Zero-Emissions Technology for Freight: Heavy-Duty Trucks, Tools to Advocate for Zero-Emissions Technology* (Oct. 2020)

106. Ihab Mikati et al., *Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status*, Am. J. Pub. Health, 108, no. 4: pp. 480–85 (Apr. 2018)

107. M.L. Miranda et al., *Making the Environmental Justice Grade: The Relative Burden of Air Pollution Exposure in the United States*, Int'l J. Env't Rsch. & Pub. Health, 8: 1755–1771 (2011)

108. A. Nardone et al., *Associations Between Historical Residential Redlining and Current Age-Adjusted Rates of Emergency Department Visits Due to Asthma Across Eight Cities in California: an Ecological Study*, Lancet Planet Health, 4(1):e24–e31 (2020)

109. Peter Huynh et al., *Residential Proximity to Freeways is Associated with Uncontrolled Asthma in Inner-City Hispanic Children and Adolescents*, J. Allergy (Cairo), 1–7 (2010)

110. R. McConnell et al., *Childhood Incident Asthma and Traffic-Related Air Pollution at Home and School*, Envtl. Health Perspect., 118(7):1021–6 (2010)

111. Gregory M. Rowangould, *A Census of the US Near-Roadway Population: Public Health and Environmental Justice Considerations*, Transportation Research Part D 25, 59–67 (2013)

112. S. Riley et al., *Proximity to Major Roadways is a Risk Factor for Airway Hyper-Responsiveness in Adults*, Can. Respir. J., 19(2):89–95 (2012)

113. V. Southerland et al., *Assessing the Distribution of Air Pollution Health Risks within Cities: A Neighborhood-Scale Analysis Leveraging High-Resolution Data Sets in the Bay Area*, 129 CA. Env. Health Pers. 1 (Mar. 2021)

114. California's Fourth Climate Change Assessment, *California's Changing Climate 2018: A Summary of Key Findings from California's Fourth Climate Change Assessment*

Volume 13

115. C.W. Tessum et al., *$PM_{2.5}$ Polluters Disproportionately and Systemically Affect People of Color in the United States*, Sci. Adv. 7: eabf4491 (2021)

116. U.S. Glob. Change Rsch. Program, Vol. II, *Impacts, Risks and Adaptation in The United States: Fourth National Climate Assessment* (David Reidmiller et al., eds., 2018)

117. Achates Power, *Near-Zero Heavy-Duty Diesel Engine Enters Fleet Service* (Apr. 6, 2022)

118. Memo from James Sanchez to Docket EPA-HQ-OAR-2019-0055 (May 3, 2022)

119. Steven Nadel & Peter Huether, ACEEE, *Electrifying Trucks: From Delivery Vans to Buses to 18-Wheelers* (June 2021)

Volume 14

120. California Energy Commission, *2021–2023 Investment Plan Update for the Clean Transportation Program* 11 (Dec. 2021)

121. Melanie Curry, *CA to Vastly Increase Investments in Zero Emission Vehicles and Infrastructure*, Cal StreetsBlog (Oct. 1, 2021)

122. EIA, *Transportation Sector Demand Module of the National Energy Modeling System: Model Documentation* (Dec. 2020)

123. *Consistency*, Merriam-Webster.com Dictionary

124. *Consistent*, Merriam-Webster.com Dictionary

125. Letter from Margo Oge, Director EPA Office of Transportation and Air Quality, to Michael Kenny, CARB Executive Officer (Oct. 24, 2000)

126. Alliance for Automotive Innovation, *Electric Vehicle Sales Dashboard*

127. Alternative Fuels Data Center, *California Laws and Incentives*

128. California Energy Commission, *Blueprints for MD/HD ZEV Infrastructure Project*

Volume 15

129. CALSTART, *$16M for Commercial Zero-Emission Vehicle Infrastructure Awarded in Seconds*

130. CARB, *Staff Report: Initial Statement of Reasons, Proposed Zero-Emission Airport Shuttle Regulation* (Dec. 31, 2018)

131. DOE, *Bipartisan Infrastructure Law (Infrastructure Investment and Jobs Act of 2021), Alternative Fuels Data Center*

132. Electric Trucks Now, *States Are Embracing Electric Trucks*

133. EPA, *Clean School Bus Program Funding*

134. EPA, *Current Nonattainment Counties for All Criteria Pollutants*

135. Federal Transit Administration, News Release, *Biden-Harris Administration and the U.S. Department of Transportation Announce Nearly $1.5 Billion in Grants Funded by the Bipartisan Infrastructure Law to Modernize Bus Fleets and Facilities* (Mar. 7, 2022)

136. Federal Transit Administration, *Fiscal Year 2021 Buses and Bus Facilities Projects*

137. Federal Transit Administration, *President Biden and the U.S. Department of Transportation Announce $409 Million for 70 Transportation Projects in 39 States* (Mar. 14, 2022)

138. Jeff Houk et al., ICCT, *Fact Sheet: Benefits of Adopting California Medium- and Heavy-Duty Vehicle Regulations Under Clean Air Act Section 177* (Nov. 2021)

139. Jennifer McNealy, ACT Research, *ACT Research Releases Updated BEV and FCEV Study & Adoption Forecasts for NA CV Markets* (Feb. 7, 2022)

140. NESCAUM, *Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding*

Volume 16

141. Esther Odufuwa, *CalACT - CEC's Clean Transportation Program Medium- and Heavy-Duty Funding Activities*, California Energy Commission Presentation (Apr. 2022)

142. Regional Electric Vehicle Midwest Coalition, *Memorandum of Understanding Between Illinois, Indiana, Michigan, Minnesota, and Wisconsin* (Sept. 30, 2021)

143. Ben Sharpe & Claire Buysse, ICCT, *Zero-Emission Bus and Truck Market in the United States and Canada: A 2020 Update* (May 21, 2021)

144. The White House, Executive Order on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, Executive Order 14,057 (Dec. 8, 2021)

145. The White House, *Fact Sheet: The Bipartisan Infrastructure Deal* (Nov. 6, 2021)

146. The White House, *Fact Sheet: Vice President Harris Announces Actions to Accelerate Clean Transit Buses, School Buses, and Trucks* (Mar. 7, 2022)

147. U.S. Office of the Federal Chief Sustainability Officer, *100% Zero-Emission Vehicle Acquisitions by 2035, Including 100% Light-Duty Acquisitions by 2027, Federal Sustainability Plan*

148. Zero Emission Transportation Association Website

149. EDF, *Electric Fleet Deployment & Commitment List*

Volume 17

150. CARB, *Staff Report: Initial Statement of Reasons, Proposed Proposed Amendments to the Exhaust Emissions Standards and Test Procedures for 2024 and Subsequent Model Year Heavy-Duty Engines and Vehicles, Heavy-Duty On-Board Diagnostic System Requirements, Heavy-Duty In-Use Testing Program, Emissions Warranty Period and Useful Life Requirements, Emissions Warranty Information and Reporting Requirements, and Corrective Action Procedures, In-Use Emissions Data Reporting Requirements, and Phase 2 Heavy-Duty Greenhouse Gas Regulations, and Powertrain Test Procedures* (June 23, 2020)

151. Heavy Duty Trucking, *Volvo Trucks Building Electrified Charging Corridor in California* (July 14, 2022)

152. Stacey E. Alexeeff et al., *Google Street View Car Measurements of Traffic Related Air Pollution within Neighborhoods and Asthma-Related Emergency Department Visits and Hospitalizations*, Env't Epidemiology 3 (2019)

153. Huzeifa Badshah et al., ICCT, *Current State of NO_X Emissions from In-Use Heavy-Duty Diesel Vehicles in the United States* (Nov. 2019)

154. Jonathan Buonocore et al., *Distribution of Air Quality Health Benefits of MHEV Policies: New York* (2022) (slide presentation)

155. Ken Lee & Michael Greenstone, U. Chi. Energy Policy Inst., *Air Quality Life Index Annual Update* (Sept. 2021)

156. South Coast AQMD, *South Coast AQMD Governing Board Adopts Warehouse Indirect Source Rule* (Aug./Sept. 2021)

157. Yu Jiang et al., *Characterizing Emission Rates of Regulated Pollutants from Model Year 2012 + Heavy-Duty Diesel Vehicles Equipped with DPF and SCR Systems*, 619–20 Sci. Total Env't 765 (Apr. 1, 2018)

158. CARB, *Pollution standards authorized by the California waiver: a crucial tool for fighting air pollution now and in the future*

159. EPA, *Vehicle Emissions California Waivers and Authorizations*

160. CARB, *California Greenhouse Gas Emissions for 2000 to 2014—Trends of Emissions and Other Indicators* (2016)

Volume 18

161. Beate Ritz et al., *Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California* (June 12, 2009)

162. Douglas Houston et al., *Disparities in Exposure to Automobile and Truck Traffic and Vehicle Emissions Near the Los Angeles–Long Beach Port Complex*, Am. J. Public Health, 104(1): 156–64 (2014)

163. Laura Bliss, *Six States Adopt Clean Truck Rule*, Transport Topics (Jan. 6, 2022)

164. CARB, *States that Have Adopted California's Vehicle Standards under Section 177 of the Federal Clean Air Act* (May 13, 2022)

165. Tony Barboza, *Freeway pollution travels farther than we thought. Here's how to protect yourself*, L.A. Times (Dec. 30, 2017)

166. Bill Mongelluzzo, *Top US Port Gateways Expand Share of Asian Imports*, Journal Of Commerce Online (Aug. 31, 2018)

167. Jeff Horseman, *Inland Empire is Warehouse Central, But How Did it Happen?*, The Press Enterprise (Sept. 29, 2021)

168. U.S. International Trade Commission, *The Impact of the COVID-19 Pandemic on Freight Transportation Services and U.S. Merchandise Imports*

169. Declaration of Elizabeth Scheehle at B-019-B-024, Union of Concerned Scientists v. NHTSA (D.C. Cir. No. 19-1230)

170. Declaration of Jay Chamberlin at B-27-B-32, Union of Concerned Scientists v. NHTSA (D.C. Cir. No. 19-1230)

Volume 19

171. CARB, *Statewide Truck and Bus Regulations*

172. South Coast Air Quality Management District et al., *Petition to EPA for Rulemaking to Adopt Ultra-Low NO_X Exhaust Emission Standards for On-Road Heavy-Duty Trucks and Engines* (June 3, 2016)

173. CARB, *Strategies for Reducing Emissions from On-Road Heavy-Duty Trucks: 2022 AQMP Mobile Source Working Group* (Jan. 26, 2020)

174. CARB, *Proposed 2016 State Strategy for the State Implementation Plan* (May 17, 2016)

175. Wayne Miller et al., *In-Use Emissions Testing and Demonstration of Retrofit Technology for Control of On-Road Heavy-Duty Engines* (Sept. 2013) (Executive Summary)

176. Barbi Kerschner & David Barker, *Survey and Analysis of Heavy-Duty Vehicle Warranties in California*, prepared for CARB by the Institute for Social Research (Dec. 2017)

177. CARB Truck Idling Support Document, Docket No. EPA-HQ-OAR-2010-0317-0003

178. South Coast Air Quality Management District, *Draft 2022 Air Quality Management Plan*, Appendix V, Attachment 3