

November 5, 2021

Michael S. Regan
Administrator of the U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Mail Code 1101A
Washington, DC 20004
Via email: Regan.Michael@epa.gov

Dear Administrator Regan,

On behalf of the International Council on Clean Transportation (ICCT), I am writing to express our support for a MY2027 heavy-duty vehicle and engine standard that takes a multi-pollutant approach: requires best available control technology for nitrogen oxide emissions that aligns with the requirements of the California Heavy-Duty NO_x Omnibus Rule and accelerates the transition to zero emission vehicles in those applications ready to move quickly. These actions are necessary to fulfill the EPA mandate to protect public health and welfare, but also to fulfill the ambition of the Biden Administration to address systemic racism reflected by exposure disparities in marginalized communities.

This rulemaking is the Agency's first opportunity to set the pace for a transition to zero emission trucks and buses necessary to meet the US climate targets set by President Biden. Towards this end, US EPA may consider including a set of narrowly targeted carbon dioxide emission limits, part of a 'multi-pollutant' standard suggested by President Biden 'in consideration of the role that zero-emission heavy-duty vehicles might have in reducing emissions from certain market segments...' ¹ Cargo vans, transit shuttles, transit buses, school buses, last mile delivery trucks and vans, refuse trucks, yard tractors, and short-haul tractors are examples of vehicle applications where the technology is commercially available, multiple manufacturers have introduced products into the market, and total cost of ownership will achieve cost parity in the 2025-2030 time period in the absence of incentives. All major manufacturers of transit buses and school buses, including four out of five manufacturers of refuse trucks, are taking orders on zero emission products. Walmart aims for a 100% zero emission truck fleet by 2040, FedEx will electrify its entire pick-up and delivery fleet by 2040, and Amazon's 'Shipment Zero' will electrify 50% of its package deliveries by 2030. Ikea has deployed a fleet of 40 electric trucks in New York this year, part of

¹ The White House, "Executive Order on Strengthening American Leadership in Clean Cars and Trucks." Washington, DC: 5 August 2021. Available at <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/08/05/executive-order-on-strengthening-american-leadership-in-clean-cars-and-trucks/>

its ambition to achieve 100% zero emission home deliveries in 30 global markets by 2025. Fifteen states and the Province of Quebec have already endorsed the goal of 30% medium- and heavy-duty trucks sales by 2030. US EPA may consider supporting these efforts by adopting zero or near-zero CO₂ emission limits on sales of new engines in first-mover vehicle market segments.

This rulemaking is a critical opportunity to address criteria pollutant emissions from combustion engines. Existing emission standards for diesel trucks and buses fail to require real-world emissions performance in line with the standards, particularly in low-speed urban driving environments. They also fail to properly address the lifetime emission impacts of tampering, poor maintenance, and equipment failure. In the fallout following the Volkswagen Dieselgate scandal, the ICCT called attention to the fact that ninety percent of deaths from excess diesel NO_x emissions in the United States were linked to heavy-duty diesel trucks and buses despite the attention paid to diesel cars.² At that time we estimated that in 2040, 2,200 premature deaths in the United States could be avoided with the adoption of next generation emission standards for heavy-duty vehicles capable of reducing per-vehicle NO_x emissions by 90 percent with commercially available technology.

To take advantage of these potential benefits and make progress towards compliance with National Ambient Air Quality Standards for Ozone, the California Air Resources Board adopted the Heavy-Duty Omnibus Rule in 2020.³ This rule requires a 90 percent reduction in nitrogen oxide emissions from new engines on the FTP cycle. The rule includes provisions designed to address high NO_x emissions that can occur during low-load driving conditions, emissions increases that occur with degradation of the emission control system, and other improvements. But the benefits of California's program are limited by the jurisdiction of the Air Resources Board. A national program led by US EPA would be necessary to extend these provisions to trucks whose environmental impact is beyond the reach of state authority.

Emission control systems to meet these requirements on diesel engines – using advanced catalysts and slightly larger volumes in the existing selective catalytic reduction (SCR) system, along with cylinder deactivation or other forms of thermal management – utilize commercially available technologies that have been demonstrated by the Southwest Research Institute (SwRI). Over the past 7 years of technology demonstration, this program, funded both by EPA and CARB, demonstrated multiple compliance pathways for meeting a 90% NO_x reduction from two diesel engines and one natural gas engine. Natural gas engines, which accounted for less than two percent of sales in 2020, utilize a three-way catalyst in common use for decades and are the first commercially available engines compliant with California Omnibus standards to be sold in the United States. Finally, zero emission powertrains, using an electric motor powered by batteries or hydrogen fuel cells, provide a third technology pathway. Electric motors are a

² Annenberg, Susan C., Joshua Miller, Ray Minjares, Li Du, Daven K. Henze, Forrest Lacey, Christopher S. Malley, et al. 2017. "Impacts and Mitigation of Excess Diesel-Related NO_x Emissions in 11 Major Vehicle Markets." *Nature* 545 (7655): 467–71. <https://doi.org/10.1038/nature23692>.

³ The rule is not final until approved by the Office of Administrative Law, which we expect will occur this year. The adopted HDV Omnibus regulation and supporting materials are available at <https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox>

leapfrog technology that do not suffer from emissions degradation, poor maintenance, or tampering. These electric powertrains guarantee zero tailpipe emissions throughout the lifetime of the vehicle, and they bring significant energy savings and greenhouse gas reductions necessary to achieve President Biden’s climate goals. Considering all the potential costs of its regulation, California estimates the benefits will exceed costs by a factor of 7 to 1.

Experience in the United States and other major vehicle markets has consistently shown that when motor vehicle regulators set standards based on maximum achievable and cost-effective technology, manufacturers consistently meet them. Despite manufacturer complaints, we do not expect history to change course. SwRI has demonstrated and confirmed that diesel engines are able to meet the 90% reduction in NO_x emissions over the FTP, RMC and low-load certification cycles. The experimental work has demonstrated an accelerated aging protocol that industry can use to evaluate the durability of the system. Ongoing work funded by EPA will confirm that a reduction in the degradation rate of the emissions control system is feasible out to an 800,000-mile useful life as adopted by CARB. Ongoing system optimization, published by suppliers (SAE 2021-01-0211) is showing that no intrinsic limitations to improve compliance margin exist in light of the technical capabilities and deployment of existing commercially available technologies. The SwRI team itself identified several areas to improve the compliance margin, some of which are currently being explored as part of the EPA Technical Projects to Inform the Cleaner Trucks Initiative. Furthermore, compliance margins for in-use PEMS testing are addressed through the use of conformity factors included in the HDV Omnibus rule. Therefore, the ICCT considers that currently available technologies can not only achieve a 90% reduction in NO_x emissions over the certification cycles, but also enable sufficient compliance margins to account for aging, production variability, and in-use testing.

Cost is a key factor. The 2024 requirements of the HDV Omnibus Rule, according to ICCT research, would require modest increases in technology complexity and cost.⁴ We estimate an incremental cost between \$100 and \$1,100 for a 13.0L Class 8 heavy-duty vehicle to achieve a 75 percent reduction in emissions under the FTP, as well as new Low Load Cycle requirements. Compliance with California 2027 requirements would require additional technology changes to meet the greater 90% reduction in emissions under the FTP and additional Low Load Cycle requirements. We estimate an incremental cost range of \$2,200 to \$3,200 for a 13.0L Class 8 heavy-duty vehicle in 2027, compared to what is currently required to meet US EPA 2010 standards.

We take issue with industry claims of high costs due to warranty and useful life requirements. Existing incremental cost estimates for a 12L-13L engine to fully comply with the HDV Omnibus Rule range from \$2,170 on the low end (published by ICCT) up to \$80,821 on the high end (released by EMA). CARB’s own estimates reflect the median of cost estimates at \$8,478.⁵

⁴ Posada, Francisco, Aaron Isenstadt, and Huzeifa Badshah. (2020) “Estimate Cost of Diesel Emissions Control Technology to Meet Future California Low NO_x Standards in 2024 and 2027.” Washington, DC: International Council on Clean Transportation. Available at <https://theicct.org/sites/default/files/publications/HDV-emissions-compliance-cost-may2020.pdf>

⁵ Muncrief, Rachel. (2021). “What will it really cost to build the next generation of low-NO_x trucks?” Washington, DC: International Council on Clean Transportation. <https://theicct.org/blog/staff/real-cost-low-nox-trucks-apr2021>

The difference in estimates is explained by assumptions and methodology related to durability and warranty costs. While the ICCT conducted a bottoms-up component cost analysis and applied widely used methods to estimate research, development and durability costs, our study did not include the cost of warranty and manufacturer compliance activities (such as new test procedure implementation and reporting requirements). EMA by comparison generated its estimates from an anonymous and confidential survey of its members that provides no basis for evaluation. By contrast, the ARB utilized a methodology for warranty and compliance costs that is clearly stated. Their approach results in an estimate of \$1,800 incremental cost of extended warranty and compliance activities or 21% of the total incremental cost. In light of not producing our own warranty and compliance cost estimates, we find the ARB estimates to be clearly documented, thorough and credible in contrast to the EMA estimates that provide no basis for an objective comparison.

This proposal comes at a time when public awareness of environmental justice led President Biden to announce:

Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related, and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts. It is therefore the policy of my Administration to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care (27 Jan 2021, Executive Order on Tackling the Climate Crisis at Home and Abroad)⁶

This engine and vehicle standard is the first in more than twenty years to update vehicle emission standards for heavy-duty trucks, a key source of exposure disparities in marginalized communities. According to the Moving Forward Network, 45 million people live within 300 feet of a highway, 40 percent of US ports, freight facilities and logistics centers are in regions that do not meet National Ambient Air Quality Standards, two times more low-income households are exposed to dangerous diesel exposure risk than their proportion of the US population, and African Americans represent three times more of the at-risk population compared to their share of the US population. The Clean Air Act is one of the most successful environmental laws in US history, but by focusing on population-average reductions it has permitted structural inequities in environmental exposures to persist.

“We have shown here that most emission source types—representing ~75% of exposure to PM_{2.5} in the United States—disproportionately affect racial-ethnic minorities. This phenomenon is systemic, holding for nearly all major sectors, as well as across states and urban and rural areas, income levels, and exposure levels. Industry, light-duty gasoline vehicles, construction, and heavy-duty diesel vehicles are often among the

⁶ The White House, “Executive Order on Tackling the Climate Crisis at Home and Abroad.” Washington, DC: 27 January 2021. Available at <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>

largest sources of disparity, but this can vary widely by source type and location. Because of a legacy of racist housing policy (fig. S2; supporting results) and other factors, racial-ethnic exposure disparities have persisted even as overall exposure has decreased ([11](#)–[13](#)). Targeting locally important sources for mitigation could be one way to counter this persistence. (Tessum et al, 2021)⁷

EPA may consider addressing these inequities by setting limits on nitrogen oxides that require the best available control technologies for internal combustion engines in line with California requirements, while establishing requirements on manufacturers to sell a minimum percentage of vehicles that meet limits of zero tailpipe carbon dioxide emissions. Such limits can maximize air quality benefits in marginalized communities by targeting at this early stage those first-mover vehicle applications that tend to operate in and around urban ports, depots, warehouses, and highways.

For further information, please contact Ray Minjares, ICCT Heavy-Duty Vehicles Program Director, at Ray@theicct.org or by phone at +1 510-529-1647.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Drew Kodjak', with a stylized flourish at the end.

Drew Kodjak
Executive Director

CC: Joseph Goffman, Acting Assistant Administrator, OAR
Daniel Utech, Chief of Staff
Sarah Dunham, Director, OTAQ

⁷ Tessum, Christopher W., David A. Paoella, Sarah E. Chambliss, Joshua S. Apte, Jason D. Hill, and Julian D. Marshall. 2021. “PM_{2.5} Polluters Disproportionately and Systemically Affect People of Color in the United States.” *Science Advances* 7 (18): eabf4491. <https://doi.org/10.1126/sciadv.abf4491>.