

Require at least a 2:1 margin to offset legacy emissions to reflect real-world impacts.

The emission differences between the MY 2024-2025 engines required by the HDO rule and the legacy engines CARB is considering be allowed for sale in those years are much larger than the emissions differences measured under the HD FTP cycle. The legacy engines will not be certified on the low-load cycle (LLC) nor held to the new heavy-duty in-use test procedures, and they will be allowed to use the meaningless Not to Exceed (NTE) test instead of the three-bin moving average window (3B-MAW) to determine in-use compliance. While we are not supportive of the proposal to sell legacy engines, if CARB moves forward to do so, the real world emissions should be required to be offset, not just the smaller differences measured on the HD FTP cycle.

CARB's own real-world data makes clear the need for the new LLC and 3B-MAW cycles and emission standards. According to its report, "the vast majority of operating conditions are not evaluated and go unchecked for in-use compliance [under the NTE]" (ISOR II-11), with 24 percent of manufacturer submitted data having ZERO valid NTE events. This toothless in-use operating procedure has contributed to a massive discrepancy between reductions achieved in the lab versus those achieved in the real world.

Vehicles certified to the 0.2 g/bhp-hr NO_x standard frequently have much higher emissions in the real world. For example, CARB's own data shows that such diesel engines exhibit as much as 1.77 g/bhp-hr NO_x under delivery operations, nearly a **nine-fold increase** in emissions compared to certification.¹ At the same time, these vehicles saw virtually no valid NTE events and passed the few that existed, indicating how woefully inadequate the current procedure is for reflecting real-world impacts. The most impactful vocational trucks studied use precisely the classes of legacy engines covered by this proposal, including the Cummins ISX12 and ISL9 (though the study's design prevents attribution of the most egregious results).

These excess emissions are the result of real-world operating conditions where modern diesel emission controls are ineffective (again, according to CARB's research),² the exact type of high-idle, low-speed operations expected in warehouses or ports, areas with significant air quality problems that result in highly inequitable health impacts. It was these conditions the LLC was designed to account for in certification.

CARB's data on the LLC shows that the reductions on the new LLC are anticipated to be substantially larger than the reduction in HD FTP emissions. Current generation engines meeting the 0.2 g/bhp-hr NO_x standard emitted up to 1.5 g/bhp-hr NO_x emissions on the LLC.³ In 2024, the requirement is 0.2 g/bhp-hr NO_x on the LLC, **nearly twice the reduction** required on the HD FTP.

To effectively offset the real-world emissions of legacy engines, CARB should require manufacturers to offset legacy emissions by at least a 2:1 margin to reflect the inadequate test procedures under which these legacy engines were certified.

¹ C. McCaffery, et al. "Real-world NO_x emissions from heavy-duty diesel, natural gas, and diesel hybrid electric vehicles of different vocations on California roadways," *Sci. Total Environment* 784, 147224 (2021). DOI: 10.1016/j.scitotenv.2021.147224.

² K. Boriboonsomsin, et al. "Real-world exhaust temperature profiles of on-road heavy-duty diesel vehicles equipped with selective catalytic reduction," *Sci. Total Environment* 634, 909-921 (2018). DOI: 10.1016/j.scitotenv.2018.03.362.

³ C. Sharp, "Update on Heavy-Duty Low NO_x Demonstration Programs at SwRI," Presentation to the California Air Resources Board, September 26, 2019.

Remove non-ZEV actions as compliance options.

The deep cuts in M/HDV emissions needed to protect public health and avoid climate change's worst impacts demand a rapid transition to ZEVs. Unfortunately, the proposal takes the conflicting position of purporting to support ZEV deployment but then capping the credit price and allowing compliance through low NOx combustion credits. This directly conflicts with the state's objective to zero-out emissions from the M/HD fleet and incentivizes an industry at cross purposes with ZEVs.

Low NOx combustion vehicles perpetuate reliance on fossil fuels whose production and use—from drilling to transporting to refining to storage—is rife with emissions that adversely impact communities, public health, and the environment.⁴ Further, the latest research shows that low NOx vehicles emit significantly above their certification when tested in the real world.⁵ Since emission control systems degrade over time, these vehicles can and do pollute more than their diesel counterparts.⁶

M/HD ZEVs are commercially available for almost all applications and classes, and the technology is improving exponentially. However, supporting combustion technologies, particularly where additional fueling infrastructure is required, locks in long-term fossil fuel investments that ultimately cost and pollute more than ZEVs and risk becoming stranded assets.

CARB should remove combustion vehicles and non-ZEV offset projects as compliance pathways to avoid entrenching fossil fuel interests and help accelerate the transition to ZEVs.

Sincerely,

Leslie Aguayo
The Greenlining Institute

Jennifer Helfrich
Ceres

Dave Cooke, Ph.D.
Union of Concerned Scientists

Cristina Marquez
IBEW Local 569

Joel Ervice
Regional Asthma Management and Prevention
(RAMP)

Jesse N. Marquez
Coalition For A Safe Environment

Catherine Garoupa White
Central Valley Air Quality Coalition (CVAQ)

Adrian Martinez
Earthjustice

Joe R. Gatlin
NAACP, San Pedro-Wilmington Branch # 1069

Patricio Portillo
Natural Resources Defense Council

Theral Golden
West Long Beach Association

Ricardo Pulido
Community Dreams

Kevin Hamilton
Central California Asthma Collaborative

Magali Sanchez-Hall, MPH
EMERGE

⁴ <https://envhealthcenters.usc.edu/infographics/infographic-natural-gas>

⁵ https://ww2.arb.ca.gov/sites/default/files/2021-04/Natural_Gas_HD_Engines_Fact_Sheet.pdf

⁶ Arvind Thiruvengadam, Marc C. Besch, Berk Demirogok, Saroj Pradhan, Filiz Kazan, Beti Selimi, Rasik Pondicherry, Allen Duffy, Jordan Leatherman, Chakradhar Reddy, Cem Baki, Jason England, Aaron Leasor, Daniel K. Carder. In-use emissions and chassis dynamometer emissions rates of heavy-duty diesel and alternative fueled vehicles operating in Southern California. 30th CRC Real World Emissions Workshop (March, 2021).

John Shears
The Center for Energy Efficiency and Renewable
Technologies

Taylor Thomas
East Yard Communities for Environmental
Justice

Peter M. Warren
San Pedro & Peninsula Homeowners Coalition

Nicole Wong
Dream Corps Green For All

Drew Wood
California Kids IAQ

Andy Wunder
Environmental Entrepreneurs (E2)