
Date: May 7, 2021
To: Environmental Quality Commission
From: Leah Feldon, Deputy Director
Subject: Item D: New Medium- and Heavy-duty Truck Standards (Informational)
May 20, 2021, EQC meeting

Purpose This is an informational briefing for the commission on new medium- and heavy-duty diesel engine standards adopted in California and to be proposed in Oregon. DEQ staff will provide an overview of the California rules that staff will bring before the EQC for consideration in November 2021:

- Advanced Clean Truck Rules
- Low-NO_x Omnibus Rules

Staff will briefly outline the environmental and public health concerns associated with diesel truck engine emissions, explain DEQ's participation in the broad, multi-state coalition to expand diesel engine rules, discuss Oregon's authority under Section 177 of the Clean Air Act to adopt California on-road rules, describe each rule and discuss next steps in the process.

Concerns with diesel engine exhaust Diesel engine exhaust is a complex mixture of gasses and particles that both on their own, and collectively, are associated with a variety of health effects. In 2015, DEQ published a comprehensive review of peer-reviewed science on exposure to diesel (attachment 1 to this staff report). In summary, that report found exposure to diesel engine exhaust is associated with a variety of effects, including:

- Increased risk of certain cancers, including lung and bladder cancers.
- Cardiovascular effects including an increased risk of heart attacks.
- Pulmonary effects, such as upper respiratory system irritation and decreased lung functions.
- Neurodevelopmental effects including decreased cognitive function and decreased birthweight

Diesel engines are responsible for approximately 25 percent of all nitrogen oxides (NO_x) emissions in the state, a precursor to the formation of ground level ozone. Communities across Oregon, including the Portland-metropolitan

area and the Rogue Valley have experienced increasing levels of ozone in recent years. Increasing levels of ozone, or smog, leads to a wide variety of health effects including aggravated asthma, decreased lung function and chronic obstruction pulmonary disease.

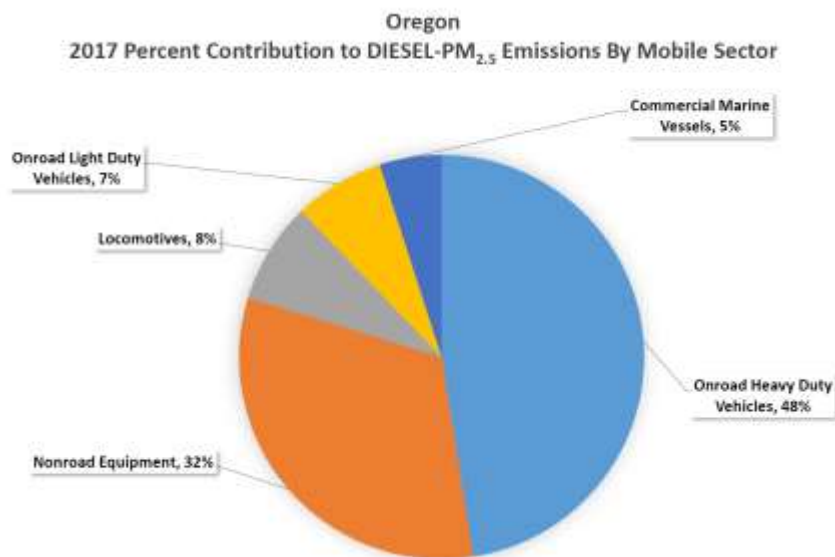
EPA estimates that cleaning up diesel engines as a result of federal regulations will ultimately reduce documented public health and environmental impacts to be worth more than \$296 billion annually. In Oregon alone, the direct and indirect public health and environmental impact of exposure to diesel exhaust could be valued up to \$3.5 billion per year. This is one indicator of how serious the effects of diesel exhaust exposure can be.

In addition to the health effects, combustion of diesel fuel is a significant source of greenhouse gas emissions. Transportation accounts for approximately 40 percent of all statewide greenhouse gas emissions in Oregon. This represents the largest source of emissions in Oregon, and a sector with increased emissions in recent years. While heavy-duty trucks and buses, which typically are fueled by diesel, only account for four percent of vehicles on the road nationally, they are responsible for nearly 25 percent of total transportation sector greenhouse gas emissions nationally, and 23 percent in Oregon. Emissions from trucks are one of the fastest growing sources of greenhouse gas emissions, and the number of truck miles traveled on the nation's roads is projected to continue to grow significantly in the coming decades.

While carbon dioxide is typically regarded as the key greenhouse gas of concern, black carbon, a constituent of diesel engine exhaust, is increasingly recognized as a significant climate-forcing agent. In the United States, diesel engines are the largest source of black carbon. Black carbon emissions contribute to climate change by:

- Warming the atmosphere directly by absorbing solar radiation and emitting it as heat;
- Darkening snow and ice, causing them to warm and melt much faster;
- Affecting the properties of clouds, including their reflectivity and lifetime, stability and precipitation.

The climate-forcing effects of black carbon are short-lived, meaning any action to reduce emissions results in near-term benefits.



This graph shows that mobile sources are responsible for the vast majority of diesel particulate matter emissions in Oregon. Medium- and heavy-duty diesel trucks (those with a Gross Vehicle Weight Rating of 14,000 pounds or above) are responsible for approximately half of all emissions.

Authority to establish new vehicle emission standards

The federal Clean Air Act grants the U.S. EPA original jurisdictions for establishing emissions standards for new motor vehicles, including heavy-duty diesel trucks. Section 209(a) of the federal Clean Air Act (42 USC § 7543) prohibits states, (except California, or other political sub-divisions, such as local or regional governments, from establishing emission standards for new motor vehicles. However, there is an important exception: Section 177 (42 USC § 7507) allows states to adopt new motor vehicle emissions standards that are identical to standards adopted by the state of California, if California has received a waiver from the U.S. Environmental Protection Agency to promulgate its standards. This is an authority that sixteen states, including Oregon, have exercised.

Additionally, ORS 468A.380 provides authority to the Environmental Quality Commission to establish motor vehicle emissions standards. It is under this authority, and consistent with the federal Clean Air Act, that Oregon has adopted motor vehicle emissions standards for new vehicles, such as adoption of California's light-duty Low- and Zero-Emissions Vehicle regulations.

Adoption of California standards by other states amplifies the environmental impact of the rules by ensuring they are applied to a larger market-share of new vehicles. It also ensures Oregon keeps pace with its neighbors and has access to the cleanest, lowest-emitting technologies.

**Strategy
integration and
commitments**

The rules discussed during this information item are central to DEQ’s efforts to reduce harmful diesel engine exhaust and transportation-related greenhouse gas emissions. They are integrated into a variety of DEQ strategies and work, including:

Clean Diesel Strategy

At the January 2021 EQC meeting, DEQ presented three strategic directions for addressing diesel engine exhaust. This rulemaking supports Strategic Direction #2 “Adopt newer and cleaner technologies.” Together, these regulations set Oregon on a path to zero-carbon transportation options for the medium- and heavy-duty diesel fleet while ensuring the diesel trucks manufactured in the meantime are as “clean” as possible. Failure to adopt these emerging technologies may lock the next generation of trucks and equipment into higher-emitting technologies and a continued reliance on fossil fuels.

Executive Orders 17-21 and 20-04

Governor Brown’s Executive Orders 17-21 and 20-04 relate to zero-emission vehicles and reducing greenhouse gas emissions, respectively. Both orders include mandates that DEQ must:

- Maintain identity with the latest new vehicle emissions standards adopted by the California Air Resources Board
- Reduce transportation-related greenhouse gas emissions by accelerating the adoption of low- and zero-carbon technologies

The Advanced Clean Truck rule is foundational to reducing greenhouse gas emissions because it ensures the availability of zero emission vehicles in Oregon.

Multi-State Medium/Heavy-Duty ZEV Memorandum of Understanding

In July 2020, Governor Brown signed onto a multi-state Medium- and Heavy-Duty ZEV MOU with 14 other signatory states and Washington D.C. The MOU commits states to work together to advance and accelerate the market for electric medium- and heavy-duty vehicles, with a goal of 100 percent of all new medium- and heavy-duty vehicle sales be zero emission vehicles by 2050 with

an interim target of 30 percent zero-emission vehicle sales by 2030. The MOU includes the development and implementation of a ZEV action plan for trucks and buses, and will seek ways to accelerate the deployment of these zero emission vehicles to benefit disadvantaged communities. This plan will be completed in 2021.

The MOU comes at an important transition point for the industry as investment in zero emission vehicle technology for the medium- and heavy duty sector continues to ramp up. Medium- and heavy-duty vehicles are also an acknowledged, but unaddressed, environmental justice problem that directly and disproportionately harm communities located near freight corridors, ports and distribution centers.

Statewide Transportation Strategy and Every Mile Counts

In 2020, Governor Brown called for the Departments of Environmental Quality, Transportation, Energy and Land Conservation and Development to identify implementation actions to reduce GHG emissions. In response to that directive a multi-agency work plan was developed and the Every Mile Counts Campaign was launched. The workplan identifies high-impact strategies that the agencies can implement under existing authorities and with existing resources.

Because of our authorities and technical capacity, DEQ is uniquely situated to focus on strategies that reduce vehicle emissions through the adoption of cleaner fuels and vehicles; an Every Mile Counts objective. A major action identified under this objective is to adopt new emission standards and ZEV requirements for medium- and heavy-duty trucks.

Regional Haze

The adoption of new emission standards and ZEV mandates will also be included in Oregon's 2021 Regional Haze Plan as one of several long-term strategies to address visibility impairment in Class 1 areas. As of 2017, on-road heavy-duty vehicles represented 44 percent of statewide on-road NOx emissions. In addition, by 2028, modeled mobile source NOx visibility impairments at Mount Hood, as an example, would represent about 63 percent of the total while industrial sources would be about 21 percent. Since mobile sources are the largest emitting sector by far for these important haze precursors, taking action to reduce NOx from one of the most significant sources will lead to improvements in visibility in many of Oregon's Class 1 areas.

Clean Fuels Program Extension and Expansion

Also in response to Every Mile Counts and EO 20-04, DEQ is preparing to initiate a rulemaking to extend and expand the Clean Fuels Program to a 25 percent% reduction in transportation fuel carbon intensity by 2035. Preliminary compliance pathway scenarios modeling indicates that vehicle electrification – and the Advanced Clean Truck rule in particular – is key to the success of this expansion, and may even allow the program to exceed a 25 percent by 2035 mandate.

Advanced Clean Trucks Rule

Overview and Scope of Regulation

California recently adopted the Advanced Clean Trucks Rule, which will result in greenhouse gas and tailpipe emissions reductions in the medium- and heavy-duty vehicle sectors. The rule requires medium- and heavy-duty vehicle manufacturers to sell ZEVs as a certain percentage of sales, beginning with the 2024 vehicle model year. The rule also includes a one-time reporting requirement for large entities to provide vehicle usage and location data to support future consideration of a clean fleet purchase regulation.

Beginning in 2024, manufacturers must increase their zero-emission truck sales depending upon the class size of the truck. The sales numbers are based on vehicles sold and delivered to a purchaser. The following chart provides the sales requirements:

Model year	Class 2b-3	Class 4-8	Class 7-8 Tractor
2024	5%	9%	5%
2025	7%	11%	7%
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	55%	75%	40%

The targets acknowledge the availability and anticipated ability for manufacturers to provide and sell ZEV trucks over the coming years, with earlier targets for segments such as Class 2b-3 pickup trucks, Class 4-8 drayage trucks, first- and last-mile delivery, garbage trucks, local buses, and utility and government vehicles, and Class 7-8 tractor trailer trucks.

It establishes a credit and deficit system, similar to the existing framework for light and medium-duty ZEV requirements. The requirements also provides flexibility for manufacturers to build ZEVs in one weight class or across all weight classes.

The one-time reporting requirement under the rules will provide information to DEQ to understand the types of vehicles fleets own and how they use them. It would require fleets with a certain number of trucks with a facility in Oregon, state, local, and government agencies, or businesses with a certain annual revenue to report information.

Oregon is also considering the adoption of a fleet reporting requirement or setting Oregon-specific requirements on which entities must report. Under California's rules, government agencies, entities with at least 50 vehicles or that have a total annual revenue above \$50 million must report vehicle information. Oregon could establish alternative fleet size or revenue requirements or exclude certain fleet categories from reporting.

**Heavy Duty
Engine and
Vehicle
Omnibus**

The adoption of California's Advanced Clean Trucks rule would result in greenhouse gas and tailpipe emissions reductions as described above. However, not all vehicle applications or sectors will be able to make the transition to zero emission technology in the near term. For example, DEQ anticipates at least 50,000 new non-ZEV Class 8 trucks would be purchased at Oregon dealerships between 2024 and 2035. Since diesel engines currently power 98 percent of these trucks, some demand for diesels will persist. To address tailpipe emissions associated with the remaining medium- and heavy duty diesel trucks sold in California, the California Air Resources Board developed the Heavy Duty Engine and Vehicle Omnibus Regulation often referred to as Low NOx Omnibus.

The regulation is fairly complex with numerous details related to engine and pollution control technology specifications, engine testing, warranties and other elements. Key points include:

- There is a need for cleaner vehicles that have lower tailpipe emissions throughout the vehicle lifecycle. There is also a need for engine emission standards that are more relevant to how these vehicles operate in our communities. Heavy trucks are typically used for many more miles than the current standards anticipated. Warranties that better reflect the use of the vehicle would address long term maintenance problems that are associated with deterioration of equipment.

- Low load operation (low speeds and/or light payloads) is not addressed in the current engine standards and these emissions make up a significant percentage of the total for any given truck.
- A demand for diesel trucks will remain in the near term therefore we should ensure that we have only the cleanest possible diesels on the road.

The Low NOx Omnibus regulation includes:

- 1) Lower NOx and PM_{2.5} standards for new truck engines (both diesel and non-diesel engines)
 - a. NOx standard would be 75 and 90 percent below the current federal standards, respectively, in 2024 and 2027. NOx reductions will also reduce secondary nitrate PM_{2.5} formation.
 - b. PM_{2.5} standard would be reduced by 50 percent primarily to prevent backsliding with potentially less efficient particulate controls to accommodate the lower NOx standard.
- 2) New, low load cycle standard which addresses emissions associated with low or idle speeds and other situations when emissions temperatures are not high enough to ensure proper catalyst operation
- 3) New Useful Life and Warranty periods

Adopting the Low NOx Omnibus rules by reference under authority of the Clean Air Act Section 177 would mean that manufacturers of all new medium- and heavy-duty vehicles and engines sold in Oregon for on-road use would need to meet these new standards. This does not affect vehicles that are already on the road.

Additional rule updates

Additionally, DEQ is proposing updates to the LEV rules to ensure continued identity with California rules. CARB adopted revisions to the On-Board Diagnostic (OBD II) requirements for light-duty vehicles on Oct. 3, 2019. These changes clarify both existing definitions and testing requirements, and also allow manufacturers to certify future vehicles that comply with the OBD II regulation.

Next steps

DEQ plans the following actions for this proposed rulemaking:

- May and June 2021: DEQ will hold listening sessions with the public and key stakeholder groups
- June and July 2021: DEQ will convene an Advisory Committee to discuss the proposed rulemaking and solicit feedback on the fiscal and economic impacts

- August and September 2021: Public comment
- November 2021: DEQ will bring the proposed rules to EQC for action

**Supporting
materials and
links**

1. The Concerns About Diesel Engine Exhaust (DEQ) available at:
<https://www.oregon.gov/deq/FilterDocs/DieselEffectsReport.pdf>
2. Diesel Engine Emissions in Oregon Staff Report, January 2021 EQC Meeting. Available at:
https://www.oregon.gov/deq/EQCdocs/01222021_ItemL_Diesel.pdf
3. Multi-state Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding, available at:
<https://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf/>
4. Statewide Transportation Strategy – Every Mile Counts multi-agency implementation work plan, available at:
https://www.oregon.gov/odot/Programs/TDD%20Documents/STS%20Multi-Agency%20Implementation%20Work%20Plan_2020-2022.pdf
5. California Air Resources Board Advanced Clean Trucks Regulation reference materials, available at:
<https://ww2.arb.ca.gov/rulemaking/2019/advancedcleantrucks>
6. California Air Resources Board Heavy-Duty Omnibus Regulation reference materials, available at:
<https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox>

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