VW Environmental Mitigation Plan for the State of Oregon

March 2018

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

State of Oregon
Department of Environmental Quality

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Background

Since 2009, the Volkswagen Group of America—under the Volkswagen, Audi and Porsche nameplates—sold diesel passenger cars in the United States with emission control defeat devices that violated federal motor vehicle emission standards. Software was installed in more than 590,000 2.0 and 3.0 liter engines that resulted in emissions of nitrogen oxides up to 40 times the allowed limits. Litigation from several parties, including the U.S. Department of Justice, the Federal Trade Commission, the Environmental Protection Agency, the state of California and class action lawsuits brought by vehicle owners, were raised to a federal district court. These various actions were resolved for the claims associated with the 2.0 liter vehicles in a partial Consent Decree that was approved in Oct. 2016. On May 17, 2017 a settlement was approved for the 3.0 liter class of vehicles.

The decree requires Volkswagen to provide more than $2.9 billion to an Environmental Mitigation Fund to mitigate previous and current excess emissions of nitrogen oxides by these noncompliant vehicles. Funds are to be distributed among participating states, tribes, the District of Columbia and Puerto Rico to support eligible mitigation actions outlined in the decree. The initial allocation to the state of Oregon (based on registration share of VW diesels by state) is approximately $72.9 million to be spent over 10 years. The decree requires each Beneficiary to submit a broad outline of a mitigation plan at least 30 days before the first funding request. This document outlines the state of Oregon's initial mitigation plan. DEQ will have up to 10 years to spend the allotted funds and this plan will necessarily change as needed. DEQ will solicit public review and comment as the plan evolves over time.

The decree establishing the trust requires a high level plan submitted to the Trustee demonstrating the following required elements:

1. The overall goal for use of the funds;
2. The categories of Eligible Mitigation Actions the Beneficiary (i.e. state of Oregon) anticipates will be appropriate to achieve the stated goals and the preliminary assessment of the percentages of funds anticipated to be used for each type of mitigation action;
3. A description of how the Beneficiary will consider the potential impact of the selected mitigation action on air quality in areas that bear a disproportionate share of the air pollution burden within the state; and
4. A general description of the expected ranges of emission benefits estimated to be realized by implementation of the identified mitigation actions.

This document outlines how the Department of Environmental Quality, Oregon's designated agency for the fund, proposes to administer the plan and describes the priorities and criteria for initial project selection.

The Consent Decree anticipates that states will periodically update their mitigation plan. During the term of the decree, DEQ may adjust the goals and elements of Oregon's plan to reflect changing circumstances and experience from efforts made to date. DEQ would provide opportunity for public review and comment on any changes before submitting as a revised mitigation plan to the Trustee.

Oregon’s Air Quality Challenges

Diesel Engines and Public Health

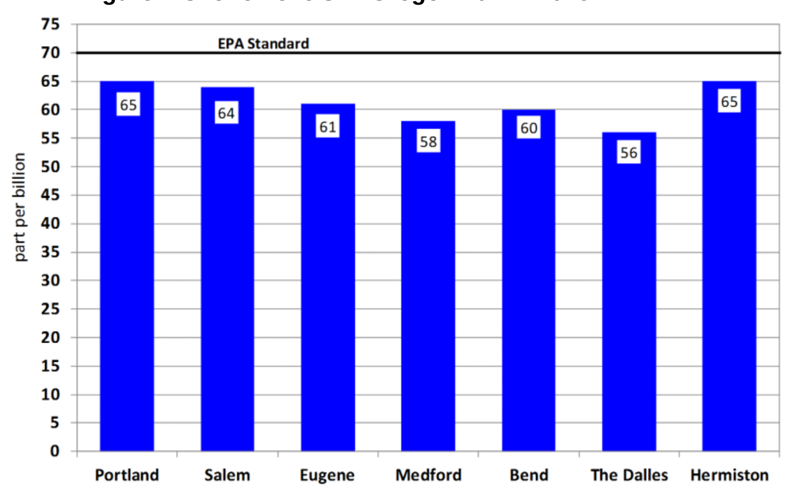
The overall goal of the Environmental Mitigation Fund is to reduce nitrogen oxide (NOx) emissions from mobile sources, with court approved eligible mitigation actions focusing primarily on medium and heavy duty diesel engines. While the overall pollution resulting from diesel engines is a complex mixture of gases and particles, the significant pollutants are nitrogen oxides and particulate matter. Each has distinct health and environmental impacts. Diesel particulate is also an important climate change pollutant as well as a priority air toxic in Oregon. This plan recognizes the suite of air contaminants and effects produced by diesel engines (NOx, PM, ozone, air toxics and climate) and is designed to achieve the multi-pollutant benefits of reducing diesel pollution. Diesel engines as distinct from gasoline engines have a distinctive role in contributing to air pollution. Diesel fuel accounts for only 29 percent of all transportation fuel consumed in Oregon, but diesel engines are responsible for 49 percent of NOx and 60 percent of fine particulate matter from transportation sources.

Nitrogen oxides are a family of poisonous, highly reactive gases resulting from fuel combustion, especially at the high temperatures typically found in compression ignition or diesel engines. The primary health impact from nitrogen oxides comes from its ability to react with other chemicals in the air to form ozone (smog) and particulate matter, each with their own adverse health effects. EPA established an air quality standard for nitrogen dioxide in 1971. No area in Oregon, or any other state for that matter, currently exceeds the NOx criteria pollutant standard.

Ozone is formed from the combination of NOx and volatile organic compounds in the presence of sunlight. Excessive levels of ozone can make it more difficult to breathe, and cause shortness of breath and coughing with a sore or scratchy throat. Lung diseases such as asthma, emphysema, and chronic bronchitis are aggravated in the presence of ozone. While ozone makes the lungs more susceptible to infection, it can continue to damage the lungs even after the symptoms have disappeared. These effects can be found in healthy people but can be more serious in people with lung diseases like asthma or emphysema.

EPA established an ozone standard first in 1979 with the most recent update adopted in 2015. While Portland had violated an earlier ozone standard, currently all areas of the state are in compliance with the current 8-hour standard of 70 parts per billion. Even so, it is clear from Figure 1 that the margin for safety is small enough in many parts of the state that additional reductions of ozone precursor emissions would be useful as a margin of safety to avoid nonattainment status. Regardless of ozone criteria pollutant status, reductions of ozone that can be achieved using mitigation plan actions will provide climate change benefits when ozone is reduced even from current levels.

Figure 1 Ozone Levels in Oregon 2014 - 2016



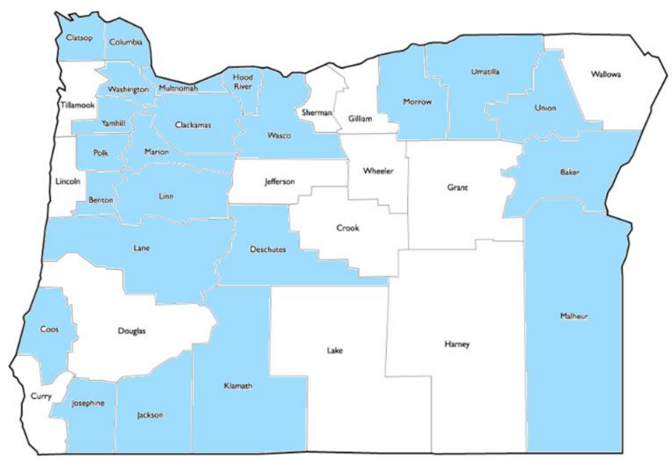
Three Year Average of Fourth Highest Eight Hour Average Ozone

In 2016 ,the Bend monitor was moved to The Dalles so: 1. Bend is 2013-15. 2. The Dalles is 2016 only.

Fine particulate matter is a public health concern because these very small particles transport deep into the lungs with the ability to transfer into the bloodstream. Recent studies have found a stronger link between adverse health effects and exposure to black carbon—the major constituent of diesel particulate than exposure to fine particulates generally (Janssen et al, 2011). Even with the complex mixture of multiple pollutants found in diesel exhaust, fine particulate matter appears to have the greatest potential for adverse health effects. Researchers have concluded that human health impacts associated with fine particulate may be ten times greater than for nitrogen oxides, 150 times greater than hydrocarbons and 2,000 times greater than carbon monoxide on an equivalent mass basis (McCubbin and Delucchi, 1999). Diesel particulates have been specifically associated with a number of chronic and acute health effects including premature mortality, aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, school absences, lost work days and restricted activity days), changes in lung function with an increase in respiratory symptoms, altered respiratory defense mechanisms and chronic bronchitis and asthma. (CA EPA, 2017) (US EPA, 2002) (US Dept Health and Human Services, 2005) (IARC, 2012). For the approximately 360,000 Oregonians currently with asthma, diesel particulates represent a risk for triggering asthma attacks. Diesel particulates are also suspected to contribute to adverse health effects in the nervous system with evidence for impaired cognition (Suglia et al, 2008).

The Oregon Environmental Quality Commission has adopted Ambient Benchmark Concentrations to identify, evaluate and address air toxics, including diesel particulate matter. Air toxics levels over the benchmarks signals an elevated cancer risk to the public above one-in-a-million additional cancers over a lifetime of exposure. Based on the most recent evaluation prepared by EPA, as many as 92 percent of Oregonians face an elevated risk for cancer greater than one-in-a-million over a lifetime from this exposure (Figure 2).

Figure 2 Counties above 1 in a Million Cancer Risk from Diesel PM (2011 EPA National Air Toxic Assessment)



Diesel Engines and Climate Change

Climate change is a priority concern in Oregon (Oregon Global Warming Commission, 2017) with an established goal to arrest growth in greenhouse gases by 2010; with a short term target to reduce emissions by 2020 at least 10 percent below 1990 levels and a long term target to secure further reductions to 75 percent below 1990 levels by 2050. Carbon dioxide is the largest anthropogenic contributor to climate but other gases and particles also influence climate in similarly adverse ways. Diesel engines make specific contributions through emissions that lead to tropospheric ozone formation and direct emissions of black carbon as well as carbon dioxide.

Tropospheric ozone contributes to atmospheric warming by absorbing infrared radiation. Since the beginning of industrialization, ozone may have constituted up to 35 percent of the contribution to climate change from all greenhouse gases. Unlike other well-mixed greenhouse gases, ozone is short lived with its impact affected by transport times resulting in discrete geographical rather than global impacts. One model suggested while tropospheric ozone could have contributed $0.3^{o}C$ to the global annual average during spring and summer months transport from polluted northern continental regions may contribute about $0.4^{o}C$ to $0.5^{o}C$ warming to conditions in the Arctic (Shindell et al, 2006).

Research over the past several years has concluded that black carbon particles have an adverse effect on climate change (Bond et al 2013). Black carbon, making up about 70 percent of the particulate emissions from diesel engines, has the ability to warm the atmosphere differently than greenhouse gases. It contributes 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.

Globally, major sources of black carbon include cook stoves and warming fires but the largest source of black carbon emissions in North America is the diesel engine. Black carbon is a short lived climate forcer with an atmospheric lifetime of days to weeks, compared to 50 to 100 years for carbon dioxide. Reductions in black carbon, and other short lived climate forcers like methane and ozone, can result in significant near term climate benefits. Action on black carbon now can provide climate change relief equivalent to one to two decades of action on carbon dioxide (Bice et al, 2009). Reducing black carbon is a complementary strategy to necessary reductions in carbon dioxide. One study suggested that to reach even a 500 ppm CO_2 equivalent target by 2100 while ignoring black carbon sources would require cutting global CO_2 emissions to half the 2005 levels about 8 years earlier (Kopp & Mauzerall, 2010).

The most recent Emissions Gap report by the United Nations highlighted the urgent need for accelerated short-term actions if the goals of the Paris Agreement are to be reached and specifically highlighted the role of short term climate forcers like black carbon and methane (UN Environment, 2017). The report points out that in addition to fast temperature response from reductions in short lived climate forcers, reducing these forcers would also contribute to mitigating climate change impacts resulting from cumulative heat uptake like sea level rise and glacier and ice melting. Reductions of these short term forcers also lessens the likelihood of passing irreversible thresholds and the triggering of positive feedbacks (Shindell et al, 2017; Xu & Ramanathan, 2017)

While climate change is a global phenomenon caused primarily by well mixed greenhouse gases, black carbon reductions can have more localized benefits. For instance, studies have documented adverse effects on snowpack and the hydrological study in the Pacific Northwest and the Sierra Nevada resulting from black carbon deposition (Qian et al, 2009). Reducing these impacts will have beneficial impacts for maintaining year round water availability for water users like irrigators and salmonids dependent on cooler water temperatures.

Overall Goals

Diesel engines are an integral part of the economy of Oregon given the power, durability and energy efficiency these engines represent to a broad and doverse community of owners and operators. The adverse impacts from emissions can be mitigated with cost effective use of the Environmental Mitigation Funds. Despite the substantial funding availble in the mitigation fund, targeted use of the funds meeting the following goals will best address the air quality challenges facing Oregon.

- Maximize benefits for vulnerable populations, e.g., low income, minority, elderly and youth;
- Prioritize pollution reductions in areas of the state with the highest emissions of nitrogen oxides and particulate matter from diesel engines; and
- Maximize pollution reduction cost effectiveness.

Vulnerable populations

Low income and minority populations are at increased risk from exposures to toxic air contaminants from cars and trucks, including diesel particulate matter, even as compared to the general population. (For more information, see DEQ's 2012 Portland Air Toxics Solutions project http://www.deq.state.or.us/aq/planning/report/8environmentalJustice.pdf) Although health effects from diesel exhaust exposure occur across the age spectrum, people that are very young and old are especially vulnerable to known health effects from diesel exhaust exposure. Public health protection targeted toward each of these groups will also result in benefits for the general population.

Highly Impacted Areas

Diesel engines are widely used because of their fundamental utility but can be concentrated in areas with higher levels of economic activity. The plan intends to focus on projects that will benefit those areas of the state experiencing the highest pollution levels, assessed to the extent possible for risk to vulnerable populations as well as total NOx and particulate emissions from diesel engines.

Cost Effectiveness

Cost effectiveness is a metric that evaluates the project's cost to reduce a ton of diesel NOx and PM. Effective use of these funds to deliver the greatest benefit per dollar expended requires an assessment and selection of highest cost effectiveness among many possible eligible projects that could be funded. While Oregon's share of the fund, $72.9 million, is substantial, it is insufficient to address the entire emission reduction need represented by the aging, legacy diesel fleet. The pool of potentially eligible vehicles and engines is likely greater than 70,000 but with the funding available it may be possible to replace only about 1,900 older diesel vehicles. From the beginning of its program, the state of Oregon has relied on cost effectiveness in its clean diesel funding allocation process as a project evaluation tool.

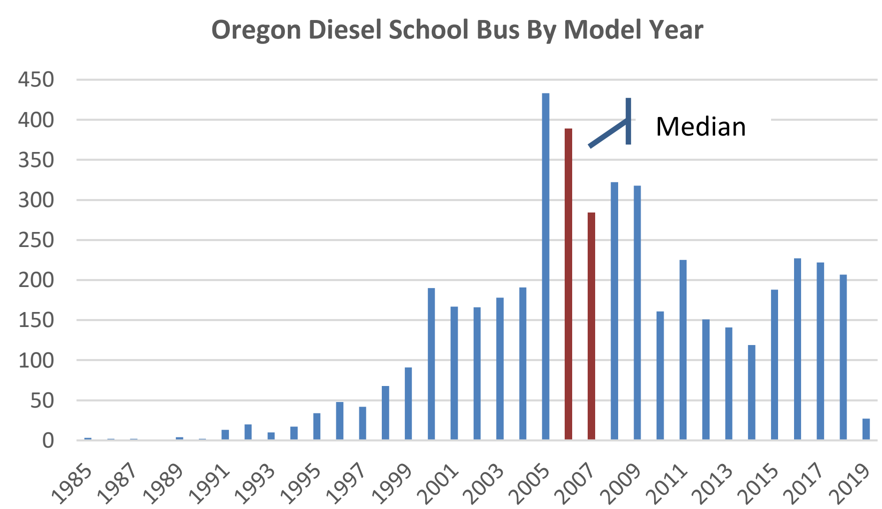
Initial Mitigation Plan Projects

The Oregon Legislature in SB 1008 (2017) authorized the Department of Environmental Quality to receive and manage funds from the Volkswagen settlement. The Legislature authorized only a specific project focus, retrofitting exhaust controls or replacing a select number of diesel school buses. The Legislature is expected to revisit the issue of authorizing additional allowable mitigation actions in future sessions.

There are several reasons why old school buses are a priority for emission reduction. School buses are the only fleet in the state facing a mandated replacement target for air quality purposes. Many kinds of school buses are known to have elevated pollution levels inside the bus (Sabin et al, 2005). Young people are especially vulnerable to adverse health effects from diesel emissions because of continuing lung development and higher respiratory rates than adults and thus represent a disproportionately impacted population. Several studies have documented health benefits for students travelling on lower emissions buses including improved lung function, reduced incidence of bronchitis and asthma with resulting decreases in absenteeism (Beatty & Shimshack, 2011) (Adar et al, 2015). Clean diesel school bus fleets are also identified as a priority social determinant of health by the Centers for Diesel Control and Prevention in their program to promote high impact community-wide, non-clinical health initiatives (www.cdc.gov/hi5).

Currently there are about 2800 diesel powered school buses in Oregon with engine model years earlier than 2007. In 2009, the Oregon Legislature adopted a goal to have all of these buses either retrofitted with exhaust controls by 2017 or replaced ultimately by 2025. Even with this directive, the Oregon Department of Education, considering historic turnover rates, estimates there would still be 450 older diesel buses remaining in 2025.

Figure 3 Replacement Beginning With Median Model Year



The school bus plan for Oregon is to address at least 450 diesel powered school buses with emission reduction strategies including either bus replacement or exhaust control retrofitting. School buses will be selected starting from the median model year of the state's fleet. This will be determined after the Oregon Department of Education completes the annual school bus inventory by January 2017. School districts with buses in this year, and adjoining model years as necessary to reach the 450 bus target, will be contacted to determine their interest and capability to participate.

Selected school districts will have the option to install diesel particulate filters (utilizing the "DERA option[1]") or to scrap and replace a bus in their fleet that:

- has at least three years of remaining useful life;
- has operated in Oregon in the past year; and
- will continue to operate in Oregon for at least three years following.

The new bus can be powered by late model diesel, propane, natural gas or electricity. When choosing the replacement approach, an older diesel school bus will be scrapped. The assistance amount offered will be up to 100 percent of the cost to purchase and install exhaust controls or up to $50,000 or 30 percent, whichever is less, towards the purchase an Oregon minimum standard bus.

The order in which districts will be contacted will be based on the draw of numbers randomly assigned to districts with buses within this contingent. DEQ expects to complete about one quarter of the 450 buses per year to better manage administrative costs and to minimize the replacement bubble as these buses eventually age out of the fleet 10-12 years in the future. By proceeding in a pre-determined selection process, the replacement process can begin immediately without the need for applications and review. School boards and school districts would also know from the outset which vehicles are to be replaced with these funds and which buses need to be upgraded or replaced using other resources. We anticipate the school bus program will draw $18 million from the Oregon allocation under Appendix D, approximately 26 percent of the total available.

Projected Emission Results

The amount of emission benefits realized will depend upon the selected strategy. Diesel particulate filters as an after market retrofit will be the only available exhaust control funded by this program. These result in a substantial reduction in particulate matter and hydrocarbons but would have little to no effect on NOx emissions. We anticipate the majority of actions will involve vehicle replacement, which will result in emission reductions in NOx, PM and other harmful pollutants. The new bus can be powered by late model diesel, propane, natural gas or electricity with the choice dependent upon the district's needs and desires. The estimated emission reductions are based on replacement with a late model diesel bus. Any alternative fuel buses that are purchased can be expected to result in additional reductions in one or more of the pollutants shown here.

Lifetime Results (short tons)	NOx	$PM_{2.5}$	Hydrocarbons	Carbon Monoxide	Carbon Dioxide	Black Carbon (CO_2e)
Amount reduced	274.43	23.51	36.02	132.63	3,614.6	38,796.5
Percent Reduced	89.6%	97.9%	91.1%	90.9%	7.5%	97.9%

[1] The terms of the settlement primarily identify diesel engine repowering and replacement as eligible for funding support with a strong emphasis on highway vehicles. Other types of projects reducing emissions from older diesel engines are possible, e.g., exhaust control retrofitting, truck stop electrification and non-road equipment replacement relying on the DERA Option. The decree allows for these additional group of project areas to be fundable from a Beneficiary's allotment of environmental mitigation funds, provided the projects meet applicable EPA grant guidelines under the Diesel Emission Reduction Act (DERA). A detailed comparison of VW eligible mitigation actions and DERA Option projects, including funding limits is provided in Appendix B.

Impacts to Disproportionately Impacted Areas

A primary goal of Oregon's use of the mitigation fund is to ensure that projects reduce pollution in disproportionately impacted areas of the state and also populations that are themselves especially vulnerable and adversely impacted like low income, minority, elderly and youth populations. In this initial plan, the focus is on reducing impacts to young people who are especially vulnerable to health effects from diesel exhaust exposure. In children particulate pollution affects lung function and lung growth because of higher respiration rates and continuing lung development (Buka et al, 2006). Underscoring this point, the state of California determined diesel particulates to be among the five most hazardous pollutants to children (CA EPA, 2001). In affirming the connection between children's health and air pollution, the American Academy of Pediatrics adopted a policy statement recommending reductions in mobile source pollution including retrofitting of diesel engines (American Academy of Pediatrics, 2004).

Measuring Environmental Benefits

Pollution reduction benefits will be calculated for each project relying primarily on EPA's Diesel Emission Quantifier. The expected emission benefits will depend in large part on the nature, operation and age of the vehicle or equipment being replaced or retrofitted. DEQ anticipates simultaneous reductions in NOx, particulate and air toxic emissions to be on the order of 80 to 90 percent depending upon the engine size, category and age. As noted earlier, DEQ anticipates public health and environmental benefits over the wide range of impacts associated with exposure to exhaust from legacy diesel engines. DEQ anticipates that most of the replacement vehicles and equipment will result in improved fuel economy as a result of advances in technology. As a result climate change benefits will also be realized from reductions in pollutants like carbon dioxide and black carbon.

Future Project Opportunities

The Oregon Legislature is expected to provide additional direction as to the preferred uses of environmental mitigation funds in future legislative sessions. The initial work outlined here is expected to expend about $18 million of the $72.9 available. We outline here additional desired opportunities to use Environmental Mitigation Funds. These will be described more fully in future iterations of the beneficiary plan.

Governor Kate Brown has challenged state agencies to support an aggressive timeline to achieve a statewide goal of 50,000 or more registered and operating electric vehicles by 2020 outlined in Executive Order 17-21 (http://www.oregon.gov/gov/Documents/executive_orders/eo_17-21.pdf). One of the strategies to achieve this goal outlined in the Executive Order is to utilize up to 15% of the Environmental Mitigation Fund to support further expansion and upgrades to the light duty electric vehicle charging infrastructure in Oregon. DEQ, along with the Oregon Department of Transportation, the Oregon Department of Energy and the Oregon Health Authority Public Health Division are directed to engage with interested stakeholders and receive public comment to inform development of a plan to use Environmental Mitigation Funds to support vehicle electrification. The plan should prioritize developing and maintaining electric vehicle charging stations with a focus on connecting rural communities, low-income communities and Oregonians living in multi-family homes. This would complement ongoing efforts in the Electric Vehicle Rebate Program and Charge Ahead Rebate Program recently authorized in HB 2017 (2017).

For the remaining funding, DEQ recognizes there are a wide range of projects among the authorized eligible mitigation actions with identifiable environmental benefits. The finite nature of the funding necessitates a selection process to determine the most effective application of the funding to meet the Oregon air quality challenges this funding can address. Selection criteria will be developed in a public process to identify criteria to use in project selection that can also differentiate optimal projects among what are otherwise quality and valuable proposals.

DEQ recommends using a competitive approach to allocate the remaining funds. DEQ would offer at least annual solicitation opportunities over the remaining term of the Trust to select highly qualified eligible mitigation projects. Projects may be funded under authority provided by the decree among the eligible mitigation actions or under contemporary guidelines associated with EPA's Diesel Emission Reduction Act grant program (the DERA Option). The details of DEQ's selection process, such as the frequency of grant opportunities, weighting factors for selection criteria, and other considerations would be developed in a public rulemaking process, subject to public involvement, review and comment and adopted by rule by the Environmental Quality Commission.

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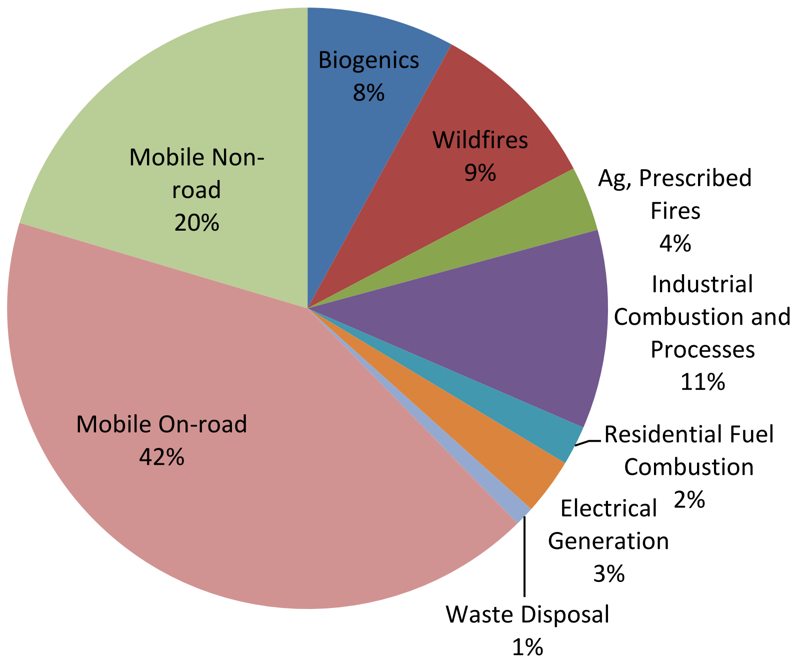
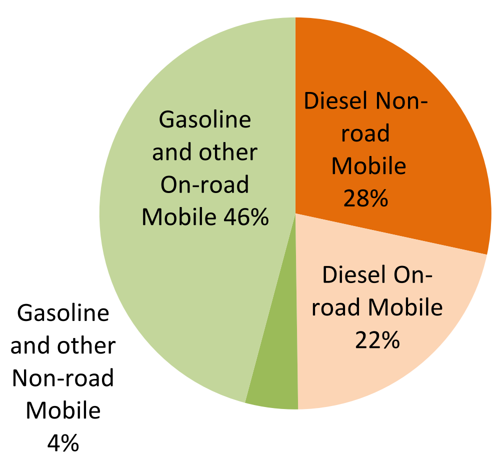
Cars and trucks are a major source of nitrogen oxide emissions in Oregon.

Oregon NOx Emissions (2014)

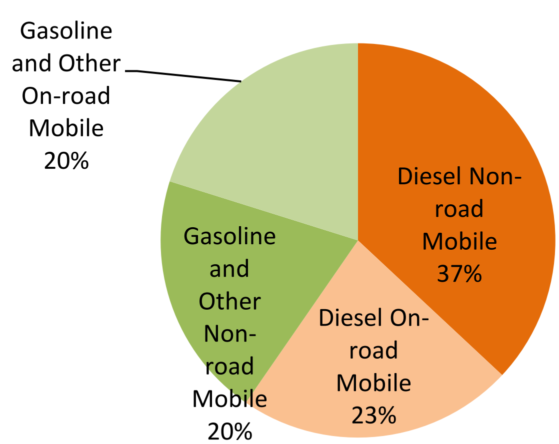


Diesel engines contribute 49 percent of NOx and 60 percent of PM from mobile sources in Oregon while consuming only 29% of the fuel used by mobile sources.

Mobile Source NOx

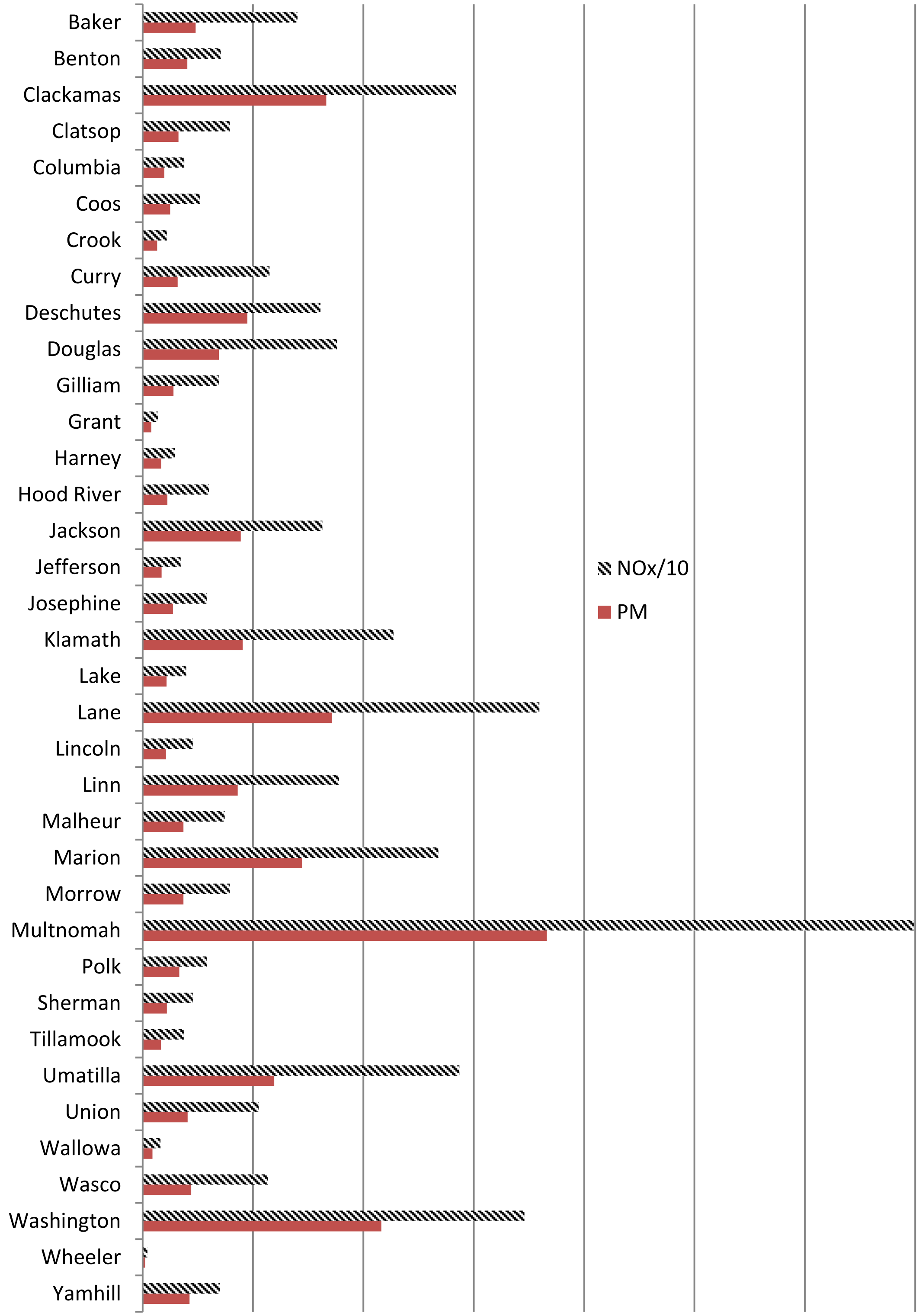


Mobile Source $PM_{2.5}$



Mobile Source Diesel NOx and PM by county, tons per year

NOx	PM
1403.4	48.1
708.4	40.4
2839.0	166.3
789.2	32.5
377.0	19.6
519.5	25.0
218.0	13.1
1148.5	31.8
1610.4	94.9
1762.7	69.1
693.6	28.0
142.2	7.9
292.6	16.8
599.9	22.4
1628.0	88.8
344.4	17.3
581.7	27.4
2272.3	90.7
393.7	21.7
3595.6	171.4
455.1	21.0
1779.3	86.2
744.0	37.1
2678.6	144.4
788.7	37.1
6989.6	366.3
582.1	33.2
453.9	22.0
375.9	16.8
2871.3	119.3
1052.3	40.7
162.4	8.8
1135.0	44.0
3460.5	216.3
42.5	2.4
700.7	42.6



Office of Transportation and Air Quality June 2017

Detailed Comparison of VW Eligible Mitigation Action 1-9 and Eligible Mitigation Action #10 (DERA Option)

Eligible Mitigation Actions 1-9* Class 8 Local Freight Trucks and Port Drayage Trucks (Eligible Large Trucks) Class 4-7 Local Freight Trucks (Eligible Medium Trucks) For, 1) Beneficiaries that have State regulations that already require upgrades to 1992-2009 engine model year trucks at the time of the proposed EMA, and 2) Eligible Trucks shall also include 2010-2012 engine model year trucks.				Eligible Mitigation Action 10: DERA Option** Class 5-8 Medium and Heavy Duty Highway Vehicles (including Drayage Trucks)		
Activity	Vehicle and Equipment Eligibility (Engine Model Year)	Trust Funding Limits: Non-Gov. Owned	Trust Funding Limits: Gov. Owned	Activity	Vehicle and Equipment Eligibility (Engine Model Year)	DERA Funding Limits
Engine replacement with new diesel or alternate fueled engine, MY (model year) in which the EMA occurs or one engine model year prior	1992-2009	40%	100%	Engine replacement with diesel or alternate fueled engine, 2017 MY or newer	1995-2006	40%
				Engine replacement with engine certified to CARB's Optional Low-NOx standards, 2017 MY or newer	1995-2006	50%
Engine replacement with new all-electric engine, engine MY in which the EMA occurs or one engine MY prior	1992-2009	75%	100%	Engine replacement with an electric motor or an electric power source, 2017 MY or newer	1995-2009	60%
Vehicle replacement with new diesel or alternate fueled vehicle, engine MY in which the EMA occurs or one engine MY prior	1992-2009	25% (50% for Drayage)	100%	Vehicle replacement with diesel or alternate fueled vehicle, 2017 MY or newer engine (2012 MY or newer engine for Drayage)	1995-2006	25% (50% for Drayage)
				Vehicle replacement with vehicle powered by engine certified to CARB's Optional Low-NOx standards, 2017 MY or newer engine	1995-2006	35% (50% for Drayage)
Vehicle Replacement with all-electric vehicle, engine MY in which the EMA occurs or one engine MY prior	1992-2009	75%	100%	Vehicle replacement with all-electric vehicle, 2017 MY or newer engine	1995-2009	45% (50% for Drayage)
				Retrofits with verified exhaust control technologies (SCR is the only eligible retrofit technology for vehicles with 2007-2009 MY engines)	1995-2009	100%
				Verified Aerodynamic Technologies and Low Rolling Resistance Tires (in conjunction with above activities)	1995-2009	100%
				Verified Idle Reduction Technologies (APUs and generators are not eligible on vehicles with 20072009 MY engines)	1995-2009	25%
				Clean Alternative Fuel Conversion	1995-2009	40%

Eligible Mitigation Actions 1-9*

Class 4-8 School Bus, Shuttle Bus, or Transit Bus (Eligible Buses)
For, 1) Beneficiaries that have State regulations that already require upgrades to 1992-2009 engine model year buses at the time of the proposed EMA, and 2) Eligible Buses shall also include 2010-2012 engine model year class 4-8 school buses, shuttle buses, or transit buses.

Activity	Vehicle and Equipment Eligibility (Engine Model Year)	Trust Funding Limits	
		Non-Gov. Owned	Gov. Owned
Engine replacement with new diesel or alternate fueled engine, engine MY in which the EMA occurs or one engine model year prior	2009 and older	40%	100%
Engine replacement with new all-electric engine, engine MY in which the EMA occurs or one engine MY prior	2009 and older	75%	100%
Vehicle replacement with new diesel or alternate fueled vehicle, engine MY in which the EMA occurs or one engine MY prior	2009 and older	25%	100%
Vehicle Replacement with all-electric vehicle with the engine MY in which the EMA occurs or one engine MY prior	2009 and older	75%	100%

Eligible Mitigation Action 10: DERA Option**

Type A, B, C, D Buses
Class 5-8 Transit, Shuttle, or other buses

Activity	Vehicle and Equipment Eligibility (Engine Model Year)	DERA Funding Limits
Engine replacement with diesel or alternate fueled engine, 2017 MY or newer	1995-2006	40%
Engine replacement with engine certified to CARB's Optional Low-NOx standards, 2017 MY or newer	1995-2006	50%
Engine replacement with an electric motor or an electric power source, 2017 MY or newer	1995-2009	60%
Vehicle replacement with diesel or alternate fueled vehicle, 2017 MY or newer engine	1995-2006	25%
Vehicle replacement with vehicle powered by engine certified to CARB's Optional Low-NOx standards, 2017 MY or newer engine	1995-2006	35%
Vehicle replacement with all-electric vehicle, 2017 MY or newer engine	1995-2009	45%
Retrofits with verified exhaust control technologies (SCR is the only eligible retrofit technology for vehicles with 2007-2009 MY engines)	1995-2009	100%
Verified Idle Reduction Technologies (APUs and generators are not eligible on vehicles with MY 2007-2009 engines)	1995-2009	25%
Clean Alternative Fuel Conversion	1995-2009	40%

Eligible Mitigation Actions 1-9*

Freight Switchers
Must currently operate 1000+ hours per year.

Activity	Vehicle and Equipment Eligibility (Engine Tier)	Trust Funding Limits: Non-Gov. Owned	Trust Funding Limits: Gov. Owned
Engine replacement with new diesel or alternate fueled engine or generator sets that are EPA certified for the engine MY in which the EMA occurs	Pre-Tier 4	40%	100%
Engine replacement with new all-electric engine	Pre-Tier 4	75%	100%
Locomotive replacement with new diesel or alternate fueled freight switcher that is EPA certified for the engine MY in which the EMA occurs	Pre-Tier 4	25%	100%
Locomotive replacement with new all-electric freight switcher	Pre-Tier 4	75%	100%

Ferries/Tugs

Activity	Vehicle and Equipment Eligibility (Engine Tier)	Trust Funding Limits: Non-Gov. Owned	Trust Funding Limits: Gov. Owned
Engine replacement with new Tier 3 or 4 diesel or alternate fueled engine	Pre-Tier 3	40%	100%
Engine replacement with new all-electric engine	Pre-Tier 3	75%	100%
Certified Remanufacture System or Verified Engine Upgrade	Pre-Tier 3	40%	100%

Eligible Mitigation Action 10: DERA Option**

Line Haul (freight and passenger) and Switcher Locomotives Must currently operate 1000+ hours per year

Activity	Vehicle and Equipment Eligibility (Engine Tier)	DERA Funding Limits
Engine replacement with 2017 MY or newer Tier 4 engine	Unregulated – Tier 2; Tier 2+ switcher	40%
Engine replacement with 2017 MY or newer allelectric engine	Unregulated – Tier 2; Tier 2+ switcher	60%
Locomotive replacement with equipment powered by a 2017 MY or newer engine (diesel or alternate fuel)	Unregulated – Tier 2; Tier 2+ switcher	25%
Locomotive replacement with 2017 MY or newer allelectric equipment	Unregulated – Tier 2; Tier 2+ switcher	45%
Certified Remanufacture System or Verified Engine Upgrade	Unregulated - Tier 2+	40%
Retrofit with verified exhaust control technology	Unregulated - Tier 2+	100%
Idle reduction technology, including shore power	Unregulated – Tier 2+	40%

Marine Engines
Must currently operate 1000+ hours per year.

Activity	Vehicle and Equipment Eligibility (Engine Tier)	DERA Funding Limits
Engine replacement with a 2017 MY or newer Tier 3 or Tier 4 engine (diesel or alternative fuel)	Pre-Tier 3	40%
Engine replacement with 2017 MY or newer all-electric engine	Pre-Tier 3	60%
Certified Remanufacture System or Verified Engine Upgrade	Pre-Tier 3	40%

Eligible Mitigation Actions 1-9*

Ocean Going Vessels (OGV) Shore Power

Activity	Vehicle and Equipment Eligibility (Engine Model Year or Tier)	Trust Funding Limits: Non-Gov. Owned	Trust Funding Limits: Gov. Owned
Costs associated with shore-side system	n/a	25%	100%

Airport Ground Support Equipment Forklifts and Port Cargo Handling Equipment

Activity	Vehicle and Equipment Eligibility (Engine Model Year or Tier)	Non-Gov. Owned	Gov. Owned
Engine replacement with new all-electric engine	GSE: Pre-Tier 3 diesel; 3 g/bhp-hr and higher spark ignition Forklifts and Port CHE: Greater than 8000 lbs lift capacity	75%	100%
Equipment replacement with new all-electric equipment		75%	100%

Eligible Mitigation Action 10: DERA Option**

Marine Shore Power Connection System

Activity	Vehicle and Equipment Eligibility (Engine Model Year or Tier)	DERA Funding Limits
Costs associated with shore-side system	n/a	25%

Nonroad Diesel Engines

Activity	Vehicle and Equipment Eligibility (Engine Model Year or Tier)	DERA Funding Limits
Engine replacement with all-electric engine	0-50 HP = 2005 and newer; 51-300 HP = 1995 and newer; 301+HP = 1985 and newer; See FY2017 State Clean Diesel Program Guide for complete engine tier restrictions	60%
Equipment Replacement with 2017 MY or newer allelectric equipment		45%
Engine replacement with a 2017 MY or newer engine (diesel or alternative fuel)		40%
Equipment replacement with equipment powered by 2017 MY or newer engine (diesel or alternative fuel)		25%
Retrofit with verified exhaust control technologies		100%
Verified Engine Upgrade		40%

Electrified Parking Spaces (Truck Stop Electrification)

Activity	Vehicle and Equipment Eligibility	DERA Funding Limits
Labor and equipment of eligible EPA SmartWay verified electrified parking space technologies	n/a	30%

Light Duty Zero Emission Vehicle Supply Equipment • Level 1, level 2, or fast charging equipment that is not consumer light duty electric vehicle supply equipment, OR • Light duty hydrogen fuel cell vehicle supply equipment includes hydrogen dispensing equipment capable of dispensing hydrogen at a pressure of 70 megapascals (MPa)	
• 100% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that will be available to the public at a Government Owned Property. • 80% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that will be available to the public at a Non-Government Owned Property. • 60% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that is available at a workplace but not to the general public.) • 60% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that is available at a multi-unit dwelling but not to the general public. • 33% of the cost to purchase, install and maintain eligible light duty hydrogen fuel cell vehicle supply equipment capable of dispensing at least 250 kg/day, that will be available to the public. • 25% of the cost to purchase, install and maintain eligible light duty hydrogen fuel cell vehicle supply equipment capable of dispensing at least 100 kg/day that will be available to the public.	

* The term "Repower" in the Consent Decree has been changed to "Engine replacement" for ease of comparison.
** DERA Option eligibility and cost-shares are based on the FY2017 State Clean Diesel Program Guide. Subsequent years are subject to change.

Definitions/Glossary of Terms from Appendix D-2 to Partial Consent Decree MDL No. 2672 CRB (JSC)

"Airport Ground Support Equipment" shall mean vehicles and equipment used at an airport to service aircraft between flights.

"All-Electric" shall mean powered exclusively by electricity provided by a battery, fuel cell, or the grid.

"Alternate Fueled" shall mean an engine, or a vehicle or piece of equipment which is powered by an engine, which uses a fuel different from or in addition to gasoline fuel or diesel fuel (e.g., CNG, propane, diesel-electric Hybrid).

"Certified Remanufacture System or Verified Engine Upgrade" shall mean engine upgrades certified or verified by EPA or CARB to achieve a reduction in emissions.

"Class 4-7 Local Freight Trucks (Medium Trucks)" shall mean trucks, including commercial trucks, used to deliver cargo and freight (e.g., courier services, delivery trucks, box trucks moving freight, waste haulers, dump trucks, concrete mixers) with a Gross Vehicle Weight Rating (GVWR) between 14,001 and 33,000 lbs.

"Class 4-8 School Bus, Shuttle Bus, or Transit Bus (Buses)" shall mean vehicles with a Gross Vehicle Weight Rating (GVWR) greater than 14,001 lbs used for transporting people. See definition for School Bus below.

"Class 8 Local Freight, and Port Drayage Trucks (Eligible Large Trucks)" shall mean trucks with a Gross Vehicle Weight Rating (GVWR) greater than 33,000 lbs used for port drayage and/or freight/cargo delivery (including waste haulers, dump trucks, concrete mixers).

"Drayage Trucks" shall mean trucks hauling cargo to and from ports and intermodal rail yards.

"Forklift" shall mean nonroad equipment used to lift and move materials short distances; generally includes tines to lift objects. Eligible types of forklifts include reach stackers, side loaders, and top loaders.

"Freight Switcher" shall mean a locomotive that moves rail cars around a rail yard as compared to a line-haul engine that move freight long distances.

"Generator Set" shall mean a switcher locomotive equipped with multiple engines that can turn off one or more engines to reduce emissions and save fuel depending on the load it is moving.

"Government" shall mean a State or local government agency (including a school district, municipality, city, county, special district, transit district, joint powers authority, or port authority, owning fleets purchased with government funds), and a tribal government or native village. The term 'State' means the several States, the District of Columbia, and the Commonwealth of Puerto Rico.

"Gross Vehicle Weight Rating (GVWR)" shall mean the maximum weight of the vehicle, as specified by the manufacturer. GVWR includes total vehicle weight plus fluids, passengers, and cargo.

> Class 1: < 6000 lb; Class 2: 6001-10,000 lb; Class 3: 10,001-14,000 lb; Class 4: 14,001-16,000 lb; Class 5: 16,001-19,500 lb; Class 6: 19,501-26,000 lb; Class 7: 26,001-33,000 lb; Class 8: > 33,001 lb

"Hybrid" shall mean a vehicle that combines an internal combustion engine with a battery and electric motor.

"Intermodal Rail Yard" shall mean a rail facility in which cargo is transferred from drayage truck to train or vice-versa.

"Port Cargo Handling Equipment" shall mean rubber-tired gantry cranes, straddle carriers, shuttle carriers, and terminal tractors, including yard hostlers and yard tractors that operate within ports.

"Repower" shall mean to replace an existing engine with a newer, cleaner engine or power source that is certified by EPA and, if applicable, CARB, to meet a more stringent set of engine emission standards. Repower includes, but is not limited to, diesel engine replacement with an engine certified for use with diesel or a clean alternate fuel, diesel engine replacement with an electric power source (grid, battery), diesel engine replacement with a fuel cell, diesel engine replacement with an electric generator(s) (genset), diesel engine upgrades in Ferries/Tugs with an EPA Certified Remanufacture System, and/or diesel engine upgrades in Ferries/Tugs with an EPA Verified Engine Upgrade. All-Electric and fuel cell Repowers do not require EPA or CARB certification.

"School Bus" shall mean a Class 4-8 bus sold or introduced into interstate commerce for purposes that include carrying students to and from school or related events. May be Type A-D.

"Tier 0, 1, 2, 3, 4" shall refer to corresponding EPA engine emission classifications for nonroad, locomotive and marine engines.

"Tugs" shall mean dedicated vessels that push or pull other vessels in ports, harbors, and inland waterways (e.g., tugboats and towboats).

"Zero Emission Vehicle (ZEV)" shall mean a vehicle that produces no emissions from the on-board source of power (e.g., All-Electric or hydrogen fuel cell vehicles).