

TLU-7 Heavy Duty Vehicle Emissions Standards and Retrofits

Policy Description

The State of Montana would seek to work with other states and the U.S. Environmental Protection Agency (EPA) to advance greenhouse gases (GHG) emissions standards for on-road heavy-duty vehicles. In addition, the state would adopt incentive programs to reduce particulate matter emissions from existing on-road heavy-duty vehicles. Diesel particulate matter includes black carbon aerosols, which are thought to contribute to global warming through positive radiative forcing.

Approaches to diesel engine emission reductions include vehicle scrappage and replacement, repowering (engine replacement), and retrofit with exhaust after-treatment devices. Two devices commonly used to reduce diesel particulate matter emissions are diesel oxidation catalysts and diesel particulate filters. These devices can be used on certain model year engines of heavy-duty trucks, motor coaches, and transit and school buses.

Policy Design

Goal levels

- The state would encourage the retrofit of on-road heavy-duty diesel vehicles of model year 2006 or earlier. (Beginning with model year 2007, heavy-duty vehicles must meet stringent new EPA emissions standards and therefore have very low black carbon emissions.)
- The state would develop and implement a diesel retrofit incentive program with a goal of retrofitting 50% of the pre-2007 heavy-duty vehicles registered in the state that would still be in use in 2020. (The vast majority of heavy-duty vehicles in the 2020 fleet will meet the 2007 EPA standards and therefore not require retrofits.)
- The state would lead by example by initiating a retrofit program for the state-owned and state-leased vehicle fleet, with a goal of reaching a minimum of 80% of the pre-2007 vehicles fleet.

Timing

- The state would lead by example by seeking to initiate a diesel retrofit program for the state-owned and leased vehicle fleet by 2009.
- By 2009, a voluntary diesel retrofit program will be established by a state agency, focused on private heavy-duty vehicles registered in the state. Information packages would be developed about the health effects of air pollutants on human health, particularly on children. The program would create incentive options and

marketing strategies, track retrofit and research activities, and spearhead the progression of on-road heavy-duty GHG emissions standards with other states and the EPA.

- Heavy-duty vehicle retrofit incentives will be available for vehicle owners by 2011.

Parties Involved

MT Dept. of Transportation, MT Dept. of Environmental Quality, Local Governments, MT Metropolitan Planning Organizations, Relevant Industries (Utilities, Parcel Delivery Services, etc.), Public and Private Educational Institutions/Organizations, Public Health Department, Montana University System

Implementation Mechanisms

The appropriate state agency would establish a voluntary program to retrofit diesel engines in a rebate program. Users of heavy-duty diesel engines, who retrofit with emission controls, would also qualify for a credit against Montana income or business taxes (whichever is relevant) to a percentage (such as 25%) of the retrofit costs. Some retrofits reduce emissions of black carbon, which contribute to the greenhouse effect.

The state would encourage communities to establish local ordinances requiring retrofitting of heavy-duty vehicles, including garbage and construction trucks. In addition, transit companies contracted by the public school system to transport students, regardless of the purpose (daily transport, sporting events, educational trips, etc.) would also be required to participate in the retrofit programs.

The state would encourage the EPA to initiate the development of new GHG emission standards for heavy-duty vehicles.

The state and some counties have the regulatory authority to require air pollution control measures in areas designated by the EPA as “nonattainment” for air pollution under the federal Clean Air Act. Exhaust emissions from engine combustion can be identified through technical studies and targeted by state or county air pollution control measures.

Promotion and Marketing

- Encourage local/county governments to act consistently with and support state actions.
- Encourage federal agencies located within the state to act accordingly with and support state actions.
- The state will develop information packages about the effects of air pollutants in diesel emissions on human health, particularly on children.
- Implement a voluntary diesel retrofit program by an appropriate state agency.

- Encourage transit companies contracted with a public school district to act accordingly with and support state actions. Educational information will be provided by a state agency about health effects of air pollutants from diesel emissions on children's health to both the transit companies and the public education system.
- Assist in the development of on-road heavy-duty vehicles GHG standards with other states and the EPA.
- Encourage the Montana university system to conduct research on on-road heavy-duty vehicles GHG standards and emission reduction technologies.
- All state-supported programs would have dedicated detailed web sites. In addition to information and materials, program participation by the various governmental agencies and individual businesses (i.e., success stories) would also be documented and extolled.

Technical Assistance

- Contact the manufacturers of the various diesel emission reductions technologies to coordinate objectives and obtain technical support for outreach materials.
- The EPA created the Retrofit Technology Verification Process. This program evaluates the emission reduction performance of retrofit technologies, including their durability, and identifies engine operating criteria and conditions that must exist for these technologies to achieve those reductions.
- The EPA has also developed the Voluntary Diesel Retrofit Program to address pollution from diesel construction equipment and heavy-duty vehicles that are currently on the road. Program information is available to help fleet operators, air quality planners in state/local government, and retrofit manufacturers to create effective retrofit projects.

Funding Mechanisms and or Incentives

- Funding for retrofit incentives would be proposed through legislative action. The owners of the retrofitted heavy-duty diesel engines would qualify for a credit against Montana income or business taxes (whichever is relevant) to a percentage of the retrofit costs (tax credit). Another option is "feebates" incurred as part of the engine maintenance costs, which would be based on the age of the engine.
- Funding may be available through the EPA Voluntary Diesel Retrofit Program and/or the EPA funding programs to reduce air toxics at the local level. Also refer to "Related Policies/Programs in Place" for more possible funding avenues.
- The Montana university system can obtain applicable grant funding independently.

Voluntary and/or Negotiated Agreements

- Work with regulated entities to promote voluntary compliance assistance through distribution of materials, staff training, etc. Encourage participation in EPA's National Clean Diesel Campaign.

Codes and Standards

- Refer to the information provided in the previous sections.

Pilots and Demonstrations

- Coordinate with product developers to help them promote their technologies.

Reporting

- The state will develop a tracking system so that the emissions reductions from the application of heavy-duty diesel replacement technologies can be derived. The state can annually contact the primary shipper companies in the main Montana cities to gather estimates from their inventories.

Enforcement

- No enforcement actions are necessary since this is a voluntary program. However, the EPA will penalize any manufacturer who does not comply with their standards.

Related Policies/Programs in Place

The Federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program: A heavy-duty diesel engine retrofit can be eligible for CMAQ funds, but the vehicle must operate predominantly within or in close proximity to an EPA designated air quality nonattainment or maintenance area, and primarily benefit those areas. If the truck is privately owned, CMAQ funding would be contingent upon meeting the public-private partnership provisions of the guidance. Funds under the program also may be used for school bus programs in nonattainment and maintenance areas to retrofit or replace engines with the latest technologies that reduce emissions.

On December 21, 2000, the EPA signed emission standards for model year 2007 and later heavy-duty highway engines (the California Air Resources Board adopted virtually identical 2007 heavy-duty engine standards in October 2001). The rule included two components: (1) emission standards, and (2) diesel fuel regulation. The rule focused on particulate matter (PM) and nitrous oxides. The stringent standard for PM took in effect in the 2007 heavy-duty engine model year. The nitrous oxides standard for diesel engines will be phased in between 2007 and 2010. As a result, model year 2007 and new heavy-duty vehicles have very low particulate matter emissions.

A new energy law enacted in August 2005 created a national program to clean up older diesel engines. The legislation, known as the Diesel Emissions Reduction Act or DERA,

provides federal funding to help finance voluntary retrofit incentive programs (both grants and loans) at both the national and state level.

The EPA has also developed the Voluntary Diesel Retrofit Program with a designated web site. The program addresses pollution from diesel construction equipment and heavy-duty vehicles that are currently on the road today. The program web site is designed to help fleet operators, air quality planners in state/local government and retrofit manufacturers understand this program, and obtain the information they need to create effective retrofit projects. Funding will depend upon the President's FY07 budget.

In addition, the EPA also has created the National Clean Diesel Campaign (NCDC). The NCDC will work aggressively to reduce the pollution emitted from diesel engines across the country through the implementation of varied control strategies and the aggressive involvement of national, state, and local partners.

Estimated GHG Savings and Cost or Cost Savings

	<u>2010</u>	<u>2020</u>	<u>Units</u>
GHG Emission Savings	0	0.022	MMtCO ₂ e
Net Present Value (2006-2020)	0	\$12.8	\$ Million
Cumulative Emissions Reductions (2006-2020)	0	0.179	MMtCO ₂ e
Cost-Effectiveness			\$/MtCO ₂ e

Data Sources

- Truck population data (by model year), mileage accrual data, and PM2.5 emission factors from MOBILE6 model.
- Cost of retrofit devices (including installation) from: California Air Resources Board, *Evaluation of Port Trucks and Possible Mitigation Strategies*, Preliminary Draft, April 2006.

Quantification Methods

- Assume HDVs of model year pre-1994 are retrofitted with diesel oxidation catalysts (DOCs) and HDVs of model year 1994-2006 are retrofitted with diesel particulate filters (DPFs).
- DOCs reduce PM emissions by 25%; DPFs reduce PM emissions by 85% (California Air Resources Board technology verification levels)

- Obtain population of pre-2007 HDVs in operation in 2020 from MOBILE6 (by model year and by two weight classes: 14,000 – 33,000 lbs GVW and 33,001 – 80,000 lbs GVW)
- Assume retrofit program begins in 2011 and is completed in 2015.
- Assume program retrofits 50% of the pre-2007 HDVs that would be operating in 2020.
- Calculate PM2.5 emission reductions achieved in each year 2011 – 2020.
- PM2.5 emissions from HDVs are 75.6% elemental carbon (black carbon), according to MOBILE6. Calculate black carbon emission reduction.
- Assume 1 ton reduction in PM2.5 emissions is equivalent to 2,053 ton reduction in CO2 equivalent emissions. This is the midpoint of method suggested in Jacobson, Mark Z., “Correction to ‘Control of fossil-fuel particulate black carbon and organic matter, possibly the most effective method of slowing global warming’” *Journal of Geophysical Research*, Vol. 110, D14105, 2005.
- Assume cost for DOC (purchase plus installation) is \$1,200 for GVW 14,000 – 33,000 lbs and \$2,000 for GVW 33,000+.
- Assume cost for DPF (purchase plus installation) is \$7,000 for GVW 14,000 – 33,000 and \$8,500 for GVW 33,000+.
- Calculate total retrofit costs by year (all retrofits occur 2011 – 2015).
- 4% discount rate to calculate NPV.

Key Assumptions

- See above.

Key Uncertainties

There is a great deal of uncertainty in the global warming impact of aerosol black carbon emissions (such as diesel particulate matter). The IPCC has not assigned a global warming potential to black carbon emissions.

Additional Benefits and Costs

This strategy will reduce diesel particulate matter emissions. Many scientific studies have linked breathing PM to a series of significant health problems, including aggravated asthma, difficult breathing, chronic bronchitis, heart attacks, and premature death. Diesel particulate matter is of specific concern because it is likely to be carcinogenic to humans when inhaled.

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD