

Congestion Mitigation and Air Quality Improvement (CMAQ) Program



U.S. Department of Transportation
Federal Highway Administration



Diesel Retrofits

Diesel engines play a vital role in key industry sectors including freight, public transportation, construction, and agriculture. However, diesel exhaust contains high levels of fine particulate matter (PM_{2.5}) emissions, which can pose significant risks to public health, including causing lung damage and premature death.

Diesel retrofits offer a cost-effective way to reduce air emissions. The harmful effects of diesel emissions on public health are well-established, and over 45 products are available and EPA-verified for engines built between 1960 and 2006.

For diesel oxidation catalysts and diesel particulate filter retrofits – the most commonly used technologies – the cost-effectiveness ranges from \$18,700 to \$87,600 per ton of PM_{2.5} reduced. For selective catalytic reduction systems and engine upgrade kits, the cost-effectiveness ranges from \$1,900 to \$19,000 per ton of nitrogen oxides (NO_x), a precursor to PM_{2.5}, reduced. For retrofitting school buses and class 6-8b trucks, the cost-effectiveness ranges from \$11,100 to \$69,900 per ton of PM_{2.5} reduced. For urban bus retrofit and rebuild programs, the cost-effectiveness is about \$31,500 per ton of PM_{2.5} reduced.

Eligible projects include acquisition of retrofitted vehicles, installation of tailpipe emissions control devices, and provision of diesel-related outreach activities. A public sponsor, such as a metropolitan planning organization (MPO), city, county, or school district, is required for each project. Typical diesel engines in heavy-duty trucks and equipment can last up to 30 years, and the U.S. Environmental Protection Agency (EPA) estimates that more than 11 million older diesel engines are in use today. Unlike newer models, older engines are highly

polluting. The FAST Act amended the eligible uses of CMAQ funds to include installation of diesel emission control technology on non-road diesel equipment or on-road diesel equipment that is used in highway construction and transit projects or port-related freight operations that located in ozone (O₃), PM₁₀ or PM_{2.5} nonattainment or maintenance areas.

Eligible Diesel Retrofit Vehicles

- School buses
- Refuse trucks
- Transit buses
- Port-related drayage trucks
- Locomotives
- Construction equipment



Examples of Successful Diesel Retrofit Projects

New York, NY: The New York City Department of Sanitation used CMAQ funds to retrofit approximately 828 refuse trucks. Diesel particulate filters were installed on 616 trucks, while diesel oxidation catalysts were used on the remaining vehicles – at a cost of \$10 million over several years.

- *Estimated emission reductions: 5,067.4 kg/year NO_x , 281.5 kg/year $PM_{2.5}$, and 356.0 kg/year PM_{10}*

Chicago, IL: At a cost of \$9.2 million (with local match provided by CSX), the Chicago Metropolitan Agency for Planning funded the retrofit of seven switcher locomotives at the CSX Barr Rail Yard in Riverdale, IL.

- *Estimated emission reductions: 12.4 kg/day volatile organic compounds, 308.2 kg/day NO_x , and 8.6 kg/day $PM_{2.5}$*

San Francisco Bay Area, CA: The Metropolitan Transportation Commission allocated funding to 12 transit agencies in the Bay Area to retrofit nearly 1,700 transit buses with diesel particulate filters. The project cost \$15.6 million (\$13.8 million CMAQ; \$1.8 million local match).

- *Estimated emission reductions: 2,250 kg/day NO_x , 150 kg/day PM*

Photo: FHWA



For more information, please contact:

U.S. Department of Transportation Federal Highway Administration
Office of Natural Environment
1200 New Jersey Avenue, S.E., Washington, D.C. 20590
202-366-4053

http://www.fhwa.dot.gov/environment/air_quality/cmaq/