

US EPA ARCHIVE DOCUMENT

Three recent studies illustrate that diesel retrofit technologies are a cost-effective means of reducing emissions from diesel engines. These studies are summarized below. Taken together, they show that capitalizing on diesel retrofit technologies and expanding their use can help improve air quality in a cost-effective manner.

1. Summary of Cost Effectiveness for Various Diesel Retrofit Scenarios¹

Vehicle	Retrofit Technology	Range of \$/ton of PM Emissions Reduced	
School Bus	DOC ^a	\$12,000	\$49,100
	CDPF ^b	\$12,400	\$50,500
Class 6 & 7 Truck	DOC	\$27,600	\$67,900
	CDPF	\$28,400	\$69,900
Class 8B Truck	DOC	\$11,100	\$40,600
	CDPF	\$12,100	\$44,100
250 hp Bulldozer	DOC	\$18,100	\$49,700

a. Diesel oxidation catalyst

b. Catalyzed diesel particulate filter

Conclusions:

- The cost effectiveness values include only PM reductions and would be lower if the co-benefits of reducing emissions of other pollutants (carbon monoxide and hydrocarbons) were included.
- The results above are comparable to the cost effectiveness of other EPA programs targeted at reducing PM emissions. EPA's Urban Bus Retrofit and Rebuild Program, 2007 heavy-duty emissions standards, and nonroad tier 4 emissions standards had cost effectiveness values of \$31,500/ton PM reduced, \$14,200/ton PM reduced, and \$11,200/ton PM reduced, respectively

¹ U.S. EPA. Diesel Retrofit Technology: An Analysis of the Cost-Effectiveness of Reducing Particulate Matter Emissions from Heavy-Duty Diesel Engines through Retrofits. March 2006.

2. Summary of Lake Michigan Air Directors' Consortium (LADCo) Study²

Summary of Cost Effectiveness for Various Diesel Retrofit Scenarios^a

Vehicle	Retrofit Technology	Range of \$/ton PM ^b , NOx, and Hydrocarbons Reduced	
Class 8a and 8b Heavy-Duty Diesel Vehicles	DOC	\$920	\$1,431
	DPF	\$2,069	\$3,534
	EGR^c + DPF	\$1,935	\$4,337
	SCR^d + DPF	\$5,060	\$6,505
250 hp Bulldozer	DOC	\$398	\$1,529
	DPF	\$842	\$3,487
	EGR + DPF	\$1,935	\$4,337
	SCR + DPF	\$1,383	\$3,724

a. These cost effectiveness values were calculated for the LADCo states of Illinois, Indiana, Michigan, Ohio, and Wisconsin

b. Note that PM emissions receive a weight of 20 based on CARB's Carl Moyer methodology

c. Exhaust gas recirculation

d. Selective catalytic reduction

Conclusions:

Diesel retrofits are cost-competitive considering that CARB's Carl Moyer program will fund projects with cost effectiveness values below \$14,300 per ton pollutant and each of the values in the above table fall well below that limit.

3. Summary of National Academy of Sciences Study³

Comparison of Diesel Retrofit Projects to Common CMAQ Projects^a

Project	Median Cost per Ton of NOx and Hydrocarbons Reduced ^b
Inspection and Maintenance	\$2,200
Diesel Retrofits	\$5,950
Traffic Signalization	\$23,500
Bike/Pedestrian	\$98,500

a. Note that the National Academy of Sciences (NAS) study provides cost effectiveness values in calendar year 2000 dollars which were updated to 2006 dollars here.

b. In calculating these values, the NAS study assumed a weighting scheme of 1:4 for hydrocarbons:NOx.

Conclusion:

Diesel retrofits are cost-competitive compared to several common CMAQ projects.

²ENVIRON. Evaluation of Candidate Mobile Source Control Measures for LADCo States in 2009 and 2012. March 2007.

³Transportation Research Board. The Congestion Mitigation and Air Quality Improvement Program: Assessing Ten Years of Experience. Special Report 264. Washington, D.C. 2002.



For more information about the Midwest Clean Diesel Initiative please visit us on the web at <http://www.epa.gov/midwestcleandiesel> or send us an email at MCDI@epa.gov