SmartWay Transport Partnership
U.S. Environmental Protection Agency

A Glance at Clean Freight Strategies: Retrofit Devices for Drayage

Integrating retrofit technologies into the existing drayage fleet can achieve significant reductions in emissions depending on the technology selected.

What is the challenge?

With the development of cleaner engine technologies, the emission profiles of diesel trucks have improved over time. These cleaner technologies take time to work their way into the existing truck fleet however. The drayage fleet, since it typically consists of the oldest trucks on the road, is the last to see improvements from the cleaner technologies added to new trucks. Consequently, areas served by the drayage fleet are subject to higher pollution levels.

What is the solution?

Engine replacement will capture the technological improvements recently introduced, however it is often prohibitively expensive. If engine replacement is not an option, there are a number of retrofit technologies or fuel additives that can improve emissions from older trucks. Retrofit control devices tend to be engine-specific, with options for older trucks remaining more limited than for newer models. Proper maintenance and use of the retrofit device is required to ensure continued effectiveness of these devices on older higher emitting trucks.

The U.S. Environmental Protection Agency has signed a Memorandum of Agreement (MOA) with the California Air Resources Board (CARB) establishing reciprocity in the verification of emissions control technologies. There are approximately six technologies/additives available for pre-1988 engines on the lists of verified technologies for both CARB and EPA.

The results are in . . .

The technologies/additives that are approved for use in older trucks are listed in the table below along with the expected emissions improvement. All of these options come with slight fuel efficiency penalties. Retrofit devices applied to older engines have the potential to reduce particulate matter (PM), carbon monoxide (CO) and hydrocarbons (HC) whereas devices that reduce nitrogen oxides (NO_x) or carbon dioxides (CO_2) are still being developed. Also, these devices must be maintained properly and operated using low sulfur (500 ppm or less) on-highway fuel. Adding biodiesel is one of the few options to improve CO_2 emissions from older trucks, however biodiesel potentially increases NO_x emission rates.

Next steps

The technology to improve the emissions profile of older trucks exists. It is simply a matter of paying for it. There are no efficiency improvements that accrue to those adopting the new technologies, requiring the provision of incentive mechanisms. California's Carl Moyer Program helps fund technologies that achieve greater than required emission reductions. This government funded program is one mechanism that could speed the adoption of retrofit devices.

The EPA's Voluntary Diesel Retrofit Program Web site highlights information for fleet owners/operators considering retrofit options for their vehicles, and can be found at: www.epa.gov/otaq/retrofit/overview.htm.

		Percent Emissions Reductions			
Manufacturer	**Technology**	**PM**	**CO**	**NOx**	**HC**
Engelhard	CMX Catalyst Muffler	20	40	n/a	50
Lubrizol	PuriNOx Water emulsion fuel	16 to 58	-35 to 33	9 to 20	-30 to -120
Lubrizol Engine Control Systems	AZ Purimuffler AZ Purifier	20	40	n/a	50
Various	Biodiesel (1 to 100%)	0 to 47	0 to 47	0 to -10	0 to 67
Various	Cetane Enhancers	n/a	n/a	0 to 5	n/a
Johnson Matthey	CEM Catalyst Muffler	20	40	n/a	50