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New diesel trucks and buses cut soot and smog more than 90%

For decades, diesel trucks and buses have spewed large amounts of soot, smog-causing gases and carcinogens into the air. But new diesel engines are more than 90 percent cleaner than a few years ago, far exceeding the emission reductions required by the U.S. Environmental Protection Agency, according to a new independent study released Thursday. Data show new diesel technologies are working even better than expected.

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But new diesel engines are more than 90 percent cleaner than a few years ago, far exceeding the emission reductions required by the U.S. Environmental Protection Agency, according to a new study released Thursday.

The quest to clean up diesels has been mounted for several decades, yet its progress has long lagged behind the success stories of car exhaust.

But tests--conducted by independent researchers funded by a coalition of government and industry--now show the diesel technologies are working even better than expected. Truck and bus engines are much cleaner than they are required to be under new federal standards, and for many pollutants, the latest models are emitting the same levels as gasoline-powered automobiles, the researchers said.

Ultra-fine particulates—the tiny pieces of soot that can lodge in lungs and cause respiratory and heart problems—were 99 percent lower in 2007-model trucks and buses than in 2004 models, and 89 percent lower than the amounts allowable under the EPA's 2007 standards, according to the study.

Particulates have long been considered one of the most dangerous pollutants spewed by diesel engines. The fine particles from diesel can trigger asthma attacks, heart attacks, bronchitis and other serious ailments, and the EPA says they cause several thousand deaths each year.

Other important air pollutants—hydrocarbons, a major ingredient of smog—were 95 percent lower in the new diesels than the amounts required under EPA's 2007 standards, according to the study. Carbon monoxide was 98 percent lower than required.

Daniel Greenbaum, president of the Health Effects Institute, a nonprofit research group that directed the study with another research group, said "likely a lot of lives will be saved once we get the older fleet replaced."

He said the new models of diesel trucks and buses emit the same levels of particulates as gasoline-powered vehicles. They are equipped “with essentially the same technology that is required in cars,” Greenbaum said.

The one major pollutant that still lags behind is nitrogen oxides, which react with hydrocarbons to cause ozone, or smog. It is particularly a problem in smoggy regions, such as the Los Angeles basin.

For the new trucks and buses, levels of nitrogen oxides were 70 percent lower than in 2004, and 10 percent below current federal requirements. Another 80 percent reduction is required beginning in January.

The study was overseen by the Health Effects Institute, a Boston-based independent research group that has studied air pollution since 1980, and the Coordinating Research Council, a nonprofit research partnership between industry and government agencies. It was funded by the EPA, U.S. Dept. of Energy, the diesel and petroleum industries and the California Air Resources Board, but the tests were designed, administered and reported without their influence and using federal test procedures, according to the research teams.

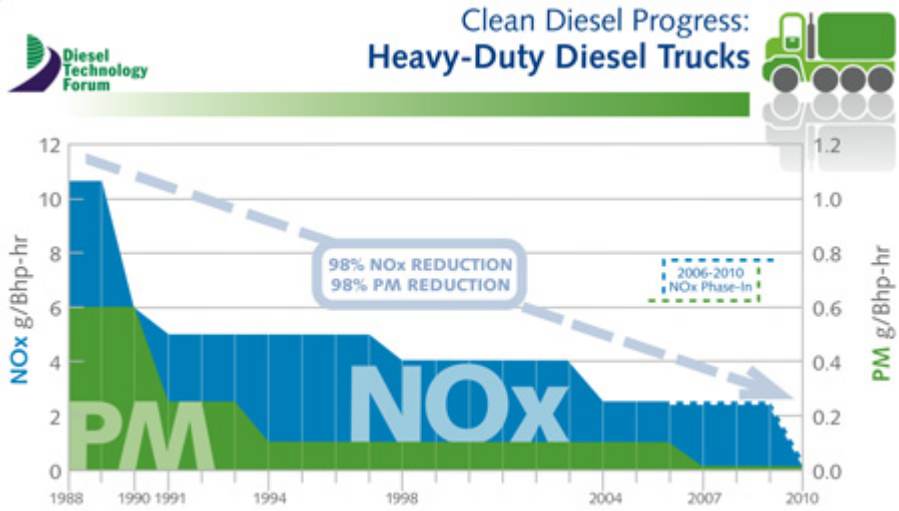
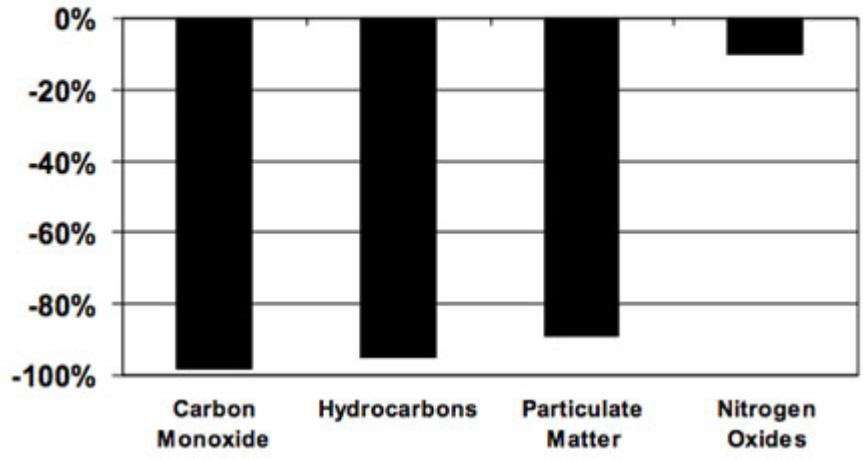


Figure 1. Percent Below Required 2007 Levels
(Source: Table ES-2 below)



Diesel engine manufacturers say the new data reinforces that “clean diesel” is a reality. They are nearly as low in emissions as engines powered by alternative fuels such as natural gas.

“These findings underscore just how clean this new generation of fuels, engines and emissions control technology really is,” said Allen Schaeffer, executive director of the Diesel Technology Forum, which represents manufacturers of diesel engines, fuel and emissions systems.

It would take 60 of the new truck or bus models to emit the same soot as one of the old 1988 models, Schaeffer said.

More than 360,000 of the new trucks and buses were purchased in the past two years, which he said will go a long way toward cleaning many cities’ air.

For the study, part of a five-year project, heavy-duty diesel engines from the four major manufacturers--Cummins, Detroit Diesel, Caterpillar and Volvo-- were tested for more than 300 air pollutants at a laboratory in San Antonio, Texas.

The researchers only tested new engines, so the trucks and buses might put out more emissions as they age, Greenbaum said But under the EPA rules, their warranties for emissions equipment must last 450,000 miles, four times longer than cars.Greenbaum said one surprise was the extent of

reductions in cancer-causing and other toxic compounds. Diesel exhaust is considered a potent human carcinogen because of a variety of substances. Polycyclic aromatic hydrocarbons declined 79 percent from 2004 models, while elemental carbon and metals were down 98 to 99 percent.

The challenge in cleaning up diesel has been finding technologies that can trap particles and gases without reducing fuel efficiency. Spurred by new standards adopted by California and the EPA, the engine manufacturers and oil industries had to develop ultra-low sulfur fuel and new catalysts and other gas-control technologies.

Controlling nitrogen oxides, or NOx, has been the biggest challenge. EPA's rule for 2007 engines, adopted in 2000 by the Clinton Administration, gave manufacturers three extra years for fully meeting that standard.

"The original rule basically recognized that while the [particulate] traps were ready, the NOx control was not," Greenbaum said.

Schaeffer of the diesel industry added, "clearly more work is needed on NOx, and 2010 models will deliver that starting January 1, 2010."

"Everything you do to drive down NOx tends to reduce fuel economy," he said.

Most diesel manufacturers said they will meet the tougher nitrogen oxides standard starting in January by equipping engines with new catalysts—a technology called selective catalytic reduction, already used in Europe--and an advanced gas recirculation system.

However, one company, Navistar, has said it cannot meet the nitrogen oxides standard next year so it will use credits to offset the difference. Navistar filed suit against the EPA to change the standards. The other three companies have filed a brief in court supporting the EPA rules.

Other diesels, such as construction and farm equipment, must meet the same emission standards, but have until 2013, or in some cases, 2015, to do so. The new tests only checked truck and bus engines.

To meet health standards at many U.S. cities with heavy particulate pollution, manufacturers of both gasoline and diesel engines may have to face even tougher emission standards in the future, Greenbaum said.

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Photo: Trucks at the Port of Oakland, in California, where diesel exhaust a serious environmental justice issue for neighboring communities. Courtesy KQED Quest. Figures: Emissions (top graphic) from new diesel engines have dropped more than 90 percent, as measured in brake-horsepower per hour, the standard regulatory unit for emissions. Graphic courtesy Diesel Technology Forum. The result (bottom graphic) is that today's engines are far below 2007 emissions standards. Graphic courtesy Health Effects Institute.