

Cleaner Diesel Handbook



BRING CLEANER FUEL AND DIESEL RETROFITS
INTO YOUR NEIGHBORHOOD

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ENVIRONMENTAL DEFENSE

finding the ways that work

Executive summary

Cost-effective steps to reducing diesel pollution

Environmental Defense's *Cleaner Diesel Handbook* is designed to empower the private sector, public officials and ordinary citizens with the means to reduce harmful pollution from diesel engines. This handbook focuses on methods of reducing pollution created by diesel engines, especially those used in construction and other nonroad sectors. The nonroad sector includes vehicles not typically found on roads, such as agricultural equipment, locomotives, ferries, snowmobiles and airplanes. Construction equipment is part of the nonroad sector. Collectively, nonroad engines discharge more dangerous fine sooty particles than any other source in the transportation sector. The solutions described here can reduce these harmful emissions by up to 90% and are a cost-effective response to the challenge of improving local air quality.

The health imperative: half of Americans live with unhealthy air

Diesel engines emit nearly 40 toxic substances, smog-forming oxides of nitrogen and fine particulate matter, and they contribute to a laundry list of adverse health effects including: asthma, cardiovascular and respiratory problems, strokes, heart attacks, lung cancer and premature death. Diesel exhaust is estimated to contribute to more than 75% of the added cancer risk from air toxics in the United States. Of special concern are two main pollutants: fine particulate matter, which lodges deep in the lungs, and oxides of nitrogen (NO_x), which are precursors to smog. Both can be reduced substantially with the tools described in this handbook.

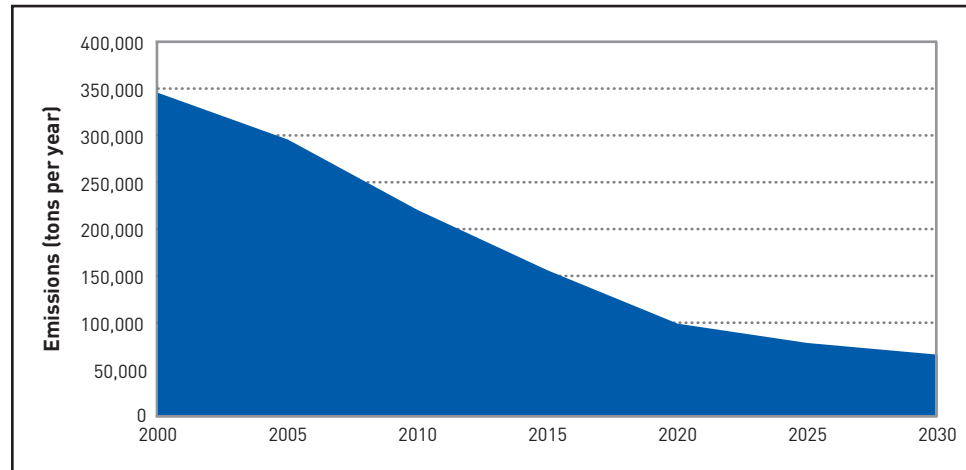
Recent data from the U.S. Environmental Protection Agency (EPA) shows that about half of all Americans live in places that fail to meet basic health standards for ozone (smog), fine particulates (soot) or both. On April 15, 2004, EPA found 474 counties—home to 159 million Americans—out of full compliance with the health-based eight-hour ozone standard. NO_x is a significant precursor in the formation of ground-level ozone and nonroad engines, as a vehicle class, emit almost one-fifth (more than 4 million tons) of the total national NO_x emissions from all sources.

As of April 2005, EPA classified 208 counties spanning 20 states as being out of full compliance with the health-based fine particulate (PM_{2.5}) standard. More than 57 million Americans live in counties that are not meeting the health-based particulate pollution standard. For the states and local communities that are struggling to trim every possible ton of pollution to meet federal health-based air quality standards and protect the health of their community, reducing pollution from existing diesel vehicles and equipment now is vitally important.

Cleaner air: bridging the 25-year gap

On May 10, 2004, EPA announced new air pollution regulations that will significantly lower pollution from new nonroad diesel engines used in construction, agriculture, manufacturing and services. As old diesel equipment is replaced over the coming years, this rule will deliver important public health benefits to communities across America. But the full pollution reductions and

FIGURE 1
Particulate pollution under phase-in of federal standards for diesel trucks, buses, and machinery



National PM_{2.5} emissions under phase-in of federal standards for onroad diesel trucks and buses, and nonroad diesel equipment. (Estimated from EPA, 2000 and EPA, 2004a)

public health benefits of this rule will not be realized for more than 20 years due to the lag in time before the emissions standards come into effect and because of the long life spans of heavy-duty diesel engines. Many nonroad engines, like those used on construction or marine vehicles, may have life spans of several decades. A child born today may still be breathing soot from a backhoe in her neighborhood when she graduates from college—unless that backhoe is replaced with a clean one or retrofit with emissions controls.

Figure 1 shows national particulate pollution under the phase-in of the federal emissions standards for diesel trucks, buses and nonroad machinery.

While the health benefits from full implementation of EPA national diesel emissions standards are extremely important, the incremental phase-in of these benefits indicates that thousands of premature deaths each year could be prevented by speeding the cleanup of diesel engines. The shaded area under the curve represents the pollution a retrofit program could prevent.

Cost-effective diesel pollution reduction

This handbook demonstrates that cleaning up diesel engines is a cost-effective way to reduce the adverse health effects of diesel pollution and outlines some simple steps, like enforcing idling laws and using clean fuels—like ultra-low sulfur diesel (ULSD)—with best available retrofit technologies that can cut diesel emissions by up to 90%.

The three “Rs” of emissions reduction

Repower. Replace the engine, or entire vehicle, with newer, cleaner technologies that meet or exceed EPA’s newest standards and/or uses alternative fuels.

Refuel. Alternative fuels, ultra-low sulfur diesel fuel and other clean fuels or additives are important first steps.

Retrofit. Reduce diesel exhaust with best available pollution control technology.

The handbook describes the “3Rs” of engine operations, as well as the use of best practices in equipment management. It gives particular attention to the subjects of cleaner fuels and retrofit technologies. The main goal is to reduce emissions of both fine particulate matter and NO_x. Appendices to the handbook will include some information on the manufacturers of retrofit technology and distributors of cleaner fuels. Together, this information is meant to serve as a starting point for anyone seeking to cut harmful diesel pollution.

Right now, there are a variety of cleaner fuels and demonstrated retrofit technologies available to reduce emissions of particulate matter (PM), oxides of nitrogen (NO_x), hydrocarbons (HC), carbon monoxide (CO), smoke and odor from existing diesel engines. It is important to remember that not all technologies and fuels target the same pollutants, and that appropriate tech-

nologies or fuels may vary in different contexts. Generally, a combination of multiple technologies and emissions control strategies is necessary for maximum emissions reduction.

In addition to describing the tools available for diesel pollution reduction, this handbook examines a variety of methods for implementing successful retrofit programs. The handbook provides examples of successful programs such as government and private sector efforts, contract specifications, voluntary retrofit programs, and economic or market incentive programs that provide financial support for cleaner technology or fuels.

Ultimately, the handbook demonstrates the need to reduce diesel engine emissions and presents the means to design and implement measures to clean up diesel technology. Together, these tools can be used to build a successful retrofit program in any community.