



# CLEAN SCHOOL BUS USA

## What You Should Know About Reducing Diesel Exhaust from School Buses

School buses provide our nation's children with safe, convenient transportation. Diesel exhaust from school buses, however, poses a health risk, particularly to children. Diesel exhaust contains small particles as well as smog-forming and toxic air pollutants. Exposure to diesel exhaust can cause lung damage and respiratory problems and can exacerbate asthma and existing allergies. Buses that idle outside schools can pollute the air inside the school building as well as outdoors. Fortunately, there are several steps that schools can take to reduce diesel exhaust from school buses.

### Recommended Actions to Reduce Diesel Pollution

Clean School Bus USA encourages school districts to reduce the health risks associated with exposure to diesel exhaust by:

R<sup>E</sup>ducing school bus idling time and reinforcing smart driving practices, such as following at least three car lengths behind any vehicle with visible exhaust or a noticeable odor.

R<sup>E</sup>trofitting current school bus fleets with new technologies and introducing cleaner fuels.

R<sup>E</sup>placing the oldest buses with new ones that meet stringent pollution control standards.

### How Are Children Affected?

Air pollution from diesel vehicles has health implications for everyone, but children are more susceptible to this pollution because they breathe at a faster rate than adults. Children's lungs are still developing, and children are more likely to play actively outdoors. More than 24 million children in the United States ride a bus to and from school every day.

### Help Clear the Air with Clean School Bus USA

Clean School Bus USA is an initiative sponsored by the U.S. Environmental Protection Agency (EPA) to help communities reduce pollution from school buses. It's a partnership of educators, industry, businesses, school officials, school bus fleet and transportation managers, state and local governments, public health officials, and other community leaders who are committed to protecting children's health and modernizing America's school bus fleet.

# Clean School Bus USA Case Studies

Communities across the country are developing effective local partnerships to reduce air pollution from diesel school buses. School children in these areas reap immediate air quality benefits from effective anti-idling policies, buses that run on cleaner fuels, and buses retrofitted with state-of-the-art emission reduction technologies.

## Portland, Maine

In the last five years, the Portland school district has replaced 90 percent of its school bus fleet with newer, cleaner buses. This pioneering effort is part of a multi-faceted statewide campaign to reduce emissions from diesel school buses. The campaign—a partnership between the Portland School Transportation Department, the Maine Departments of Education and Environmental Protection, the Asthma Regional Council, and the U.S. Environmental Protection Agency—focuses on: anti-idling and fuel conservation; aggressive investments in newer, cleaner buses; and route management to assign the cleanest buses to the longest routes.

## State of Washington

With support from Washington's legislature, schools throughout the state will retrofit bus fleets, reducing toxic

Here are some specific actions school districts can take to achieve these goals:

### Implement Anti-idling and Smart Driving Practices

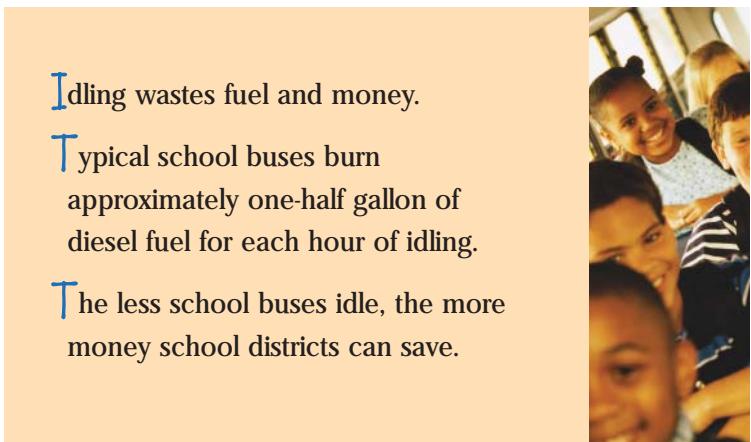
- Train school bus drivers to turn off their buses as soon as they arrive at loading or unloading areas and to refrain from restarting their buses until they are ready to depart.
- Establish a program to recognize drivers who successfully reduce idling.
- Consider changing circuit configurations if necessary to power flashing lights with the battery.
- Limit idling time during early morning warm-up to what is recommended by the manufacturer (generally 3 to 5 minutes). In colder climates, block heaters can help warm the engine of older vehicles to avoid starting difficulties and shorten warm-up time. Newer buses are designed to start easily at all temperatures without idling.
- In the winter, provide a space inside the school where bus drivers who arrive early can wait.
- Follow the anti-idling laws and guidelines that many states have in place. Post signs as reminders.
- Revise bus schedules and operational logistics to minimize school bus caravanning.
- Assign cleanest buses to the longest trips. Inform drivers that following other diesel vehicles too closely can contribute to higher concentrations of diesel exhaust inside and outside the bus.

**I**dling wastes fuel and money.

**T**ypical school buses burn approximately one-half gallon of diesel fuel for each hour of idling.

**T**he less school buses idle, the more money school districts can save.

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## Case Studies (continued)

### Work Closely with Fleet Managers and Bus Drivers to Reinforce New Practices

- Make sure both fleet managers and bus drivers understand the potential health risks from breathing diesel exhaust and the benefits of not idling or caravanning.
- Highlight the economic benefit of reduced fuel consumption as a result of less idling. For example, if a fleet operates 50 buses and each bus reduces its idling time by 30 minutes per day, at \$1 per gallon of diesel fuel, the fleet would save \$2,250 per school year in fuel costs.
- Maintain engines properly.

### Work Closely with Fleet Managers to Retrofit Buses with Pollution Controls

Oxidation catalysts and particulate matter filters are two retrofit technologies that can help reduce diesel particulate matter. Both devices are housed in the exhaust system where they break down the pollutants in the exhaust.

#### Oxidation Catalysts

Diesel oxidation catalysts are widely available and commonly used retrofit technologies. They are relatively simple, low cost devices that can be installed in almost all buses and require very little maintenance.

Diesel oxidation catalysts can be used with regular diesel fuel. Diesel oxidation catalysts typically cost between \$1,000 and \$2,000 and reduce particulate matter emissions by 20 to 30 percent. Reductions may be even higher if used together with ultra-low sulfur diesel fuel.

#### Particulate Matter Filters

Diesel particulate matter filters provide even greater particulate matter reductions. Filters are a more complex technology than catalysts and generally are most appropriate for 1995 and newer buses. Filters typically cost between \$5,000 and \$10,000 and require the use of ultra-low sulfur diesel fuel. The combination of ultra-low sulfur diesel and particulate matter filter technology reduces particulate matter emissions by 60 to 90 percent.

diesel emissions by 50 to 90 percent. This program, named the Washington State Clean School Bus Program, will affect approximately 5,000 of more than 9,000 school buses throughout the state by 2008, making it the largest state-funded voluntary school bus retrofit program in the country. The Puget Sound Clean Air Agency, in partnership with several state and local agencies, conducted pilot programs with U.S. EPA grants during the past two years to pave the way for rapid deployment of retrofitted buses. Retrofits for buses will involve either installation of particulate matter filters or oxidation catalysts on school bus exhaust systems, depending on the age of the bus and the regional availability of ultra-low sulfur diesel fuel. To maximize program benefits, older school buses that pollute the most will be the first to receive retrofits.

#### Ardmore, Pennsylvania

Nearly 70 percent of the Lower Merion School District's fleet of 107 buses operate on compressed natural gas (CNG), providing noise relief and clean air benefits to the residential neighborhoods where these buses operate. To build local fast-fill CNG refueling stations and offset the upfront costs of the new buses, the district received several grants from community, state, and federal partners. Lower Merion's CNG fleet has now logged nearly 5 million miles.

## **Work Closely with Fleet Managers to Purchase Cleaner Fuels**

There are a number of alternatives to conventional diesel fuel that can help reduce particulate matter emissions from today's school bus fleet. Most of these fuels can be used with little or no modification to the bus or its engine:

- Alternative fuels such as compressed natural gas offer outstanding environmental benefits for buses designed to run on such fuels.
- Biodiesel is a fuel that contains some domestically produced, renewable components. Blends of biodiesel (B20) can be used in unmodified diesel engines, but pure biodiesel (B100) may require certain engine modifications. Pure biodiesel may not be suitable for cold climates.
- Emulsified diesel fuel is a blended mixture of diesel fuel, water, and other additives. Emulsified diesel can be used in any diesel engine to reduce emissions of particulate matter as well as nitrogen oxides.
- Ultra-low sulfur diesel fuel is diesel fuel with an extremely low sulfur content (15 or less parts per million). The low sulfur levels enable particulate matter filters to perform most efficiently. Ultra-low sulfur diesel will be required nationwide for use in all highway diesel vehicles beginning in 2006 and is currently available in some parts of the country.

## **Work Closely with Fleet Managers to Replace the Oldest Buses with New Ones**

- About one third of U.S. school buses were manufactured before 1990 and are not equipped with modern pollution controls and the latest safety features. These buses are excellent candidates for accelerated replacement.
- By 2007, EPA will require that new buses rolling off the assembly lines be 95 percent cleaner than today's models. Because some buses might meet EPA standards ahead of schedule, ask the manufacturer before purchasing a new bus to see if you can acquire one that meets these standards.
- Both diesel and compressed natural gas technologies offer very clean replacement options.



For more information about Clean School Bus USA:

Visit [www.epa.gov/cleanschoolbus](http://www.epa.gov/cleanschoolbus)

Leave a voice message at (734) 214-4780

E-mail [cleanschoolbususa@epa.gov](mailto:cleanschoolbususa@epa.gov)

For more information on diesel retrofit options, visit [www.epa.gov/otaq/schoolbus/retrofit.htm](http://www.epa.gov/otaq/schoolbus/retrofit.htm)