

A Breath of Fresh Air



Reducing Diesel Pollution Inside Texas School Buses

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ENVIRONMENTAL DEFENSE

finding the ways that work

**“A Breath of Fresh Air:
Reducing Diesel Pollution
Inside Texas School Buses”**

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School bus fleet inventories were provided by the Texas Education Agency for the 2002-2003 and 2003-2004 school years. This data is self-reported by school districts. The compilation of clean school bus projects was collected from the Dallas/Fort Worth Adopt-A-School Bus Program, the Austin area Adopt-A-School Bus program, the Houston-Galveston Adopt-A-School Bus Program, the State Energy Conservation Office, the Texas Railroad Commission, and surveys of individual school districts in late 2005 and early 2006.

COVER PHOTOS

Inhaler and children boarding bus: iStockPhoto.com
Front of buses: Colin Rowan, Environmental Defense
“Smoky” bus: Southern Alliance for Clean Energy

A Breath of Fresh Air

Reducing Diesel Pollution Inside Texas School Buses

Texas' fleet of more than 35,000 school buses is dirtier than it has to be. Buses manufactured in 2007 will have to meet strict new emission standards. But even buses made today can emit 10 times as much harmful particle pollution as the new 2007 buses will. And buses built before 1993 can emit 25 to 60 times as much particle pollution as the 2007 model. Fortunately, there are immediate and affordable steps the State of Texas can take to virtually eliminate this health risk from the lives of Texas' school children.

Parents have lots of concerns about their school-aged kids: Are they getting the best education they can? Who are they hanging out with at lunch? Are they getting the opportunity to compete with the best and brightest?

But it's safe to say that few parents wonder about what their kids are breathing on the bus ride to school. They should.

School buses are the safest way for Texas children to get to school, but the vast majority of Texas' 35,000 school buses run on diesel fuel and emit tons of unhealthy pollution that can make its way into the bus cabin, where Texas children breathe it in.

It doesn't have to be so. Across Texas, many proactive school districts are acting locally to begin cleaning up their school bus fleets. But those efforts are happening with negligible support from the state.

A comprehensive cleanup of the Texas bus fleet will require only three things: technology, money, and the attention of our lawmakers. Two of those three are available today. All that is lacking is a decision by legislators in Austin to allocate already collec-

ted pollution cleanup funds to this cleanup effort.

The dirty truth about diesel

Diesel engines emit nearly 40 toxic substances, smog-forming oxides of nitrogen, and fine particulate matter (PM).

They contribute to a laundry list of adverse health effects, including: dizziness, increased incidence and severity of asthma attacks, chronic bronchitis, coughing, symptoms associated with cardiovascular disease, cancer risk and even premature death.

Evidence continues to mount that children, especially those with asthma, are exceptionally sensitive to the effects of fine particle pollution. And air pollution affects children more than adults because they inhale more pollutants per pound of body weight and have a more rapid rate of respiration, narrower airways and a reduced ability to metabolize, detoxify and excrete toxins. Exposures that occur in childhood are of special concern because children's developmental processes can easily be disrupted, and the resulting damage may be irreversible. Additionally, exposures

How do diesel emissions get inside a school bus?

There are two sources of the diesel emissions children breathe on their bus ride to school. The obvious one, tailpipe exhaust, enters a bus through windows and other openings and through the door as children board or exit.

The other source is under the hood near the front door: The engine crankcase is vented to the air, carrying volatized engine oil, unburned fuel and exhaust gases that "blow by" the piston rings. This pollution enters the cabin primarily when children get on and off the bus.

that occur early in life appear more likely to lead to disease than do exposures later in life.

It is estimated that diesel exhaust contributes to more than 75% of the added cancer risk from air toxics in the United States.

An extra dose on the bus

Houston's average ambient PM_{2.5} level—14.6 micrograms per cubic meter—is barely in compliance with EPA's health-based standard of 15 micrograms. And diesel pollution makes up a significant portion of Houston's PM problem. Twenty-two leading scientists on the EPA's Clean Air Scientific Advisory Committee argue emphatically that levels even lower than Houston's are hazardous to our health. They have strongly urged the EPA to lower the allowable level.

Children riding most school buses in Houston and throughout Texas receive an extra dose of pollution that can reach levels several times the ambient, outside levels.

And the science indicates that even short-term exposure to elevated particulate levels can have detrimental health effects.

School buses in Texas

It is important to note that, when all risk factors are considered, school buses are the safest way for children to get to and from school. But they're not perfect.

And though they're not the only source of diesel pollution in Texas, they are the most obvious target for corrective action when you consider their precious cargo and how easily the air pollution exposures they cause can be eliminated.

Texas has an opportunity to fix this problem quickly and affordably with technology that's available today.

More than 35,000 buses transport a million Texas children to and from school each day—and approximately 85% of those buses are diesel-powered. They vary in age, which means their

emissions vary. [See graph at bottom of column.]

Unlike cars, which stop infrequently and remain closed, buses stop frequently and open their doors regularly, allowing outside air laden with a bus's own emissions to enter the cabin.

The result is often a significantly elevated level of pollution in the air inside the bus.

Yale University researchers illustrated this by attaching a monitor to a child's backpack and recording the pollution levels during his trip to school.

The levels spiked when the bus arrived to pick him up, remained elevated throughout his trip, spiked

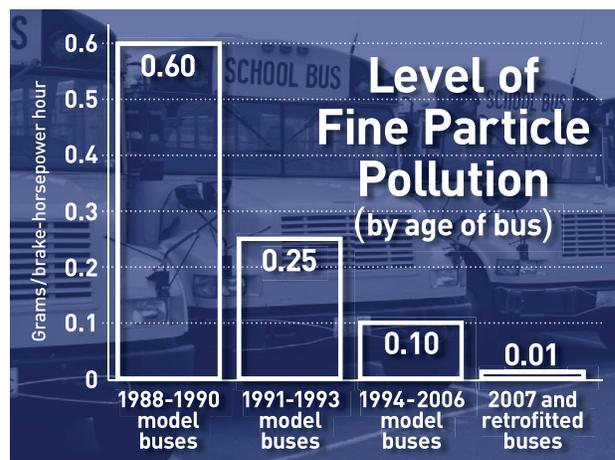
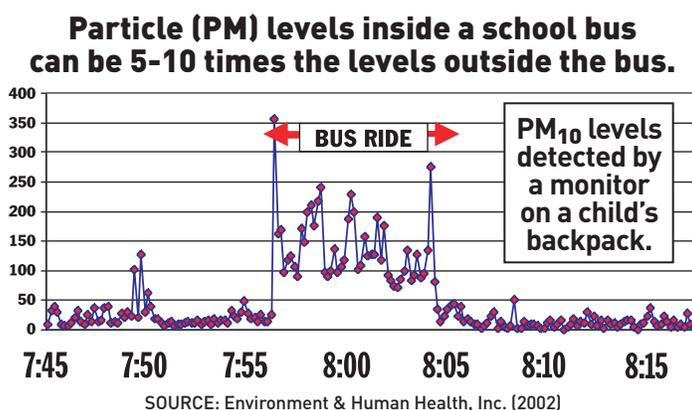
again as he exited the bus, and returned to low levels as he entered the school.

Several independent research teams using different monitoring methods have documented this effect for many buses in numerous locations.

One noted that "While children may only spend a few hours per day on school buses, the high levels of exposure encountered on board school buses can add considerably to their daily and annual exposures to air pollutants such as [diesel particulate matter] and PM_{2.5},"¹

Another found that average exposures to fine particulates on school buses were 5-6 times greater than ambient levels and approximately three times higher during bus rides than during the average walking commute.²

And the California Air Resources Board found that



school bus trips can increase children’s daily exposure to black carbon up to 34%, compared to regular passenger cars.³

Cleanup options

Thanks to new emission standards that take effect in 2007—and the requirement of cleaner-burning, low-sulfur diesel fuel in late 2006—new diesel engines will be much cleaner than their predecessors.

A bus built in 1990 emits up to 60 times more diesel pollution than a new bus. Even buses made this year emit up to 10 times more than new 2007 buses will. Unfortunately, from an air quality standpoint, diesel engines are workhorses that can last 20 years or more. So, while the new standards will eventually result in cleaner buses, at current bus replacement rates it will take years to achieve a truly “clean fleet.”

That doesn’t have to mean another 20 years of dirty diesel buses. In fact, cleaning up a fleet of more than 35,000 buses is a lot easier than it may sound.

Environmental Defense recommends two steps to clean up the Texas school bus fleet, and available technologies would play a major role:

1. Accelerate replacement schedules.

All existing buses will someday be replaced with new, cleaner buses. We recommend the accelerated replacement of the oldest and dirtiest buses—those made before 1994. Those represent a little more than one-third of the Texas school bus fleet as of 2004.

2. Retrofit older buses.

For the remaining two-thirds of the fleet manufactured since 1994, we recommend retrofit technology that will clean up bus exhaust with modest technological modifications. Diesel Particulate Filters, which are installed in place of buses’ mufflers, capture the majority of particle emissions that normally would exit the tailpipe.

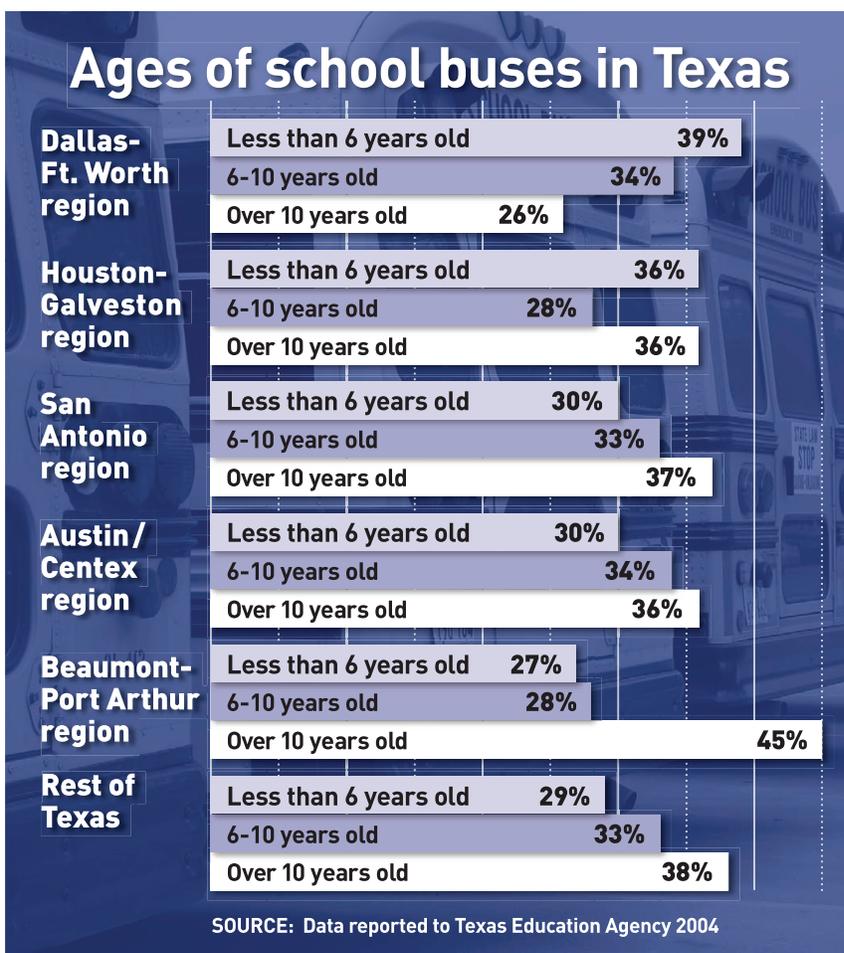
In addition, a closed crankcase filtration system, installed under the hood, captures and filters the emissions that normally are vented from the engine directly to the outside air.

Combining these technologies can result in more than a 90% reduction in diesel particle emissions. New technologies that reduce nitrogen oxides (NOx), a precursor to ozone smog, as well as particulate matter, are also candidates for school bus retrofits. Filtered—or retrofitted—buses would be very nearly as clean as new buses built to more stringent pollution standards.

How is Texas doing?

In the state’s largest metropolitan regions, the age span of public school buses is fairly consistent. In 2004, roughly one-third of school buses were less than six years old, another third was between 6-10 years old, and a third was older than 10 years. [See graph below.]

As the graph below depicts, the biggest regions—the Houston-Galveston and Dallas-Fort Worth regions—have the highest percentages of new buses



(36% and 39%, respectively), while the Beaumont-Port Arthur region had the highest percentage of older buses (45% older than 10 years).

With the exception of the Dallas-Fort Worth and Houston-Galveston regions, every region had a higher percentage of older buses (more than 10 years old) than new buses (less than six years old).

This means the process of phasing out Texas' dirtiest buses can realize a significant impact very quickly. If Texas can accelerate the rate at which the oldest buses are phased out or replaced, it will have effectively cleaned up the dirtiest (and least valuable) third of its buses years faster than it would by simply waiting for buses to "age out" and die.

Texas Clean School Bus Projects (Already done or to be completed by end of 2006)	
Accelerated diesel bus replacements	399
Filtered or "retrofitted" diesel buses . . .	1,361
Alternative-fuel buses	1,683

Some school districts are meeting this challenge quite aggressively and have pursued a variety of funding opportunities to move forward. Some have accelerated their replacement timelines. Some are installing the retrofit technologies recommended in

this document.

But, with few exceptions, these efforts are powered solely by local enthusiasm; concerned local leaders have gone the extra mile to push cleanup projects.

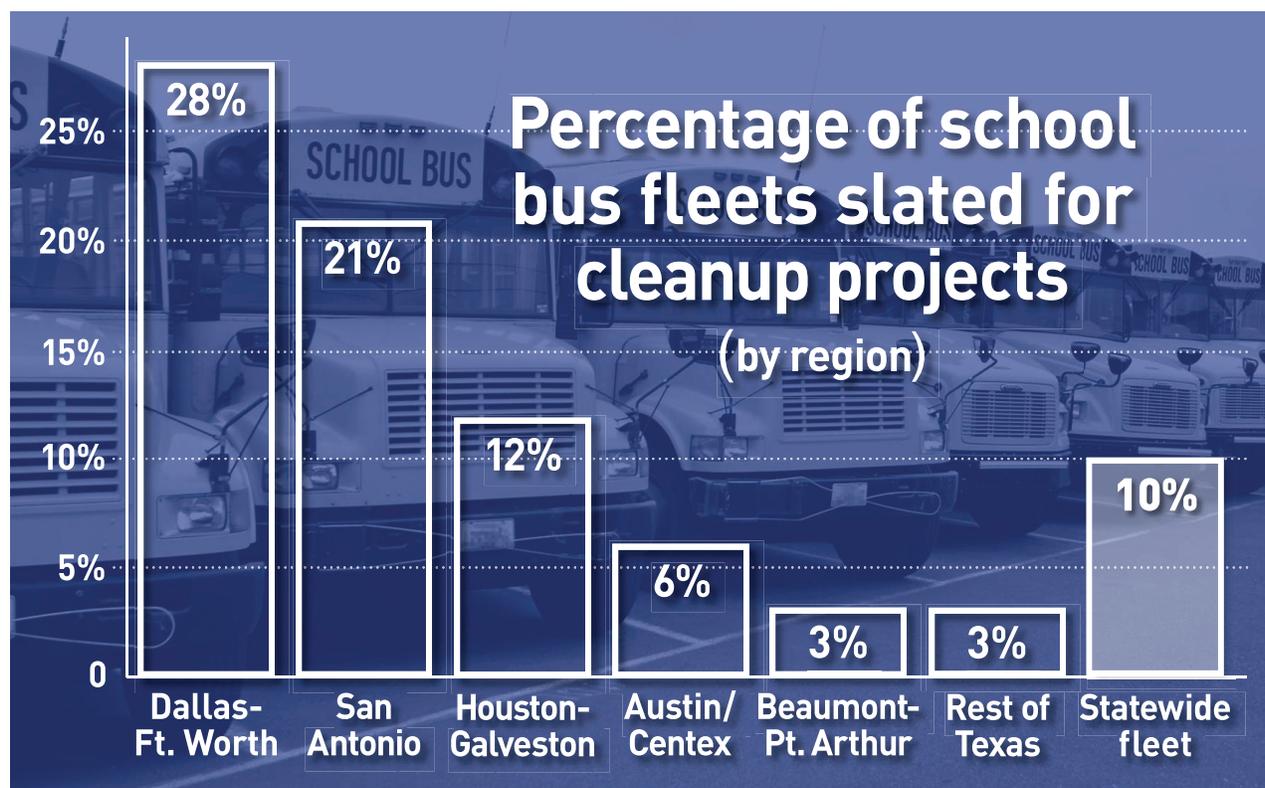
The San Antonio and Dallas regions are out in front of the other regions, with 21% and 28% of their bus fleets cleaned, respectively, using funding they secured on their own.

But the planned cleanup rate across the state is woefully low. Considering all current plans from all school districts through 2006, we estimate that less than 10% of our statewide school bus fleet will be cleaned by the end of this year.

The chart below depicts (for each of the state's biggest metropolitan regions, the rest of the districts, and the entire statewide fleet) the percentage of the total current bus inventory that will be "cleaned," based on the completed or current school district cleanup projects through 2006.

Cleaning the Texas school bus fleet is not yet a statewide priority for either school officials or state elected officials. Some regions in Texas have been more successful at cleaning their fleets because they have access to special federal highway funds designated for ozone non-attainment areas.

But children's diesel exposure should not depend on where they live. This public health issue cuts



across all geographic regions and all populations.

Safe and healthy transportation to and from school should be a state-wide priority.

The cost

Certainly, cleaning up Texas' school bus fleet is going to cost money.

So who will pay for it?

The cleanup projects cited in this document are funded from a number of sources, including

the Environmental Protection Agency (EPA) and the Federal Highway Administration (FHWA), plus Supplemental Environmental Projects (SEPs) funded by third parties.

Cleaning up Texas' school buses is a challenge that deserves significant state funding.

Environmental Defense proposes spreading the cost of the cleanup over three years, making the annual cost more manageable.

It would be a one-time investment; once the buses are clean, they're clean. We wouldn't have to "renew" spending for this project year after year.

The good news is that a few years ago, to pay for emission-reduction programs, the state government added dedicated surcharges to vehicle title transfer fees, commercial vehicle registration fees and inspection fees, and the sales tax on heavy-duty and off-road diesel vehicles. And Texans have been paying those surcharges.

District	Total bus inventory	% planned for cleanup
Dallas County Schools	1,375	88%
Houston ISD	1,042	27%
Cy-Fair ISD	664	5%
Aldine ISD	616	0%
Northside ISD	524	65%
Fort Bend ISD	481	4%
Austin ISD	445	11%
Fort Worth ISD	439	0%
Conroe ISD	402	38%
North East ISD	379	0%

The bad news is that the Legislature has not authorized spending all the funds it is collecting.

The State Treasury currently holds tens of millions of dollars collected specifically for the purpose of reducing emissions—enough to make a significant dent in a campaign to replace or clean up the school buses of Texas.

Other states, including California, New Jersey and Washington, are already tackling this issue. The legislature of each has approved significant state funds to clean up its school bus fleet.

Texas should follow suit and replace or retrofit the more than 35,000 public school buses that carry our children to and from school every day.

Environmental Defense's recommendations would require no new taxes and would not cut into the state funds that local school districts use in their classrooms.

We're convinced that once Texas parents and grandparents understand the adverse health effects of elevated PM levels—and the opportunity we have to eliminate this detrimental air pollution exposure—they will demand action from their legislators.

The threat is clear.

The solution is affordable.

The money is there.

The time to act is now. ■

¹ Ontario Public Health Association, "School Buses, Air Pollution & Children's Health: Improving Children's Health and Local Air Quality by Reducing School Bus Emissions," 2005; available at www.opha.on.ca/resources/schoolbus.pdf.

² Health Canada, "Exposure of School Children to Diesel Exhaust from School Buses," 2006. [Reproduced with the permission of the Minister of Public Works and Government Services.]

³ California Air Resources Board, "Characterizing the Range of Children's Pollutant Exposure During School Bus Commutes," ARB Staff Interpretive Summary of Study Results, 2003; available at www.arb.ca.gov/research/schoolbus/summary.pdf.

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