A Healthier Ride to School

CLEANING UP NEW YORK CITY'S DIRTY DIESEL SCHOOL BUSES

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Cover images: Upper left and, lower right: photos by Isabelle Silverman; upper right: photo iStockphoto.com); lower left: photo Mel Peffers.

Our mission

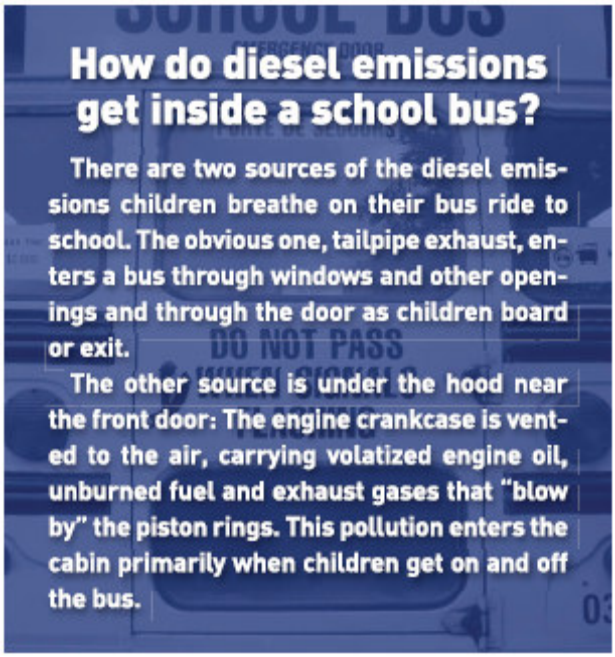
Environmental Defense Fund is dedicated to protecting the environmental rights of all people, including the right to clean air, clean water, healthy food and flourishing ecosystems. Guided by science, we work to create practical solutions that win lasting political, economic and social support because they are nonpartisan, cost-effective and fair.

The report is available online at www.edf.org/nycbuses

Executive Summary

New York City has one of the largest public school bus systems in the United States. The city's Department of Education (DOE) transports more than 138,000 students using about 6,700 diesel school buses. Although riding the bus is still the safest way to get to school, the air inside the bus can be polluted by diesel exhaust coming from the engine and tailpipe. Luckily tested retrofit technologies are available today to reduce that pollution by 90% or more.

The Environmental Protection Agency (EPA) and many studies have linked diesel emissions to thousands of premature deaths, hundreds of thousands of asthma attacks, millions of lost work days, and numerous other health impacts every year nationwide.[1] Diesel pollution inside the bus can be five times higher than outdoors. Children are at particular risk because they breathe in more air than adults and their lungs and bodies are still developing.

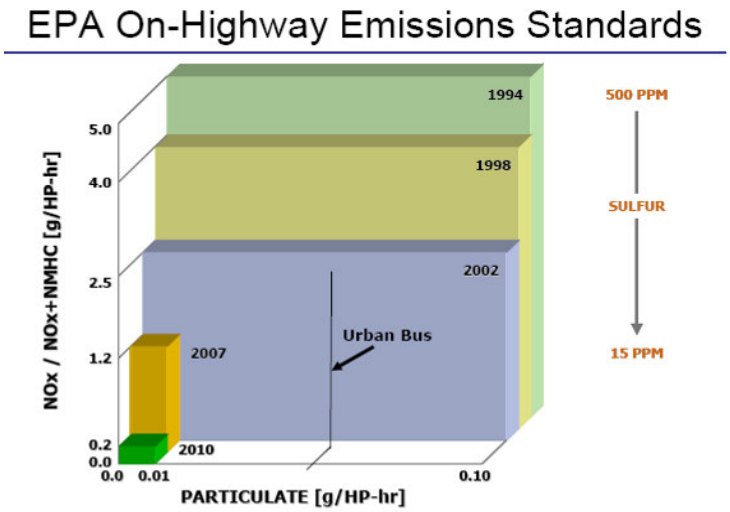


The DOE has successfully tested various retrofit technologies to clean up diesel school bus pollution. A tailpipe diesel particulate filter (DPF) and a crankcase (engine) ventilation system (CCVS) can reduce sooty particulates by 90% or more. The technology is not the challenge; the challenge is finding the funds to pay for clean buses. This report lays out how a retrofit investment of about $30 million spread out over three years combined with a lower retirement age, will make sure New York City's children ride to school on one of the cleanest fleets in the country.

Environmental Defense Fund (EDF) recognizes that this is a financially challenging time and that New York City faces budget cuts. However, this investment is a very smart one that will provide high returns in terms of health benefits. Studies show that every dollar invested in diesel retrofits yields several dollars in health benefits. In addition, New York City is not meeting federal health-based standards for fine particulate matter ($PM_{2.5}$).[2] DPF retrofits trap $PM_{2.5}$ and new buses meeting 2007 federal emission standards have 90% less $PM_{2.5}$ emissions

than buses with model years 1994-2006. School bus replacements and retrofit installations will bring New York City closer to meeting federal health based $PM_{2.5}$ standards.

FIGURE 1 (Source: Emisstar LLC)



This year New York City received $7.8 million in federal CMAQ (Congestion Mitigation and Air Quality) funds. These funds should be used to continue retrofitting the New York City school bus fleet. Projects CMAQ funds can support, that EDF believes will maximize air quality benefits and minimize 2010 contract costs, are: a) DPFs for engine model years 2002 and 2003 large school buses; b) incentive funding to replace pre-1994 large school buses with buses meeting 2007 engine standards; and c) engine crankcase ventilation systems (CCVSs) for large and small school buses.

In 2010 the DOE will issue new school bus contracts. These new contracts must reflect the City's commitment to cleaning the fleet and require certain standards from the contracted bus companies.

EDF's recommendations for these new contracts are:

<u>Large School Buses:</u>

- Set retirement age at 16 years for all large buses (current retirement age is 19 years).
- Take advantage of successfully tested new passive and active DPF technologies.
- Comply with current New York City laws requiring the installation of diesel particulate filters on large diesel school buses with model years 1998-2006 used for general education children. EDF is also recommending diesel oxidation catalysts (DOCs) and CCVSs for large buses with model years 1995-1997 for cost reasons.
- Voluntarily install diesel particulate filters on all large buses with model years 1998-2006 used for special education children.
- Dedicate proper funds to retrofit all 1994 to 2006 buses with engine and tailpipe retrofits as recommended in this report.
- Require the percentage of school buses meeting the most stringent 2010 federal emission standard to increase every year in each bus operator's fleet.

- No-idling policy

Small School Buses:

- Set retirement age at 12 years.
- Retrofit all small diesel buses with model years 1999-2006 with tailpipe DOCs and CCVS retrofits.
- Re-using the DOCs removed from large school buses
- Require each bus operator's fleet to annually increase the percentage of school buses meeting 2010 federal emission standard
- No-idling policy

Finally, the DOE should actively seek additional State and Federal funds to help offset the cost of retrofitting the fleet.

Introduction

New York City has one of the largest public school bus systems in the United States. The city's Department of Education (DOE) manages the ridership needs of more than 138,000 students. This requires the use of more than 6,770 diesel school buses and hundreds of gasoline powered buses.[3] And though the DOE has made progress cleaning up the fleet, there is much more to be done and done quickly to keep our children healthy. If the DOE continues on its current track, it will take until 2025 to get a 90% cleaner fleet. This is unacceptable given how harmful diesel emissions are to our children's health and that the technologies are available today to reduce 90% of soot emissions.

There are two upcoming opportunities that can advance New York City clean buses;

1. The DOE school bus contract is up for renewal in 2010. The DOE does not own the buses but contracts with about 50 different school bus companies. Planning must begin now to ensure that 2010 contracts will provide the framework for a clean school bus fleet.
2. Recently the DOE received $7.8 million from Congestion Mitigation and Air Quality (CMAQ) federal funds to support retrofitting school buses (See CMAQ chapter below). If carefully planned, those funds will be able to benefit bus operators and the DOE for the 2010 contracts and support a new strategy for one of the cleanest school bus fleets in the country.

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This report lays out a set of recommendations for immediate spending of the $7.8 million CMAQ funds and recommendations to reduce 90% of harmful particulate matter (soot), carbon monoxide and hydrocarbon emissions on NYC's public school bus fleet starting this year. Upon implementation of these recommendations, all large school buses will be 90% cleaner by 2013 which is 12 years sooner than if the current contracts are simply extended with the same terms. In addition, small school buses will get much cleaner as well.

Additionally, this report documents how investing in diesel retrofits for three years starting in 2010 will yield tremendous health benefits in the long run. Studies show that every dollar invested in diesel retrofits can yield several dollars in health benefits.[4] We owe this investment to the health of our children and our city.

EDF urges the DOE to include our recommendations in the new contracts and give every child a much healthier ride to school.

Recommended Use Of CMAQ Funds That Will Benefit New Contracts

The DOE currently plans to spend the CMAQ funds partially on small school bus retrofits. EDF urges the DOE not to spend CMAQ funds on tailpipe retrofits for small buses. We recommend the following:

Small Buses

- If the DOE must spend some funds on the small buses, we urge them to install engine CCVSs on the small buses only.
- Beginning with the 2010 contracts, small buses should get retrofitted with DOCs and CCVS only. The DOCs should be taken from the large buses that get DPFs to cut costs..

Large Buses

- Install DPFs on large diesel buses that still have 10 years of useful life left before retirement to maximize the DPFs air quality benefits.
- Prioritize bus model years 2001, 2002, 2003 or 2004 for DPF retrofits. 2002 and 2003 buses are ideal for 2008, 2009 or 2010 installations because the DPF would run for about 10 years before the bus would have to be retired (with a 16-year retirement age).
- Replace pre-1994 and 1994 engine model year buses with buses meeting 2007 emission standards. Pre-1994 engines are 40 times dirtier than a 2007 engine in terms of particulate matter (PM) or soot pollution.
- For financial reasons, we recommend keeping the DOCs and CCVS on the buses with model years 1995, 1996 and 1997 before retiring them after 16 years since the date of manufacture. If these buses do not have the DOCs/CCVSs installed, they should be installed for about $2,000 per bus.

If DPFs are installed on buses with engine model years 1998-2006, about 2,040 large buses would need DPFs. When additional CMAQ funding becomes available, the remaining large buses (except for model years 1995-1997) should receive DPFs. PM emissions are the same for buses with model years 1994-2006, so the installation schedule for the DPFs should be prioritized to maximize the filter's time on the bus. A filter last for about 10 years. See Table 1 for suggested installation schedule to maximize air quality benefits from filter.

TABLE 1
EDF's Recommended DPF Installation Schedule For Large Buses

Year Large Bus Should Get DPF installed	Engine Model Year of Bus	Year Bus Will Be Retired	Years Filter On Bus
2008	2002	2018	10
2009	2003	2019	10
2010	2004	2020	10
2011	2005	2021	10
2012	2006	2022	10
2010	2001	2017	7
2010	2000	2016	6
2010	1999	2015	5
2010	1998	2014	4
Other Retrofits and Retirement	**Engine Model Year of Bus**	**Year Bus Will Be Retired**	**Years DOC On Bus**
DOCs/CCVSs (to cut costs)	1997	2013	At least 3
DOCs/CCVSs (to cut costs)	1996	2012	At least 2
DOCs/CCVSs (to cut costs)	1995	2011	At least 1
Replace with 2007 buses	1991-1994	2010	N/A

Diesel Pollution and Children's Health

Pollution inside a school bus can be **five times higher** than the outside air.

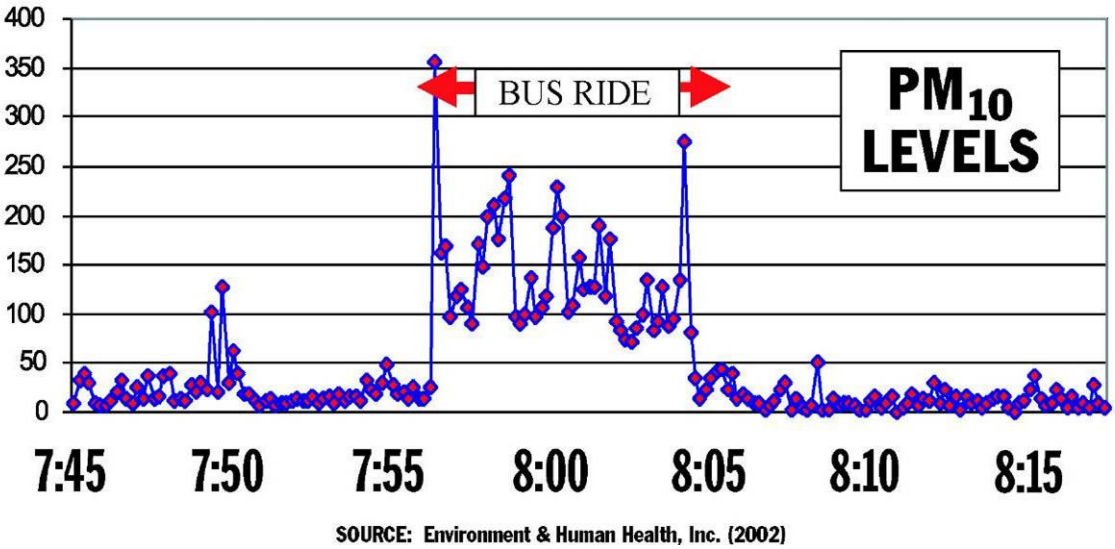
While school buses are still the safest way of getting around, children are at risk of breathing harmful pollution inside and outside the school bus. The vast majority of New York City's public school buses are diesel powered. Diesel emissions contain more than 40 toxic substances, smog-forming emissions such as nitrogen oxides (NOx), particulate matter (PM) also referred to as soot, unburned hydrocarbons and other harmful byproducts—many of which are known carcinogens.

Photo: istockphoto.com

Diesel pollution gets trapped inside the bus

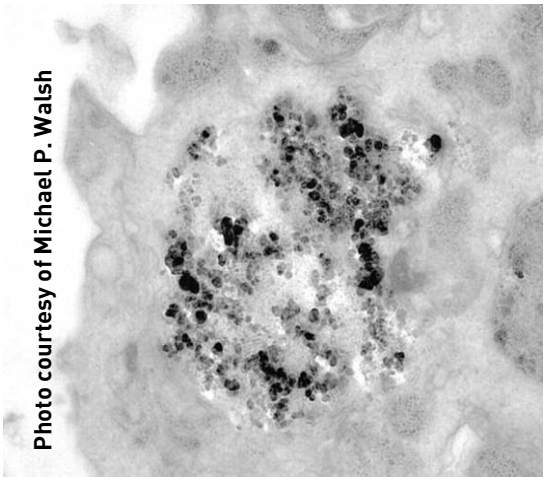
Diesel pollution enters the school bus from two sources: the crankcase (engine) and the tailpipe. In school buses the engine is in the front, right near the door, so every time the door opens, crankcase emissions and tailpipe emissions are drawn inside. Crankcase and tailpipe emissions can also enter the bus through open windows and even through the floorboards. Studies show that air quality inside the bus can be five times worse than outside air. See Figure 2. Even a short amount of time spent on a school bus can lead to high levels of exposure to harmful air pollutants such as diesel particulate matter.[5]

FIGURE 2
Course particles (PM10) measured from a child's backpack monitor



Children get an extra dose of pollution during their bus ride to school. The pollution inside the bus can be up to five times dirtier than the air outside. Even short exposures can have an adverse impact on children's health.

Fine particulate matter and children's health



Soot particles in the lining of a child's lung: Breathing in diesel soot can damage lungs and result in serious health effects.

Coarse and fine particulate matter (PM_{10} and $PM_{2.5}$ respectively) are breathed deeply into the lungs where they can lodge, creating serious, even life-threatening health problems. They can exacerbate the effects of asthma and other respiratory ailments, increase the risk of cardiovascular illnesses and cancer and even reduce adult lung function.

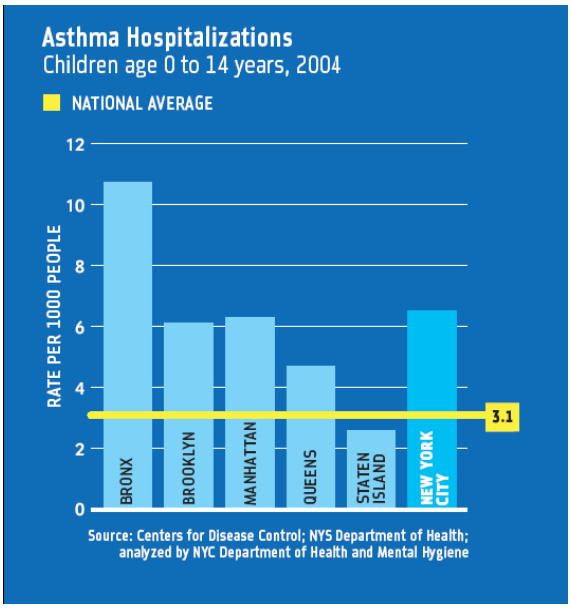
Children are at particular risk because their lungs are still developing and because they breathe in twice as much air per pound of body weight than adults.[6] Exposures that occur during childhood are of special concern because children's developmental processes can easily be

disrupted, and the resulting damage may be irreversible.[7] Additionally, exposures that occur early in life appear more likely to lead to disease than do exposures later in life. The damage to young lungs can result in reduced lung function by adulthood and other dangerous health problems.[8]

New York City children at risk

In New York City, childhood asthma rates are significantly higher than the national average of 8% for children under 17.[9] Children in New York City are twice as likely as others to be hospitalized for asthma. See Figure 3. One survey reported that in central Harlem, c childhood asthma rates are over 25%.[10] Nationally, asthma is the leading cause of school absenteeism, accounting for 14 million days of school lost annually.[11] Reducing the risk of asthma by cleaning up buses will benefit not only children's health, but also their education.

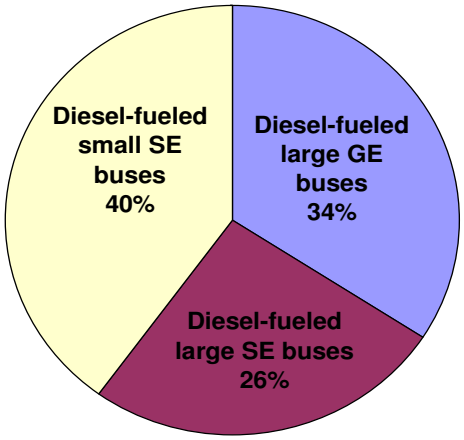
FIGURE 3
New York City asthma rates compared to the national average. Source: Centers for Disease Control: NYS Department of Health: analyzed by NYC Department of Health and Mental Hygiene.



New York City can also protect children from the long-term risk of cancer by cleaning up school buses. It is estimated that mobile sources, dominated by diesel exhaust, contribute to more than 75% of the added cancer risk from air toxics in the United States.[12] In 2000, New York City dwellers were found to be at the second greatest risk of cancer from diesel particulates in U.S. metropolitan areas (50 cities estimated).[13] In 2007, the American Lung Association ranked 25 major metropolitan areas according to short- and long-term $PM_{2.5}$ pollution; New York City ranked 16th and 17th, respectively. Not surprisingly, New York City is not meeting federal health-based $PM_{2.5}$ standards. Within the New York metropolitan area, the Bronx and Manhattan ranked worst in long-term $PM_{2.5}$ pollution. Diesel emissions, including from school buses, contribute to these rankings.[14]

Technologies for Cleaning Up New York City Diesel School Buses

FIGURE 4
Composition of diesel school buses
6,770 New York City public education buses



New York City school bus service is divided into two groups: service for *general* education children and service for *special* education children. General education children are served by 2,322 large diesel school buses. Special education children are served by 1,748 large diesel school buses and 2,700 small diesel school buses. In 2007, 78,232 general education children and 60,252 special education children used public school bus service. See Figure 4 and Table 2 below. Several hundred gasoline powered small school buses are also part of the school bus fleet, but this report focuses only on diesel buses. Gasoline powered school buses have far lower particulate matter emissions than diesel buses and therefore do not need retrofits.

TABLE 2
Fleet composition of NYC public diesel school buses as of 2007

Number of children and type of service (GE or SE)	Large buses (Type C or D buses) used for service	Small buses (Type A or B buses) used for service
78,232 general education children (GE)	2,322 GE large buses	No small buses
60,252 special education children (SE)	1,748 SE large buses	2,700 SE small buses

Diesel pollution retrofit technologies

Crankcase (Engine) Retrofit

Retrofits can be used to clean up diesel pollution coming from both the engine and the tailpipe.

CRANKCASE (ENGINE) RETROFIT: Crankcase ventilation systems (CCVS) are the only available retrofit technology to reduce engine emissions. CCVSs are installed in the engine compartment to reroute the engine exhaust into the engine air intake.

TAILPIPE RETROFITS: The two main tailpipe retrofits are diesel particulate filters (DPFs) and diesel oxidation catalysts (DOCs). DPFs reduce over 85% of particulate matter (PM) emissions and DOCs reduce about 25% of PM emissions. CCVSs in combination with DPFs are the most effective retrofit solution for all large school buses, reducing in-cabin soot levels by over 85%. These retrofits will ensure that children are no longer exposed to elevated pollution levels twice a day. The DOE has successfully piloted DPFs on large school buses.

A mechanic installs a diesel particulate filter.

New York City clean school bus regulations and commitments

In 2005, the New York City Council passed Local Law 42 (LL42-2005), which requires that DOE install best available retrofit technology to reduce engine and tailpipe diesel emissions by September 1, 2007. See Appendix E and F for LL42-2005 and its implementing rules.

Out of the approximately 6,770 public diesel school buses, LL42-2005 covers only the 2,322 large buses used for *general* education children. In April 2007, Mayor Bloomberg introduced a broad environmental sustainability plan for the city called PlaNYC. One of PlaNYC's 127 initiatives is to retrofit all NYC public school buses used for children with *special* education needs.[15] With LL42-2005 and PlaNYC's initiative, best available retrofit technology, which are DPFs, should be installed on all public school buses. See Appendix A for the exact language of PlaNYC's school bus initiative and its progress report.

LL42-2005 and its implementing rules (see Appendix E & F) categorized the different retrofit technologies into four different levels according to the effectiveness of PM reduction. The highest, Level 4 technologies, which must be considered before all other technologies, must reduce PM by 85% or greater.

As of 2008, only active or passive DPFs qualify as Level 4 technologies. Level 3 technologies, which must be evaluated if Level 4 technologies are not technologically feasible, must reduce PM by at least 50%. For example, flow-through filters (FTF) qualify as Level 3 technologies. Level 2 technologies, which can be used only if Level 4 and Level 3 technologies are not technologically feasible, must reduce PM by at least 25%. DOCs fall under the Level 1 or 2 category (see Table 3 below). In 2007, the DOE installed DOCs, which is only a level 1 or 2 technology, and tested DPFs, which is a level 4 technology.[16]

TABLE 3
Best available retrofit technology levels For PM removal under LL42-2005

Levels categorized by effectiveness of tailpipe retrofit technology only	Percentage of PM removal from tailpipe emissions	Available tailpipe retrofit technology	Engine retrofits required in addition to tailpipe retrofits.
Level 4	85% or greater	Any DPF	CCVS
Level 3	Between 50-84%	FTF	CCVS
Level 2	Between 25-49%	DOC	CCVS
Level 1	Between 20-24%	DOC	CCVS

PM=particulate matter; DPF=diesel particulate filter; FTF=flow-through filter; DOC=diesel oxidation catalyst; CCVS=crankcase ventilation system

As of 2006, DPFs had not been tested on large NYC school buses, so the DOE decided to pilot two different types of DPFs (an active and a passive system)[17] on nine buses. At the same time, the DOE went ahead with the installation of the following retrofits on the 2,300 general education buses and about 750 large special education buses: CCVSs to eliminate engine emissions and DOCs to reduce 25% of tailpipe particulate matter emissions. DOE had the less effective, Level 2 technology installed because it first wanted to test the DPF technology.

Future LL42-2005 compliance and PlaNYC implementation

DOE established the technological feasibility of Level 4 technology DPFs in its successful 2007-2008 pilot on nine buses. Although DOCs (Level 2 technology) have been installed on most large school buses, LL42-2005 states that after three years, those need to be replaced with DPFs, the best available retrofit technology.[18] The DOCs were installed in 2007, so by 2010 they must be replaced by DPFs on all large school buses that do not meet 2007 or 2010 federal engine emission standards. Under the 2007 and 2010 emission standards, new engines must have a DPF already installed by the original equipment manufacturer and therefore do not require any retrofits.

As to *crankcase* retrofits, no better technology exists to curb engine emissions so we recommend keeping the CCVS that have already been installed on the buses and put CCVSs on all the remaining large and small buses that do not have CCVSs already. Because the school bus door is right near the engine, it is very important to install CCVS on all school buses.

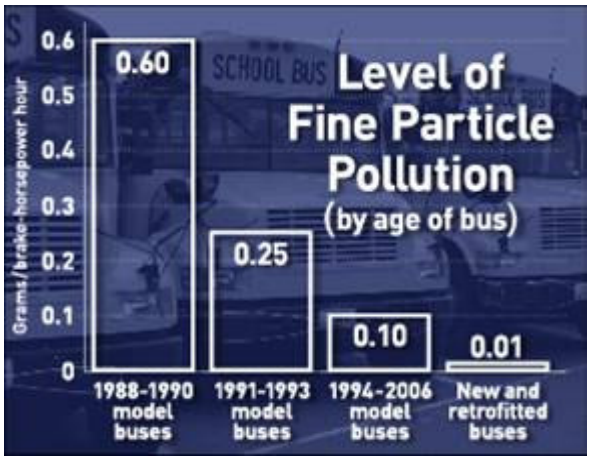
New York City Clean School Bus Recommendations

EDF recommends installing crankcase and tailpipe retrofits on all school buses as described in more detail in this section and to reduce the current 19-year retirement age. See Table 4 summary of recommendations. See Appendix C for retirement age details under the current school bus contracts.

Recommended retirement age for large buses

New Jersey has a 12-year statutory retirement age and on average Connecticut public school buses get retired around 12 years. New York's retirement age is 19 years. New York City's bus retirement policy should be somewhat similar to New Jersey's and Connecticut's. EDF urges the DOE to reduce the retirement age for the large buses to 16 years and install DPF and CCVS retrofits on all large buses. As an exception to keep costs low, large buses with engine model years 1995-1997 that have DOCs and CCVSs can go without the DPF upgrade if retired after 16 years since date of manufacture. The retrofits would make up for the late retirement age. If no retrofits are installed, the buses should be retired after 12 years but retrofits are probably more cost-effective than an earlier retirement age. There is no reason why New York City's school children cannot enjoy newer and cleaner buses like children in Connecticut and New Jersey. Even private New York City schools have started to require newer buses for private school bus service in return for longer contract terms.

FIGURE 5
Reduction of soot with new engine standards



Pollution increases with the age of the school bus (see Figure 5). For example, bus engines built before 1990 are 60 times dirtier than bus engines built in 2007. As Figure 5 shows, buses built after 1994 are four times cleaner than pre-1994 buses and this is why pre-1994 buses should be retired under the new contract terms. Although a DPF reduces particulate matter (PM) emissions by 90%, they do not reduce nitrogen oxide (NOx) emissions. NOx is a precursor to ozone (smog). The newer the bus, the lower the NOx emissions so investing in new buses reduces NOx and PM emissions.

New York City's air quality fails to meet federal health-based ozone and $PM_{2.5}$ standards.[19],[20]. Also, the new contracts should require that a certain percentage of the bus operators' fleet consist of 2007 and 2010 buses. See Figure 1 for federal diesel on-highway engine emission standards for NOx and PM. For buses meeting the 2010 federal emission

standards, the retirement age could be 18 years as long as the original equipment manufacturer recommends using the vehicle for 18 years.

Recommended retrofits for large buses

EDF recommends DPFs[21] as a tailpipe and CCVSs as a crankcase retrofit for all large buses not meeting 2007 or 2010 federal engine emission standards. To keep costs low, buses with engine model years 1995-1997 could be treated as an exception so that DOCs/CCVSs retrofits would suffice.

Recommended retirement age for small buses

The retirement age should be lowered to 12 years for all small buses to accelerate fleet turnover. As a result, no pre-1998 buses would be allowed in the small school bus fleet. The retirement age for small buses meeting 2007 emission standards could be 16 years. For buses meeting the 2010 federal emission standards, the retirement age could be 18 years as long as the original equipment manufacturer recommends using the vehicle for 18 years.

Recommended retrofits for all small buses

EDF recommends DOCs as a tailpipe and CCVSs as an engine retrofit for all small buses not meeting 2007 or 2010 federal engine emission standards. We recommend DOCs because DPFs are too expensive in relation to the purchase price of small buses.[22] To make up for the less effective retrofits, small buses should be retired at an accelerated schedule which should be 12 years.

To keep costs low, we recommend that the DOE use the DOCs from the large buses as those DOCs get replaced with DPFs and re-install the DOCs on the small buses.

No-idling policy and mandatory driver training

In September 2007, New York Governor Eliot Spitzer signed into law anti-idling legislation for school buses. The Commissioner of Education is tasked with issuing regulations requiring the elimination of unnecessary idling, particularly in school districts with high asthma rates, such as in New York City. A no-idling policy for New York City school buses should be required and enforced at every level. Bus companies should communicate the no-idling policy to their drivers year-round, with particular emphasis in September and January when drivers return from long school breaks. Rules about idling should be included in job training for new drivers and refresher training for all drivers.

TABLE 4
EDF's 2010 contract recommendations and status quo in 2008

	Large buses in 2010	**Small buses in 2010**	**Status quo in 2008**
Engine and tailpipe retrofits	Yes, for all buses that do not meet 2007 or 2010 federal diesel engine emission standards.	Yes, for all buses that do not meet 2007 or 2010 federal diesel engine emission standards.	All GE buses have retrofits (majority only 25% effective). 750 SE buses have 25% effective retrofits.
CCVS engine retrofit	Yes	Yes	Yes, all GE buses. Yes, 750 large SE buses. No small buses.
DPF tailpipe retrofit (90% PM reduction)	Yes with the exception of engine model years 1995-1997 that could have DOCs instead of DPFs.	No, because DPFs are too expensive in relation to purchase price of small buses.	Only about nine large buses have DPFs.
DOC tailpipe retrofit (25% PM reduction)	No, because not effective enough at soot (particulate matter) removal. Yes, for engine model years 1995-1997.	Yes, in combination with accelerated retirement to make up for less effective retrofit.	Yes, all large GE buses and 750 large SE buses. No small buses.
Retirement age	16 years but only for buses with DPF & CCVS retrofits or meeting 2007 emission standards. Exception for 1995-1997 buses that can have DOC & CCVS retrofit. 18 years or 2010 federal emission standards. As of 2010 no 1994 and older buses allowed in fleet.	12 years for buses with CCVS & DOC. 16 years for buses meeting 2007 emission standards. 18 years for buses meeting 2010 federal engine emission standards. As of 2010, no 1998 and older buses allowed in fleet.	19 years for large and small buses.
Require certain % of cleanest 2007 and 2010 engine model year buses	Yes, because of NOx benefits, every year the % of 2007 and 2010 buses should increase	Yes, because of NOx benefits, every year the % of 2007 & 2010 buses should increase. Operators should have choice to buy gasoline powered buses.	Retired buses only need to be replaced with five-year-old buses.

Large school buses

To maximize clean air benefits and reduce costs, it is important to start planning now for the bus retrofits in the next 5 years and the 2010 contract terms. We recommend an extended contract term (e.g. 8-10 years) to spread out the costs and make the investment into a cleaner fleet worthwhile for the bus operators and the city.

As stated before, even during times of budget cuts, investing in retrofits now makes sense for the long term. The health benefits from installing retrofits outweigh the costs manyfold.[23]

Based on the numbers provided by the DOE, we estimate that there are about 2,040 large buses with model years 1998-2006 that will need DPFs. Due to the large numbers of retrofits needed, the contract could provide for a 2-3 year installation period to complete all 2,040 large bus DPF installations. See Table 1 with detailed installation schedule recommendations.

Both passive and active DPFs have been successfully tested on NYC school buses. The costs for passive and active filters are around $7,000 and $14,000[24] (discounted price for bulk orders), respectively. Some buses require the more expensive, active DPF, a factor that will have to be evaluated by the fleet managers. Because NYC school buses tend to have low exhaust gas temperature profiles, most likely more buses will need the more expensive active diesel particulate filter.[25]

If, worst case scenario, all large school buses will need active DPFs the total costs for the approx. 2,040 DPF retrofits would be $28.6 million at $14,000 per filter. We estimate that about 900 large special education buses will need CCVS which at $700 per CCVS will cost an additional $6.3 million.

The DOCs that will have to be taken off the large buses, when DPFs are installed, can be re-installed on the small school buses.

Small school buses

For small buses, we do *not* recommend DPFs for economic reasons, even though they are the most effective retrofit technology. Instead we recommend that the oldest, dirtiest buses be retired on an accelerated schedule and DOC (tailpipe) and CCVS (crankcase/engine) retrofits be installed on the remaining small buses. Because DOCs will have to be taken off large buses, those DOCs can be re-installed on the small buses. Then only CCVS have to be purchased for the small buses.

A CCVS costs about $700 including installation and we estimate a $500 installation fee per bus for the DOCs coming from the large buses. If 2,500 small buses need CCVSs and DOCs re-installed, that would cost about $3 million for the small buses. Although there were 2,700 small school buses as of 2007, we estimate that as of 2010 only about 2,500 small buses will need retrofits. See Table 5 for cost summary.

Received CMAQ funding

In 2008, the Department of Transportation (DOT) received $7.8 million in federal Congestion Mitigation and Air Quality (CMAQ) funding for school bus retrofits. These funds should be invested according to EDF's recommendations and reduce the total price tag for the retrofits by $7.8 million which brings the total retrofit costs to about $30.1 million. Spread out over three years, these costs would be $10 million per year.

TABLE 5
Total Approx. Retrofit Costs For Large And Small Buses

	DPFs (large GE and SE buses)	**CCVS (for large SE buses)**	**DOC installation costs and new CCVS (for small buses)**	**TOTAL RETROFIT COSTS**
Large Buses	$28.6 million	$6.3 million		$34.9 million
Small Buses			$3 million	$3 million
Received CMAQ funding				-$7.8 million
TOTAL				**$30.1 million**
Costs per year over 3 year installation period				**$10.03 million per year**

Potential funding sources

So far, the DOE had to bear the cost of retrofitting school buses by using department budgets and grants. The cost to clean up school buses and retire old, dirty engines should not come at the expense of classroom and school facility funds. City, state and federal governments need to step up and help find funding to properly clean up the entire school bus fleet.

In addition, DOT and DOE should apply every year for EPA's clean diesel grants and CMAQ funding. With some appropriations through the national Diesel Emissions Reductions Act (DERA), additional clean diesel funds should become available through regional EPA offices or the metropolitan planning organization (MPO).

Conclusion

The New York City's Department of Education should take advantage of the recently received CMAQ funds and the upcoming 2010 school bus contracts to make New York City's school bus fleet 90% cleaner so that the most vulnerable population, our children, can have a healthy ride to school.

Through a combination of retrofits and the retirement of older buses, the DOE could have the largest and cleanest school bus fleet in the country within several years. The DOE needs the support of other New York City offices and agencies to help find the funding to properly modernize and clean up our school buses. This investment will protect the health of our children, help reduce future health care costs, and improve air quality for all New Yorkers.

Finally, installing retrofits in New York City will also create jobs right here in the city.

References

[1] http://www.epa.gov/otaq/diesel/
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[3] Ridership and fleet composition numbers provided by NYC Department of Education (DOE) in July 2007; all numbers and cost estimates are based on the numbers provided by DOE in 2007.
[4] http://www.edf.org/documents/4488_cleanerairamerica.pdf
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[14] American Lung Association, "State of the Air: 2007." Available at: www.lungaction.org/reports/sota07_table2.html and www.lungaction.org/reports/sota07_table2a.html
[15] See PlaNYC at http://www.nyc.gov/html/planyc2030/html/plan/air_school-bus.shtml or www.nyc.gov/2030 and search for school buses.
[16] See Chapter 26 of Title 15 of the Rules of the City of New. LL42-2005 and its implementing rules are attached as Appendix E & F.
[17] The active DPF was a system sold by HUSS GmbH, see http://huss-umwelt.com/usa. The passive system was sold by International and included an "insulating sleeve" that reduced exhaust temperature loss.
[18] LL42-2005, § 24-163.7d.(2).
[19] U.S. Environmental Protection Agency's ozone designation data. Available at www.epa.gov/ozonedesignations/regions/region2desig.htm
[20] 2007 and 2010 engine emission standards both require DPFs to be installed by the original equipment manufacturer. Engines meeting 2010 engine emission standards have six times less the NOx emissions of a 2007 engine model.
[21] If exhaust gas temperatures are below a certain temperature, passive DPFs will not work so an active DPF needs to be installed. For more information see www.cleanerdieselhandbook.org.
[22] Because a new gas powered small school bus, Type A or Type B, costs about $38,000 or $50,000 respectively, EDF believes that it does not make financial sense to invest in a $15,000 active DPF for a pre-2007 model year small diesel school bus. New diesel powered small school buses cost about $8,000 to 15,000 more than the gasoline powered ones. Our research shows that only active DPFs work on small school buses and active DPFs are more expensive than passive DPFs.
[23] http://www.edf.org/documents/4488_cleanerairamerica.pdf
[24] See Appendix B showing price quote fromo HUSS for active DPFs for school buses.
[25] HUSS Company sold the active DPFs to the NYC DOE in 2007. See http://huss-umwelt.com/usa/

APPENDIX A

PlaNYC School Bus Initative: Decrease school bus emissions - p. 126

http://www.nyc.gov/html/planyc2030/html/plan/air_school-bus.shtml

We will retrofit both large and small school buses and reduce their required retirement age

In 2005, the City Council passed Local Law 42, which mandated the use of ULSD and Best Available Technologies (BATs) in school bus transportation. Approximately 3,800 buses are subject to the law.[1] The Department of Education (DOE) is currently working with private school bus companies to retrofit all full-size school buses. To meet BAT requirements, buses will receive DPFs, DOCs, and other filtration systems.

But several thousand smaller school buses were not considered under this local law. The majority of these buses (approximately 2,700 of over 3,000 buses) are diesels.

The City will retrofit all buses with the best available retrofit technology, including DPFs. DPFs would eliminate at least 85% of the small particulate matter. State DOT, which controls the CMAQ funds, has stated that it is willing to provide $20 million for this project and the City will fund the remaining $5 million.

In addition, in the new or extended contracts with the private bus owners, DOE will require that all buses are retired earlier than the existing 19 year limit. Over the next several months, the City will evaluate the appropriate retirement age based on cost and environmental performance.

While private school buses are not covered by the local law, the City will challenge private schools to encourage similar environmental performance.

Progress (as of 4/22/08):

DOE has installed a combination of diesel oxidation catalysts (DOCs) and crankcase filters on over 2,300 large buses, in compliance with Local Law 42, and an additional 750 large special education buses, not required under the Law. In 2007, DOE began a pilot of active and passive diesel particulate filters (DPFs) on 9 buses. Preliminary results show that active DPFs are superior to passive DPFs given DOE's operating conditions, but active DPFs are at least twice as expensive. In January 2008, DOT applied for $29 million in CMAQ funds for DPFs and an accelerated retirement program for the school bus fleets in the next three years. The grant will allow fleet owners to retrofit small special education buses with active DPFs and to provide rebates to bus vendors as an incentive to replace buses from model years 1988-1993. On February 28, the City presented the project to the CMAQ Subcommittee. The Committee is expected to award CMAQ grants in May. The City is working to develop a cost-effective strategy to reduce emissions from the remainder of the school bus fleet in light of the anticipated school bus procurement negotiations with vendors, scheduled to begin in 2010.
http://www.nyc.gov/html/planyc2030/html/plan/air_school-bus.shtml

[1] As noted in the Progress report, the special education buses are not included in LL42-2005.

APPENDIX B

HUSS Price Quote For Active DPFs For Bulk Orders

HUSS LLC, 820 E. Research Drive, Suite 4, Palm Springs, CA. 92262

HUSS LLC
California Office
820 E. Research Drive, Suite 4
Palm Springs, CA. 92262
Phone: 760.322.5692
Fax: 760.322.6213
info@huss-filters.com
www.huss-filters.com

HUSS LLC
New York Office
626 Tenth Ave
New Hyde Park, NY 11040
Phone: 760.218.5042
angel.gioia@huss-filters.com

School Buses with an Active HUSS MK Filter System (active DPF)

New York
September 2008

1. **Mapping of HUSS MK Filter Systems (active DPF) for School Buses**

The following grid shows the available HUSS filter size for each school bus in dependence on horsepower and age of the relevant school buses:

For All Bus Engines	Horsepower < 200
1993 - 2006	FS 100 MKS

Pricing
(based on the horsepower of the bus engine):

- FS100 MKS: 13.661,00 USD

Included in price: - initial and extensive training class of operators and service technicians
- HUSS Control (Electronic control unit (ECU), installed in the driver cabin)

Additional costs for FS 100 (per filter):

Installation costs (FS 100)	3,110.00 USD	(approx. 2 days installation time)
Shipping / Handling	340.00 USD	
Regular servicing / maintenance	950.00 USD	(to be done each 600 hrs or at least once a year)

2. **Discount Structure**

1 - 9	HUSS MK Filter Systems	0%	discount from current rates
10 - 49	HUSS MK Filter Systems	7%	discount from current rates
50 - 99	HUSS MK Filter Systems	15%	discount from current rates
100 - 199	HUSS MK Filter Systems	18%	discount from current rates
200 - 499	HUSS MK Filter Systems	20%	discount from current rates
500 +	HUSS MK Filter Systems	22%	discount from current rates

3. **Quotation Example**

A typical school bus has less than 200 hp, so the FS 100 MKS should fit to all NYC school buses with engine model years 1993-2006 that are under 200 hp

Example based on a purchase order of **more than 500** HUSS MK Filter Systems.

(in USD)	FS 100 MKS
List Price	13.661,00
22% Discount	3,005.00
Subtotal	**10,656.00**
Installation	3,110.00
Shipping / Handling	340.00
Total:	**14,106.00 USD**

Most important advantages of the HUSS MK-filter system:

- System is independent from any external energy sources which means there is no need to plug the machine in over night for doing a regeneration
- The very quick and efficient regeneration (approx. 35 minutes) can be done anywhere (e.g. also during lunch break of the driver or while he is waiting for picking up the school kids)

Advantages of the HUSS MK-filter system:

- Particle collection rate of 99%
- No secondary emissions (NO_2)
- Electric control unit (HUSS Control) included in price, thereby permanent data documentation of relevant engine data like engine rpm, exhaust gas temperature and backpressure
- Easy handling at the push of a button
- HUSS filtering systems comply with the highest standards, and are therefore CARB certified as Level 3 Plus, EO-DE-06007-01 and EO-DE-06006 and also fulfill the requirements of NYC's Local Law 77

Best Regards

Peter Bruenke
Director North America
HUSS LLC

Delivery Terms

1. Delivery ex works Palm Springs, CA
2. Any sales tax will be added to invoice.

HUSS LLC, 820 E. Research Drive, Suite 4, Palm Springs, CA. 92262

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Regular servicing / maintenance	950.00 USD	(to be done each 600 hrs or at least once a year)

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500 +	HUSS MK Filter Systems	22%	discount from current rates

3. Quotation Example

A typical school bus has less than 200 hp, so the FS 100 MKS should fit to all NYC school buses with engine model years 1993-2006 that are under 200 hp

APPENDIX C

Bus retirement schedule under current school bus contract terms

Under the current school bus contract, each school bus operator must retire its buses according to the following schedule:

Small school bus retirement schedule

Year	% of buses of certain model years still allowed in fleet	Engine model year no longer allowed in fleet (retirement cut off)
2007	20% prior to 1991	1988
2008	10% prior to 1992	1989
2009	10% prior to 1992	1990
2010	5% prior to 1993	1991

Large school bus retirement schedule

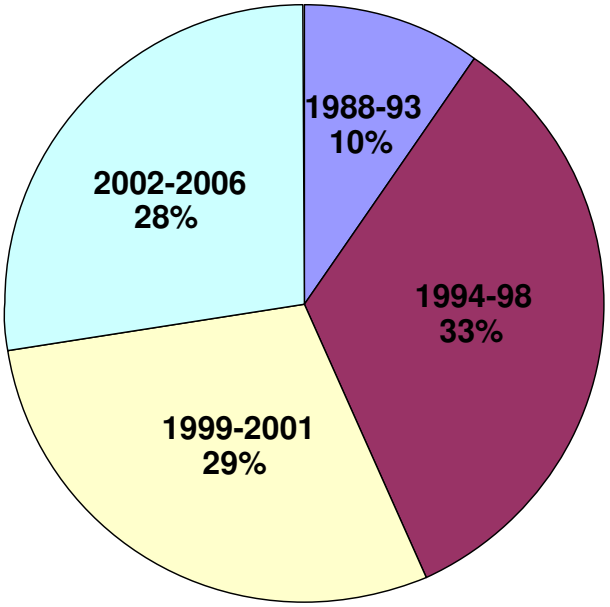
Year	% of buses of certain model years still allowed in fleet	Engine model year no longer allowed in fleet (retirement cut off)
2007	25% prior to 1991	1988
2008	20% prior to 1992	1989
2009	15% prior to 1992	1990
2010	10% prior to 1993	1991

APPENDIX D

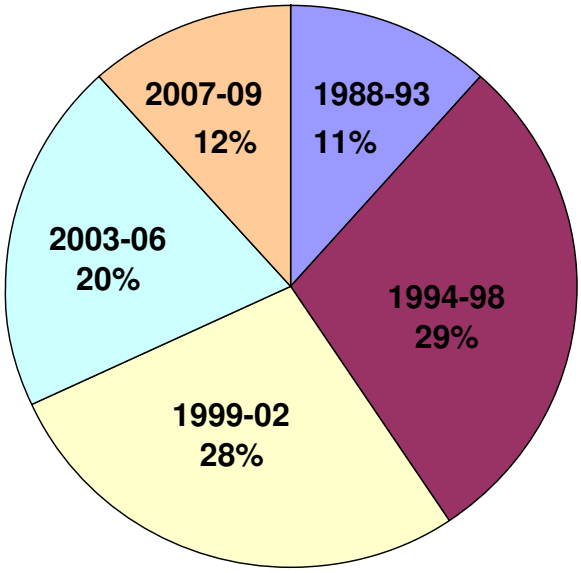
New York City statistics

Number of buses and ridership data come from data supplied by the NYC Department of Education. Small buses are Type A or Type B buses and large buses are Type C or D buses.

NYC Small School Bus Fleet Composition
Total Small Diesel & Gas School Buses: 3463



NYC Large School Bus Fleet Composition
Total Large School Buses: 3859



APPENDIX E

LOCAL LAWS
OF
THE CITY OF NEW YORK
FOR THE YEAR 2005
No. 42

Introduced by Council Members Liu, Lopez, Gerson, The Speaker (Council Member Miller), Moskowitz, Addabbo Jr., Boyland, Brewer, Clarke, Comrie, Fidler, Gennaro, Gentile, James, Jennings, Koppell, Martinez, Monserrate, Nelson, Palma, Reed, Rivera, Seabrook, Vallone Jr., Weprin, Yassky, Foster, McMahon, DeBlasio, Recchia, Baez, Katz, Avella, Jackson, Gioia, Quinn, Sanders, Barron, Perkins, Gonzalez, Oddo and the Public Advocate (Ms. Gotbaum).

A LOCAL LAW

To amend the administrative code of the city of New York, in relation to reducing the emission of pollutants from vehicles that transport children to and from school.

Be it enacted by the Council as follows:

Section 1. Chapter one of Title 24 of the administrative code of the city of New York is amended by adding thereto a new section 24-163.7 to read as follows:

§24-163.7 Use of ultra low sulfur diesel fuel and best available retrofit technology in school bus transportation. a. Definitions. For the purposes of this section only, the following terms shall have the following meanings:

(1) "Best available retrofit technology" means technology, verified by the United States environmental protection agency or the California air resources board, for reducing the emission of pollutants that achieves reductions in particulate matter emissions at the highest classification level for diesel emission control strategies, as set forth in subdivision e of this section, that is applicable to the particular engine and application. Such technology shall also, at a reasonable cost, achieve the greatest reduction in emissions of nitrogen oxides at such particulate matter reduction level and shall in no event result in a net increase in the emissions of either particulate matter or nitrogen oxides.

(2) "Department of education" means the New York city department of education, formerly known as the New York city board of education, and any successor agency or entity thereto, the expenses of which are paid in whole or in part from the city treasury.

(3) "Person" means any natural person, partnership, firm, company, association, joint stock association, corporation or other legal entity.

(4) "Reasonable cost" means that such technology does not cost greater than thirty percent more than other technology applicable to the particular engine and application
2
that falls within the same classification level for diesel emission control strategies, as set forth in subdivision e of this section, when considering the cost of the strategies, themselves, and the cost of installation.

(5) "School bus" means any vehicle operated pursuant to a school bus contract, designed to transport ten or more children at one time, of the designation "Type C bus" or "Type D bus" as set forth in 17 NYCRR §§ 720.1(Z) and (AA), and used to transport children to or from any school located in the city of New York, and excluding any vehicle utilized primarily to transport children with special educational needs who do not travel to and from school in vehicles used to transport general education students.

(6) "School bus contract" means any agreement between any person and the department of education to transport children on a school bus.

(7) "Ultra low sulfur diesel fuel" means diesel fuel that has a sulfur content of no

more than fifteen parts per million.
b. (1) Beginning July 1, 2006, any diesel fuel-powered school bus that is operated by a person who fuels such school bus at any facility at which ultra low sulfur diesel fuel is available, or of which such person has the exclusive use and control, or at which such person has the ability to specify the fuel to be made available, shall be powered by ultra low sulfur diesel fuel.
(2) Beginning September 1, 2006, any diesel fuel-powered school bus to which paragraph one of this subdivision does not apply shall be powered by ultra low sulfur diesel fuel.
c. Diesel fuel-powered school buses shall utilize the best available retrofit technology in accordance with the following schedule:
i. 50% of school buses used to fulfill each school bus contract by September 1, 2006;
ii. 100% of school buses used to fulfill each school bus contract by September 1, 2007.
d. (1) The commissioner shall make determinations, and shall publish a list containing such determinations, as to the best available retrofit technology to be used for each type of diesel fuel-powered school bus to which this section applies. Each such determination shall be reviewed and revised, as needed, on a regular basis, but in no event less often than once every six months.
(2) No person shall be required to replace best available retrofit technology or other authorized technology utilized for a diesel fuel-powered school bus in accordance with the provisions of this section within three years of having first utilized such technology for such bus, except that technology that falls within Level 4, as set forth in subdivision e of this section, shall not be required to be replaced until it has reached the end of its useful life.
(3) For purposes of this subdivision, any best available retrofit technology, or substantially similar technology, purchased or installed in whole or in part with funds provided by the state of New York or the federal government pursuant to a specific diesel emissions reduction program in effect upon the date of enactment of this section, shall constitute the best available retrofit technology for a period of not less than three years from the date on which such equipment was installed.
e. The classification levels for diesel emission control strategies are as follows, with Level 4 being the highest classification level:
i. Level 4 – strategy reduces diesel particulate matter emissions by 85 percent or greater or reduces engine emissions to less than or equal to 0.01 grams diesel particulate matter per brake horsepower-hour;
3
ii. Level 3 – strategy reduces diesel particulate matter emissions by between 50 and 84 percent;
iii. Level 2 – strategy reduces diesel particulate matter emissions by between 25 and 49 percent;
iv. Level 1 – strategy reduces diesel particulate matter emissions by between 20 and 24 percent.
f. The commissioner shall issue a written determination that permits the use of diesel fuel that has a sulfur content of no more than thirty parts per million to fulfill the requirements of subdivision b of this section if ultra low sulfur diesel fuel is not available to meet the needs of school buses to fulfill the requirements of this section. Such determination shall expire after six months and shall be renewed in writing every six months thereafter if such lack of availability persists, but in no event shall be in effect after September 1, 2006.
g. The commissioner may issue a waiver for the use of ultra low sulfur diesel fuel where the department of education makes a written finding, which is approved, in writing, by the commissioner, that a sufficient quantity of ultra low sulfur diesel fuel, or diesel fuel that has a sulfur content of no more than thirty parts per million where a determination is in effect pursuant to subdivision f of this section, is not available to meet

the requirements of this section, provided that school buses, to the extent practicable, shall use whatever quantity of ultra low sulfur diesel fuel or diesel fuel that has a sulfur content of no more than thirty parts per million is available. Any waiver issued pursuant to this subdivision shall expire after two months, unless the city agency renews the finding, in writing, and the commissioner approves renewal, in writing.

h. The commissioner may issue a waiver for the use of the best available retrofit technology by a diesel fuel-powered school bus where the department of education makes a written finding, which is approved, in writing, by the commissioner, that such technology is unavailable for purchase for such bus, in which case the owner or operator of such school bus shall be required to use the technology for reducing the emission of pollutants that would be the next best best available retrofit technology and that is available for purchase for such bus. Any waiver issued pursuant to this subdivision shall expire after three years.

i. Subdivision c of this section shall not apply to a diesel-fuel powered school bus that is equipped with an engine certified to the applicable 2007 United States environmental protection agency standard for particulate matter as set forth in section 86.007-11 of title 40 of the code of federal regulations or to any subsequent United States environmental protection agency standard for such pollutant that is at least as stringent.

j. (1) Not later than January 1, 2007, and not later than January 1 of each year thereafter, the commissioner shall submit a report to the comptroller and the speaker of the council regarding, among other things, the use of ultra low sulfur diesel fuel and the use of the best available retrofit technology by school buses during the immediately preceding fiscal year. The information contained in this report shall also be included in the mayor's preliminary management report and the mayor's management report for the relevant fiscal year and shall include, but not be limited to: (i) the number of school buses used to fulfill the requirements of school bus contracts; (ii) the number of such buses that were powered by ultra low sulfur diesel fuel; (iii) the number of such buses that utilized the best available retrofit technology, including a breakdown by vehicle model, engine year and the type of technology used for each vehicle; (iv) the number of such buses that utilized other authorized technology in accordance with this section,

4

including a breakdown by vehicle model, engine age and the type of technology used for each vehicle; (v) the number of such buses that are equipped with an engine certified to the applicable United States environmental protection agency standard for particulate matter in accordance with subdivision i of this section; (vi) the school districts where such buses that were powered by ultra low sulfur diesel fuel, utilized the best available retrofit technology, utilized such other authorized technology in accordance with this section or were equipped with an engine certified to the applicable United States environmental protection agency standard for particulate matter were used; (vii) all waivers, findings and renewals of such findings issued pursuant to subdivision g of this section, which shall include, but not be limited to, for each waiver, the quantity of diesel fuel needed by the school bus owner or operator to power diesel fuel-powered school buses used to fulfill the requirements of a school bus contract; specific information concerning the availability of ultra low sulfur diesel fuel or diesel fuel that has a sulfur content of no more than thirty parts per million where a determination is in effect pursuant to subdivision f of this section; and detailed information concerning the school bus owner's or operator's efforts to obtain ultra low sulfur diesel fuel or diesel fuel that has a sulfur content of no more than thirty parts per million where a determination is in effect pursuant to subdivision f of this section; and (viii) all waivers issued pursuant to subdivision h of this section, which shall include, but not be limited to, all findings and specific information submitted by the department of education or a school bus owner or operator upon which such waivers are based and the type of other authorized technology utilized in accordance with this section in relation to each waiver, instead of the best available retrofit technology.

(2) Where a determination is in effect pursuant to subdivision f of this section,

information regarding diesel fuel that has a sulfur content of no more than thirty parts per million shall be reported wherever information is requested for ultra low sulfur diesel fuel pursuant to paragraph one of this subdivision.
k. This section shall not apply:
(1) where federal or state funding precludes the city from imposing the requirements of this section;
(2) to purchases that are emergency procurements pursuant to section three hundred fifteen of the New York city charter; or
(3) where federal or state law prohibits the application of the requirements of this section.
l. Any person who violates any provision of this section, except as provided in subdivision m of this section, shall be liable for a civil penalty of not less than one thousand dollars and not more than ten thousand dollars, in addition to twice the amount of money saved by such person for failure to comply with this section.
m. Where a person has been found to have made a false claim with respect to the provisions of this section, such person shall be liable for an additional civil penalty of twenty thousand dollars.
n. This section shall not apply to any school bus contract entered into or renewed prior to the effective date of this section.
o. Nothing in this section shall be construed to limit the authority of the department of education or of the city of New York to cancel or terminate a contract, deny or withdraw approval to perform a subcontract or provide supplies, issue a nonresponsibility finding, issue a non-responsiveness finding, deny a person or entity prequalification as a vendor, or otherwise deny a person or entity city business.
5
§ 2. Subparagraph (i) of paragraph 5 of subdivision b of section 24-178 of the administrative code of the city of New York is amended by inserting the following lines in the Table of Civil Penalties, immediately following the line regarding civil penalties for a violation of section 24-163.6 of this chapter:

24-163.7; plus twice the amount of money saved by the school bus owner or operator for failure to comply with such section; provided that such $1,000 - $10,000 penalty and additional penalty shall not apply to		
24-163.7(m)…….	*10,000*	*1,000*
24-163.7(m)…….	*20,000*	*20,000*

§ 3. If any section, subsection, sentence, clause, phrase or other portion of this local law is, for any reason, declared unconstitutional or invalid, in whole or in part, by any court of competent jurisdiction such portion shall be deemed severable, and such unconstitutionality or invalidity shall not affect the validity of the remaining portions of this law, which remaining portions shall continue in full force and effect.
§ 4. This local law shall take effect immediately.
THE CITY OF NEW YORK, OFFICE OF THE CITY CLERK, s.s.:
I hereby certify that the foregoing is a true copy of a local law of the City of New York, passed by the Council on April 20, 2005, and approved by the Mayor on May 9, 2005.
VICTOR L. ROBLES, City Clerk of the Council
CERTIFICATION PURSUANT TO MUNICIPAL HOME RULE LAW §27
Pursuant to the provisions of Municipal Home Rule Law §27, I hereby certify that the enclosed Local Law (Local Law 42 of 2005, Council Int. No. 428-A) contains the correct text and:
Received the following vote at the meeting of the New York City Council on April 20, 2005: 49 for, 0 against, 0 not voting.
Was signed by the Mayor on May 9, 2005.
Was returned to the City Clerk on May 11, 2005.
JEFFREY D. FRIEDLANDER, Acting Corporation Counsel

APPENDIX F

IMPLEMENTING RULES TO LOCAL LAW 42-2005

Chapter 26 of Title 15 of the Rules of the City of New York
Rules Concerning the Use of Ultra-Low Sulfur Diesel Fuel and Emissions Control Technology on Vehicles that Transport Children to and from School

Statement of Basis and Purpose

On May 11, 2005, Mayor Michael Bloomberg signed Local Law 42 for the year 2005. The law amended the Administrative Code of the City of New York in relation to the use of ultra low sulfur diesel fuel ("ULSDF") and the best available retrofit technology ("BART") by vehicles that transport children to and from school. The law requires that by September 1, 2006 all diesel fuel-powered school buses shall be powered by ULSDF. The law provides that the Commissioner shall make determinations, and shall publish a list of such determinations, as to the BART for reducing the emission of pollutants to be used for each type of diesel fuel-powered school bus affected by the law.

This rulemaking sets forth the initial determinations of the Commissioner as to what constitutes BART for the purposes of compliance with section 24-163.7 of the Administrative Code.

The Rules are authorized by section 1043 of the Charter of the City of New York and section 24-163.7 of the Administrative Code of the City of New York.

***
Chapter 26 of Title 15 of the Rules of the City of New York is enacted to read as follows:

Chapter 26
Rules Concerning the Use of Ultra-Low Sulfur Diesel Fuel and Emissions Control Technology on Vehicles that Transport Children to and from School

Subchapter
A General Provisions
B Use of Best Available Retrofit Technology and Ultra Low Sulfur Diesel Fuel

Subchapter A
General Provisions
§ 26-01 Definitions.

§ 26-01 Definitions.

"Best available retrofit technology" shall mean a technology, verified by the United States environmental protection agency or the California air resources board, for reducing the emission of pollutants that achieves reductions in particulate matter emissions at the highest classification level for diesel emission control strategies, as set forth in §26-04 of subchapter B of this chapter, that is applicable to the particular engine and application. Such technology shall also, at a reasonable cost, achieve the greatest reduction in emissions of nitrogen oxides at such particulate matter reduction level and shall in no event result in a net increase in the emissions of either particulate matter or nitrogen oxides.

"Commissioner" shall mean the Commissioner of the New York City Department of Environmental Protection or her designee.

"Department of education" shall mean the New York city department of education, formerly known as the New York city board of education, and any successor agency or entity thereto, the expenses of which are paid in whole or in part from the city treasury.

"Person" shall mean any natural person, partnership, firm, company, association, joint stock association, corporation or other legal entity.

"Reasonable cost" shall mean that such technology does not cost greater than thirty percent more than other technology applicable to the particular engine and application that falls within the same classification level for diesel emission control strategies, as set forth in §26-04 of subchapter B of this chapter, when considering the cost of the strategies, themselves, and the cost of installation.

"School bus" means any vehicle operated pursuant to a school bus contract, designed to transport ten or more children at one time, of the designation "Type C bus" or "Type D bus" as set forth in 17 NYCRR §§ 720.1 (Z) and (AA), and used to transport children to or from any school located in the city of New York, and excluding any vehicle utilized primarily to transport children with special educational needs who do not travel to and from school in vehicles used to transport general education students.

"School bus contract" shall mean any agreement between any person and the department of education to transport children on a school bus.

"Ultra low sulfur diesel fuel" shall mean diesel fuel that has a sulfur content of no more than fifteen parts per million.

Subchapter B
Use of Best Available Retrofit Technology and Ultra Low Sulfur Diesel Fuel

§ 26-02 Best Available Retrofit Technology Determination. Pursuant to section 24-163.7 of the Code, any diesel fuel-powered school bus used to transport children to and from school located in the City of New York shall utilize the Best Available Retrofit

Technology ("BART"), as defined in § 26-01 of subchapter A of this chapter. In making their selections, persons fulfilling school bus contracts are directed to consult the EPA and CARB verified lists at http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm and http://www.arb.ca.gov/diesel/verdev/background.htm.

The persons fulfilling school bus contracts shall select BART for their diesel fuel-powered school buses in accordance with §26-05 of this subchapter. Such persons shall notify the Department of their selections, and the Department shall make a determination as to whether the BART selected may be utilized for the vehicle, engine and application for which it was selected. The Department shall notify these persons of its determination.

§ 26-03 School Buses That Are Not Subject to BART.

(a) Any diesel fuel-powered school bus that is equipped with an engine certified to the applicable 2007 United States Environmental Protection Agency standard for particulate matter as set forth in section 86.007-11 of title 40 of the code of federal regulations or to any subsequent United States environmental protection agency standard for such pollutant that is at least as stringent, shall not be required to utilize the BART as defined in §26-01 of subchapter A of this chapter.

(b) Any best available retrofit technology, or substantially similar technology, purchased or installed in whole or in part with funds provided by the state of New York or the federal government pursuant to a specific diesel emissions reduction program in effect upon the date of enactment of this section, shall constitute the best available retrofit technology for a period of not less than three years from the date on which such equipment was installed.

§ 26-04 Classification Levels.

Level IV
A Closed Crankcase Filtration System in combination with any Diesel Particulate Filter (DPF) or other technology verified for a specific application from either the CARB or EPA verified lists that reduces particulate matter emissions by 85 percent or greater, or reduces engine emissions to less than or equal to 0.01 grams diesel particulate matter per brake horsepower-hour.

Level III
A Closed Crankcase Filtration System in combination with any DPF or Flow Through Filter or combination of technologies verified for a specific application from either the CARB or EPA verified lists that reduces diesel particulate matter emissions by between 50 and 84 percent.

Level II
A Closed Crankcase Filtration System in combination with any DOC or Flow Through Filter or other technology verified for a specific application from either the CARB or EPA verified lists that reduces diesel particulate matter emissions by between 25 and 49 percent.

Level I
A Closed Crankcase Filtration System in combination with any DOC or emulsified diesel fuel or Flow Through Filter or other technology verified for a specific application from either the CARB or EPA verified lists that reduces diesel particulate matter emissions by between 20 and 24 percent.

§ 26-05 Selection Process.
(a) For each type of school bus subject to the BART requirement, the person fulfilling a school bus contract must identify, in list form, all types of pollution control technology devices verified for such type of school bus at classification Level IV.

(b) All types of pollution control technology devices identified by such person as classification Level IV devices that are not technologically feasible for use with respect to the particular vehicle, engine or application are to be eliminated from such list. The engine model year should be considered for BART selection among different DPFs as an active filter is necessary for pre-1994 engine model years. To eliminate all types of pollution control technology devices identified by such person at classification Level IV, or a specific type of pollution control technology, or a particular pollution control technology device, such person must demonstrate to the satisfaction of the Commissioner that operational constraints or physical, chemical or engineering principles preclude the successful and effective use of the school bus when used with such types of technology devices, or type of technology, or particular pollution control technology device.

(c) If, after the elimination process, no pollution control technology devices remain in classification Level IV from which such person can select a BART, the same identification and elimination process must be done for classification Level III. If, after the elimination process, no pollution control technology devices remain in classification Level III from which such person can select a BART, the same identification and elimination process must be done for classification Level II. If, after the elimination process, no pollution control technology devices remain in classification Level II from which such person can select a BART, the same identification and elimination process must be done for classification Level I.

(d) Once a level is selected as provided for in subdivisions (a), (b), and (c) of this section, an economic impact analysis is to be performed on the remaining technologies where the technology reduces both PM and nitrogen oxide (NOx). Such person shall select the technology achieving, at a reasonable cost, the greatest reduction in NOx emissions. If the NOx emission does not meet the reasonable cost test, the technology that achieves the greatest PM reduction from the other remaining technologies must be selected.

§ 26-06 Best Available Retrofit Technology Selection Applicability.

No person fulfilling a school bus contract shall be required to replace a selected BART within three years of having first utilized such technology. Furthermore, no person fulfilling a school bus contract shall be required to replace Level IV technology until it has reached the end of its useful life.

§ 26-07 Use of Ultra Low Sulfur Diesel Fuel.

All diesel fuel-powered school buses used to transport children to or from any school located in the City of New York must be powered by ultra low sulfur diesel fuel unless the Commissioner has issued a waiver pursuant to subdivision (g) of section 24-163.7 of the Code.

Subchapter C
Waiver Procedures

§ 26-08 Waiver for the Use of BART Based on Written Finding of Unavailability by Department of Education

(a) If the BART required for a school bus is unavailable, a person fulfilling a school bus contract may apply for a waiver for the use of BART. Such application must be based on a Written Finding of Unavailability by the Department of Education indicating that the BART for the subject school bus is unavailable for purchase. Such application shall also contain the following:
(1) The name of the person fulfilling the school bus contract who is applying for approval of the Written Finding of Unavailability;
(2) The name and identification number of the subject contract, if applicable;
(3) Identification of the school bus that is the subject of the Written Finding of Unavailability;
(4) Identification of the required BART;
(5) An explanation as to why the required BART is unavailable. Such explanation must include all documentation generated in the BART selection process described in this chapter;
(6) Identification of a technology for reducing the emission of pollutants, if any, that is available and appropriate for such vehicle, which may include a technology that does not appear on the EPA or CARB verified lists, and that, if available and appropriate, will be used instead of the BART.
(7) The name and contact number of the applicant.

(b) Applications should be sent to:
Director of the Division of Air and Noise Programs, Enforcement and Policy
Bureau of Environmental Compliance
New York City Department of Environmental Protection
59-17 Junction Blvd.
Flushing, NY 11373

(c) The Commissioner will make a determination whether to approve the Written Finding of Unavailability no later than thirty days after receipt of the application.

(d) Waivers are effective for three years. Any application for renewal shall be submitted no later than thirty days prior to the expiration date of the waiver.

(e) Contractors shall maintain records that include the installation date of the BART as well as the engine model year and engine manufacturer.

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