



North Carolina Department of Environment and Natural Resources

Beverly Eaves Perdue  
Governor

Dee Freeman  
Secretary

**MEMORANDUM**

TO: ENVIRONMENTAL REVIEW COMMISSION  
The Honorable David Rouzer, Chair  
The Honorable Mitch Gillespie, Co-Chair  
The Honorable Ruth Samuelson, Co-Chair

FROM: Kari Barsness *KKB*  
Director of Legislative and Intergovernmental Affairs

SUBJECT: Implementation of "School Bus Retrofits in Nonattainment Areas" Report

DATE: Oct 1, 2012

Pursuant to Session Law 2007-465, the Department of Environment and Natural Resources shall submit to the Environmental Review Commission a report on the School Bus Retrofits in Nonattainment Areas pilot project each year. Please consider the Implementation of the "School Bus Retrofits in Nonattainment Areas" attached as the formal submission of this report.

If you have any questions or need additional information, please contact me at (919) 707-8618 or at [Kari.Barsness@ncdenr.gov](mailto:Kari.Barsness@ncdenr.gov).

cc: Robin Smith, Assistant Secretary of Environment  
Sheila Holman, Director, Division of Air Quality  
Kristin Walker, Fiscal Research Division  
Lanier McRee, Fiscal Research Division  
Mariah Matheson, Research Division

**Implementation of  
“School Bus Retrofits in Nonattainment Areas”**

**A Report to the  
Environmental Review Commission,  
Department of Public Instruction, and  
Department of Transportation**

**Submitted by the  
Department of Environment and Natural Resources**

**This report is submitted pursuant to the requirement of Section 4(b) of Session Law 2007-465,  
House Bill 1912, enacted July 28, 2007.**

**Dee Freeman, Secretary  
Department of Environment and Natural Resources**

**Sept. 15, 2012**



## **I. Annual Report on the School Bus Retrofit Pilot Project**

The 2007 General Assembly established a pilot program to provide funds for local school administrative units to retrofit school buses in order to reduce emissions from certain diesel school buses registered in counties designated as nonattainment or maintenance for ozone or particulate matter. The legislation requires the Department of Environment and Natural Resources to submit a status report to the Department of Public Instruction (DPI), the N.C. Department of Transportation (NC DOT), and the Environmental Review Commission on the pilot program provided for in this act.

Specifically, Session Law 2007-465 requires:

**“SECTION 4.(b) Annual Report Required.** – On or before 1 September 2008, and again on or before 1 September 2009, the Department of Environment and Natural Resources shall submit a report to the Department of Public Instruction, the Department of Transportation, and the Environmental Review Commission on the pilot program under this act. This report shall include the information submitted under subsection (a) of this section and shall also include:

- (1) The total number of school buses that have the retrofit technology installed and operational under this pilot program, including a breakdown by location, vehicle model year, engine year, and the type of verified diesel emission control device used for each school bus.
- (2) The anticipated emissions reductions based on the emissions certification of the verified diesel emission control devices used and the annual miles the school buses are expected to drive.
- (3) Any recommendations to further reduce diesel emissions from school buses and whether the program to retrofit certain school buses registered in a county that is located in an area that is designated by the United States Environmental Protection Agency as nonattainment or maintenance for ozone or particulate matter is accomplishing its purpose to reduce diesel emissions, improve air quality, and protect students' health.
- (4) The feasibility and the cost of expanding the funding for this pilot program for all eligible school buses for local school administrative units in counties that are located in an area that is designated by the United States Environmental Protection Agency as nonattainment or maintenance for ozone or particulate matter.
- (5) The feasibility and the cost of expanding this pilot program statewide.”

Through coordination with DPI and NC DOT, the Department of Environment and Natural Resources, Division of Air Quality (Division) submits the following update on the pilot project.

***(1) The total number of school buses that have the retrofit technology installed and operational under this pilot program, including a breakdown by location, vehicle model year, engine year, and the type of verified diesel emission control device used for each school bus.***

Franklin and Guilford counties both completed their retrofit projects using diesel particulate filters. The average model year of the buses retrofitted in both counties was 1999. Franklin County retrofitted a total of 26 buses, while Guilford County retrofitted 30. The total project cost for these conversions was \$416,454.13. Attached are the specific bus lists of retrofitted buses per county.

***(2) The anticipated emissions reductions based on the emissions certification of the verified diesel emission control devices used and the annual miles the school buses are expected to drive.***

Through this pilot project, school buses were retrofitted with diesel particulate filters (DPF) that reduce particulate matter emissions by approximately 85 percent from the tail pipe. These school buses were retrofitted with passive DPFs at a cost of approximately \$4,000 per unit installed. The average school bus in North Carolina uses 1,455 gallons of fuel per year, carries students 9,472 miles per year, and idles approximately 15 hours. Using this bus average and the average model year of 1999, it is expected that retrofitting the 56 buses targeted will reduce particulate matter emissions by 3.4 tons of particulate matter (PM), 7.2 tons of hydrocarbons (HC) and 51.8 tons of carbon monoxide (CO) over the remaining life of the buses.

***(3) Any recommendations to further reduce diesel emissions from school buses and whether the program to retrofit certain school buses registered in a county that is located in an area that is designated by the United States Environmental Protection Agency as nonattainment or maintenance for ozone or particulate matter is accomplishing its purpose to reduce diesel emissions, improve air quality, and protect students' health.***

A program to accelerate the retirement of older school buses with newer buses that come factory-installed with active DPF devices and require diesel exhaust fluid to control nitrogen oxides (NO<sub>x</sub>) would have a significant effect on air quality and children's health as well as improving fuel economy. Not only do these newer buses reduce particulate emissions but they also emit less NO<sub>x</sub>, which would help reduce the formation of ozone in these sensitive areas. Original equipment manufacturer (OEM) buses equipped with active DPFs also have fewer maintenance requirements and greater flexibility in route shifting compared to retrofitted DPF buses.

In July 2005, DPI implemented an anti-idling policy for school buses in North Carolina. DPI should continue to encourage bus drivers to reduce their idling time. Certainly with tight school district fuel budgets, it is in the best interests of school districts to conserve fuel through reduced idling.

***(4) The feasibility and the cost of expanding the funding for this pilot program for all eligible school buses for local school administrative units in counties that are located in an area that is designated by the United States Environmental Protection Agency as nonattainment or maintenance for ozone or particulate matter.***

Many of the school districts in the nonattainment and maintenance have been proactive in securing funding for the retrofit of school buses in their areas. Retrofits have been funded through the Toyota Supplemental Environmental Project, EPA's Clean School Bus Program and North Carolina's Mobile Source Emissions Reduction Grant Program. Most of the eligible school buses currently have some level of tailpipe emissions control, either through original equipment manufacturer (OEM) devices or those retrofitted through other funding opportunities.

***(5) The feasibility and the cost of expanding this pilot program statewide.***

With additional information garnered through other school bus retrofit projects, it is not recommended that the retrofit program be extended statewide. The bulk of the buses in North Carolina capable of being retrofitted with diesel oxidation catalysts have already been retrofitted or do not have enough years of remaining service to make the project cost effective. Level 2 controls have been decertified by CARB and school systems are leery of installing passive DPFs on their buses due to the constraints placed on the bus routes of retrofitted school buses. While spare filters and cleaning machines could alleviate some of these concerns, it is the opinion of the Division of Air Quality and the Department of Public Instruction that the early replacement of aging school buses with school buses that meet the 2010 heavy-duty truck and bus engine standards would be the best use of the state's funding. These 2010 engines not only reduce particulate matter by 97 percent but also NOx by 93 percent, hydrocarbons by 92 percent, and carbon monoxide by 55 percent. See the table below that compares the emission reduction with the retrofits vs. the early replacements.

	NOx (tons/life)	PM (tons/life)	HC (tons/life)	CO (tons/life)	Total Lifetime Emissions Reduction	Cost of Retrofit/ Incremental Cost of Replacement	Cost per Ton
Level 3 Retrofits		0.45	0.88	6.26	7.59	\$7,312	\$963
Early Replacement	17.278	1.03	2.004	8.468	28.78	\$5,100	\$177

\*Lifetime emissions are based on DPI retirement of buses after 20 years of service. With retrofits being completed in 2011 on an average MY 2000 bus, benefits will be realized for nine years. With a bus replacement, the benefits will continue for 20 years.

## **II. Recommendations for Expending Remaining Allocated and Congestion Mitigation and Air Quality Improvement Program (CMAQ) Funds**

Due to the difficulties in targeting buses to be retrofit with Level 1, 2 or 3 engine exhaust controls, the division and DPI plan to complete the pilot through “retrofits by replacement.” Based on the federal interpretation of the definition of retrofits, an engine replacement (or new school bus) is eligible for funding as the legislation is written. Making this change serves the intent of the pilot program (to reduce exposure to diesel exhaust on a sensitive population) and also allows DPI to purchase cleaner, more fuel-efficient vehicles that would not otherwise be possible with the current budgetary constraints.

NC DOT and the Federal Highway Administration (FHWA) have agreed that early replacement of school buses with cleaner buses is a CMAQ eligible project. Contracts are being processed that will allow DPI to purchase approximately 21 school buses that meet the 2010 heavy-duty truck and bus engine standards by the end of 2012. While funding should allow for placement of at least one school bus per eligible county, it is the recommendation of the Division that DPI use its best judgment to the placement of these buses.

DAQ and DPI are entering into a contract to use the remaining funding to purchase new school buses. It is expected that the buses will be ordered by the end of 2012 with delivery by June 30, 2013. Therefore, it is recommended that this report be considered the final one for this Session Law.