



# Healthy School Buses: Parent & Teacher Factsheet

## School Buses & Air Pollution

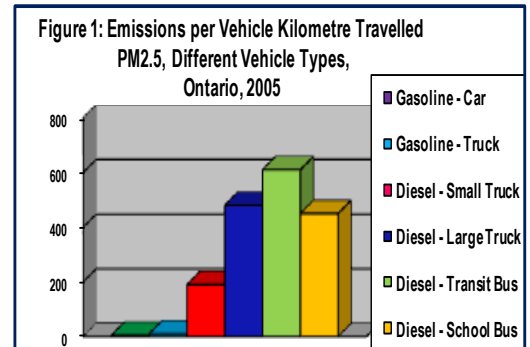
School buses are very safe vehicles. However, most are heavy-duty diesel vehicles that can emit substantial quantities of diesel-related air pollutants such as fine particulate matter (**PM<sub>2.5</sub>**), nitrogen oxides (**NO<sub>x</sub>**), and diesel particulate matter (**DPM**) as they travel to and from our children's schools.

Exposure studies have found that emissions from school bus tailpipes and engine compartments can contribute substantially to levels of air pollutants on-board school buses. Levels of air pollution on-board are also influenced by local air quality, traffic on the roads travelled, wind direction, the position of windows (i.e. open or closed), and idling and queuing patterns.

While children may spend only a few hours per day on school buses, the elevated levels of air pollution that can be encountered on-board can add considerably to their daily and annual exposures to PM<sub>2.5</sub> and DPM. This is a concern because children in many Ontario communities are already exposed to levels of air pollution that are harmful to their health. The Ontario Medical Association estimates that air pollution contributes to approximately 1,829 premature deaths, 16,907 hospital admissions, and 59,696 emergency room visits in Ontario each year.

PM<sub>2.5</sub> and DPM have been clearly associated with a broad spectrum of acute and chronic health impacts. They have been found to:

- ❖ Reduce lung function and aggravate and induce allergies
- ❖ Aggravate asthma, leading to more frequent and more severe asthma attacks
- ❖ Increase the number of respiratory infections and school and work day absences
- ❖ Increase emergency room visits, hospital admissions and premature deaths
- ❖ Contribute to chronic heart and lung diseases including lung cancer and asthma.



## Children are Sensitive to Air Pollution

With approximately 800,000 Ontario children being transported on school buses each year, school bus exposures represent a significant public health concern. The respiratory systems of children are sensitive to air pollution, and children with pre-existing respiratory conditions such as asthma are

particularly vulnerable. Childhood exposures also influence health in later life. A small shift in the average lung function of a group of children today can translate into a substantial increase in the number of adults who are susceptible to chronic respiratory diseases such as lung cancer later in life.

## Reducing Childhood Exposures

Exposures studies have found that exposures on-board school buses can be significantly reduced, even under idling conditions, by retrofitting: school bus tailpipes with emission control devices; and school bus engines with Closed Crankcase Ventilation devices (**CCVs**). These studies also suggest that on-board exposures can be reduced by keeping doors and windows closed when buses are idling, avoiding idling when buses are waiting in front of schools, and avoiding caravanning on roadways.

## New Buses are Healthier Buses

As can be seen by Table 1, emissions from school buses have declined significantly over the last 20 years as new fuel and engine emission standards have been developed and rolled out in Canada. With buses built to 2007 emission standards, it is expected that levels of air pollutants on-board approach levels in ambient air. These buses, which are outfitted with emission control devices and CCVs, are not be self-polluting. This is great news for children’s health and for local air quality. However, for older school buses, concerns remain for on-board exposures and local air quality.

Table 1: Emissions from School Buses by Model Year in Canada			
Model Years	Emissions (g/brake horse power hour <sup>0</sup> )		
	PM	HC	NO <sub>x</sub>
<1991	0.60	1.3	6
1991-93	0.25	1.3	5
1994-03	0.10	1.3	4
2004-06	0.10	0.14	2.25
2007-09	0.01	0.14	1.2
2010	0.01	0.14	0.2

## Reducing Emissions & On-Board Exposures

Student Transportation Boards in Ontario can adopt a number of policies to reduce emissions and exposures associated with pre-2007 model year school buses. They can:

1. Encourage the replacement of buses built before 1994
2. Limit the use of older school buses (i.e. greater than 12 years old)
3. Encourage the assignment of routes with an awareness for emissions
4. Require Driver Training using Natural Resources Canada’s SmartDriver Program
5. Encourage retrofitting with Auxillary Heaters in colder areas of the province
6. Encourage retrofits for pre-2007 engines with Closed Crankcase Ventilation Devices (CCV)
7. Encourage retrofits for pre-2005 buses with Diesel Oxidation Catalysts (DOCs)
8. Encourage retrofits for pre-2007 buses with Flow Through Filters (FTFs)
9. Encourage the use of biodiesel where it is available
10. Encourage the installation of air purifiers with HEPA filters.

For more information, see the report at

<http://healthyandsustainable.files.wordpress.com/2011/09/school-bus-final-oct-1.pdf>

<http://www.cleanairpartnership.org/Schoolbus>

