

Manson School District Pilot Project

Installation of School Bus Idle Reduction Technologies

"Diesel engines emit a complex mixture of gaseous pollutants and fine particles that include over forty cancer causing substances. Diesel particulates account for more than 80 percent of the associated cancer risk from air toxics in Washington. Breathing diesel exhaust is responsible for an increase in cases of asthma, emergency room visits, and increased cancer risk over a lifetime. Children are more sensitive to pollutants in diesel exhaust than adults because children breathe more air relative to their body weight and because their lungs are not fully developed."

The Department of Ecology partnered with Manson School District to eliminate idle emissions from their school buses during the loading and unloading at Manson. This was of great value not only to the children waiting to enter and exit the buses but to the faculty within the building.

Manson has a roof structure that provides protection during inclement weather during school bus loading and unloading. This design also has the building fresh air intake under the same roof. In inclement weather school buses have to operate the bus engine to keep cabin heaters operating. This action leads to school bus exhaust entering the buildings fresh air intake.

The partnership sought out a device that does not use the vehicles fuel as a means to provide heat. School buses have a large cabin area to heat. The partnership wanted to use the vehicles heating/ventilation ductwork to distribute conditioned (heated or ventilation) air as designed by the factory.

The purpose of the pilot project was to purchase twelve (12) Alternative Heating / Ventilation Devices for installation on twelve (12) school buses located at the Manson School District in Manson, Washington. The partnership desired the following specifications to be met:

- The device will not interfere with normal school bus operation or maintenance
- Operates on vehicle battery voltage (school bus electrical system)
- Uses energy from the vehicles cooling system
- Has a manual and automatic switch for unit operation
- Has a method to circulate hot coolant from the vehicles cooling system through the vehicles heat exchanger
- Allows the vehicles ventilation/heater fan to operate independently from the vehicles control panel during unit operation
- The system MUST have protective sensors that:
 - Limit excessive amperage draw
 - Limit battery drain that could prevent a no-start condition
- Provide constant heat for at least one hour (2 to 3 preferred)
- Must have a meter to show actual unit operation time with vehicle engine off
- Installation MUST be easy using common tools in school bus maintenance
- Provide direct technician assistance to Manson School District technicians for installation and operational issues

- One (1) year parts & workmanship of device required (more than one (1) year will be a points bonus)

| Estimate of Annual Emissions Benefits for Installation of Idle Reduction Technology on Manson School District School Buses | | | | | | | | | | | | |
|--|------------|----------|--------------------------|--------|-------|----------|---------------|----------------------------|------|-------|------|--|
| Veh ID | Veh Type | Veh Year | Emissions Factors (g/hr) | | | | Activity Data | Emissions Reduced (lbs/yr) | | | | |
| | | | CO | HC | PM2.5 | PM10 | Hrs/Yr | CO | HC | PM2.5 | PM10 | |
| 1 | School Bus | 1990 | 42.634 | 7.906 | 3.957 | 4.301 | 161 | 15.1 | 2.8 | 1.4 | 1.5 | |
| 2 | School Bus | 2000 | 22.567 | 5.167 | 0.351 | 0.381 | 191 | 9.5 | 2.2 | 0.1 | 0.2 | |
| 5 | School Bus | 2005 | 21.474 | 2.875 | 0.351 | 0.381 | 161 | 7.6 | 1.0 | 0.1 | 0.1 | |
| 6 | School Bus | 1985 | 74.158 | 10.078 | 7.247 | 7.877 | 34 | 5.6 | 0.8 | 0.5 | 0.6 | |
| 7 | School Bus | 1999 | 22.786 | 5.183 | 0.351 | 0.381 | 179 | 9.0 | 2.0 | 0.1 | 0.2 | |
| 8 | School Bus | 1988 | 45.003 | 10.123 | 5.102 | 5.545 | 55 | 5.5 | 1.2 | 0.6 | 0.7 | |
| 9 | School Bus | 1990 | 42.634 | 7.906 | 3.957 | 4.301 | 153 | 14.4 | 2.7 | 1.3 | 1.5 | |
| 10 | School Bus | 1996 | 23.442 | 5.232 | 0.351 | 0.381 | 194 | 10.0 | 2.2 | 0.2 | 0.2 | |
| 11 | School Bus | 2008 | 2.437 | 2.195 | 0.055 | 0.060 | 149 | 0.8 | 0.7 | 0.0 | 0.0 | |
| 14 | School Bus | 1998 | 23.005 | 5.199 | 0.351 | 0.381 | 188 | 9.5 | 2.2 | 0.1 | 0.2 | |
| 15 | School Bus | 2004 | 21.693 | 2.892 | 0.351 | 0.381 | 120 | 5.7 | 0.8 | 0.1 | 0.1 | |
| Total | | | | | | | 1585.0 | 92.8 | 18.6 | 4.7 | 5.1 | |
| <i>Grams to pounds conversion (1 gr = 2.205 X 10⁻³ lbs):</i> | | | | | | | | | | | | |
| <i>conversion factor =</i> | | | | | | 0.002205 | | | | | | |

Benefits to this project include an estimation that the Idle reduction technology will annually conserve 3,035 gallons of fuel with an annual estimated cost savings of \$12,442 to \$15,780 and a payback period of 1.5 to 1.9 years.

Reports received from Manson during the months of September–December 2008 show actual fuel savings of 870.25 gallons.

Additional benefits are reflected in the following comments received by Manson staff:

