



Diesel Engine Retrofits

[UNLEASHING THE POWER OF GREEN]

Making the smart retrofit choice



Diesel engine retrofits produce better air quality, as this handkerchief test illustrates.

Level 3 technology example: diesel particulate filter (DPF)

A diesel particulate filter or DPF is a ceramic device that collects the particulate matter in the exhaust stream. The high temperature of the exhaust heats the ceramic structure and allows the particles inside to break down or oxidize into less harmful components. DPF's work best on engines built after 1995 and like DOC's, DPF's last seven to fifteen years.

The average cost of a DPF for a school bus is estimated between \$5,000 and \$10,000. The specific cost is determined by certain criterion including the bus engine and exhaust temperatures. Installation takes an estimated six to eight hours. Although DPFs require cleaning every 100,000 miles, their warranty generally exceeds their lifetime.

Level 2 technology example: flow-through or partial filter

A flow-through or partial filter is another air pollution control device. This is a relatively new technology which uses a two stage metallic filter to trap and reduce diesel particulate matter. This technology works best on 1991-2002 engines and can operate at a lower temperature range than the higher grade DPF providing a more diverse vehicle application range. Little maintenance with no ash cleaning is required. Prices range from about \$5,000 to \$6,000 and come with a lifetime warranty which generally lasts from seven to fifteen years.

Three Levels of Retrofit Technology - Fast Facts

Level 3

- Overall pollution reduction of 60-90%
- Reduces elemental carbon up to 90%
- Lasts roughly seven-to-fifteen years
- Cost ranges from \$5,000 to \$10,000
- Six-to-eight hours are required to install
- Greater contribution towards a healthier air quality for the entire community
- Factory installed on 2007 vehicles
- Works on 1995-2006 engines

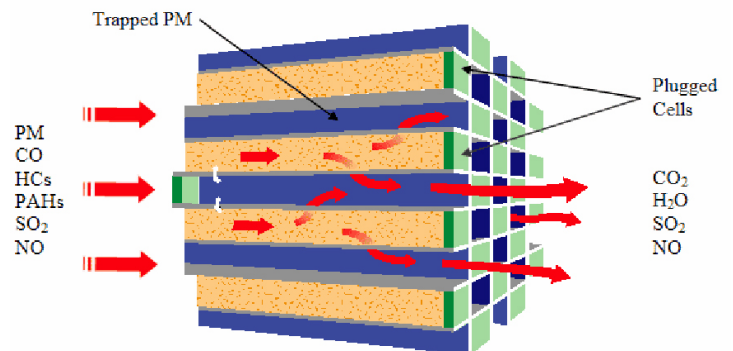
Level 2

- Overall pollution reduction of 50-75%
- Lasts roughly seven-to-fifteen years
- Cost ranges from \$5,000 to \$6,000
- Easy maintenance cleaning
- Works best on 1991-2002 engines

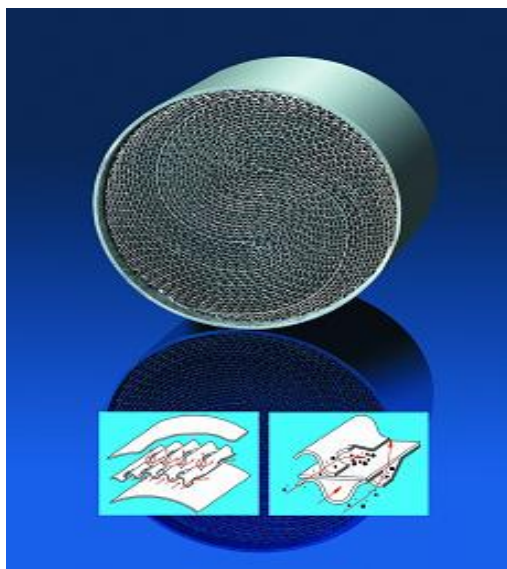
Level 1

- Overall pollution reduction of about 20-50%
- Lasts roughly seven-to-fifteen years
- 100,000 to 150,000 mile warranty
- Cost ranges from \$1,000 to \$2,000
- One-to-three hours are required to install

Diesel Particulate Filter



Reducing emissions: the bottom line



Level II Emissions Control Technology

Level I technology example: diesel oxidation catalysts

A diesel oxidation catalyst or DOC is a device that uses a chemical process to break down pollutants in the exhaust stream into less harmful components. The physical device has a porous ceramic honeycomb-like structure that is coated with a material that catalyzes a chemical reaction to reduce pollution on a variety of diesel vehicles including trucks, buses, and construction equipment.

DOC's generally come with a 100,000-to-150,000 mile warranty and can last seven-to-fifteen years. Once the catalyst is installed, it rarely requires maintenance. The average cost of a DOC for a school bus is roughly \$1,000 to \$2,000. Installation takes an estimated one-to-three hours.



Diesel Oxidation Catalyst

For more information on diesel clean-up options, please visit www.theOEC.org or contact the OEC at air@theOEC.org or (614) 487-7506.

Retrofit technology summary

DOCs may cost less than DPFs and have the same rugged durability; however the emission reduction is not nearly as effective. DOC's reduce emissions of particulate matter by about 20 percent, hydrocarbons by 50 percent and carbon monoxide by 40 percent. On the other hand, DPF's result in a much greater emission reduction with particulate matter, elemental carbon, hydrocarbons and carbon monoxide all reduced by 60-to-90%.

The midrange cost and over 50% pollution reduction make the level two technology an attractive choice. However, when the pollution reduction and cost effectiveness for each pollution control device are measured against one another, the DPF remains the best choice.

The higher cost of the DPF can pay off as a higher percentage of air quality is improved, non-attainment counties regain healthy status and economic investors are more willing to invest in cleaner communities. The health impacts of cleaner air are enumerable. Through the emissions controls of the DPF's, we now have the opportunity to create a cleaner air present and future.



Emission controls such as DPF's will help school children breathe cleaner air, and help prevent asthma, allergies, and chronic bronchitis.