

Clean Diesel Technology for County Operations



**Green
Government**

An initiative of the National Association of Counties



● Introduction

Diesel is inherently 20% to 40 % more efficient than comparable gasoline vehicles. Due to its durability, versatility and power, diesel is used in trucks, trains, boats and barges that move nearly 94% of goods in the U.S. Diesel powers nearly all the heavy construction equipment that builds our roads, bridges, homes and schools, two-thirds of all agricultural equipment, and virtually 100% of all marine, locomotive and emergency vehicles. Highway and street maintenance vehicles, delivery trucks, bucket trucks, fire and rescue equipment and construction machines like backhoes and loaders are all types of diesel equipment and vehicles likely to be found in county government fleets.

Among the biggest concerns for diesel use is the level of particulate matter and nitrogen oxide emissions. In October 2006, ultra-low-sulfur diesel fuel, containing 97% less sulfur, became the nation's standard for vehicles. In 2007, even more stringent emissions standards for heavy-duty vehicle engines with advanced pollution-control technology using ultra-low-sulfur diesel fuel will result in trucks and buses that are up to 95% cleaner than previous models.

Although it will be years before entire fleets are replaced with newer clean diesel models, many of these technologies can currently be applied to older vehicles and equipment. Several studies have found diesel retrofits to be among the most cost effective options for improving air quality. For some coun-

ties this can mean the difference between attainment and nonattainment designations for National Ambient Air Quality Standards and may be the quickest way to reduce emissions and achieve attainment status.

● How it Works

Newer clean diesel systems combine cleaner diesel fuel, advanced engines and effective exhaust-control technology. Emissions from older diesel vehicles and equipment can be reduced through one of the "5 Rs" of retrofit. These include:

1. Replacing older vehicles with diesel hybrids or ones powered by natural gas;
2. Retrofitting existing vehicles with the addition of new exhaust gas filter technology such as diesel oxidation catalysts (DOC) and diesel particulate filters (DPF) that can reduce emissions between 25% and 90%;

3. Repowering vehicles with more advanced engines or rebuilding existing engines to reduce emissions to maximize the investment value in the vehicle;
4. Refueling the vehicle with biodiesel or other renewable diesel fuels; and/or
5. Rebuilding core engine components to manufacturers' original specifications to improve emissions levels.

Case Study:

King County, Washington

In early 2007, King County announced a new partnership to bring about two million gallons of biodiesel to the area. The biodiesel, made from canola grown on Yakima County farms and fertilized with biosolids from King County's two wastewater treatment plants, will help power metro transit buses for nearly a year.

In 2003, the county partnered with Natural Selection Farms to determine how the biosolids produced at the treatment plants could help make biodiesel. Natural Selection Farms has since built a seed-crushing facility to make canola oil for shipment back to Seattle, where it will be further processed into biodiesel.

The biofuel will be enough to run all Metro diesel-powered buses on a 20% mix of biodiesel and ultra-low sulfur diesel for nearly a year. Metro expects to pay about \$2.30 per gallon for initial shipments of the fuel containing the canola, about six cents per gallon more than it currently pays for soy-based biodiesel.

This new effort is expected to remove about 22,000 tons of carbon dioxide emissions in one year. That is the equivalent of removing 2,800 vehicles from the county's roads.



The "5 Rs" of retrofit

In the case of retrofitting – DOCs promote a chemical reaction that oxidizes pollutants into water vapor and other gasses and can reduce particulate emissions by some 20% to 30%. DPFs physically trap particulate matter as exhaust gasses move through the filter and can reduce particulate matter emissions by up to 90%.

If your county opts to refuel its vehicles with biodiesel or other renewable diesel fuels, this can also reduce particulate matter emissions and petroleum consumption. Biodiesel fuels are derived from a variety of biomass sources, although the most common in the U.S. is soybean oil. These fuels are often blended with conventional diesel fuel at which point it is designated as Bxx, where xx represents the percentage of pure biodiesel contained in the blend (e.g. B5 or B20). A blend of 20% biodiesel (B20) can reduce carbon dioxide emissions by 15%.

● Get Started!

In selecting the right option for your county, consider the condition of your current county vehicles and equipment. What value remains? Is it more economical to upgrade existing technology or to acquire new vehicles and equipment? What are the emissions benefits for each fuel and technology under consideration?

● Funding

In 2005, Congress created the Diesel Emissions Reduction Program which is administered by the U.S. Environmental Protection Agency. Funding is distributed through re-

gional collaboratives to reduce diesel emissions. To access your county's regional diesel collaborative visit: www.epa.gov/cleandiesel.

Diesel retrofits can also be funded through the Congestion Mitigation and Air Quality Program, which is administered through each state's Department of Transportation and Metropolitan Planning Organizations.

Many states also have their own emissions reduction programs. Most notable are the:

- Carl Moyer Program in California which provides monetary grants to private companies and public agencies to clean up their heavy-duty engines beyond that required by law (for more information visit: www.arb.ca.gov/msprog/moyer/moyer.htm);
- Texas Emissions Reduction Incentives Program which provides grants to eligible projects in nonattainment areas and affected counties (for more information visit: www.tceq.state.tx.us/implementation/air/terp/erig.html); and
- Mobile Source Emissions Reduction Program in North Carolina which works to help achieve emissions reductions from on- and off- road mobile sources (for more information visit: http://daq.state.nc.us/motor/ms_grants/).

Other states are developing similar programs and/or offer incentives, including Ohio, Oregon, and Washington.

● Conclusion

Diesel-engine retrofits, use of cleaner fuels, and anti-idling efforts can help reduce diesel emissions and reduce asthma and other respiratory symptoms. Advances in clean diesel technology will increase in the coming years. New diesel passenger cars will be introduced in 2008 and 2009 which meet the same emissions regulations as gasoline vehicles. Progress made in reducing emissions from diesel engines means that by 2010, new engines will be at or near the levels of emissions of alternative fueled vehicles. For off-road construction equipment, significant emissions reductions will be phased in between 2008 and 2014. New regulations on marine and locomotive emissions will also be developed.

Research and development in the renewable fuels arena will also continue. For the growing area of biodiesel production, the National Biodiesel Board is working with engine and vehicle manufacturers to create a B20 fuel blend specification to help promote and ensure more standard, high quality blends.

Case Study: Butte County, California

The Butte County Air Quality Management District (BCAQMD) has participated in the Carl Moyer Program for the past eight years. In California, the Carl Moyer Program provides monetary grants to private companies and public agencies to clean up their heavy-duty engines beyond standards required by law through retrofitting, repowering or replacing their engines with newer and cleaner ones. The Butte County area does not meet the state or federal ambient air-quality standards for ozone, or the state standards for fine particulate matter.

Through their participation in the program, the district has funded over 100 clean air projects with approximately \$934,000 of state funds and \$32,565 in local funds. The district has primarily funded stationary and portable agricultural-irrigation diesel engines with cleaner burning diesel engines or electric motors. The district average cost effectiveness (cost of project divided by tons of emissions reduced) in the past several years has been between \$2,000 and \$3,000.

● Additional Resources

● Diesel Technology Forum: Retrofit Tool Kit

www.dieselforum.org/retrofit

This tool kit, provided by the Diesel Technology Forum, is designed to assist transportation and air-quality officials in starting a retrofit program. The kit includes success stories, funding options, and information for State Implementation Plans.

● National Biodiesel Board

www.nbb.org

The National Biodiesel Board is the national trade association representing the biodiesel industry as the coordinating body for research and development in the United States.

● Manufactures of Emission Controls Association

www.meca.org

The Manufactures of Emission Controls Association is a non-profit organization seeking to provide technical information on emission control technology, thereby facilitating the establishment of strong and effective state, federal, and international air quality programs that promote public health, environmental quality, and industrial progress.

● USEPA Voluntary Diesel Retrofit Program

www.epa.gov/otaq/retrofit/overview.htm

This USEPA site was specifically designed to assist owners and operators of fleets and state and local government air-quality officials in understanding diesel retrofits and creating effective programs.

Case Study: Dane County, Wisconsin

Dane County school districts and bus companies using cleaner biodiesel fuel will benefit from a first-of-a kind reimbursement program funded by the Dane County Clean Air Coalition and the Wisconsin Soybean Program. The program will reimburse school districts the cost difference between biodiesel and standard diesel fuel.

While historically biodiesel has been more expensive than conventional diesel fuel, the current price of biodiesel is the same as or even slightly cheaper than conventional diesel. During periods when the cost of biodiesel is less expensive, the purchase incentive fund will act as an insurance policy protecting school districts and bus companies from price increases.

The Dane County Clean Air Coalition contribution of \$50,000 and the Wisconsin Soybean Program contribution of \$15,000 to the biodiesel purchase incentive fund will be available for the upcoming 2007-08 school year.

Founding member companies of the NACo Green Government Initiative can provide research, facts, and best practices on the use of clean diesel technology. Contact any of the following companies to learn more:

● Diesel Technology Forum

The Diesel Technology Forum (DTF) is a non-profit organization dedicated to raising awareness about the progress and potential of diesel technology in all applications. DTF can provide additional information on clean diesel technology, retrofit options and available sources of funding. For more information visit www.dieselforum.org or contact Dawn Fenton at 301.668.7230.

● Siemens

Siemens recognizes that high performance buildings make for high performance business. Energy is the lifeline of your facility — Energy is vital to your business. From energy procurement to efficient system design and installation, from energy generation to comprehensive auditing and performance reporting — Siemens has the answers. Their innovative energy solutions also are designed with environmental and community responsibility in mind. Today's business and government leaders need a strategic partner and plan to ensure a consis-

tent, efficient, affordable and clean energy foundation. And Siemens strategic energy environmental solutions can help you manage your facility's energy needs throughout a building's life-cycle. For more information contact Chuck Hall at 847.941.5772 or chuck.hall@siemens.com.

● Wal-Mart

Wal-Mart is doing its part to live up to its environmental sustainability goals and to strive to reach its potential. We truly believe that corporations can develop and implement practices that are good for the environment and good for business. We have one of the largest private truck fleets in the United States. At today's prices, if we improve our fleet fuel mileage by just one mile per gallon, we can save over \$52 million per year. We are increasing our fleet efficiency by 25 % over the next three years and will double it within ten years. In addition, we have had hybrid vehicles in our corporate fleet since June of 2003. Hybrid vehicles dramatically reduce gasoline consumption and are environmentally-friendly alternatives to traditional automobiles. We currently have more than 300 hybrid vehicles and will be purchasing 150 additional hybrids every year. For more information, please visit www.walmartfacts.com or contact Amy Hill at amy.hill@wal-mart.com or 775.322.4476.



Visit www.greencounties.org

About the NACo Green Government Initiative

The NACo Green Government Initiative serves as a catalyst between local governments and the private sector to facilitate green government practices, products and policies that result in financial and environmental savings. Launched in 2007, the Initiative provides comprehensive resources for local governments on all things green, including energy, green building, air quality, transportation, water quality, land use, purchasing and recycling.

For more information contact Kelly Zonderwyk, NACo Senior Community Services Associate, at 202.942.4224 or kzonderwyk@naco.org.

