Summary of the Mid-Atlantic Diesel Collaborative's
Diesel Emissions Workshop

August 21-22, 2006
Philadelphia, PA

Overview of Diesel Emissions in the Mid-Atlantic Region, Bill Gillespie, MARAMA

Emission inventory data indicates that on-road and non-road diesel emissions in the Mid-Atlantic Region are highest in populated, urban areas. Diesel emissions often occur in areas where people live, work and play.

Counties with high on-road and non-road diesel emissions are in many cases counties that do not attain the annual $PM_{2.5}$ standard.

Technical studies and air monitoring data indicate that exposure to fine particles ($PM_{2.5}$), elemental carbon, air toxics and other air pollutants is associated with proximity to roadways and mobile source emissions. Diesel emissions are part of the mobile source mix.

Diesel Emissions, Toxics, and Health Implications, Maria Costantini, Health Effects Institute

Diesel emissions are complex. They contain thousands of species and their composition depends on fuel, vehicle, driving patterns, etc.

Diesel emission components of concern are:

- Particulate matter (fine and ultrafine) and its constituents:
  - Carbon core (black/elemental carbon)
  - Polycyclic Aromatic Hydrocarbons (PAHs)
  - Metallic ashes
- Gases
  - NO_2
  - Air toxics (PAHs, VOCs, aldehydes etc.)

Other combustion sources emit components found in diesel exhaust so assessing exposure to diesel exhaust is difficult.

Health risks associated with diesel exhaust include cancer, asthma, and heart disease.

New, “cleaner” diesel engines equipped with oxidation catalysts, particulate filters, exhaust gas recirculation, selective catalytic reduction and other emission controls may increase NO_2 emissions or form some new pollutant species. Emissions from new diesel engines need to be studied.

Over the short-term, health effects studies will focus on exposure to diesel exhaust in traffic, near traffic, and in occupational settings. Acute and long-term exposure effects will also be studied.

Guidance for Quantifying & Using Emission Reduction, Kelly Sheckler, EPA Region 3

Emission calculation tools are needed to estimate diesel emissions for: SIPS, emission inventories, transportation conformity analyses, grant applications, trends analyses, reports to Congress, CMAQ Eligibility determinations, etc.

EPA and other organizations have developed a host of tools to estimate diesel emissions and diesel emission reductions. Many of these tools are available over the web as are guidance documents and other materials. The major tool for evaluating emission reductions from diesel retrofit projects for SIP and conformity purposes is the National Mobile Inventory Model (NMIM). See: http://www.epa.gov/otaq/nmim.htm. EPA’s SmartWay web site provides emission estimating tools for many applications including: truck stop electrification, fuel saving technologies, locomotives, exhaust and crankcase emissions, and more.

Truck Stop Electrification (TSE) and Other Freight Efforts - How we Quantify Benefits, Kevin Black, Federal Highway Administration (FHWA)

A significant number of trucks are “pass through” trucks (trucks that are not registered in the state where they operate). FHWA is studying truck activity with the Freight Analysis Framework Program.

Trans-border issues involving vehicles from Canada and Mexico continue to be an issue in estimating diesel emissions.

The new PM and ozone standards, mobile source air toxics, and greenhouse gas emissions are likely to be issues in calculating future diesel emissions.

Heavy duty diesel vehicles are very fuel/energy efficient compared to other fuels (biodiesel and CNG). So they are favored from an energy efficiency and greenhouse gas perspective.

TSE and CMAQ Eligibility, Howard Simon, Maryland Department of Transportation (MDOT)

Truck Stop Electrification allows truckers to shut down their engine and obtain electric power and "creature comforts" while resting. IdleAire truck stops provide: electricity (110V AC), cab heating/cooling, television and movies, telephone and Internet access. IdleAire has 44 locations nationally, two in Maryland.

Truckers can save about $1.13 per hour by pulling into an IdleAire truck stop rather than idling their engine.

TSEs reduce diesel emissions and reduce noise and wear and tear on the truck engine.

Maryland DOT estimated the emission reductions from IdleAire truck stops in Maryland by making the following calculation.

Emission Reduction = Hours per day x Space Utilization Rate x Number of Spaces x Emission Factor

For NO_X, the emission reduction for 192 spaces was 0.40 tons/day.

Mr. Simons said credits generated from TSE are good for conformity purposes, but are not recommended for inclusion in a SIP.

The SmartWay Calculator, Arleen Shulman, Pennsylvania Department of Environmental Protection (DEP)

Pennsylvania has many programs designed to improve energy efficiency and many of these programs can be used to reduce diesel emissions.

Ms. Shulman gave a practical demonstration of the SmartWay Calculator and how it can be applied to "real-life" truck fleet. In this example, the calculator showed that a fleet of 250 trucks could achieve a net savings of $354,000 per year by installing bunk heaters at commercial interest rates. Ms. Shulman gave other examples of the savings that accrue from the use of SmartWay technologies.

Opportunities for Quantifying Retrofit Emission Reductions for SIPs and Conformity, Gary Dolce, EPA OTAQ

There are several tools or methods for quantifying emission reductions from retrofit projects and truck stop electrification. Before doing any retrofit project or long-duration idling reduction project for which you want to take credit in a SIP or

conformity determination, it is important to review the appropriate guidance document. For long-duration idling, the guidance can be found at: http://www.epa.gov/otaq/stateresources/transconf/policy/truckidlingguidance.pdf For retrofit projects, the guidance can be found at: http://www.epa.gov/otaq/stateresources/transconf/policy/420b06005.pdf

Diesel retrofit projects are a cost-effective way to improve air quality and protect public health. They can achieve emissions reductions of up to 90 percent for PM, 50 percent for NO_x, and 90 percent for VOC.

Emission reductions from diesel retrofits can help states meet the 8-hour ozone and $PM_{2.5}$ ambient air quality standards

States have multiple options for incorporating retrofit projects in their SIPs and their transportation conformity and general conformity analyses.

The transportation bill (SAFETEA-LU) directs Metropolitan Planning Organizations (MPOs) to give priority to funding diesel retrofits under Congestion Mitigation and Air Quality Improvement Program (CMAQ) ($8.6 billion over 5 years). Non-road retrofits are now eligible for CMAQ dollars.

Energy Policy Act of 2005 requires that EPA provide guidance for including retrofits in SIPs and guidance has been developed.

In quantifying reductions from retrofit projects, EPA recommends use of National Mobile Inventory Model (NMIM). EPA will review alternative approaches to quantifying reductions on a case-by-case basis.

NMIM - What is it, What it can do, and What the Inputs are. Gary Dolce, EPA OTAQ

NMIM is not a new model. It is a new inventory development tool that creates input files, runs MOBILE6.2 and NONROAD, and processes output. Essentially, NMIM is a graphical user interface that runs the MOBILE6.2 and NONROAD 2005 models. It can be used for general inventory development or to simply calculate reductions from retrofit projects.

To estimate emission reductions for a retrofit project, NMIM should be run twice. Run the model for a base case without retrofit project inputs then run the model for a control case with retrofit project inputs. Except for the retrofit reductions, all other inputs should be the same in both cases. The retrofit reduction is difference between the two cases. If not using NMIM to generate local inventory, calculate the percentage difference between base and control cases and apply that percentage to the local inventory.

Application of NMIM to Fleet-Specific and Fleet-Wide Examples, Gary Dolce, EPA OTAQ

Mr. Dolce provided two detailed examples of how NMIM can be used to calculate emissions reductions from diesel projects.

Efforts to Develop a Voluntary Diesel Emission Reduction Calculation Tool – "The Diesel Emission Quantifier" Carol Febbo, EPA Region 3

The Diesel Emission Quantifier (DEQ) allows users to input information about a fleet to determine the emissions reductions that will accrue if a given technology is installed or applied. If the user enters information about the cost of the technology, they can generate cost effectiveness information from the tool. The DEQ should not be used for SIP and conformity calculations but it can be used to evaluate emissions for other purposes for CMAQ and DERA funded projects. The DEQ can be used for calculating emissions. DEQ uses the latest modeling information available, but does not require the users to download and learn a complex model. The DEQ should be available by late summer or early fall.

Open Discussion on Tools Needed in the Future - Input from Audience

The following comments and suggestions were made by meeting attendees at the end of the workshop.

- A tool is needed to estimate the emissions reduced from projects involving locomotives and commercial marine ships. Will MOVES provide this capability? Will another tool? Chris Trostle, PA.
- EGAS underestimates diesel locomotive emissions. EPA should reexamine diesel locomotive emissions and ultra low sulfur diesel fuel effects. Chris Trostle, PA.
- Johnson Matthey has built an easy to use Excel spreadsheet model, based on a California cost-effectiveness guidance, to estimate the emission reductions that occur if diesel retrofits projects are implemented for specific fleets. Urszula Miezio, Johnson Matthey
- Hands-on NMIM training is available at the National Emissions Inventory Conference each year. Additional training could be made available if there is sufficient interest. Gary Dolce, EPA, OTAQ
- How do diesel emission tools capture the effect of fuel economy (increased miles per gallon)? For every gallon of fuel not burned, there should be commensurate reductions in pollutant emissions. Randall K. Evans, Infineum USA, L.P. Guidance or clarification is needed on the impacts of improved fuel economy and how to calculate these impacts.
- Can emissions benefits be quantified for projects that involve purchasing hybrids and/or other fuel efficient vehicles? Emission benefits do not apply to the use of hybrid or fuel efficient light duty vehicles (LDV).

Emission benefits may apply to the use of hybrid or fuel efficient heavy duty vehicles (HDDV). Gary Dolce, EPA, OTAQ

- Under what conditions would one generate emission credits for fuel efficient HDDVs?