

Introduction to EPA's MOVES Model

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The MOVES logo is displayed in a metallic, 3D-style font with a glowing effect, set against a dark grey rectangular background.

MOVES



Why is EPA developing MOVES?

- **CAA requires EPA to regularly update emission factors and emission factor models**
- **FORTRAN code used in MOBILE6.2 is obsolete and increasingly difficult to maintain**
- **National Research Council 2000 review of EPA's mobile source modeling program included several recommendations that will be addressed by MOVES**



How is MOVES different from MOBILE6.2?

- Graphical User Interface
- Pre-loaded with all data necessary to run
- Modal (microscale) emissions rates
- Modular database structure (easier to update)
- Energy and GHG calculations



MOVES Schedule

- **January 2005**
 - MOVES2004 released
- **May 2007**
 - MOVES Demo released
- **Late 2008**
 - Planned release of MOVES2008
- **Late 2009**
 - Planned release of MOVES2009
 - Final onroad criteria pollutant model; MOBILE6.2 replacement
- **2010+**
 - Add nonroad emissions to MOVES



What is MOVES Demo?

- Released May 2007
- Replaces MOVES2004 for on-road energy consumption, GHGs, Well-To-Pump
- Has placeholder values for criteria pollutants
- Has basic MOVES structure but not all functionality planned for later versions



Uses of MOVES Demo

- Allow users to become familiar with basic operation of MOVES
- Get early feedback from users on ease-of-use, additional features needed, etc.
- Can be used for GHG and energy analysis, but emission rates still subject to change



Limitations of MOVES Demo

- **Criteria pollutant (HC, CO, NO_x, PM, SO₄) results are meaningless**
- **GUI focuses on developing national inventories**
 - County level analysis in MOVES Demo is based on mix of national defaults with some EPA-developed county-level inputs
 - Hard to enter many county level inputs
- **Many features still incomplete**
 - E.g., I/M program inputs



MOVES2008

- **Developing MOVES2008 for release in late 2008**
 - Adding criteria pollutant emission factor databases
 - Adding additional features to simplify regional and project-level analysis for SIPs and conformity
 - **Data importers**
 - **Improved domain handling capabilities**
- **MOVES2008 will be a draft model**
 - No official use requiring MOVES2008
 - Release will be followed by a one year period for public review, training, and EPA guidance development



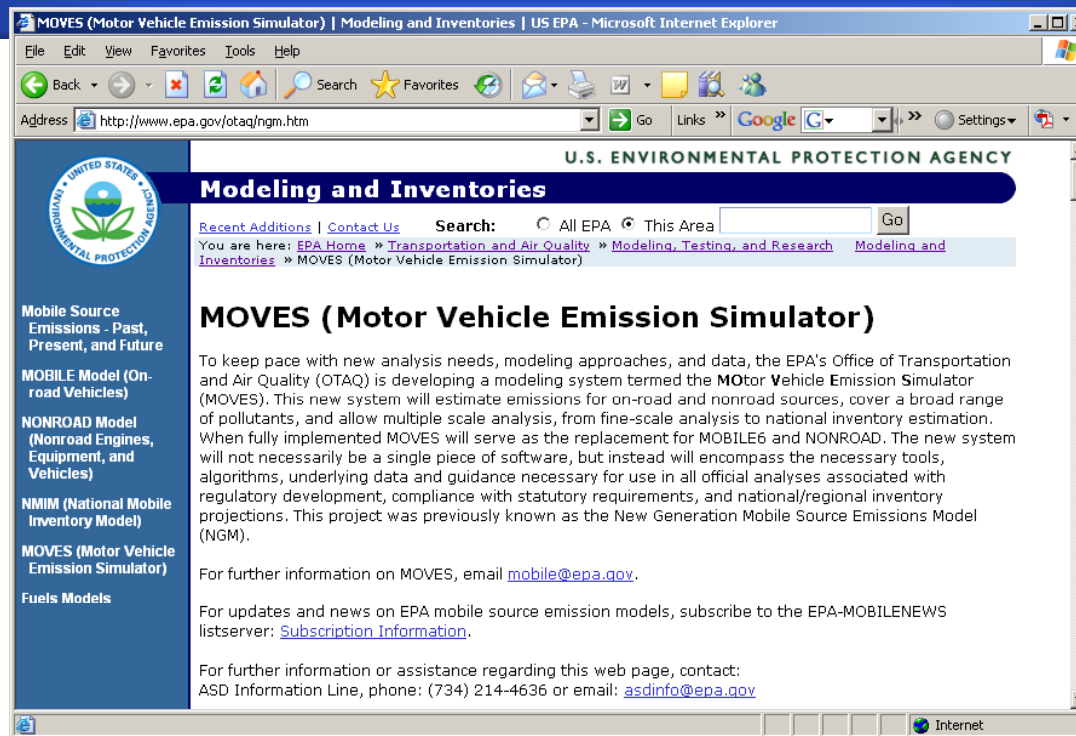
What Should You Do Now?

- **Update computer hardware**
 - See MOVES documentation for recommendations
- **Provide feedback on MOVES Demo**
 - Send comments to mobile@epa.gov
- **Build staff expertise in relational databases and MySQL**
- **Attend MOVES training next year**
- **Subscribe to MOBILENEWS email list for MOVES updates**
 - www.epa.gov/otaq/models/mobilelist.htm



MOVES

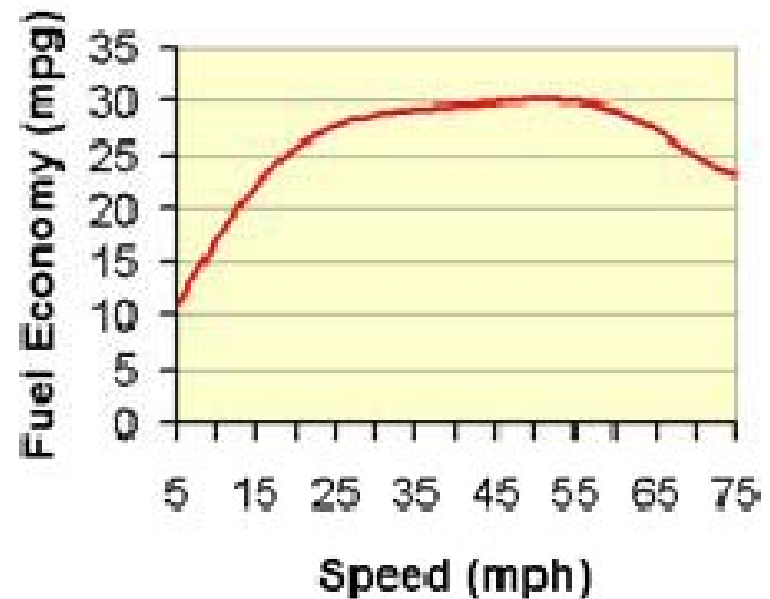
Visit the MOVES website:
<http://www.epa.gov/otaq/ngm.htm>



- Software, technical documentation, conference and meeting presentations, and other helpful background materials

Greenhouse Gas Analysis

- With a few exceptions, most agencies currently conducting transportation GHG analysis use VMT as a surrogate for GHGs (CO₂)
- VMT is usually a poor surrogate in cases where congestion/speeds are expected to change; energy consumption is affected by speed



Using MOVES for GHG Analysis

- **MOVES can model multiple forms of energy:**
 - Total energy consumption
 - Fossil fuel energy consumption
 - Petroleum energy consumption
- **and multiple GHGs:**
 - Carbon dioxide (CO₂)
 - Methane (CH₄)
 - Nitrous Oxide (N₂O)
 - CO₂ Equivalent



Using MOVES for GHG Analysis: Two Options

- **Emission Inventory**

- MOVES, unlike MOBILE6.2, is an inventory model
- Can calculate total energy consumption and/or GHG emissions for a selected geographic area and fleet
- Some local data (e.g., VMT, fleet mix) not easy to modify in MOVES Demo—best incorporated through post-processing MOVES results
- Improvements planned for MOVES2008 and later versions will make GHG inventory analysis much easier



Using MOVES for GHG Analysis: Two Options

- **Look-up Table Output Option**
 - A look-up table output option allows users to produce running emission rates in grams per mile in order to post-process results, as some agencies currently do with MOBILE
 - In a lookup run, MOVES produces energy or emissions rates (grams/mile, BTU/mile, etc.) for each speed bin (5 mph increments)
 - Results available for GHGs, energy (and mpg with post-processing)
 - EPA is considering g/hour output for non-running emissions (e.g., starts)



Using MOVES for GHG Analysis: Additional Features

- Modeling advanced technology vehicles
- Alternative drive cycles
- Lifecycle analysis



Using MOVES for GHG Analysis: MOVES Demo Limitations

- **MOVES Demo has some limitations related to energy/GHG analysis that will be addressed in future versions:**
 - Fuel economy standards in 2007 Energy Bill not incorporated
 - Energy/GHG effects of biofuels (E85, biodiesel) not fully accounted for
 - No option to model CA emissions standards
 - Energy/speed relationships may change for some vehicle types
 - Runtimes rather long for inventories (reasonable for lookup tables)



Using MOVES for GHG Analysis: Conclusions

- **MOVES already includes GHG analysis capabilities that are superior to MOBILE6.2, and will continue to improve**
- **MOVES GHG analysis is an easy way to become familiar with the model**
 - MOVES will replace MOBILE6.2 for SIP and conformity analysis, and GHG analysis with MOVES Demo is a good way to prepare for using the new model for other analyses
- **EPA and FHWA are available to provide assistance, and welcome your questions and comments on the model**

