Emissions Inventory Conference: MOVES2014 for Advanced Users

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March 2015

Course Goals

- Provide an overview of MOVES2014
  - Deciding on a modeling strategy
  - Using MOVES to estimate both onroad and nonroad emissions

- A detailed look at MOVES2014 at the County scale for SIPs and regional conformity analyses based on EPA MOVES Technical Guidance
  - Setting up a RunSpec and creating a county database using the County Data Manager
  - Using MOVES2014 in the inventory and rates modes, and running a custom domain
  - Reviewing output using MySQL

- Hands-on experience in using the MOVES2014 model

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Course Outline

- Module 1: Introduction
  - General MOVES overview and strategies for running MOVES
- Module 2: Generating Inventories at the County Scale
  - Creating a RunSpec for an inventory run
  - Using the County Data Manager to create an input database
  - Understanding converters (using Daily VMT converter)
  - Running MOVES
- Module 3: Processing MOVES output
  - Understanding MOVES output tables
  - Using the post-processing menu in MOVES
  - Using MySQL to view and process output

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Course Outline, continued

- Module 4: Using the Custom Domain Option
  - Relevant inputs
  - Dividing the activity using zones
  - Hands-on exercise: modeling a multi-county area with a custom domain

- Module 5: Emission Rates at the County Scale
  - Types of rates
  - Building a rates look-up table
  - Creating a RunSpec and input database for a rates run
  - Hands-on exercise: create an inventory using rates

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Course Outline, continued

- Module 6: Modeling Nonroad Emissions
  - Options for modeling nonroad emissions
  - Hands-on demonstration

- Module 7: Review and Best Practices
  - Discuss some common issues

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Module 1
Introduction to MOVES and Modeling Approaches

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Module 1 Overview

- Overview of MOVES
- Available documents
- Modeling options

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What's New in MOVES2014

- New OTAQ rules
  - Tier 3
  - HD GHG phase 1
  - LD GHG
- New science
  - Relied on dozens of new test programs and scientific studies
  - Future forecasts (VMT, population, sales)
- Improved functionality
  - Improved integration with air quality models
  - More features for local inputs
  - GUI improvements
  - Adds existing NONROAD model

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When do I use MOVES?

- EPA *Federal Register* notice of October 7, 2014 (79 FR 60343) approved MOVES2014 for:

- New State Implementation Plans (SIPs)
  - Use MOVES2014 now for any new SIPs
  - If significant work on a SIP with MOVES2010 has already been completed, you can continue

- Transportation conformity analyses, including
  - Regional conformity analyses
  - Project-level conformity analysis (PM & CO Hotspot)
  - *FR* notice established a two-year conformity grace period
    - **Until October 7, 2016, use either MOVES2010 or MOVES2014**
    - **After that, use only MOVES2014**

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EPA MOVES Guidance

- MOVES2014 SIP and Conformity Policy Guidance
  - Published July 2014
    - http://www.epa.gov/otaq/models/moves/index.htm#sip
    - Guidance on when MOVES should be used in SIPs and transportation conformity analyses

- MOVES Technical Guidance
  - Published January 2015
    - http://www.epa.gov/otaq/models/moves/index.htm#sip
    - Detailed guidance on appropriate inputs for MOVES in SIPs and regional conformity analyses
    - Defaults vs. local information
    - Developing appropriate local inputs

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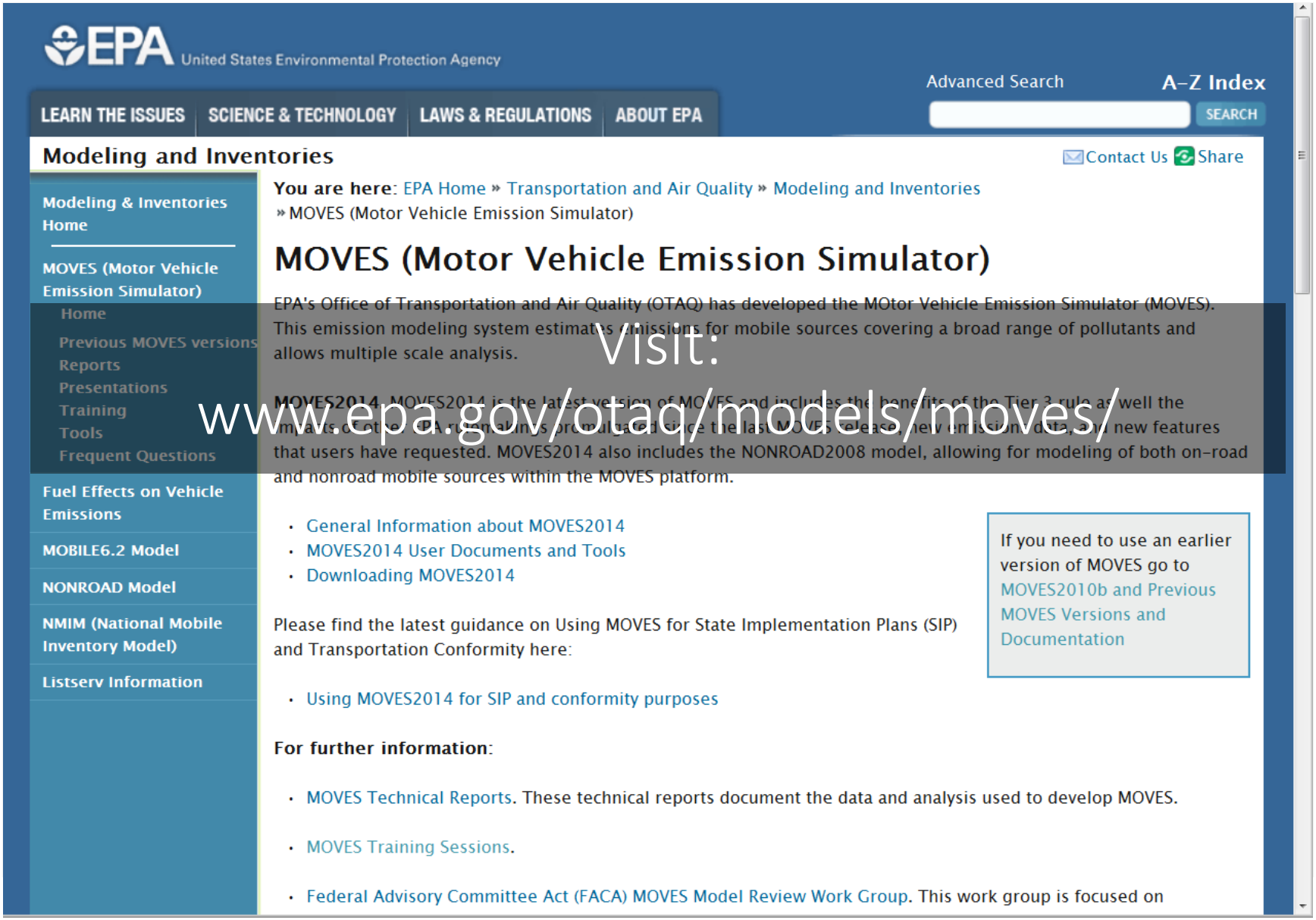
Other MOVES Information



Visit:
www.epa.gov/otaq/models/moves/

Other MOVES Information

- To join the MOVES listserv, send a blank email to join-EPA-MOBILENEWS@lists.epa.gov

- Questions? Contact us:

  MOBILE@epa.gov

  www.epa.gov/otaq/models/moves/

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Modeling Options Overview

- MOVES gives the user an array of input & output options
- Users need to plan their modeling approach, e.g.,
  - Scale/Domain
  - Inventory vs. Emission Rates
- Modeling approach will affect
  - Number of runs
  - Amount of post-processing necessary
  - Input data required
- Next few slides give an overview
- See also Section 2 in the Technical Guidance

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Calculation Type

- Two types: Inventory or Emission Rates
  - Either are acceptable for SIP and regional conformity analyses
  - Use same method for base and projected inventories
  - Also, use same method for SIP and conformity analyses
  - Use interagency consultation

- Trade-offs in both approaches; choice depends on the area and purpose
  - In many cases, Inventory is the appropriate calculation type

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Calculation Type

- Inventory: Output is emissions in units of mass (e.g., grams, kg, lbs, tons) for the time and place specified
  - Shorter run times than Emission Rates
  - MOVES processes results (rates x activity) to yield total mass of emissions
  - Results are specific to county and time
    - A daily run produces a county inventory for one day with a specific 24-hour temperature profile

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Calculation Type

- Emission Rates: Output is a set of emission rates per mile or per vehicle
  - Longer run times and larger output files than Inventory
  - User must post-process results by multiplying rates by vehicle activity data to get inventory
    - MOVES produces three sets of rates (rateperdistance, ratepervehicle, rateperprofile) and two alternative rates (rateperstart, rateperhour)
  - Could cover wide range of conditions with fewer runs than inventory
    - An emission rates run produces a table of emission rates varying by temperature, speed, road type, etc.
    - Rates can be applied to multiple counties and multiple days with the same fuels and I/M programs

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When Should I Use Inventory?

- Inventory may be better if you want to:
  - Model a small number of counties over a limited time period, &
  - Minimize post-processing and avoid inadvertent errors

- For example, Inventory typically used to
  - Develop inventories for a single nonattainment area with a limited number of counties

When Should I Use Emission Rates?

- Emission Rates may be better if you want to:
  - Model many counties
  - Model a wide range of temperatures or
  - Apply rates on a link basis (for a link-based inventory)

- For example, Rates typically used to
  - Develop inventories for a multi-state domain over multiple seasons
  - Develop emission rates for a representative county and then apply them to many other counties
  - Model a full range of temperatures with a small number of runs
  - Use with travel model post-processing software to develop inventories
  - Use the SMOKE-MOVES interface tool to post-process results for air quality modeling
    - More information on SMOKE-MOVES on the MOVES web page

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Custom Domain vs. County

- Two options in Geographic Bounds panel for county scale runs
  - Either are acceptable for SIP and conformity purposes
  - Use same method for base and projected inventories
  - Also, use same method for SIP and conformity analyses
  - Use interagency consultation
- "County"
  - Allows access to some default county-level information
  - In Inventory mode, gives results for that specific county
- "Custom Domain"
  - Allows user to define a multi-county area or partial county as a single modeling domain
    - Individual "zones" (e.g., counties) can be defined
  - No direct access to default county-level information
  - In Inventory mode, results are for each defined zone

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When Should I Use County?

- Use County when you want to model
  - A single county, in either inventory or emission rates mode
  - A small number of counties, and you plan to run one for each individually
  - A representative county, (i.e., a county that has the same fuels and I/M program as the other counties)
    - Allows access to MOVES defaults for your representative county
    - Under this approach, use emission rates mode and post-process appropriate rates with vehicle activity data from each county

When Should I Use Custom Domain?

- Use Custom Domain when you want to model:
  - Several counties with the same fuels and I/M programs in a single run
    - User can specify activity for each zone within the Custom Domain
    - Output will be produced for each zone (county)
    - Not typically used in emission rates mode
  - A partial county

Key Points

- Think carefully about which approach makes the most sense for your situation
  - Do some test runs to get a sense of differences in input requirements, run time, and output file size for each approach

- Be consistent!
  - While you can get the same answer regardless of the approach, it is much easier to avoid problems if you:
    - Use the same approach for base and projection years
    - Use the same approach for SIP and conformity analyses

- Use interagency consultation to make sure everyone agrees on best approach from the start

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Locating Your Data Folder

- The data folder stores the MOVES2014 default database, as well as input and output databases
- This folder is used to communicate between MOVES and MySQL Workbench, the post-processing tool for MOVES database tables
- Its location varies by operating system, but can generally be found in one of two places:
  - Windows 7 or later - C:\ProgamData\MySQL\MySQL Server 5.6\
  - Windows XP - C:\Documents and Settings\All Users\Application Data\MySQL\MySQL Server 5.6\
- Once you locate it, create a shortcut to it on your desktop (right-click on folder, choose “Create shortcut” and drag it to your desktop)

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Questions?

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