

# Update on MOVES

NTAQS

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The word "MOVES" is displayed in a stylized, metallic, three-dimensional font with a brushed metal texture and a slight shadow effect, set against a dark grey rectangular background.

# Introduction: MOVES2010

- **Motor Vehicle Emission Simulator**
- **Estimates total emissions & energy use from all on-road sources (cars, trucks, buses, motorcycles)**
  - Could eventually include other mobile sources (e.g., non-road, marine, locomotive, aviation sources)
- **Contains latest data about vehicle emissions**
- **Uses an updated software platform**
  - Modular database structure is easier to update with new emissions, fleet, and activity data
- **Replaces MOBILE for on-road vehicle emissions**
  - Significant expansion of capabilities compared to MOBILE

## MOVES Versions

- **Draft MOVES2009**
  - Draft model released April 2009
- **MOVES2010**
  - Released December 2009
  - Improved emission rates database
  - Added start and evap emissions to emissions rate calculator
  - Faster performance
  - Added new features
  - Added new pollutants and pollutant processes
  - Added motorcycle emissions

# MOVES Policy and Guidance Documents

- **Federal Register Notice of Availability**
  - Published March 2, 2010 (75 FR 9411)
    - [www.epa.gov/otaq/models/moves/index.htm](http://www.epa.gov/otaq/models/moves/index.htm)
  - Approves the use of MOVES2010 for SIPs in states other than California
  - Starts a two-year grace period for use of MOVES2010 in regional conformity analyses
- **MOVES2010 SIP and Conformity Policy Guidance**
  - Published December 2009
    - [www.epa.gov/otaq/models/moves/420b09046.pdf](http://www.epa.gov/otaq/models/moves/420b09046.pdf)
  - Provides detailed guidance on when MOVES2010 should be used in SIPs and transportation conformity analyses

# MOVES Policy and Guidance Documents

- **MOVES2010 Technical Guidance**
  - Published December 2009, **updated April 2010**
    - [www.epa.gov/otaq/models/moves/420b10023.pdf](http://www.epa.gov/otaq/models/moves/420b10023.pdf)
  - Provides guidance on appropriate inputs for MOVES2010 in SIPs and regional conformity analyses
    - Defaults vs. local information
    - Developing appropriate local inputs
- **Guidance documents under development**
  - Quantitative PM hot-spot analyses for transportation conformity (includes PM project-level MOVES guidance) draft released May 2010
    - <http://www.epa.gov/otaq/stateresources/transconf/policy.htm>
  - CO project-level MOVES guidance
  - MOVES to be approved for PM and CO hot-spot conformity analyses once guidance finalized (with grace period)

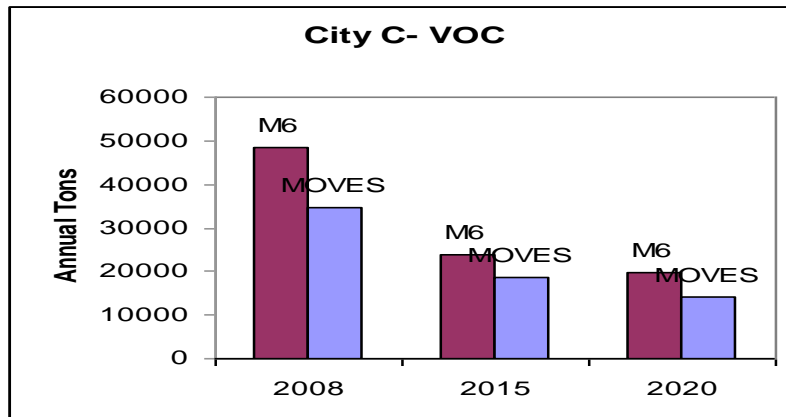
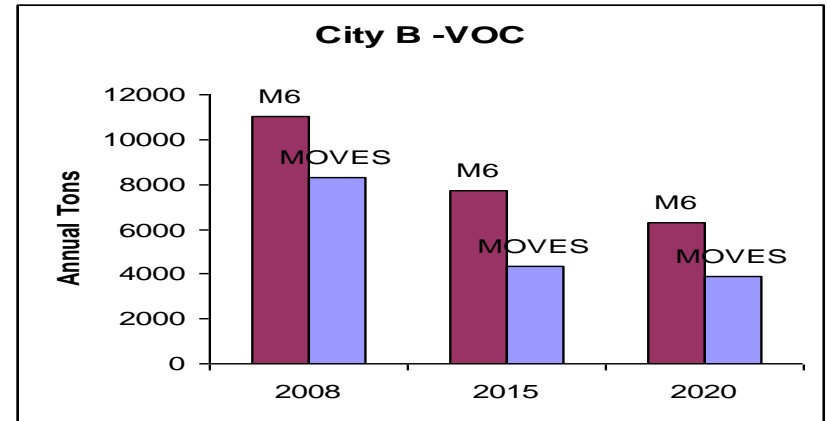
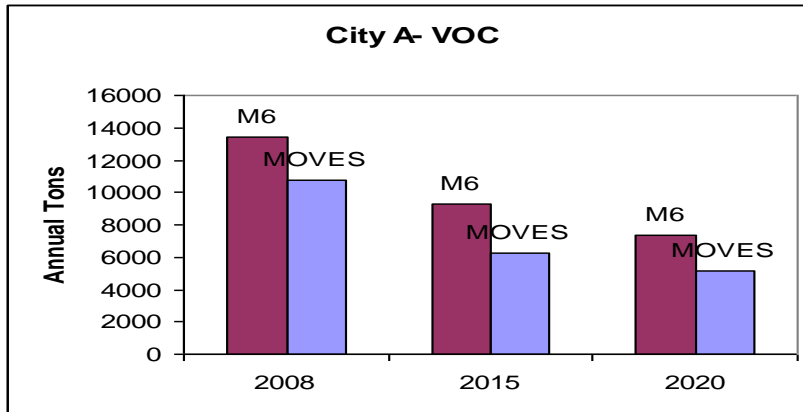
# Other MOVES Documentation

- **MOVES User Guide describes:**
  - The features of the graphical user interface (GUI)
  - Instructions on how to access each feature
  - Step-by-step example run
  - Running MOVES in a batch mode
- **The Software Design and Reference Manual (SDRM) describes:**
  - The hardware and software requirements
  - Software design components
  - Overview of processing, data and control flow
  - Functional design:
    - Generators (process input data)
    - Calculators (generate results)
    - Aggregators (summarize input and outputs)
  - Input and output database tables and design

# How does MOVES Change our Understanding of On-road Emissions?

- **Compared MOVES2010 and MOBILE estimates for three sample urban counties**
  - O<sub>3</sub> and PM<sub>2.5</sub> nonattainment areas
  - Different climates, LD/HD mix
  - Used NMIM inputs rather than full SIP-level analysis
- **Results show MOVES has:**
  - Higher NO<sub>x</sub>
  - Higher PM
  - Lower VOC
  - Often greater percent reduction over time

## MOVES vs. MOBILE6.2 Example Cities: VOC

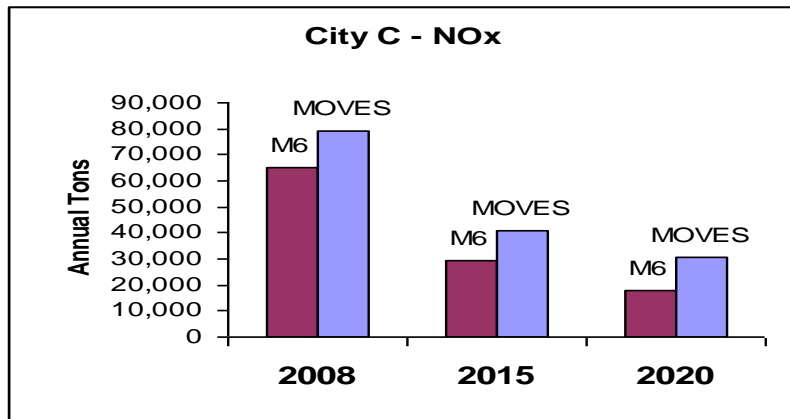
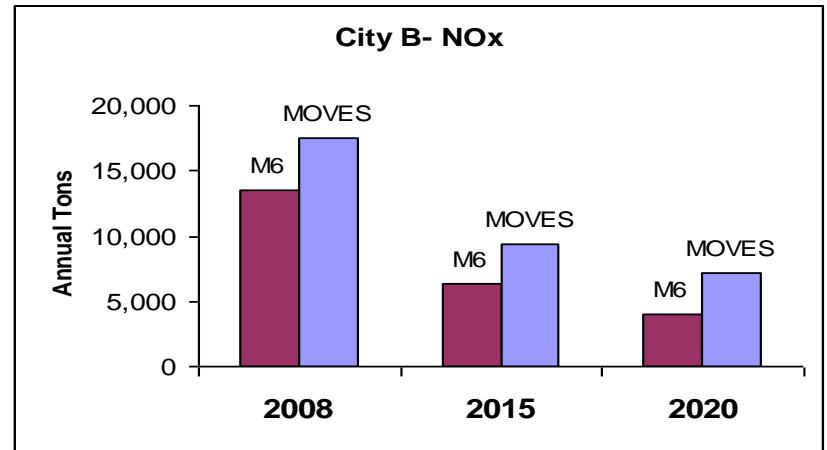
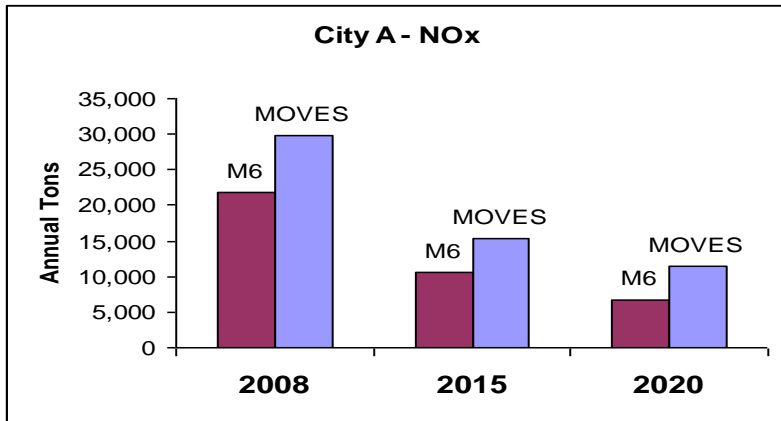


**Percent Change 2008-2015**

	M6	MOVES
City A	-31%	-42%
City B	-31%	-48%
City C	-50%	-46%



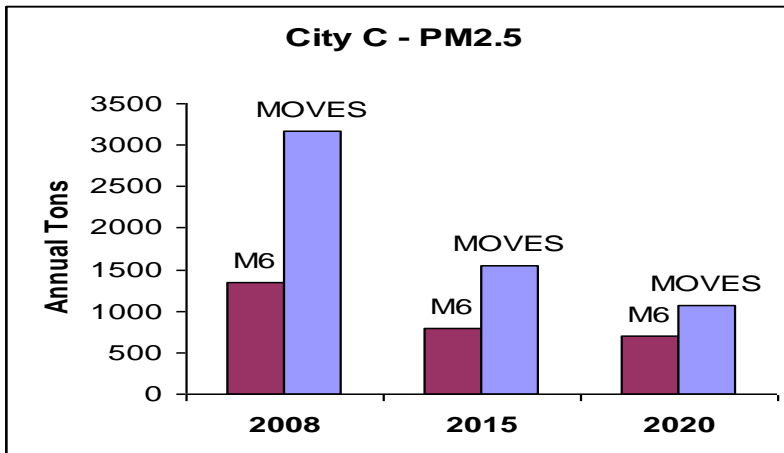
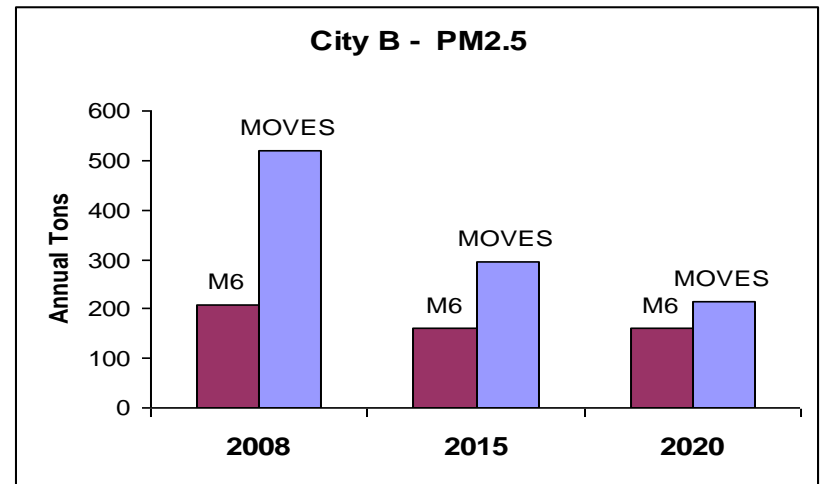
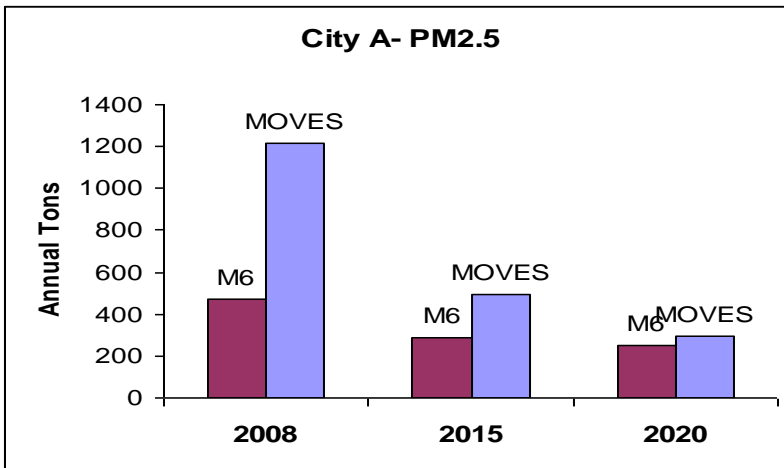
## MOVES vs. MOBILE6.2 Example Cities: NO<sub>x</sub>



**Percent Change 2008-2015**

	M6	MOVES
City A	-52%	-49%
City B	-53%	-46%
City C	-56%	-49%

## MOVES vs. MOBILE6.2 Example Cities: PM<sub>2.5</sub>



**Percent Change 2008-2015**

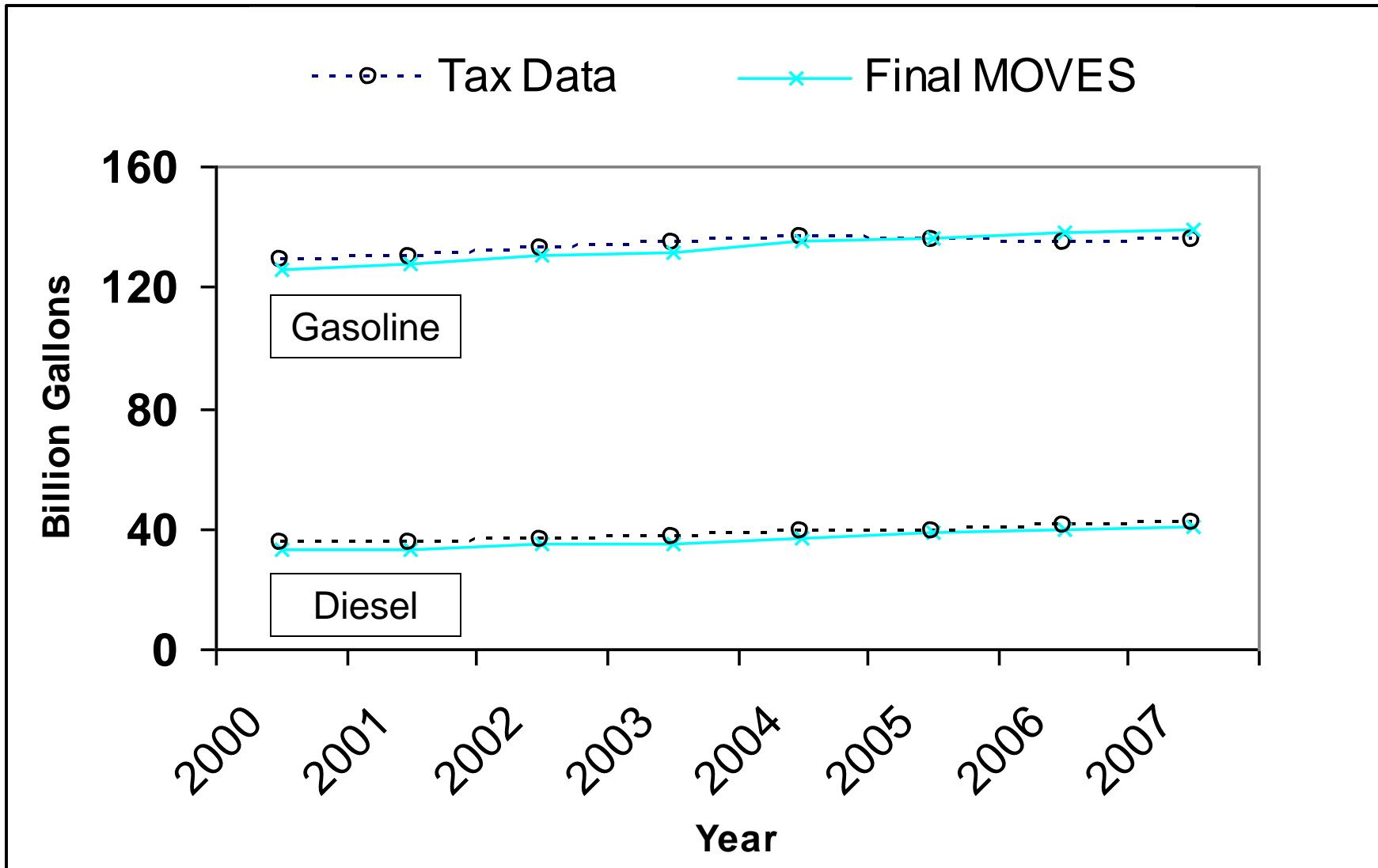
	M6	MOVES
City A	-40%	-59%
City B	-23%	-44%
City C	-40%	-51%



# MOVES and GHG Estimation

- **EPA's best tool for estimating on-road GHGs:**
  - CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, and elemental carbon (black carbon)
- **Key features that improve emissions estimates:**
  - Allows distinct modeling of different operating modes
    - Such as driving, vehicle start-up, idling
    - Allows assessment of various strategies on GHGs
  - County and Project level scales allow on-road GHG estimation for various geographic areas
    - Gives users ability to customize with local inputs

# National Fuel Consumption Comparison



# Updates After MOVES2010 Release

- **These updates add features, improve performance and correct minor errors**
  - Impact on criteria pollutants is small
  - Not considered new emission models for SIPs and conformity
- **5/15/2010 Database**
  - Updated MOVES database that corrects several minor errors in the original MOVES2010 default database
  - To use this database, it must be installed separately from the MOVES2010 installation

# MOVES Training Opportunities

- **EPA/FHWA have developed a 2-day MOVES training course**
  - First day: County scale for SIPs and regional conformity analyses
  - Second day: MOVES Project scale
- **Upcoming EPA/FHWA Training dates/locations**
  - August 26, Boston, MA (one day training at NTAQS)
  - August 31-September 1, Indianapolis, IN.
  - September 14-15, Nashville, TN.
  - September 15-16, Kansas City, KS.
  - September 23-24, Las Vegas, NV.
  - September 27, San Antonio, TX (one day training at the International Emission Inventory Conference)
  - October 18-19, Seattle, WA.
- **Additional Training locations will be posted on EPA's website:**  
<http://www.epa.gov/otaq/models/moves/trainingsessions.htm>

# MOVES

Visit the MOVES website:  
[www.epa.gov/otaq/models/moves/](http://www.epa.gov/otaq/models/moves/)

The screenshot shows a web browser window displaying the MOVES website. The browser's address bar shows the URL <http://www.epa.gov/otaq/models/moves/>. The page title is "MOVES (Motor Vehicle Emission Simulator) | Modeling and Inventories | US EPA - Windows Internet Explorer provided by EPA". The website header includes the EPA logo and the text "U.S. ENVIRONMENTAL PROTECTION AGENCY". The main content area is titled "Modeling and Inventories" and features a search bar and a breadcrumb trail: "You are here: EPA Home » Transportation and Air Quality » Modeling, Testing, and Research » Modeling and Inventories » MOVES (Motor Vehicle Emission Simulator)". The main heading is "MOVES (Motor Vehicle Emission Simulator)". Below this, a paragraph describes the MOVES system: "EPA's Office of Transportation and Air Quality (OTAQ) is developing the Motor Vehicle Emission Simulator (MOVES). This new emission modeling system will estimate emissions for mobile sources covering a broad range of pollutants and allow multiple scale analysis. MOVES currently estimates emissions from cars, trucks & motorcycles. We plan to add the capability to model non-highway mobile sources in future releases." A list of links follows, including "MOVES2010 Technical Guidance (PDF)", "MOVES2010 Mobile Source Emissions Model: Questions and Answers (PDF)", "Federal Register Notice of Availability: Official Release of MOVES2010 Motor Vehicle Emissions Model for Emissions Inventories in SIPs and Transportation Conformity", "Instructions for downloading and extracting MOVES2010InstallationSuite", "Download MOVES2010InstallationSuite (ZIP)", and "MOVES2010 Errata Sheet/Information Sheet (PDF)". A note on the right side of the page states: "NOTE: You will need Adobe Acrobat Reader, available as a free download, to view some of the files on this page. See EPA's PDF page to learn more about PDF, and for a link to the free Acrobat Reader." The browser's status bar at the bottom shows "Done" and "Local intranet".

- Software, technical documentation, conference and meeting presentations, and other helpful background materials
- Questions should be directed to [MOBILE@epa.gov](mailto:MOBILE@epa.gov)

