

Using MOVES2010 for Estimating On-Road GHG Emissions

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The logo for MOVES (Motor Vehicle Emissions Simulator) is displayed in a stylized, metallic, 3D font with a glowing effect. The letters are white with a blue and yellow gradient, set against a dark blue background.

Overview of Presentation

- Introduction to MOVES2010
- Key Features of MOVES for GHG Estimation

Introduction: MOVES2010

- **Motor Vehicle Emission Simulator**
- **Estimates total emissions & energy use from all on-road sources (cars, trucks, buses, motorcycles)**
- **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
 - Could eventually include other mobile sources (e.g., non-road, marine, locomotive, aviation sources)
- **Responds to U.S. National Research Council recommendations (2000)**

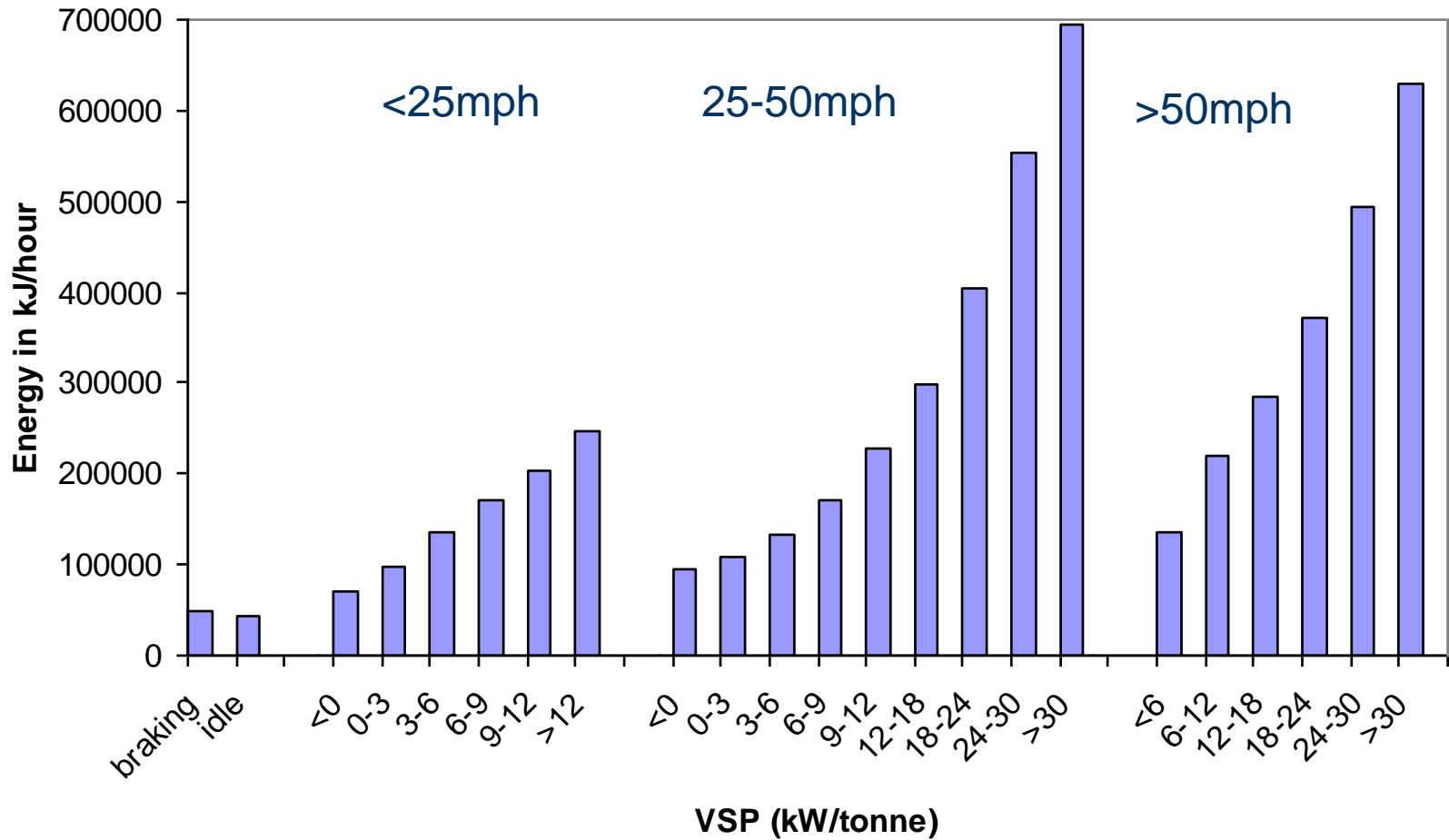
MOVES and GHG Estimation

- **EPA's best tool for estimating on-road GHGs:**
 - CO₂, N₂O, CH₄, 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

MOVES and Operating Modes

- **MOVES improves emissions estimates by accounting for vehicle behavior through time**
- **MOVES uses a distribution of time vehicles spend in different “operating modes” (bins)**
 - Operating mode – what the vehicle is doing, i.e., accelerating, braking, cruising, idling
 - Vehicles use different amounts of energy (“vehicle specific power” or VSP) in different operating modes
 - MOVES defines 23 operating mode bins for running: combinations of speed and VSP
 - Also includes additional operating modes for starts, extended idling, etc.

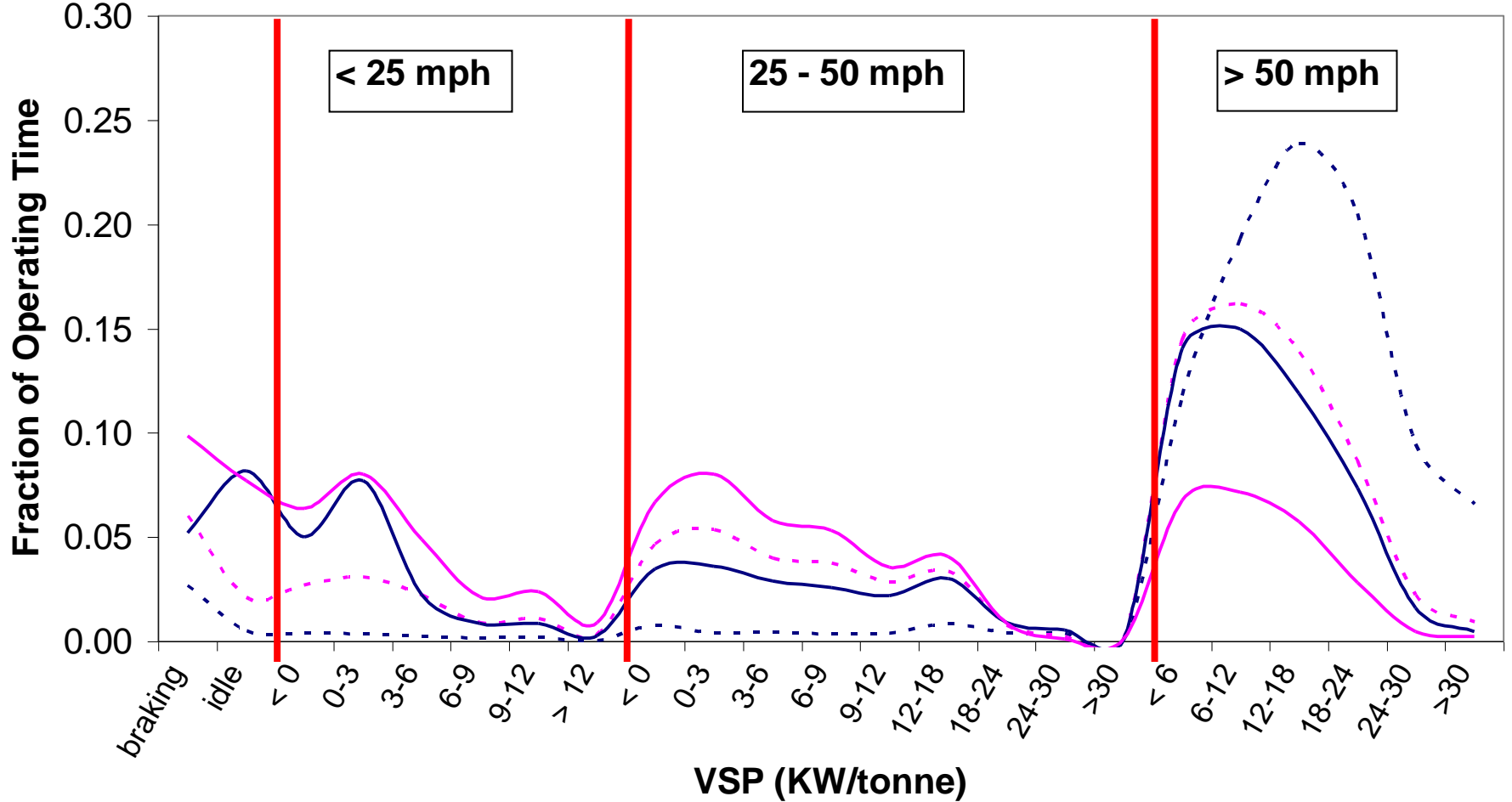
Energy Consumption by Operating Mode MY 2010 Gasoline Passenger Car



Distribution of Operating Time by Bin

Light-Duty Cars and Trucks

- Rural Freeway
- Urban Freeway
- Rural Arterial
- Urban Arterial



MOVES Emissions Rates:

- MOVES includes a different emissions rate for each combination of:

- Source,

-

-

Age group, and

Operating mode

Gas-LDV-MY2001

8-9 years

low speed coast; 20 mph, VSP 0-3 kW/tonne

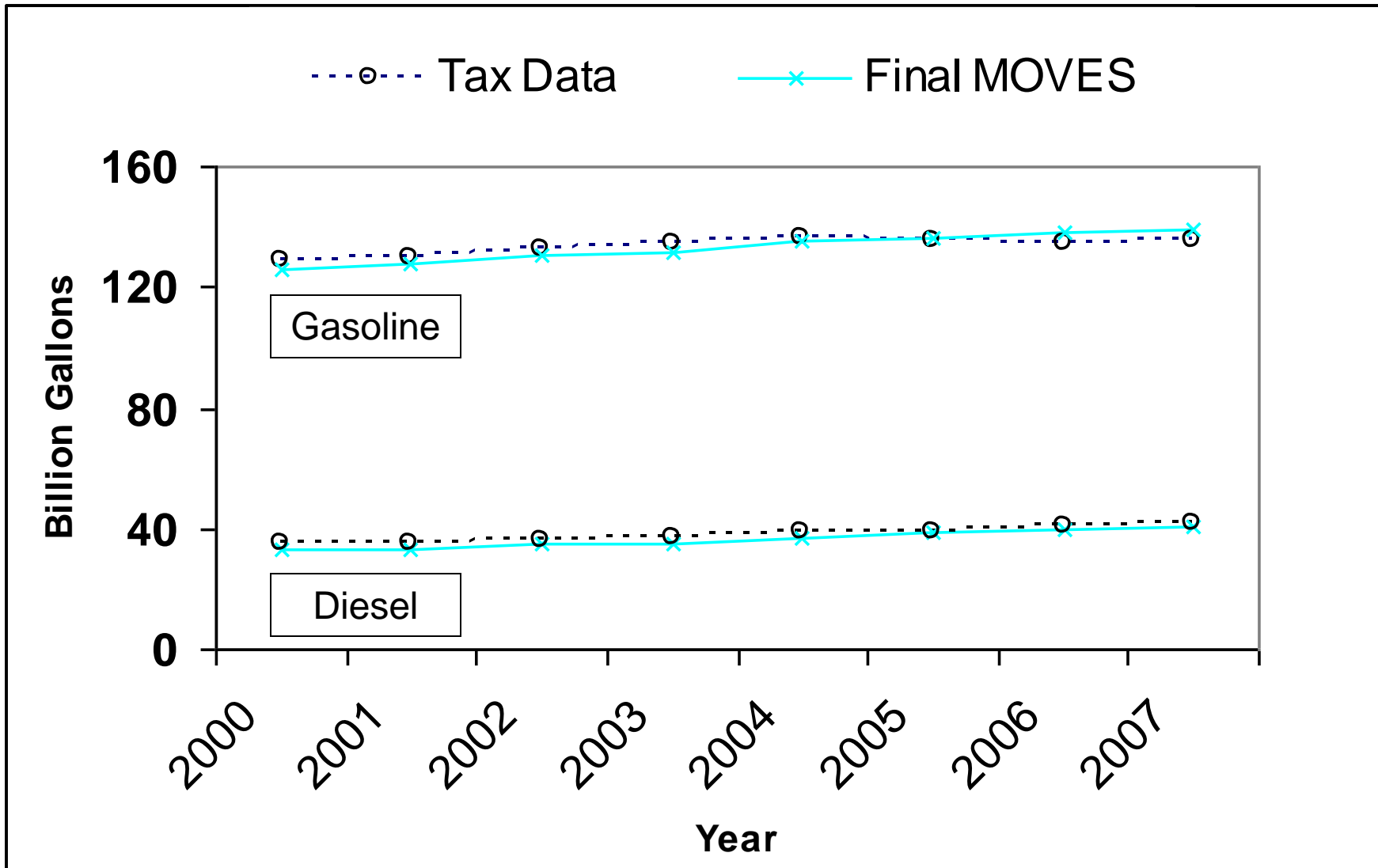
Gas-LDT-MY2005

4-5 years

accelerating; 55 mph, VSP 12-15 kW/tonne

- Information can be aggregated for total emissions
- National MOVES GHG estimates match GHG estimates based on fuel sales

National Fuel Consumption Comparison



MOVES Analysis Scales

MOVES has three possible scales of analysis

1. National scale

- Uses default fleet and vehicle activity data within model
- Not recommended for estimating emissions for a state or smaller geographic area; results will be inaccurate

2. County scale

- Relies on user-supplied data

3. Project scale

- Relies on user-supplied data

● Common emission rates for all three scales

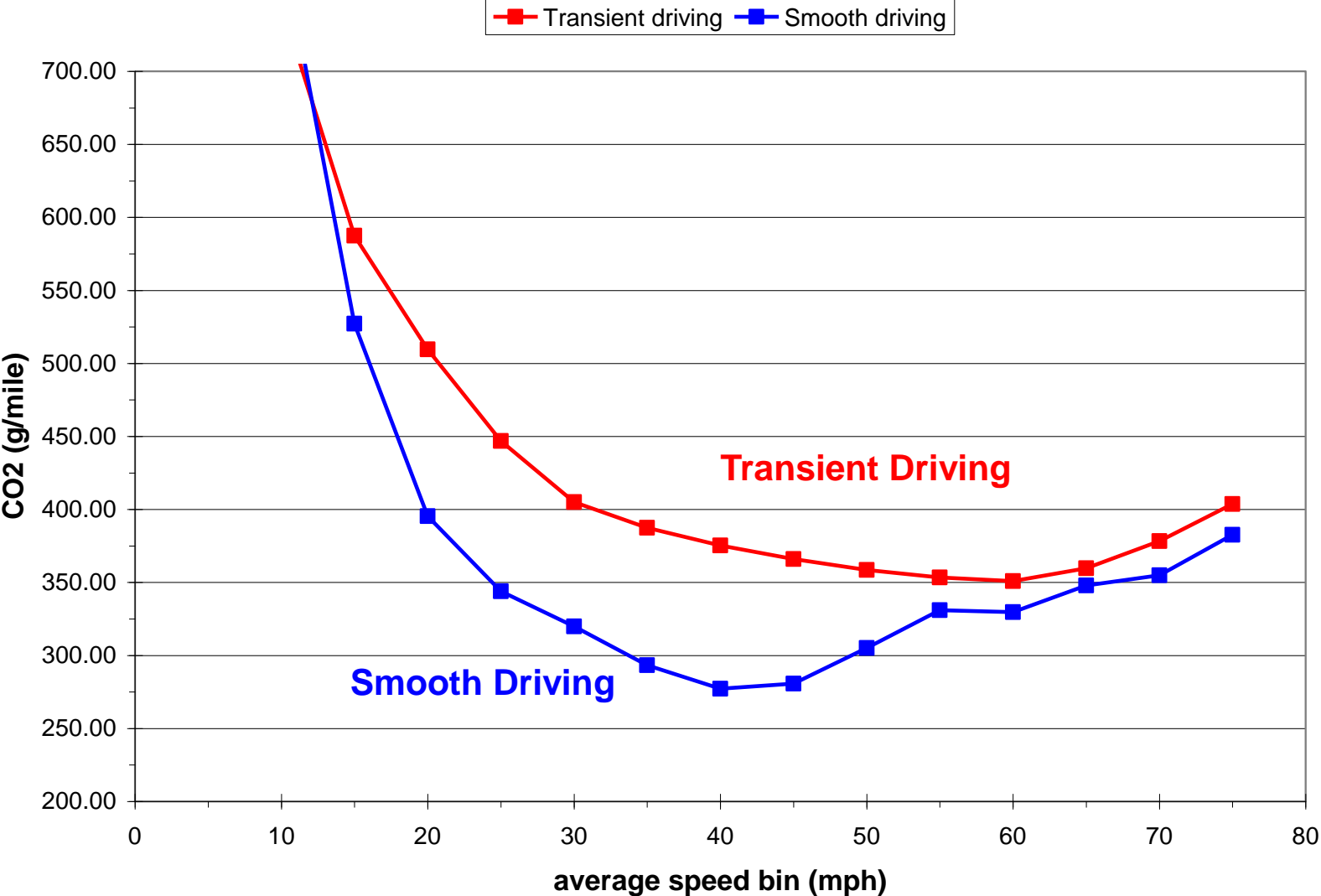
County Scale

- **Could be used to estimate GHG emissions for:**
 - An individual county
 - Several counties and/or portions of counties
 - An entire state, using every county or using a representative county(-ies)
- **Better resolution than national scale**
- **Could be used to examine GHG impacts of regional travel changes, if travel model sensitive to them, e.g:**
 - Addition of public transit / commuter rail
 - Changes in traffic volumes, routes, and speeds

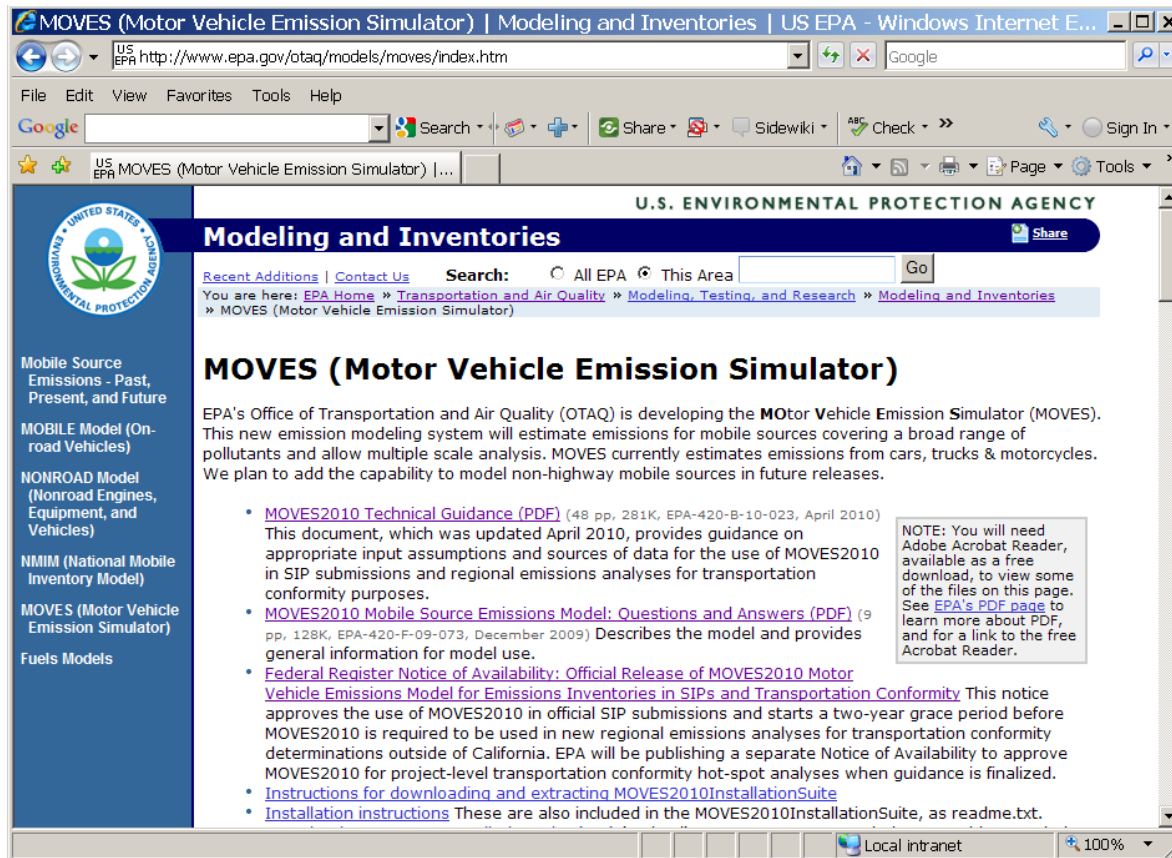
Project Scale

- **Could be used to estimate GHG emissions from a specific highway or transit project**
- **Could be used to examine GHG impacts of changes that affect driving behavior on a specific facility, e.g:**
 - Adding a lane to highway or arterial
 - Synchronizing traffic signals along an arterial
 - Adding or improving transit service on a route
- **Requires user to bring information on how the change affects detailed vehicle driving patterns**

CO₂ Impact of Traffic Smoothing



Visit the MOVES website: www.epa.gov/otaq/models/moves/index.htm



The screenshot shows a web browser window displaying the EPA MOVES website. The browser's address bar shows the URL <http://www.epa.gov/otaq/models/moves/index.htm>. The page header includes the U.S. Environmental Protection Agency logo and the text "U.S. ENVIRONMENTAL PROTECTION AGENCY". The main heading is "Modeling and Inventories". Below this, there is a search bar and a navigation menu. The main content area is titled "MOVES (Motor Vehicle Emission Simulator)" and contains a paragraph describing the simulator. A list of links is provided, including technical guidance, model questions and answers, and a federal register notice. 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."

MOVES (Motor Vehicle Emission Simulator)

EPA's Office of Transportation and Air Quality (OTAQ) is developing the **MO**tor **V**ehicle **E**mission **S**imulator (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.

- [MOVES2010 Technical Guidance \(PDF\)](#) (48 pp, 281K, EPA-420-B-10-023, April 2010) This document, which was updated April 2010, provides guidance on appropriate input assumptions and sources of data for the use of MOVES2010 in SIP submissions and regional emissions analyses for transportation conformity purposes.
- [MOVES2010 Mobile Source Emissions Model: Questions and Answers \(PDF\)](#) (9 pp, 128K, EPA-420-F-09-073, December 2009) Describes the model and provides general information for model use.
- [Federal Register Notice of Availability: Official Release of MOVES2010 Motor Vehicle Emissions Model for Emissions Inventories in SIPs and Transportation Conformity](#) This notice approves the use of MOVES2010 in official SIP submissions and starts a two-year grace period before MOVES2010 is required to be used in new regional emissions analyses for transportation conformity determinations outside of California. EPA will be publishing a separate Notice of Availability to approve MOVES2010 for project-level transportation conformity hot-spot analyses when guidance is finalized.
- [Instructions for downloading and extracting MOVES2010InstallationSuite](#)
- [Installation instructions](#) These are also included in the MOVES2010InstallationSuite, as readme.txt.

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.

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