Travel Efficiency Assessment Methods

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May 10, 2011
Mobile Source Technical Review Subcommittee

Overview

- There continues to be demand for both criteria and ghg emissions
  - » Vehicles
  - » Fuels and
  - » **Travel efficiency strategies**

- EPA's new methods, documents and tools:
  1. Potential Changes in Emissions Due to Improvements in Travel Efficiency
  2. Transportation Control Measure information document

National total emissions estimates by source category, 2008
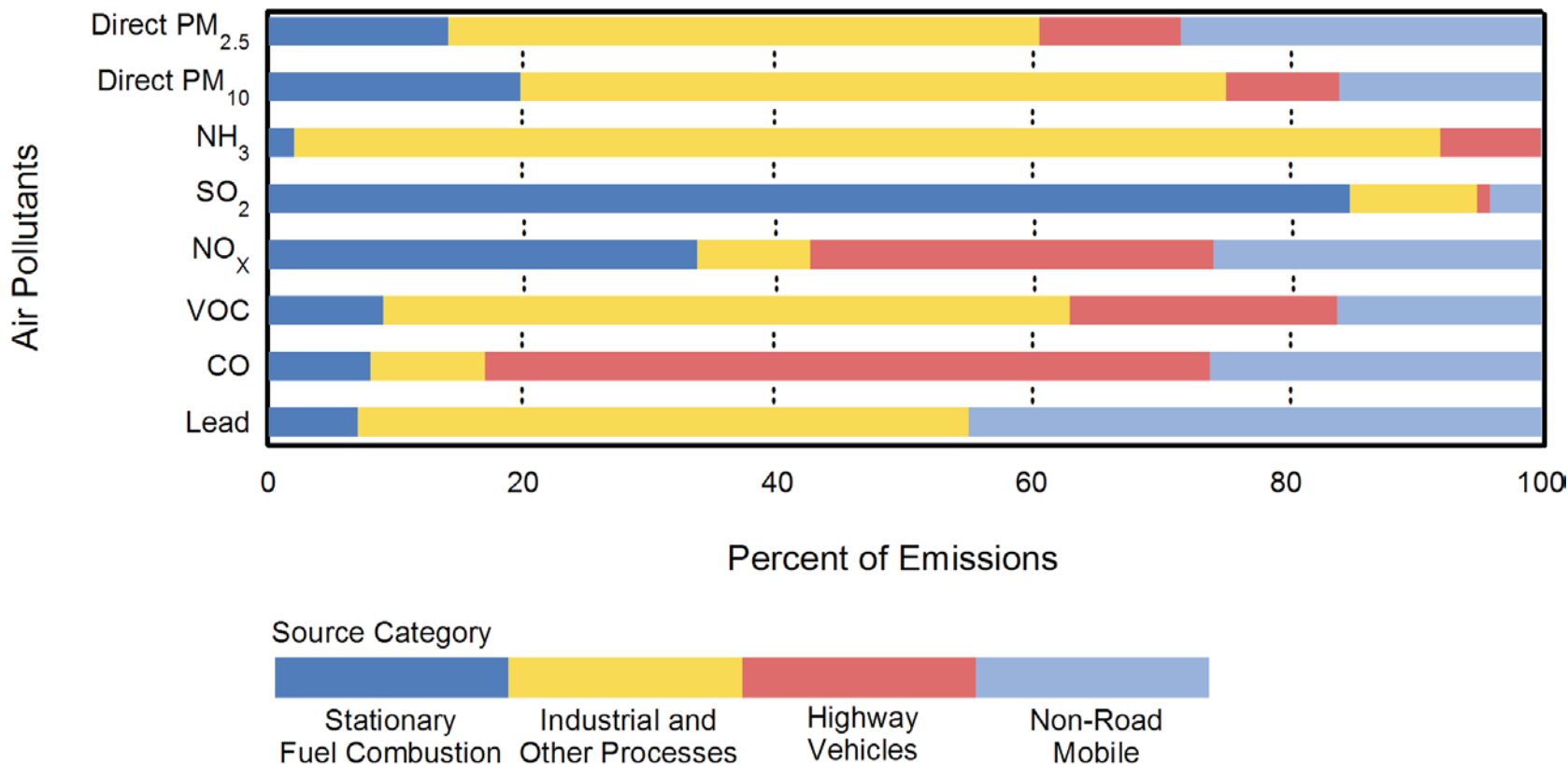
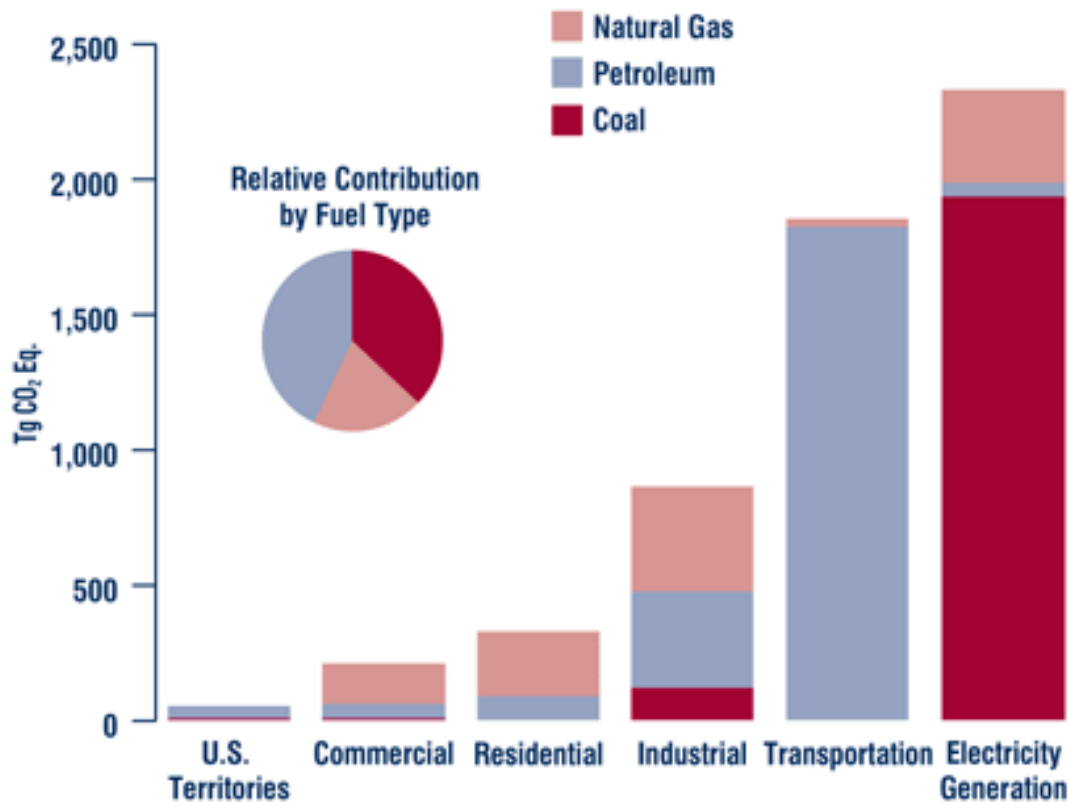Source: ***Our Nation's Air – Status and Trends through 2008***
February 2010, EPA-454/R-09-002
On the web: www.epa.gov/airtrends/2010/

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2011 U.S. Greenhouse Gas Inventory Report

2006 CO$_2$ Emissions from Fossil Fuel Combustion by Sector and Fuel Type

Note: Electricity generation also includes emissions of less than 0.5 Tg CO$_2$ Eq. from geothermal-based electricity generation.

Source: EPA report, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009*, April 2011 EPA 430-R-11-005

On the web: www.epa.gov/climatechange /emissions/usinventoryreport .html

Reducing Transportation Emissions at the State/Local Level

Many strategies to consider...

- Travel demand management
  - » HOV / vanpool / carpool / commute strategies
  - » Public transit
  - » Bicycle and pedestrian facilitie
  - » Urban parking restrictions
- Transportation systems management, e.g.
  - » Intelligent transportation systems
  - » Pricing strategies -- road pricing, parking pricing
  - » Speed limit reductions
  - » Eco-driving
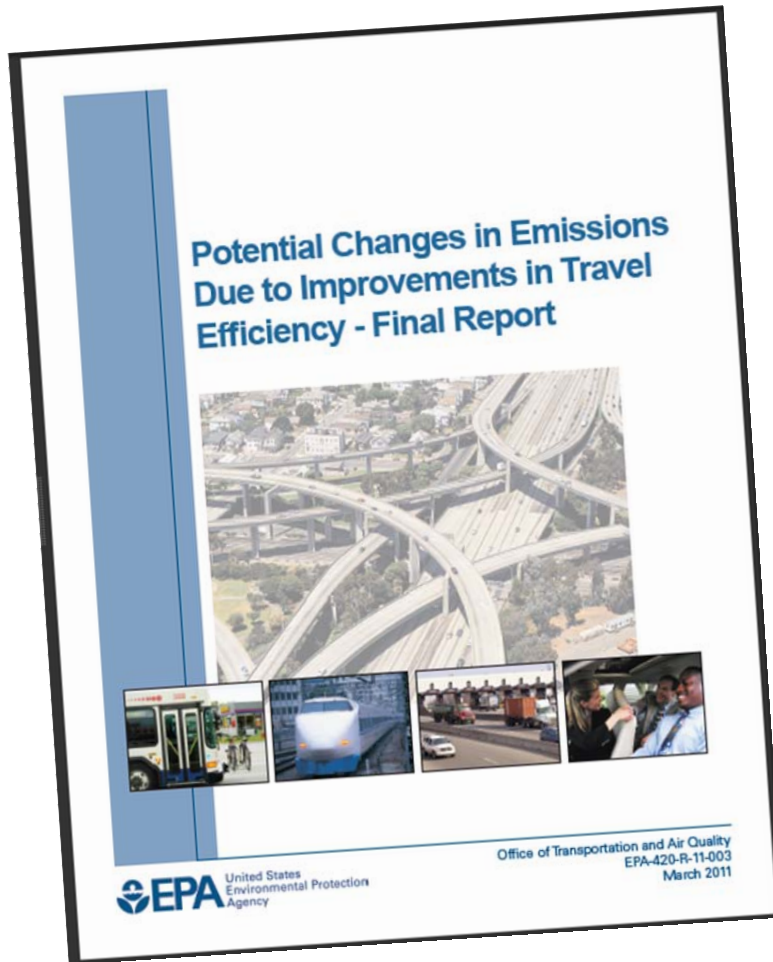- "Smart growth" and other land use changes
- Freight efficiencies (SmartWay)

How should policy makers choose?

New EPA tools, methods, and documents for assessing GHG and criteria pollutant benefits of these strategies:

1. Potential Changes in Emissions Due to Improvements in Travel Efficiency
    » Released March 2011

2. Transportation Control Measure Information Document
    » Released March 2011

Potential Changes... a.k.a "the **TEAM** document"

Potential Changes in Emissions Due to Improvements in Travel Efficiency - Final Report

Office of Transportation and Air Quality
EPA-420-R-11-003
March 2011

United States Environmental Protection Agency

- Goals:
  - » establish EPA estimates of potential national emission reductions from travel efficiency strategies
  - » demonstrate that existing tools and data could be used to quantify the reductions
- Uses a new methodology: **T**ravel**E**fficiency**A**ssessment **M**ethod **(TEAM)**
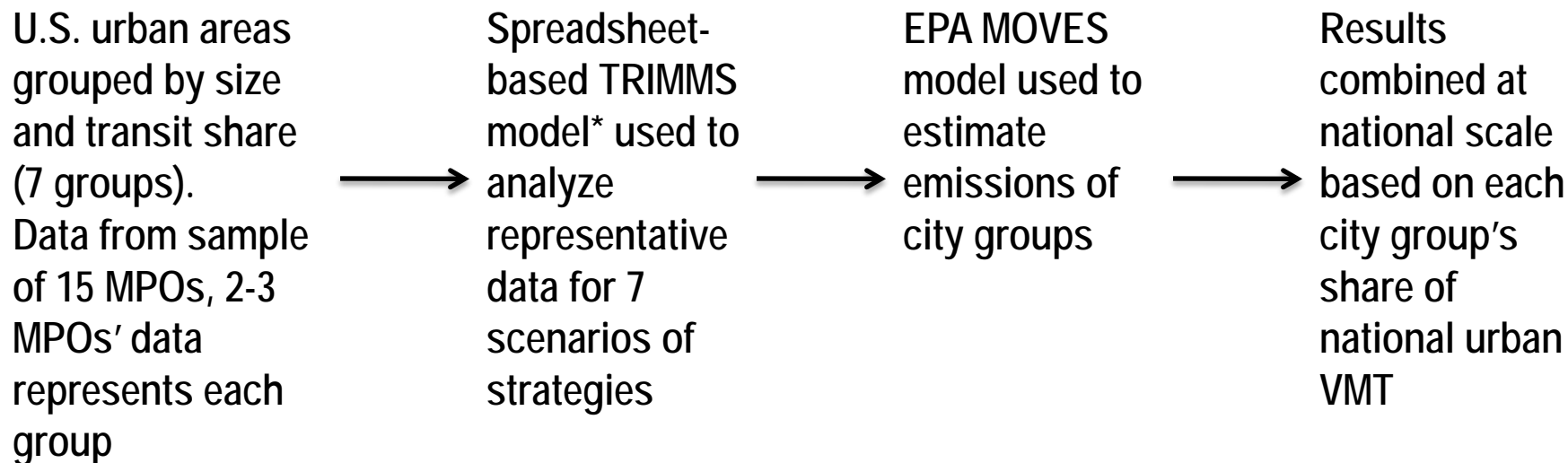
www.epa.gov/otaq/stateresources/policy/420r11003.pdf

TravelEfficiencyAssessmentMethod

- **TEAM** estimates national <u>urban</u> emission reductions for select strategies by using:
  - » *Local transportation data* from MPOs
  - » *TRIMMS 2.0* - an existing transportation planning sketch model
  - » *MOVES2010* emission factors, applied to TRIMMS output of trips and VMT reduction
- Builds a bridge between national travel efficiency studies (Moving Cooler) and local MPO data and modeling tools
- Provides a starting point for state and local governments to evaluate potential GHG reductions

Travel**E**fficiency**A**ssessment**M**ethod

U.S. urban areas grouped by size and transit share (7 groups).
Data from sample of 15 MPOs, 2-3 MPOs' data represents each group

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Spreadsheet-based TRIMMS model* used to analyze representative data for 7 scenarios of strategies

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EPA MOVES model used to estimate emissions of city groups

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Results combined at national scale based on each city group's share of national urban VMT

Results are at the national scale; cities belonging to each group can get a sense of which strategies may work best for their size and level of transit

* TRIMMS: Trip Reduction Impacts for Mobility Management Strategies, CUTR, USF

City Group Definitions and Representative Areas

City Group	Definition	Representative Areas	No. of U.S. Cities Represented	Share of National Daily Urban VMT
1	Pop ≥2.9 million High Transit Share (>9%)	San Francisco, CA Washington, DC	6	17%
2	Pop ≥2.9 million Low Transit Share (9% or less)	San Diego, CA Seattle, WA	9	22%
3	Pop 1,500,000-2,899,999 High Transit Share (>4%)	Portland, OR Denver, CO	7	6%
4	Pop 1,500,000-2,899,999 Low Transit Share (4% or less)	Sacramento, CO Salt Lake City, UT	8	7%
5	Pop 750,000-1,499,999	Memphis, TN Raleigh-Durham, NC	21	12%
6	Pop 250,000-749,999	Fresno, CA Knoxville, TN Rochester, NY	87	18%
7	Pop < 250,000	Burlington, VT Wilmington, NC	313	17%
		Total	451	100%

Strategy Combinations (Scenarios)

Scenario	Strategy Combinations					
	Region-wide TDM	Land Use/Smart Growth	Transit Fare Reduction	Transit Service Improvements	Pricing Mileage Fees	Pricing Parking Fees
Baseline	Current conditions without any of the above strategies					
Scenario 1	✓					
Scenario 2	✓	✓				
Scenario 3	✓	✓	✓			
Scenario 4	✓	✓	✓	✓		
Scenario 5	✓	✓	✓	✓		✓
Scenario 6	✓	✓	✓	✓	✓	
Scenario 7	✓	✓	✓	✓	✓	✓

Strategies were based on what MPOs are currently implementing, planning for, or considering in their transportation plans

National Urban On-road Light Duty Emission Reductions

Scen.	Strategies	Emission Reductions in 2030				Emission Reductions in 2050			
		CO_2e	$PM_{2.5}$	NO_x	VOC	CO_2e	$PM_{2.5}$	NO_x	VOC
1	Region-wide TDM	0.10%	0.10%	0.10%	0.09%	0.26%	0.26%	0.26%	0.25%
2	Plus: Smart Growth	1.01%	1.01%	1.00%	0.98%	2.97%	2.96%	2.93%	2.86%
3	Plus: Transit Fare Reductions	1.40%	1.40%	1.39%	1.36%	4.19%	4.18%	4.16%	4.08%
4	Plus: Transit Service Improvements	1.44%	1.44%	1.43%	1.41%	4.30%	4.29%	4.28%	4.23%
5	Plus: Parking Fees	2.92%	2.92%	2.91%	2.90%	6.98%	6.94%	6.87%	6.68%
6	Plus: Mileage Fees, Minus: Parking Fees	1.94%	1.93%	1.92%	1.87%	6.28%	6.25%	6.17%	5.95%
7	All Strategies	3.42%	3.42%	3.40%	3.35%	8.83%	8.78%	8.65%	8.29%

TEAM Findings

- The largest emission reductions come from:
  - » mileage and parking fees, followed by
  - » smart growth strategies

- Traditional TDM strategies had a relatively smaller impact on emissions
  - » However, TDM only applied to work trips; other strategies applied to all trips

- Some areas may benefit substantially more from travel efficiency strategies than other areas
  - » Areas with high VMT growth, high drive alone rates, and low parking costs showed the greatest reductions
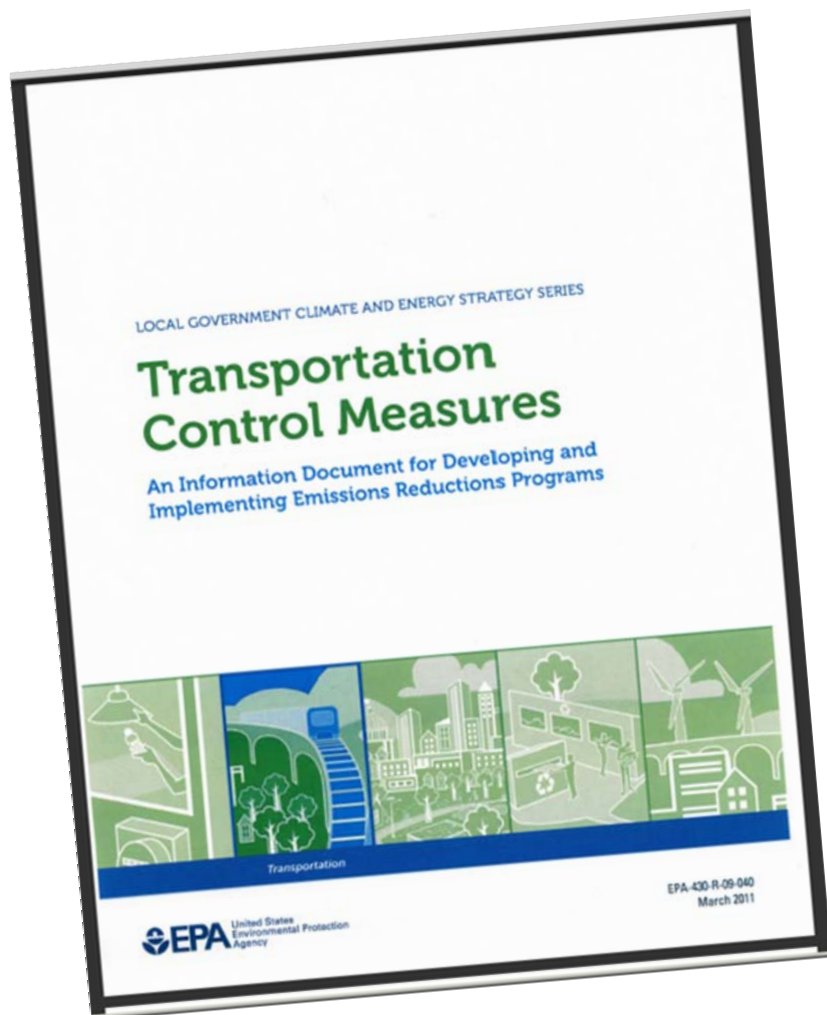
Conclusions

The **TEAM** approach:

- Demonstrates that travel efficiency strategies can result in substantial emission reductions
  - » Especially in high growth areas with long trip length and limited strategies currently in place

- Represents a unique procedure to estimate GHG emission reductions from travel efficiency strategies
  - » Available travel data and tools from current planning practice can support state and local GHG planning and initial strategy evaluation

  - » Provides a new method for local governments to assess multi-pollutant benefits of travel efficiency strategies

Future Follow-on Work

- Create state and local user manual to apply **TEAM** anywhere; manual to include:
  - » Information and data required
  - » Step-by-step procedures
  - » Considerations for assumptions and interpreting results
- Under consideration: apply **TEAM** approach to additional strategies, such as
  - » Intelligent transportation systems
  - » Speed limit controls
  - » Eco-driving

TCM Information Document

Transportation Control Measures

LOCAL GOVERNMENT CLIMATE AND ENERGY STRATEGY SERIES

An Information Document for Developing and Implementing Emissions Reductions Programs

- Provides information on how local governments have planned and adopted TCMs
- Overview of measures, benefits, costs, sources of funding, examples and case studies
- Available on the web:

www.epa.gov/otaq/stateresources/policy/430r09040.pdf