Overview of Performance Measures: CMAQ On-Road Mobile Emissions and Percent of Non-Single Occupancy Vehicle (Non-SOV) Travel

Cecilia Ho, Office of Natural Environment

Phoenix, AZ
September 14-15, 2017
Agenda

• Discussion of 2 Measures:
  o On-Road Mobile Source Emissions
  o Percent of Non-Single Occupancy Vehicle (Non-SOV) Travel

• Introduction and Overview

• Data Sources and Calculating the Measure

• Target Establishment and Reporting

• Other Related Requirements and Information

• Questions and Conclusions
Acronyms

- ACS: American Community Survey (US Census)
- CMAQ: Congestion Mitigation and Air Quality Improvement Program
- CO: Carbon Monoxide
- NAAQS: National Ambient Air Quality Standards
- NOx: Oxides of Nitrogen
- O₃: Ozone
- PM₂.₅,₁₀: Particulate Matter (2.5 or 10 micrometers or less in diameter)
- VOC: Volatile Organic Compound
National Performance Management Measure for CMAQ On-Road Mobile Emissions
Why a National Emissions Measure?

• Federal-aid highway program performance management established in 23 USC § 150 (as provided for under MAP-21) is expected to transform the program, including by a refocus on national goals

• 23 USC § 150 (c)(5) includes two measures related to the Congestion Mitigation & Air Quality Improvement (CMAQ) Program:
  o traffic congestion
  o on-road mobile source emissions

• 23 USC § 150 also requires States to establish performance targets for applicable measures, and to submit biennial performance reports
Summary of New 23 CFR Part 490

National Performance Management Measures

Subpart A: General Information (Target Establishment, Reporting, and NHPP and NHFP Significant Progress Determination)

Subpart B: Measures to Carry Out the Highway Safety Improvement Program (HSIP)

Subpart C: Measures for Assessing Pavement Condition

Subpart D: Measures for Assessing Bridge Condition

Subpart E: Measures to Assess Performance of the National Highway System (NHS)

Subpart F: Measure to Assess Freight Movement on the Interstate System

Subpart G: Measures to Assess the CMAQ Program – Traffic Congestion

Subpart H: Measure to Assess the CMAQ Program – On-Road Mobile Source Emissions
§ 490.101 & § 490.805: Definitions

• **On-road mobile source emissions:** Emissions created by all projects and sources financed with funds from 23 USC § 149 CMAQ Program.

• **Attainment Area:** As defined in 23 CFR 450.104, any geographic area in which levels of a given criteria air pollutant (e.g., ozone, carbon monoxide, PM$_{10}$, PM$_{2.5}$, and nitrogen dioxide) meet the health-based National Ambient Air Quality Standards (NAAQS) for that pollutant.

• **Nonattainment Area:** As defined in 23 CFR 450.104, any geographic region of the United States that EPA designates as a nonattainment area under section 107 of the Clean Air Act for any pollutants for which an NAAQS exists.

• **Maintenance Area:** As defined in 23 CFR 450.104, any geographic region of the United States that the Environmental Protection Agency (EPA) previously designated as a nonattainment area for one or more pollutants pursuant to the Clean Air Act Amendments of 1990, and subsequently predesignated as an attainment area subject to the requirement to develop a maintenance plan. For the purposes of the performance rule, areas that have completed the end of the 20-year maintenance period are excluded.
§ 490.101 & § 490.805: Definitions

- **National Ambient Air Quality Standard (NAAQS):** As defined in 23 CFR 450.104, those standards established pursuant to section 109 of the Clean Air Act (see 40 CFR Part 50).

- **Criteria Pollutant:** Any pollutant for which there is established a National Ambient Air Quality Standards (NAAQS) at 40 CFR part 50. The transportation-related criteria pollutants per 40 CFR 93.102(b)(1) are carbon monoxide, nitrogen dioxide, ozone, and particulate matter (PM$_{10}$ and PM$_{2.5}$).
§ 490.807: On-Road Mobile Source Emissions Measure for the CMAQ Program

<table>
<thead>
<tr>
<th>Measure Area</th>
<th>Performance Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure to Assess the CMAQ Program – On-Road Mobile Source Emissions (Subpart H)</td>
<td><strong>Emissions Measure:</strong> Total Emission Reductions for Carbon Monoxide (CO), Nitrogen Oxides (NOx), Volatile Organic Compounds (VOCs), Particulate Matter (PM$<em>{10}$ and PM$</em>{2.5}$) for CMAQ funded projects in designated nonattainment and maintenance areas</td>
</tr>
</tbody>
</table>

- The Total Emissions Reduction is the cumulative 2-year and 4-year reported emission reductions for:
  - all projects funded by CMAQ funds and
  - applicable criteria pollutants and precursors
Measures and Targets

<table>
<thead>
<tr>
<th>Applicable to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEASURE An expression based on a metric (where applicable) used to establish targets and to assess progress toward achieving said target</td>
</tr>
<tr>
<td>TARGET Quantifiable level of performance or condition, as a value for the measure, to be achieved within a time period required by FHWA</td>
</tr>
</tbody>
</table>

States report on progress towards target
§§ 490.105, 490.803, 490.809: Applicability

- $O_3$, CO, PM$_{10}$ and PM$_{2.5}$ nonattainment and maintenance areas
- Applicability Determination: one year before State DOT Baseline Performance Period Report due to FHWA
- Applicability Re-assessment: one year before State DOT Mid Performance Period Progress Report due to FHWA
§ 490.809 (c): Nonattainment and Maintenance Area Determinations

- § 490.809 (c)(1): These areas shall be identified based on the effective date of the Environmental Protection Agency’s (EPA) designation under the NAAQS in 40 CFR part 81
  - As of the date 1 year before the State DOT Baseline Performance Period Report is due to FHWA
    - If revision occurs before this date, total emissions reduction measure no longer applies
    - If revision occurs after this date, total emissions reduction measure still applies
§ 490.809 (c): Timeline

• § 490.809 (c)(2): The nonattainment and maintenance areas to which the total emissions reduction measure applies shall be revised if:
  o On the date 1 year before the State DOT Mid Performance Progress Report is due to FHWA, the area is no longer in nonattainment or maintenance for relevant pollutants
    ▪ If revision occurs before this date, total emissions reduction measure no longer applies
    ▪ If revision occurs after this date, total emissions reduction measure still applies
Relaxation of CMAQ Emissions Requirements for Maintenance Areas

- “Maintenance Area” definition revised to exclude any area that has completed its 20-year maintenance plan
- States and MPOs can request their areas to be excluded from the CMAQ performance requirements if they reach attainment status (or achieve their 20-year maintenance plan) on the date 1 year before the State DOT Mid Performance Progress Report is due to FHWA
Data Sources and Calculating the Emissions Measure
Subpart H: On-Road Mobile Source Emissions

• Measure: Total Emissions Reduction
• Calculation: Cumulative 2-year and 4-year Emission Reductions (kg/day) for CMAQ funded projects of reduced emissions for:
  o Nitrogen Oxides (NOx)
  o Volatile Organic Compounds (VOCs)
  o Carbon monoxide (CO)
  o Particulate Matter (PM$_{10}$ and PM$_{2.5}$)
### § 490.809 Data Requirements: Emission Reductions

<table>
<thead>
<tr>
<th>Relevant Data</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nonattainment or maintenance areas</td>
<td>• 40 CFR Part 81 or &lt;br&gt; • EPA Green Book*</td>
</tr>
<tr>
<td>• Applicable States and MPOs</td>
<td>• FHWA will post on website</td>
</tr>
<tr>
<td>• Emission reduction estimated for each CMAQ funded project by pollutant and precursor</td>
<td>• CMAQ Public Access System**</td>
</tr>
</tbody>
</table>

* **EPA Green Book:** Another data source to check an area’s nonattainment or maintenance status.

**Data Submittal:** State DOTs shall enter project information into the CMAQ project tracking system for each CMAQ project funded in the previous Federal fiscal year by March 1 of the following Federal fiscal year.
Public Access System Submittal Timeline

**Starting-point of On-Road Mobile Source Emissions Performance Period (Oct 1, 2017)**

- State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2018)

**Baseline Performance Period Report (Oct 1, 2018)**

- State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2019)

**Mid-Performance Period Report (Oct 1, 2020)**

- State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2020)

**End-Point of On-Road Mobile Source Emissions Performance Period (Oct 1, 2021)**

- State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2021)

**Full Performance Period Report (Oct 1, 2022)**

- State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2022)
Data Timeline for the 1st Performance Period

• Baseline Performance Period
  o Latest data collected*

• Mid Performance Period
  o Federal Fiscal Years 2018 and 2019
  o 2 years of data

• Full Performance Period
  o Federal Fiscal Years 2018 through 2021
  o 4 years of data

*Baseline data for the first performance period would include CMAQ projects from FY 2014-2017.
CMAQ Public Access System

• Visit https://fhwaapps.fhwa.dot.gov/cmaq_pub/ and navigate to the Report tab:
  o Reports
  o Project Information
    ▪ Project Year
    ▪ Project Reporting Category
  o Project Location
    ▪ Project State
    ▪ Project MPO
Emissions Measure Formula

\[ \text{Total Emission Reduction}_{p} = \sum_{i=1}^{T} \text{Daily Kilograms of Emission Reductions}_{p,i} \]

Where:

i = applicable projects reported in the CMAQ Public Access System for the first 2 Federal fiscal years of a performance period and for the entire performance period [§ 490.105(e)(4)(i)(B)]
**Emissions Measure Formula**

\[
\text{Total Emission Reduction}_p = \sum_{i=1}^{T} \text{Daily Kilograms of Emission Reductions}_{p,i}
\]

*Where:*

\( p = \text{criteria pollutant or applicable precursor: PM}_{2.5}, \ PM_{10}, \ CO, \ VOC, \text{ or NOx}; \)

\( \text{Daily Kilograms of Emission Reductions}_{p,i} = \text{total daily kilograms, to the nearest one thousandths, of reduced emissions for a criteria pollutant or an applicable precursor “p” in the in the first year the project is obligated} \)
Emissions Measure Formula

\[ Total \ Emission \ Reduction_p = \sum_{i=1}^{T} \text{Daily Kilograms of Emission Reductions}_{p,i} \]

Where:

\( T = \) total number of applicable projects reported to the CMAQ Public Access System for the first 2 Federal fiscal years of a performance period and for the entire performance period, [§490.105(e)(4)(i)(B)]

Total Emission Reduction\(_p\) = cumulative reductions in emissions over 2 and 4 Federal fiscal years, total daily kilograms, to the nearest one thousandths, of reduced emissions for criteria pollutant or precursor “p”
Knowledge Check: Which Pollutants Are to be Reported?

Emissions reductions need to be calculated for which of the following pollutants?

a) Carbon Dioxide (CO$_2$), Nitrogen Oxides (NOx), Sulfur Dioxide (SO$_2$), and Particulate Matter (PM$_{2.5}$ and PM$_{10}$)
b) Nitrogen Oxides (NOx), Volatile Organic Compounds (VOCs), Carbon Monoxide (CO), and Particulate Matter (PM$_{2.5}$ and PM$_{10}$)
c) Carbon Monoxide (CO), Total Hydrocarbons (THC), Hazardous Air Pollutants (HAPs), and Nitrogen Oxides (NOx)
d) Ozone (O$_3$), Carbon Monoxide (CO), and Particulate Matter (PM$_{2.5}$ and PM$_{10}$)
Knowledge Check: Calculating the Measure

What are the units of the on-road mobile source emissions measure?

a) Tons per year
b) Grams per mile
c) Kilograms per day
Knowledge Check: Baseline Performance Period

For what period are data for the on-road mobile source emissions measure to be included in the Full Performance Period Report? (for the 1st Performance Period)

a) Calendar Year 2018 Total Emissions Reductions
b) Calendar Years 2018 through 2019 Total Emission Reductions
c) Fiscal Years 2018 through 2021 Total Emissions Reductions
d) Fiscal Year 2021 Total Emissions Reductions
§ 490.811 Calculating the Emissions Measure

**Example Calculation**

<table>
<thead>
<tr>
<th>Project</th>
<th>Fiscal Year of CMAQ Obligation</th>
<th>NOx Benefit (kg/day)</th>
<th>VOC Benefit (kg/day)</th>
<th>CO Benefit (kg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ozone area transit</td>
<td>2018</td>
<td>10.5</td>
<td>7.83</td>
<td></td>
</tr>
<tr>
<td>2. Ozone area traffic flow improvement</td>
<td>2019</td>
<td>0.953</td>
<td>0.487</td>
<td></td>
</tr>
<tr>
<td>3. CO area bike/ped</td>
<td>2018</td>
<td></td>
<td></td>
<td>2.127</td>
</tr>
<tr>
<td>4. CO area traffic flow improvement</td>
<td>2019</td>
<td></td>
<td></td>
<td>2.335</td>
</tr>
<tr>
<td>5. CO area transit project</td>
<td>2020</td>
<td></td>
<td></td>
<td>49.9</td>
</tr>
</tbody>
</table>


**4-Year Total (2018-2021)** | 11.453 | 8.317 | 54.362
Target Establishment and Reporting
§ 490.105 Establishing Targets: State DOTs

• Must establish statewide 2-year and 4-year targets for each performance period
  o For all nonattainment and maintenance areas within the State boundary
  o For each applicable criteria pollutant and precursors

• Targets shall reflect the anticipated cumulative emissions reduction to be reported in the CMAQ Public Access System

• State may establish additional targets
  o Must report in the baseline performance period report and evaluate progress in subsequent reports
§ 490.811 Calculating the Emissions Measure

Example Calculation

<table>
<thead>
<tr>
<th>Project</th>
<th>Fiscal Year of CMAQ Obligation</th>
<th>NOx Benefit (kg/day)</th>
<th>VOC Benefit (kg/day)</th>
<th>CO Benefit (kg/day)</th>
<th>PM2.5 Benefit (kg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ozone area transit</td>
<td>2018</td>
<td>10.5</td>
<td>7.83</td>
<td>5.1</td>
<td>1.2</td>
</tr>
<tr>
<td>2. Ozone area traffic flow improvement</td>
<td>2019</td>
<td>0.953</td>
<td>0.487</td>
<td>0.25</td>
<td>1.3</td>
</tr>
<tr>
<td>3. CO area bike/ped</td>
<td>2018</td>
<td>4.5</td>
<td>1.03</td>
<td>2.127</td>
<td>0.93</td>
</tr>
<tr>
<td>4. CO area traffic flow improvement</td>
<td>2019</td>
<td>5.6</td>
<td>4.5</td>
<td>2.335</td>
<td>2.335</td>
</tr>
<tr>
<td>5. CO area transit project</td>
<td>2020</td>
<td>7.45</td>
<td>0.784</td>
<td>49.9</td>
<td>3.5</td>
</tr>
</tbody>
</table>

**Measure Calculation**

<table>
<thead>
<tr>
<th></th>
<th>2-Year Total (2018-2019)</th>
<th>4-Year Total (2018-2021)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx Benefit</td>
<td>21.553</td>
<td>29.003</td>
</tr>
<tr>
<td>VOC Benefit</td>
<td>13.847</td>
<td>14.631</td>
</tr>
<tr>
<td>CO Benefit</td>
<td>9.812</td>
<td>59.712</td>
</tr>
<tr>
<td>PM2.5 Benefit</td>
<td>5.765</td>
<td>9.265</td>
</tr>
</tbody>
</table>
State DOT Target Setting: Timeline

• First set of targets within 1 year of the effective date of the final rule – May 20, 2018 [23 USC 150(d)]
• Targets must be reported to FHWA by Oct. 1, 2018
• Adjustment of 4-year target allowed at the midpoint of performance period
Applicability Determinations for State Targets

- Nonattainment and maintenance areas for an applicable criteria pollutant effective as of 1 year before the State Baseline Performance Period Report is due
- Shall be revised if the area is no longer nonattainment or maintenance as of 1 year before the State Mid Performance Period Report is due
  - States with no nonattainment and maintenance areas at the Mid Performance Period are not required to meet target setting and reporting requirements for the rest of the performance period
§ 490.105: Establishing Targets: MPOs

• An MPO shall establish quantifiable targets for each applicable pollutant and precursors for the nonattainment or maintenance areas within the Metropolitan Planning Area boundary.
• Targets shall reflect the anticipated cumulative emission reduction to be reported in the CMAQ Public Access System.
MPO Targets

• An MPO must develop both 2-year and 4-year quantifiable targets if any part of a designated nonattainment and maintenance area overlaps the boundary of an urbanized population 1 million* or more
• Otherwise, only 4-year targets are needed

* Based on U.S. Census’ most recent published annual population estimates available one year before the State Baseline Performance Period Report is due
State DOT Target Adjustment: MPO Impact

- If State(s) adjust 4-year target(s) in the Mid Performance period, and the MPO* established a target to support the State target(s)
  - The MPO shall report to State(s) within 180 days that it:
    - Agrees to plan a program of projects to contribute to the State’s target
    - or
    - Commits to a new quantifiable target

* Only applies to MPOs with 1 million or less population
Target Adjustment

• Adjustment of quantifiable targets in a manner that is collectively developed, documented and mutually agreed upon by the State DOT and the MPO [23 CFR 490.105(f)(8)]
Performance Period & State DOT Biennial Performance Reporting Timeline

1st Performance Period for Emission Reduction Measure

1st Performance Period for All Other Measures

Baseline Performance Period Report (due Oct 1, 2018)

Mid Performance Period Progress Report (due Oct 1, 2020)

2nd Performance Period for Emission Reduction Measure

2nd Performance Period for All Other Measures

Full Performance Period Progress Report (due Oct 1, 2022)

Baseline Performance Period Report (due Oct 1, 2022)

Mid Performance Period Progress Report (due Oct 1, 2024)

Full Performance Period Progress Report (due Oct 1, 2026)
§ 490.107 Target Reporting*: State DOTs

- **Baseline Performance Period Report includes:**
  - Baseline condition/performance
  - 2- and 4-year targets
  - Nonattainment and maintenance area boundaries
  - MPO CMAQ performance plan, where applicable

- **Mid Performance Period Progress Report includes:**
  - 2-year condition/performance
  - 2-year progress in achieving performance targets
  - Adjusted 4-year targets (optional)
  - MPO CMAQ performance plan, where applicable

- **Full Performance Period Progress Report includes:**
  - 4-year condition/performance
  - 4-year progress in achieving performance targets
  - MPO CMAQ performance plan, where applicable

*Must use an electronic template provided by FHWA*
§ 490.107 Target Reporting: MPOs

- Targets to respective State DOT(s) in a manner that is documented and mutually agreed upon by both parties
- Baseline level and progress toward targets in Metropolitan Transportation Plan
- CMAQ Performance Plan in State Biennial Performance Reports (for applicable MPOs only)
§ 490.107 CMAQ Performance Plan

- MPOs will provide CMAQ Performance Plans to State DOTs
  - The CMAQ Performance Plan will be attached to the Biennial Performance Reports from the State DOTs to FHWA
- FHWA is developing guidance for developing CMAQ Performance Plans
  - FHWA will post the list of MPOs for which the CMAQ Performance Plan is applicable/required
§ 490.107 CMAQ Performance Plan

- CMAQ performance plan includes CMAQ congestion and total emissions measures:
  - Baseline Performance Period Report includes:
    - Baseline condition/performance
    - Targets (2-year and 4-year Targets)
    - Description of projects for funding and the projects will contribute to achieving targets
  - Mid Performance Period Report includes:
    - 2-year condition/performance,
    - 2-year progress assessment in achieving performance targets
    - If applicable, adjusted 4-year target
    - Update description of projects and their contribution to achieving the 4-year target
  - Full Performance Period Progress Report includes:
    - 4 year condition/performance
    - 4-year progress assessment in achieving performance 4-year targets
Knowledge Check: State DOT Target Setting

A State DOT needs to set quantifiable targets for what time periods in the Baseline Performance Report?

a) 5-year and 10-year targets
b) 2-year and 4-year targets
c) 4-year targets
d) 2-year targets
Knowledge Check: MPO Target Setting

True or False: MPOs must always set 2-year and 4-year targets for Total Emissions Reductions.

False

1) If you are in attainment status one year before State DOT Baseline Performance Period Report is due to FHWA
2) If any part of a designated nonattainment and maintenance area overlaps the boundary of an urbanized population 1 million* or more, otherwise set only 4 year targets

*Based on U.S. Census’ most recent published annual population estimates available one year before the State Baseline Performance Period Report is due
Other Related Requirements and Information
§ 490.109 Significant Progress Determination

• No significant progress determination required for the CMAQ On-Road Mobile Source Emissions measure
(1) In general.— Each MPO serving a TMA with a population over 1,000,000 people representing a nonattainment or maintenance area shall develop a performance plan that—

- (A) includes an area baseline level for traffic congestion and on-road mobile source emissions for which the area is in nonattainment or maintenance;
- (B) describes progress made in achieving the performance targets described in section 150(d); and
- (C) includes a description of projects identified for funding under this section and how such projects will contribute to achieving emission and traffic congestion reduction targets.

(2) Updated plans.— Performance plans shall be updated biennially and include a separate report that assesses the progress of the program of projects under the previous plan in achieving the air quality and traffic congestion targets of the previous plan.
Questions?
Contacts

For questions or more information, please contact:

FHWA Office of Natural Environment:

Cecilia Ho, Cecilia.ho@dot.gov, 202-366-9862
Karen Perritt, Karen.Perritt@dot.gov, 202-366-9066
National Performance Management Measure for Traffic Congestion: Percent of Non-Single Occupancy Vehicle (Non-SOV) Travel
Agenda

• What We’ll Cover:
  o Precise step-by-step procedures for calculating one of the CMAQ congestion measures
    ▪ Percent of Non-SOV travel
  o Definitions
  o Applicability
  o Data requirements
  o Calculation methods
**Subpart G Measures**

- **PHED Measure:** Annual Hours of Peak Hour Excessive Delay (PHED) Per Capita
- **Non-SOV Travel Measure:** Percent of Non-Single Occupancy Vehicle (SOV) Travel
Definitions

• **American Community Survey (ACS)** is a national level ongoing survey from the U.S. Census Bureau that includes data on jobs, occupations, educational attainment, and transportation patterns.

• **Highway Performance Monitoring System (HPMS)** is a national level highway information system that includes data on the extent, condition, performance, use, and operating characteristics of the Nation’s highways.
§ 490.703 Applicability: PHED and Non-SOV Travel Measures

- Areas with the following criteria:
  - **Area Characteristics**
    - Designated urbanized area,
    - Contains NHS mileage, **AND**
    - Population over 200,000*
  - **Nonattainment or Maintenance Area**
    - ozone (O₃),
    - carbon monoxide (CO), **OR**
    - particulate matter (PM₁₀ or PM₂.₅)

- All MPOs and State DOTs that have NHS mileage that overlaps with an applicable urbanized area must coordinate on a **single, unified target** and report on the measures

* For the first performance period only, applies to urbanized areas with populations over 1 million
§ 490.707 Non-SOV Travel Measure

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urbanized Area</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Measure</strong></td>
<td><strong>Target</strong></td>
</tr>
<tr>
<td>Percent of non-SOV travel for an entire urbanized area</td>
<td>% of non-SOV travel in each urbanized area</td>
</tr>
<tr>
<td>States report on progress towards target</td>
<td></td>
</tr>
</tbody>
</table>
§ 490.709 Data Requirements for Non-SOV Travel Measure

• Based on person travel
• Requires estimates of the number of people traveling by single occupancy and non-single occupancy vehicles
• Computed to 0.1%
• Can be developed from one of three data sources and methods
  A. American Community Survey (ACS)
  B. Local travel survey
  C. System use measurement
§ 490.709 Data Requirements for Non-SOV Travel Measure

<table>
<thead>
<tr>
<th>Option</th>
<th>Relevant Data</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method A</td>
<td>• 5-Year Estimate for “Commuting to Work” totaled by mode, as of August 15 the year Performance Report is due</td>
<td>• American Community Survey (Table DP03)</td>
</tr>
<tr>
<td>Method B</td>
<td>• Travel mode choices gathered within 2 years of the start of Performance Period</td>
<td>• Local Survey</td>
</tr>
<tr>
<td>Method C</td>
<td>• Sample or continuous count of travelers using different modes</td>
<td>• Modal Counts</td>
</tr>
</tbody>
</table>
§ 490.713 Non-SOV Travel Measure

Based on one of three methods

A. 100% - SOV% travel
B. Results of local survey
C. Annual volume of non-SOV

\[ \frac{\text{Total annual volume}}{\text{Annual volume of non-SOV}} \]
Method A: American Community Survey (Default)

• Use “5 Year Estimate” DP03 Table
  o “Commuting to Work” section
  o “Estimate” column

\[
\% \text{ nonSOV Travel} = 100\% - \% \text{ SOV Travel}
\]

• Based on work trips only
• Assumes all other modes, including telecommuting, are part of non-SOV travel
American Community Survey

https://www.census.gov/programs-surveys/acs/

Then go to:

• Data>Data Tables and Tools>Data Profiles
• Select State from drop-down menu, then Get Data Profile>Economic Characteristics
American Community Survey

Data Profiles

Data Profiles have the most frequently requested social, economic, housing, and demographic data. Each of these four subject areas is a separate data profile. The data profiles summarize the data for a single geographic area, both numbers and percent, to cover the most basic data on all topics.

2015  2014  2013  2012

2011 - 2015 ACS 5-Year Data Profiles

United States
Social Characteristics — includes Education, Marital Status, Relationships, Fertility, Grandparents...
Economic Characteristics — includes Income, Employment, Occupation, Commuting to Work...
Housing Characteristics — includes Occupancy and Structure, Housing Value and Costs, Utilities...
Demographic Characteristics — includes Sex and Age, Race, Hispanic Origin, Housing Units...

*All links go to American FactFinder

Choose your State, County, or Place

Select a state to begin:

You have selected:

Refine your selection:
- County
- Place

Select County/Place:

Get Data Profile  Clear Selections
American Community Survey

Choose your State, County, or Place

Select a state to begin:
Tennessee

You have selected:
Tennessee

Refine your selection:
- County
- Place

Select County/Place:

Get Data Profile  Clear Selections

Tennessee

Social Characteristics — includes Education, Marital Status, Relationships, Fertility, Grandparents...
Economic Characteristics — includes Income, Employment, Occupation, Commuting to Work...
Housing Characteristics — includes Occupancy and Structure, Housing Value and Costs, Utilities...
Demographic Characteristics — includes Sex and Age, Race, Hispanic Origin, Housing Units...

For Data Profiles for additional geographies, search on American FactFinder:
https://factfinder.census.gov/bkmk/navigation/1.0/en/d_dataset:ACS_15_5YR/d_product_type:DATA_PROFILE/
## American Community Survey, Table DP03

<table>
<thead>
<tr>
<th>Subject</th>
<th>Estimate</th>
<th>Margin of Error</th>
<th>Percent</th>
<th>Percent Margin of Error</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMPLOYMENT STATUS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population 16 years and over</td>
<td>464,407</td>
<td>+/-2,568</td>
<td>464,407</td>
<td>(X)</td>
</tr>
<tr>
<td>In labor force</td>
<td>291,336</td>
<td>+/-2,695</td>
<td>62.7%</td>
<td>+/-0.4</td>
</tr>
<tr>
<td>Civilian labor force</td>
<td>290,985</td>
<td>+/-2,676</td>
<td>62.7%</td>
<td>+/-0.4</td>
</tr>
<tr>
<td>Employed</td>
<td>271,304</td>
<td>+/-2,487</td>
<td>58.4%</td>
<td>+/-0.4</td>
</tr>
<tr>
<td>Unemployed</td>
<td>19,631</td>
<td>+/-1,118</td>
<td>4.2%</td>
<td>+/-0.2</td>
</tr>
<tr>
<td>Armed Forces</td>
<td>351</td>
<td>+/-135</td>
<td>0.1%</td>
<td>+/-0.1</td>
</tr>
<tr>
<td>Not in labor force</td>
<td>173,071</td>
<td>+/-2,177</td>
<td>37.3%</td>
<td>+/-0.4</td>
</tr>
<tr>
<td>Civilian labor force</td>
<td>290,985</td>
<td>+/-2,676</td>
<td>290,985</td>
<td>(X)</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>(X)</td>
<td>(X)</td>
<td>0.0%</td>
<td>+/-0.4</td>
</tr>
<tr>
<td>Females 16 years and over</td>
<td>242,293</td>
<td>+/-1,506</td>
<td>242,293</td>
<td>(X)</td>
</tr>
<tr>
<td>In labor force</td>
<td>137,896</td>
<td>+/-1,763</td>
<td>56.9%</td>
<td>+/-0.6</td>
</tr>
<tr>
<td>Civilian labor force</td>
<td>137,853</td>
<td>+/-1,757</td>
<td>56.9%</td>
<td>+/-0.6</td>
</tr>
<tr>
<td>Employed</td>
<td>120,980</td>
<td>+/-1,754</td>
<td>55.2%</td>
<td>+/-0.6</td>
</tr>
<tr>
<td>Own children of the householder under 6 years</td>
<td>38,920</td>
<td>+/-563</td>
<td>38,920</td>
<td>(X)</td>
</tr>
<tr>
<td>All parents in family in labor force</td>
<td>24,640</td>
<td>+/-965</td>
<td>63.3%</td>
<td>+/-2.1</td>
</tr>
<tr>
<td>Own children of the householder 6 to 17 years</td>
<td>78,588</td>
<td>+/-1,396</td>
<td>78,588</td>
<td>(X)</td>
</tr>
<tr>
<td>All parents in family in labor force</td>
<td>54,172</td>
<td>+/-1,730</td>
<td>68.9%</td>
<td>+/-1.7</td>
</tr>
<tr>
<td><strong>COMMUTING TO WORK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers 16 years and over</td>
<td>266,139</td>
<td>+/-2,424</td>
<td>266,139</td>
<td>(X)</td>
</tr>
<tr>
<td>Car, truck, or van -- drove alone</td>
<td>225,588</td>
<td>+/-2,299</td>
<td>84.7%</td>
<td>+/-0.5</td>
</tr>
<tr>
<td>Car, truck, or van -- carpooled</td>
<td>22,049</td>
<td>+/-1,141</td>
<td>8.3%</td>
<td>+/-0.4</td>
</tr>
<tr>
<td>Public transportation (excluding taxicab)</td>
<td>1,886</td>
<td>+/-334</td>
<td>0.7%</td>
<td>+/-0.1</td>
</tr>
<tr>
<td>Walked</td>
<td>3,611</td>
<td>+/-448</td>
<td>1.4%</td>
<td>+/-0.2</td>
</tr>
<tr>
<td>Other means</td>
<td>2,777</td>
<td>+/-344</td>
<td>1.0%</td>
<td>+/-0.1</td>
</tr>
<tr>
<td>Worked at home</td>
<td>10,251</td>
<td>+/-776</td>
<td>3.9%</td>
<td>+/-0.3</td>
</tr>
<tr>
<td>Mean travel time to work (minutes)</td>
<td>21.7</td>
<td>+/-0.3</td>
<td>(X)</td>
<td>(X)</td>
</tr>
</tbody>
</table>
Method B: Local Travel Survey

• % non-SOV travel is that travel that is not occurring by driving alone in a motorized vehicle, including telecommuting
• May be for work trips or all trips
• Needs to have been conducted as recently as 2 years prior to the reporting period
Method C: System Use Measurement

- Based on counts of travelers
- Sample or continuous methods can be used

\[
\% \text{ nonSOV travel} = 100 \times \left( \frac{\text{Volume}_{\text{nonSOV}}}{\text{Volume}_{\text{nonSOV}} + \text{Volume}_{\text{SOV}}} \right)
\]

\(\text{Volume}_{\text{SOV}}\) = annual person volume of travelers making trips by driving alone
**Method C: System Use Measurement**

\[ \text{Volume}_{\text{nonSOV}} = \text{annual volume of person travel by modes other than driving alone} \]

\[ = \sum_{m=1}^{t} \text{Volume}_m \]

\(m = \text{travel mode, SOV travel excluded}\)

\(\text{Volume} = \text{annual volume of person travel for mode} \ m\)

\(t = \text{total number of non-SOV modes}\)
Example: Method A (ACS Data)

- Following the previous instructions for accessing ACS data, we have found Table DP03 for Detroit

<table>
<thead>
<tr>
<th>COMMUTING TO WORK</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers 16 years and over</td>
<td>1,602,992</td>
</tr>
<tr>
<td>Car, truck, or van -- drove alone</td>
<td>1,346,658</td>
</tr>
<tr>
<td>Car, truck, or van -- carpooled</td>
<td>136,483</td>
</tr>
<tr>
<td>Public transportation (excluding taxicab)</td>
<td>27,819</td>
</tr>
<tr>
<td>Walked</td>
<td>22,493</td>
</tr>
<tr>
<td>Other means</td>
<td>18,188</td>
</tr>
<tr>
<td>Worked at home</td>
<td>51,351</td>
</tr>
<tr>
<td>Mean travel time to work (minutes)</td>
<td>25.9</td>
</tr>
</tbody>
</table>
Example: Method A (ACS Data)

\[
\% \text{ SOV Travel} = \frac{\text{Workers who drove alone}}{\text{Total workers}} = \frac{1,346,658}{1,602,992} = 84.0\%
\]

\[
\% \text{ NonSOV Travel} = 100\% - 84.0\% = 16.0\%
\]
Contacts

For questions or more information, please contact:

FHWA Office of Operations:

Rich Taylor, rich.taylor@dot.gov, 202-366-1327
Questions?