TRANSPORTATION CONFORMITY OVERVIEW TRAINING

Prepared for the Texas Department of Transportation
Revised March 2016

Training Objectives

Understand the Following:

- *Why is air quality relevant to transportation?*
- *What is the regulatory framework governing air quality and designation of nonattainment areas?*
- *What actions do nonattainment areas need to take to improve air quality?*
- *How does this apply to the transportation sector and to TxDOT and its partner agencies?*

Overview of the Problem: Transportation, Air Quality & Public Health

- Traffic-related emissions are a major contributor to ambient air pollution
- Air pollution causes 200,000 early deaths each year in the U.S., of which **53,000** can be attributed to contributions of road transportation emissions.

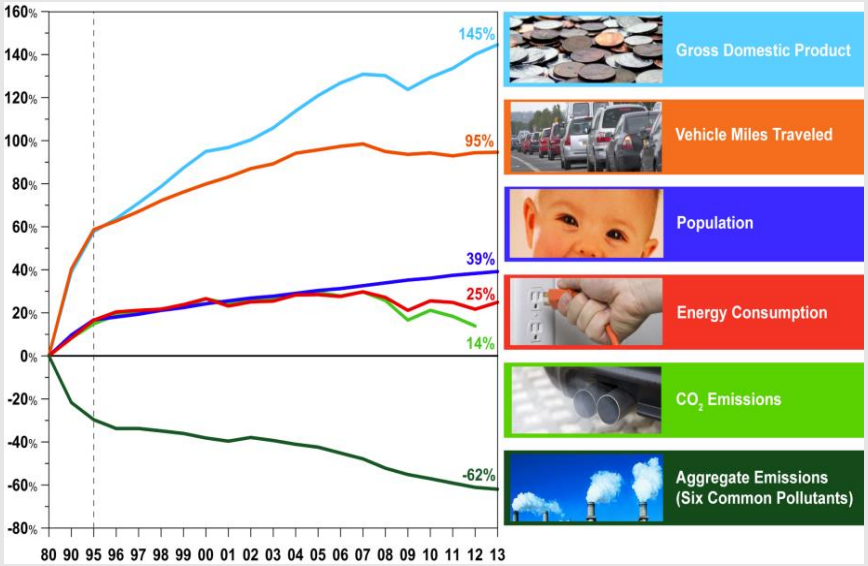
NO_x
- Irritates airways, especially lungs.

O_3
- Triggers reactions in people who have asthma.

VOCs
- Triggers conjunctival irritation, nose and throat discomfort, cancers, etc.

CO
- Decreases the ability of your blood to carry oxygen

PM
- Aggravates symptoms in individuals who already suffer from respiratory or cardiovascular diseases.



Source: http://www.epa.gov/airtrends/aqtrends.html#comparison

Training Outline

Federal Air Quality Regulations

State Implementation Plan (SIP)

Transportation Conformity

❑ Section 1.

FEDERAL AIR QUALITY REGULATIONS

Outline for Section 1: Federal Air Quality Regulations

- Clean Air Act and the National Ambient Air Quality Standards (NAAQS)
- Criteria pollutants, air toxics, and greenhouse gases.
- Sources of emissions, including on-road mobile source emissions
- Air quality monitoring
- Process of designating nonattainment areas
- Texas nonattainment areas and status

Clean Air Act

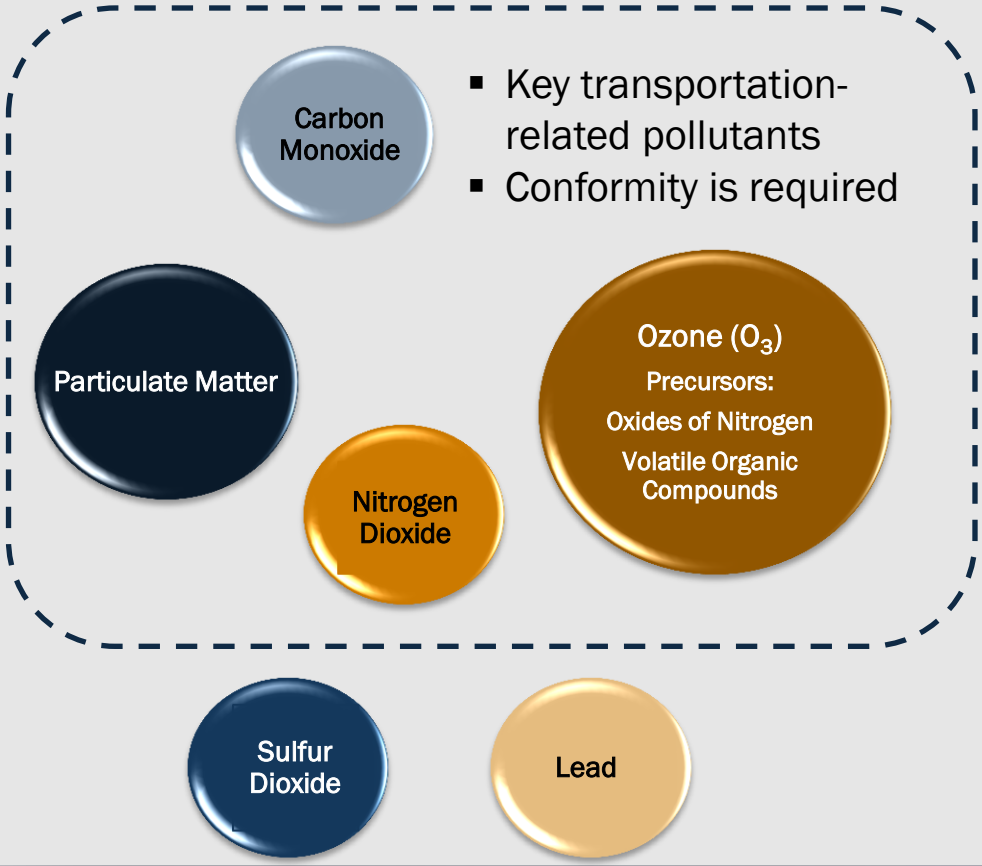
- Clean Air Act (CAA), 1970
  - Established National Ambient Air Quality Standards (NAAQS) and six criteria pollutants
  - Established requirements for State Implementation Plan (SIP)
- CAA Amendments, 1977
  - Introduced Transportation Conformity
- CAA Amendments, 1990
  - Current Legal authority
  - Expanded Transportation Conformity Provisions
    - Identified the actions states/MPOs must take to reduce emissions from on-road mobile sources in nonattainment/maintenance areas
  - Established 5-year NAAQS review period

National Ambient Air Quality Standards (NAAQS)

- Under 40 CFR Part 50, CAA 1970
- National Standards for six principal pollutants (criteria pollutants) considered harmful to public health and the environment.
- NAAQS is developed into two types:
  - Primary standards: To protect human health
  - Secondary standards: To protect public welfare

Criteria Pollutants

Six common air pollutants that are regulated under CAA through NAAQS.



- Ozone (O_3)
  - *Precursors – Oxides of Nitrogen (Nox) and Volatile Organic Compounds (VOCs)*
  - *Formed by precursors reacting in presence of sunlight*
- Nitrogen Dioxide (NO_2)
- Carbon Monoxide (CO)
- Particulate Matter (PM_{10}, $PM_{2.5}$)
- Lead (Pb)
- Sulfur Dioxide (SO_2)

Current NAAQS for Criteria Pollutants

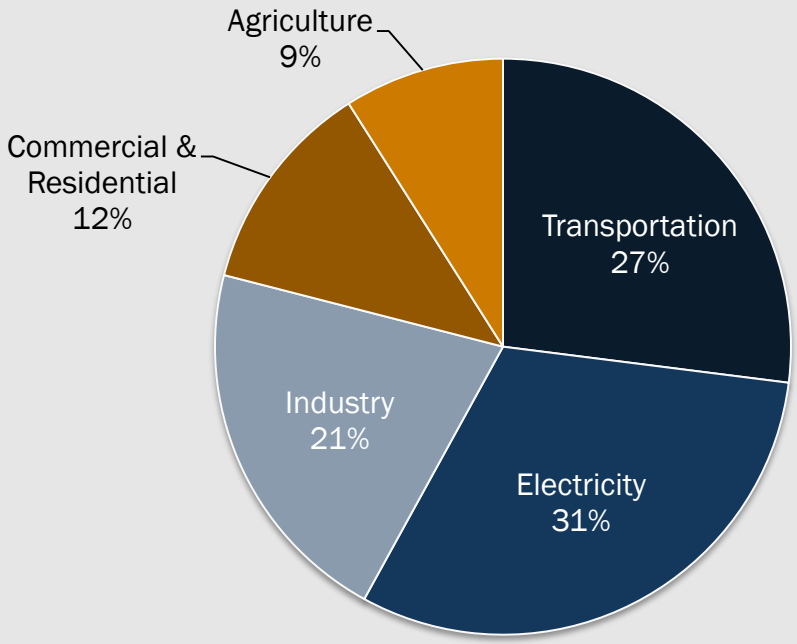
Pollutant/Final Rule		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour 1-hour	9 ppm 35 ppm	Not to be exceeded more than once per year
Lead [73 FR 66964, Nov 12, 2008]		Primary and Secondary	Rolling 3 month average	0.15 $\mu g/m^3$ (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		Primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	Annual	53 ppb (2)	Annual Mean
Ozone [80 FR 65292 Oct 26, 2015]		Primary and Secondary	8-hour	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution Dec 14, 2012	$PM_{2.5}$	Primary	Annual	12 $\mu g/m^3$	annual mean, averaged over 3 years
		Secondary	Annual	15 $\mu g/m^3$	annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010]		Primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[38 FR 25678, Sept 14, 1973]		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Mobile Source Air Toxics (MSATs)

- Compounds emitted from highway vehicles or non-road equipment
  - Examples: Benzene, Formaldehyde, Acetaldehyde, 1,3-Butadiene, etc.
  - Exposure to MSATs can cause cancer or other serious health and environmental effects.
- All are associated with transportation
- No applicable NAAQS – addressed through FHWA Interim Guidance for NEPA Analysis

Greenhouse Gases

- Gases that trap heat in the atmosphere and cause global climate change
- Transportation accounts for 27% of US GHG emissions
- Carbon dioxide (CO_2) is the primary GHG from transportation. Others include methane, nitrous oxide, etc

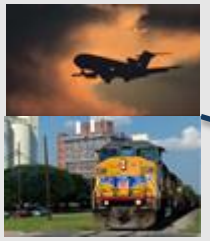


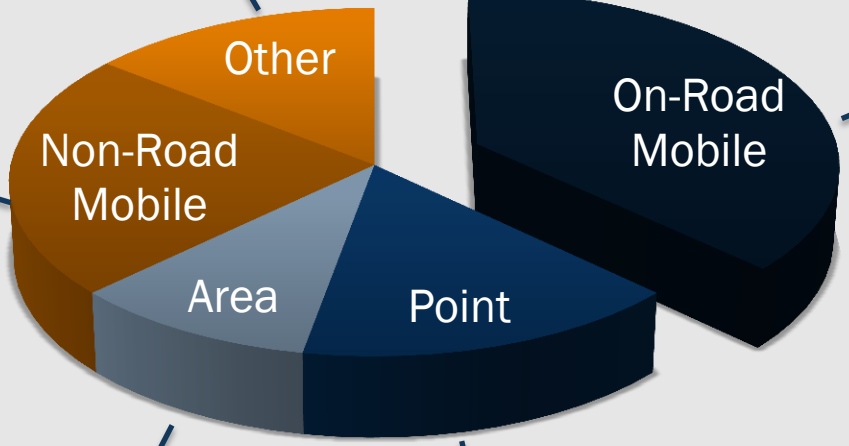
Source:
https://www3.epa.gov/climatechange/ghgemissions/sources.html

Emission Sources

Emissions from biogenic source, e.g., crops, lawn grass, and trees

Emissions from vehicles or equipment that are not operated on roads or highways





Emissions from on-road vehicles burning fuel

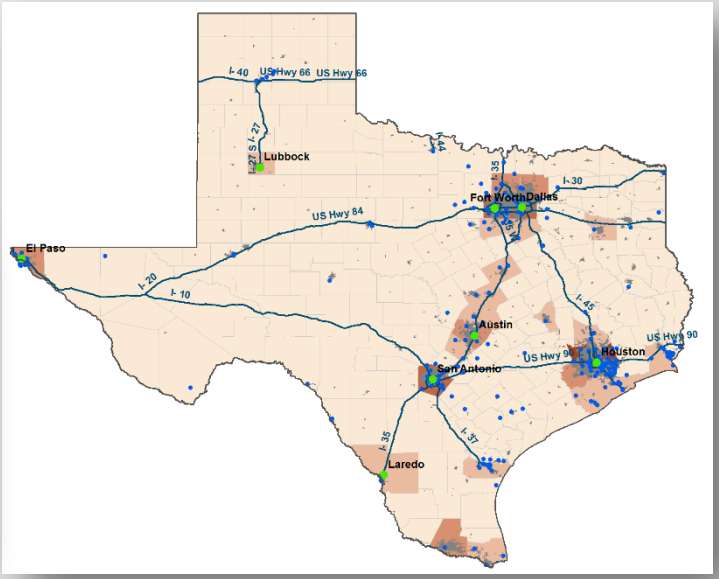
Regulated as part of **Transportation Conformity**

Emissions from small stationary and non-transportation pollution sources

Emissions collected annually from fixed or large facilities

Air Quality Monitoring

- Required by Federal regulations (40 CFR Part 58)
- Evaluate and record ambient conditions
- Collect air quality data that can be compared to NAAQS
- Provide basis for area designations and conformity analysis
- In Texas, monitoring is done by TCEQ



Air Quality Area Designations

- A designation is the term EPA uses to describe the air quality in a given area for any of six criteria pollutants, as compared as NAAQS.
- CAA requires EPA to designate areas as "attainment" (meeting), "nonattainment" (not meeting), or "unclassifiable" (insufficient data) after monitoring data is collected.
- Once nonattainment designations take effect, the state and local governments have 3 years to make plans outlining how areas will attain and maintain NAAQS by reducing emissions.

Air Quality Area Designations

Attainment	Maintenance	Nonattainment
Meet all NAAQS 3-years data are used to determine attainment status Conformity requirement: None	Meet all NAAQS, but previously violated; Must demonstrate maintenance of attainment status for 20-year period Conformity requirement: Air Quality Planning must be integrated SIP	Does not meet NAAQS E.g.: 8-hr Ozone 3-year average of annual 4th-highest daily maximum 8-hr average ozone concentrations measured at each monitor within an area must not exceed NAAQS Conformity requirement: Air Quality Planning must be integrated SIP

For Ozone, the total concentrations based on 8-hour average above the NAAQS can be classified into:

Extreme , Severe 17, Severe 15, Serious, Moderate, and Marginal

For Carbon Monoxide, the total concentrations are classified into:

Serious, Moderate

New or Revised NAAQS

- When any of the NAAQS are revised, new area designations are required, along with a new SIP or a partial SIP revision
- States and EPA must undertake specific obligations to ensure the new/revised NAAQS are met
  - Within 2 years: Area Designations required
  - Within 3 years: State Implementation Plans need to be submitted
  - Within 18-36 months after Designations: Due dates for Nonattainment area SIPs

Texas Nonattainment Areas and Status

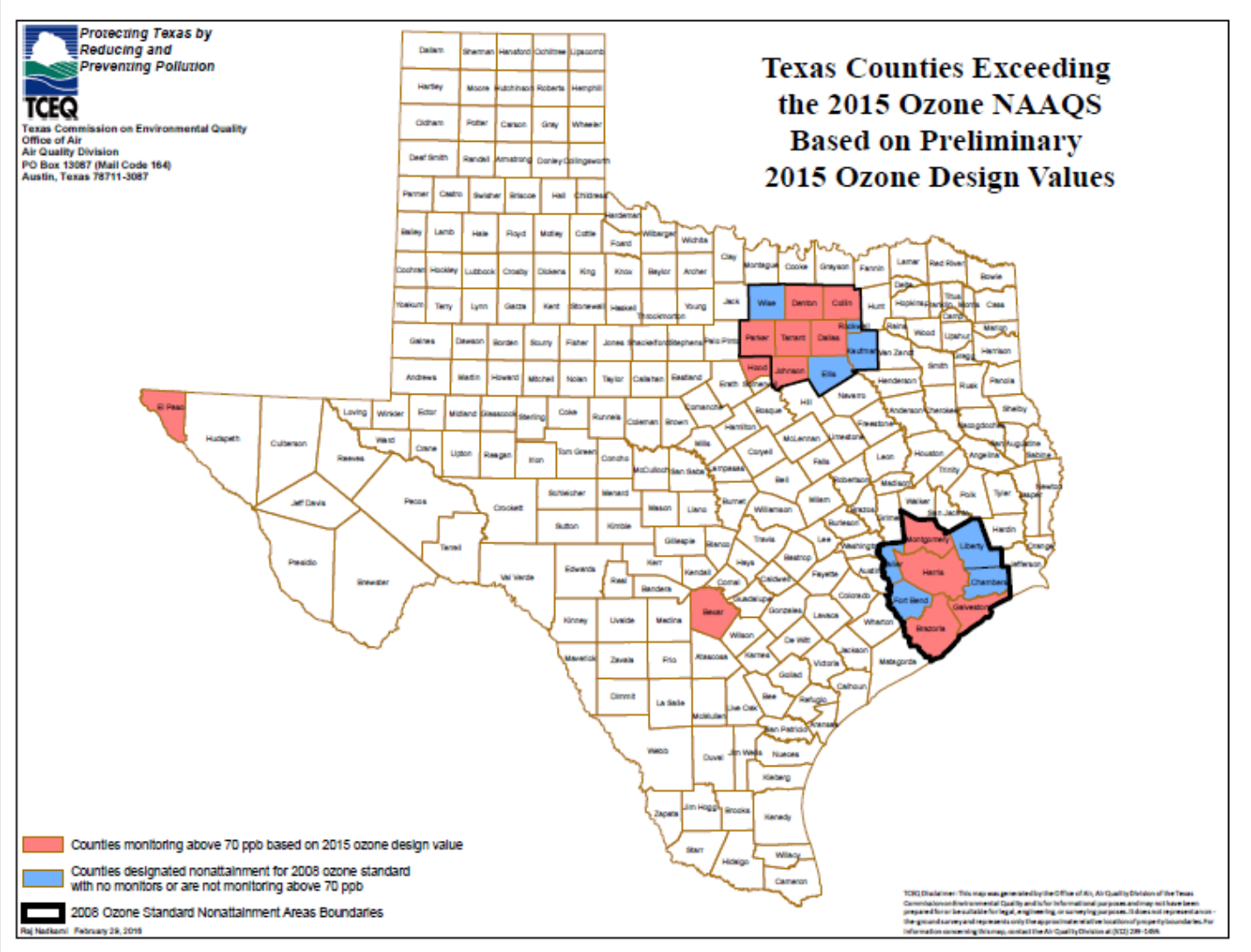
Region	Counties	Pollutant	Status
Houston-Galveston-Brazoria	Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller	8-hr Ozone (2008)	Marginal
Dallas-Fort Worth*	Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, Wise	8-hr Ozone (2008)	Moderate
El Paso	El Paso	PM-10	Moderate
El Paso	El Paso	CO	Attainment Maintenance

** Collin County is also in nonattainment for Lead, but conformity does not apply (not a transportation-related pollutant)*

Impact of New 2015 Ozone Standard

- On October 1, 2015, EPA revised the Ozone NAAQS from the existing 2008 standard of 75 ppb to 70 ppb
- Proposed designations under the new standard due in October 2016
- Potential state designation recommendations for public comment currently list 21 counties in four areas for designation as nonattainment:
  - Bexar, Brazoria, Chambers, Collin, Dallas, Denton, El Paso, Ellis, Fort Bend, Galveston, Harris, Hood, Johnson, Kaufman, Liberty, Montgomery, Parker, Rockwall, Tarrant, Waller, Wise

Texas Counties Exceeding the 2015 Ozone NAAQS



Conclusions

- Air pollutant emissions come from various sources, and adversely impact human health
  - Transportation is a major source
- CAA provides a legal framework for addressing air quality and public health
  - Authorizes EPA to set the NAAQS
- Under NAAQS, areas are designated into different categories based on state air monitoring data
- Areas in violation of the NAAQS (nonattainment areas) must adhere to specific provisions
  - This may include a State Implementation Plan (SIP) and transportation conformity requirements

❑ Section 2.

STATE IMPLEMENTATION PLAN

Outline for Section 2: State Implementation Plan

- Overview of the State Implementation Plan (SIP)
  - Requirements
  - Types
- Significance of SIP to transportation
  - Conformity and the Motor Vehicle Emissions Budget (MVEB)
  - Control Strategies and Transportation Control Measures (TCMs)

Overview of State Implementation Plan

- **Definition**
  - State air quality plan for nonattainment/maintenance areas to meet/continue to meet the NAAQS. Required per the CAA.
- **Purpose of the SIP**
  - Eliminate/reduce violations of the NAAQS
  - Expedite attainment of the NAAQS
- **In Texas**
  - Texas Commission on Environmental Quality (TCEQ) is responsible for the SIP
  - Set of plans, procedures, and strategies developed by TCEQ as state regulations to demonstrate how Texas is going to attain NAAQS in nonattainment and maintenance areas

Overview of State Implementation Plan

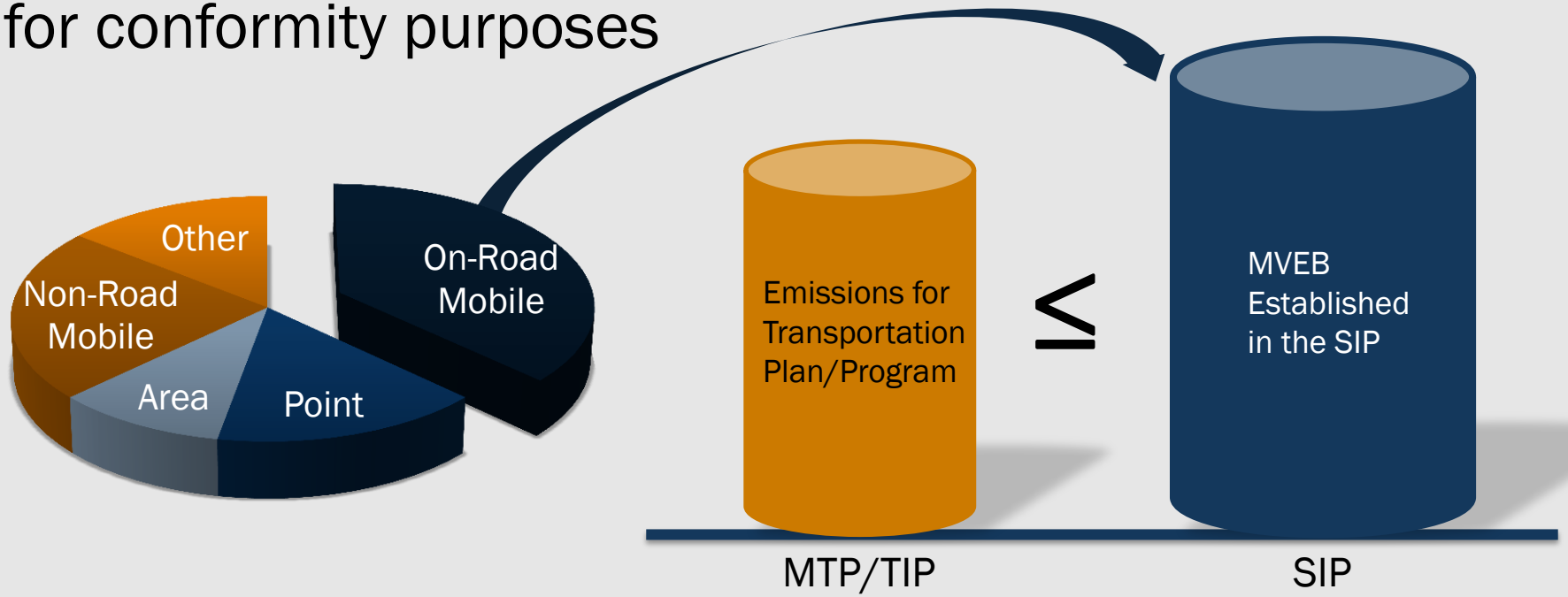
- **Facts about SIP :**
  - —Legal and federally enforceable
  - —Collaborative public process
  - —Signed by the Governor
  - —Adopted by the State
  - —Approved by EPA
  - —Identifies control strategies to attain NAAQS
  - —Addresses point, mobile, and area sources

SIP Types and Requirements

- SIP types and requirements vary based on pollutant type and nonattainment classification (severity)
- Types of SIPs relevant to transportation:
  - Control strategy SIPs
    - Reasonable Further Progress
    - Attainment Demonstration
  - Maintenance Plans
  - Conformity SIPs

SIP, Transportation Conformity and the MVEB

- All federally funded transportation projects/plans must conform to the SIP, which is determined through the transportation conformity process.
- SIP sets the motor vehicle emissions budget (MVEB) for conformity purposes



SIP, Transportation Conformity and the MVEB

Definition of the Motor Vehicle Emissions Budget:

> "...*portion of the total allowable emissions defined in the submitted or approved control strategy SIP revision or maintenance plan for a certain date for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS, for any criteria pollutant or its precursors, allocated to highway and transit vehicle use and emissions.*" (40 CFR 93.101)

Establishment of the MVEB

- Developed based on emission inventory as a part of the SIP process
- Subject to the interagency consultation process
- Reflect effects of control measures included in the SIP.
- Mobile-source emissions are estimated based on:
  - Number of vehicles in the region
  - Vehicle age,
  - Rate of fleet turnover to newer and cleaner vehicles
  - Seasonal temperatures
  - Vehicle miles traveled (VMT)
  - Population growth
- EPA provides final approval of MVEB

SIP Control Strategies and TCMs

- SIP control strategies or control measures identify means of achieving emission reductions to achieve the SIP purpose
  - These cover all emission sources (on-road mobile, non-road mobile, point, and area)
- Transportation Control Measures (TCMs) - SIP strategies that will only reduce transportation-related emissions by reducing vehicle use or improving traffic flow.
- Measures that reduce emissions by improving vehicle technologies, fuels, or maintenance practices are part of SIP controls, but not TCMs.
- Examples of TCMs per the CAA include:
  - Improved public transit,
  - Traffic flow improvements and high-occupancy vehicle lanes,
  - Shared ride services,
  - Pedestrian/bicycle facilities, and
  - Flexible work schedules

SIP Revisions

- SIP revision are typically prepared for a specific area and to revise only part of the SIP as needed
- SIP revisions occurs when:
  - New NAAQS are introduced or NAAQS are revised
  - New data improves modeling techniques
  - Specific area's attainment status changes
- A SIP revision is made up of a narrative section, which is like a summary report, and a package of rules, regulations, and agreements, to legally fulfill what is written in the narrative

Conclusions

- SIP
  - Federally-required plan - nonattainment areas and maintenance areas demonstrate plans to meet/continue to meet the NAAQS
- The SIP requirements and type vary by attainment status, severity, and pollutant
- SIP covers all sources of emissions – point, mobile, area
- Transportation conformity – process to ensure transportation's compliance with SIP
  - MVEB may apply to mobile source emissions
  - TCMs may be included in SIP

❑ Section 3.

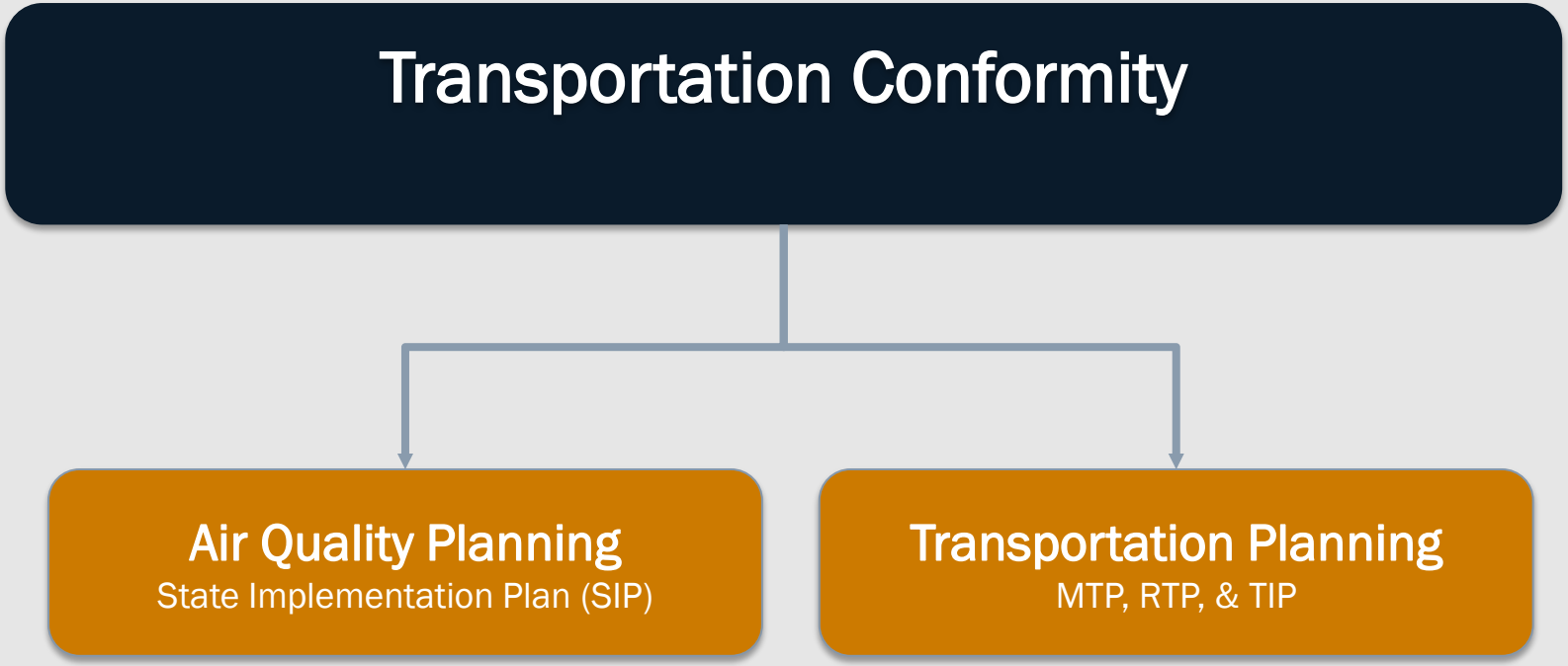
TRANSPORTATION CONFORMITY

Outline for Section 3: Transportation Conformity

- Transportation conformity and relationship to the SIP
- Conformity demonstration process
- Project-level conformity
- Interagency consultation
- Conformity determination triggers
- Conformity lapses
- Transportation Control Measures (TCMs)
- Congestion Mitigation and Air Quality (CMAQ) program

Transportation Conformity

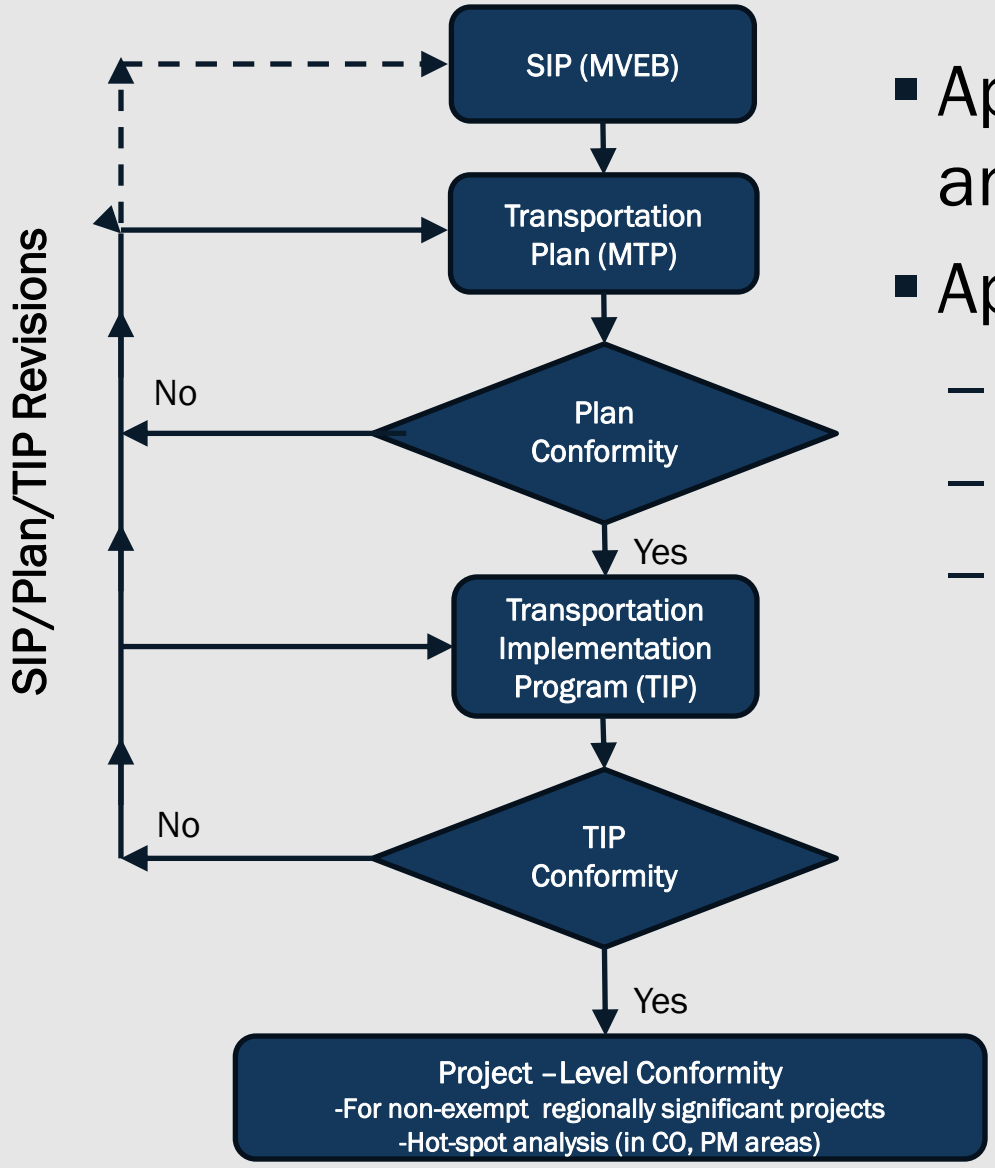
Connects air quality planning and transportation planning



Transportation Conformity

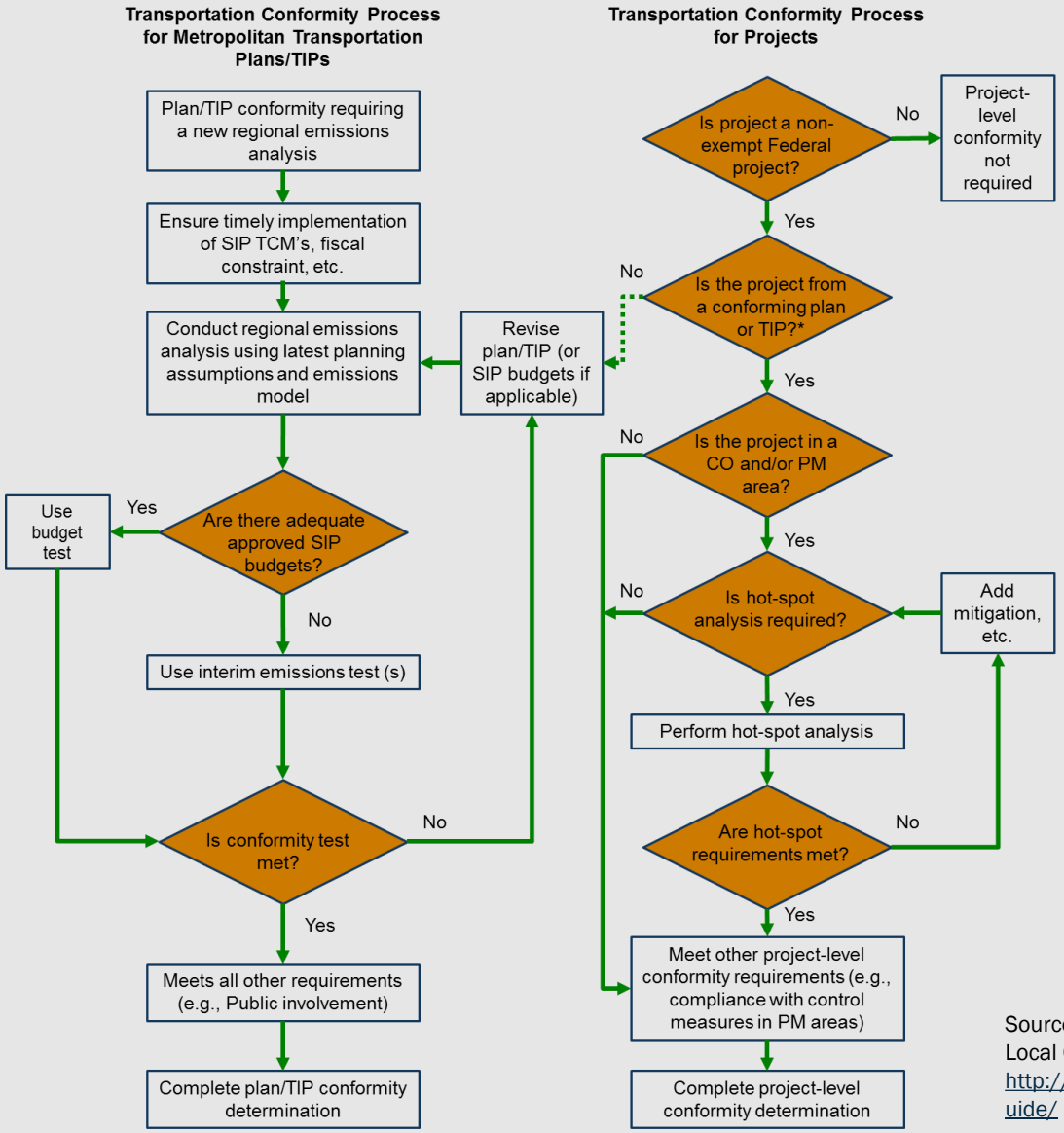
- Ensures that transportation plans, transportation improvement programs, and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) will conform to air quality goals set by the SIP and ensure those transportation activities will not:
  - Cause new air quality violations
  - Worsen existing violations
  - Delay timely attainment of NAAQS, interim reductions or milestones
- Conformity applies in nonattainment/maintenance areas for six criteria pollutants

Conformity Overview



- Applies to nonattainment and maintenance areas
- Applies to
  - MTP
  - TIP
  - Non-exempt projects with FHWA/FTA funding or requiring FHWA/FTA approval at any stage

Transportation Conformity Process



Source: Transportation conformity: A Basic Guide for State and Local Officials
http://www.fhwa.dot.gov/environment/air_quality/conformity/guide/

Transportation Conformity Process – Summary

SIP Emissions Budget

- TCEQ sets emissions budgets for the region

Plan and Program Conformity Determination

- MPO performs regional air quality analysis of MTP and TIP
- Total emissions from the regional transportation activities after implementation of MTP and TIP should not exceed SIP emissions budget
- MTP and TIP are fiscally constrained

MTP and TIP Approval

- FHWA/FTA determines that MTP and TIP are conforming to SIP

Project–Level Conformity Determination

- Project must come from a conforming MTP and TIP
- Project must be consistent with MTP and TIP
- Hot spot analysis may be needed for PM and CO
- Determined based on information on the environmental document

Project Approval

- FHWA/FTA signs a decision for the environmental document
- FHWA/FTA approves the federal funding for the project

Conformity Determination

- A conformity determination shows that implementation of the MTP, TIP, or project will not:
  - cause any new violations of the NAAQS
  - increase the frequency or severity of violations of the standard
  - delay timely attainment of the standard or any interim milestone.
- For MTP and TIP conformity
  - shows that the total emissions from on-road travel on an area's transportation system are consistent with SIP goals
- For project-level conformity
  - shows that the project is consistent with the regional conformity determination and that potential localized emissions impacts are addressed.

Conformity Determination Triggers

- New conformity determination required
  - Every 4 years, or earlier if there are changes to MTP or TIPs
  - SIP revision that changes MVEB
  - Net change in TCMs (except within substitution rule)
  - New NAAQS
  - Re-designation of area

Exempt Projects

- Identified in detail in 40 CFR §§ 93.126-93.128
- Exempt from all conformity requirements
  - specific projects under the categories of safety, mass transit, air quality, etc
- Exempt from regional emissions analysis
  - intersection channelization, interchange reconfiguration, etc.
- Exemptions for traffic signal synchronization projects

Conformity Lapse

Failure to Meet Conformity Requirements

1-Year Grace Period

Conformity Lapse

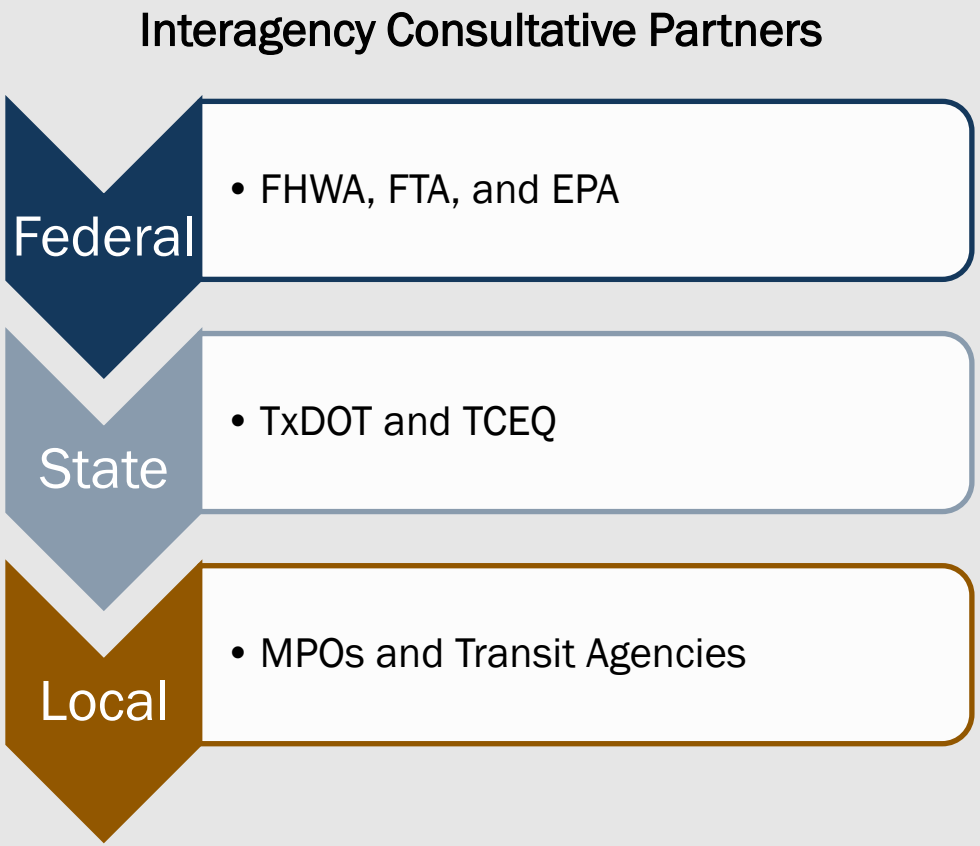
During a Lapse, Only the Following Projects Can Proceed

- Exempt Projects
- TCMs in Approved SIP
- Approved by FHWA/FTA before Lapse

Major Components of a Conformity Determination

Interagency Consultation & Public Involvement

- **Consultation is required on development of:**
  - SIPs
  - MTP/TIPs
  - Conformity Determinations
- **Technical Working Group (TWG)**
  - Provides statewide technical coordination in Texas



Latest Planning Assumptions and Emission Model

All conformity determinations should

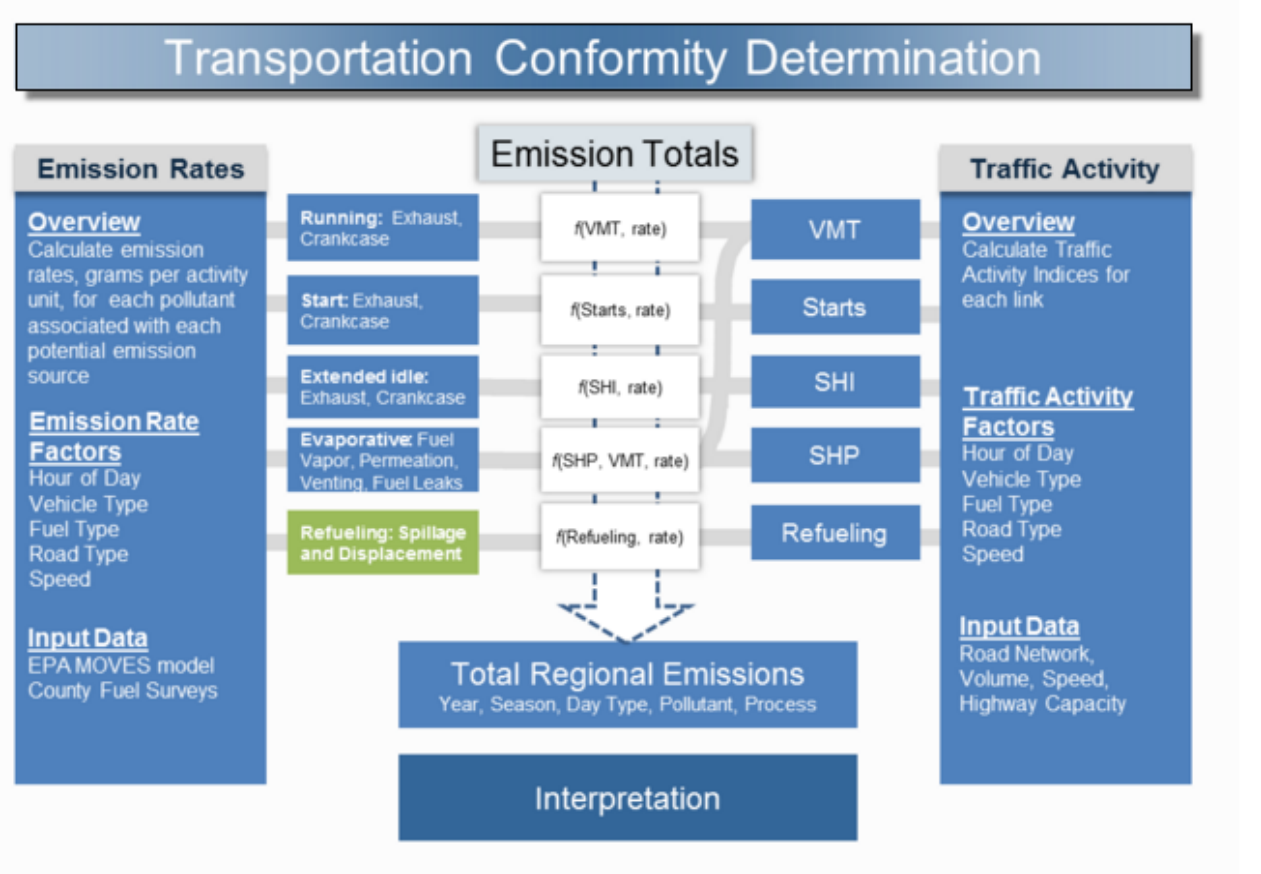
- Make use of latest planning assumptions
  - i.e., based on the most current information that is available to state and local planners, e.g. MPO, to make their MTP/TIPs.
  - reflect latest planning, population, employment, travel, vehicle age and fleet mix, and congestion estimates
- Make use of the latest EPA emission model (MOVES model).

Regional Emission Analysis

- The key analytical component of the conformity determination
- Demonstrate that the consistency of MTP/TIPs with the SIP is achieved (usually by comparing with MVEB)
- The analysis applies to:
  - The entire transportation network in the nonattainment or maintenance area
  - All proposed regionally significant projects,
  - The effects of any emission control programs already adopted by the enforcing jurisdiction

Regional Emissions Analysis Process

- Activity
  - VMT
  - Start
  - Idle
  - Park
- Emission rates
  - Running
  - Start
  - Idle
  - Evaporative
  - Refuel
- Total emissions
  - Multiply Emission rates with Activities
  - Aggregate to produce emission totals



Timely Implementation of TCMs

- Transportation Control Measures (TCMs) are strategies that:
  - are specifically identified and committed to in State Implementation Plans (SIPs); and
  - will reduce transportation-related emissions by reducing vehicle use or improving traffic flow
- Timely implementation of TCMs is required per transportation conformity provisions
- TCM substitution rule allows for TCMs to be substituted without a SIP revision as long as substitute TCM
  - has equivalent or greater emissions reduction; and,
  - follows implementation timeframe in SIP

Fiscal Constraint

- Important part of general transportation planning and programming
- Requirements are more stringent in nonattainment and maintenance areas
  - Conformity determination can only be made on a fiscally constrained TIP/MTP
  - Projects can be included in the first two years of the TIP and STIP only if funds are “available” or “committed”

Project-Level Transportation Conformity

- Applicable to non-exempt projects in Ozone, CO, NO_2, or PM nonattainment/maintenance areas
- Requirements
  - Project must come from a conforming MTP/TIP
  - Scope and design concept not significantly changed
  - Hot-spot analysis may be required in CO or PM nonattainment/maintenance areas

Congestion Mitigation and Air Quality Improvement (CMAQ) Program

- Federal-aid highway funding program – originally introduced as part of Intermodal Surface Transportation Efficiency Act (ISTEA)
- Jointly administered by FHWA and FTA
- CMAQ provides funding for projects/programs to attain and maintain NAAQS and to mitigate congestion

- Types of Eligible Projects:
  - Diesel retrofits and engine replacement
  - Anti-idling facilities
  - Transit Improvements
  - Bicycle and Pedestrian Projects
  - Alternative Fuels
  - I/M Programs

Conclusions

- Transportation conformity is a federally- required mechanism for states to make sure that their transportation plans or programs are consistent with the air quality goals in the SIP
- Conformity determination includes regional and project-level conformity
- Important elements include: Interagency consultation, public involvement, regional emissions analysis with latest planning assumptions, timely implementation of TCMs, and fiscal constraint
- Conformity determination – required every four years, or due to other conformity determination triggers
- Failure to meet requirement can results in a conformity lapse –certain transportation projects cannot be advanced