



# Air Quality and Transportation Planning



23 USC 134: “It is in that national interest to encourage and promote the safe and efficient management, operation, and development of surface transportation systems...”

A Metropolitan Planning Organization is required for urban areas with a population of 50,000 or more.

MPOs must develop a long-range transportation plan in cooperation with the FHWA with a 20-year forecast period.

23 USC 134: “In metropolitan areas that are in nonattainment... under the Clean Air Act, the metropolitan planning organization shall coordinate the development of a transportation plan with the process for development of the transportation control measures of the State Implementation Plan.”



# Clean Air Act

## *A Brief History*



Los Angeles Civic Center, 1948

*Credit: Los Angeles Times Photographic Archive, Department of Special Collections, Charles E. Young Research Library, UCLA*

### **1965: Motor Vehicle Air Pollution Control Act**

Controls on certain auto emissions

### **1990's: Clean Air Act Amendments**

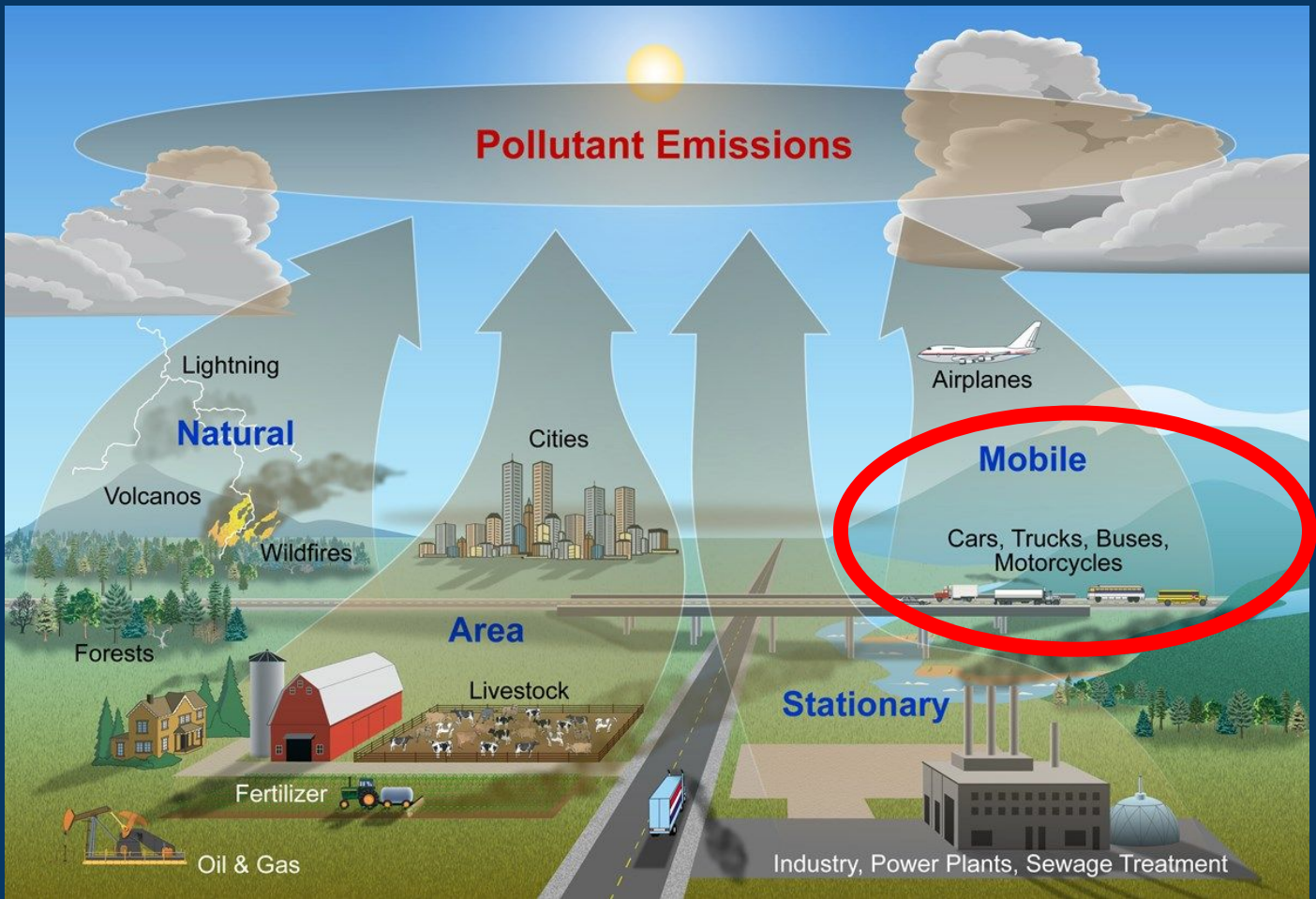
Increased authority and responsibility of Federal Gov  
Conformity becomes a law

### **1950's: Air Pollution Control Act**

First federal legislation for air quality  
Provided funding for research

### **1970's: Clean Air Act**

Health-Based Air Quality Standards created  
State Implementation Plans requires to achieve Standards  
Controls on motor vehicle emissions



Mobile Sources currently account for ~50% of pollutant emissions in Utah.

Image from National Parks Service



## National Ambient Air Quality Standards (NAAQS) for Pollutants Related to Transportation (Health Standards)

Pollutant	Type of Average	Concentration
<b>Carbon Monoxide - CO</b> Reduces supply of oxygen in the bloodstream	8 - Hour	9 ppm (10 mg/m <sup>3</sup> )
<b>Ozone - O<sub>3</sub></b> Damages lining of the lung	8 - Hour	0.070 ppm
<b>Particulate Matter - PM<sub>2.5</sub></b> Compromise respiratory & cardiac health	24 hour	35 µg/m <sup>3</sup>
<b>Particulate Matter - PM<sub>10</sub></b> Compromise respiratory & cardiac health	24 hour	150 µg/m <sup>3</sup>



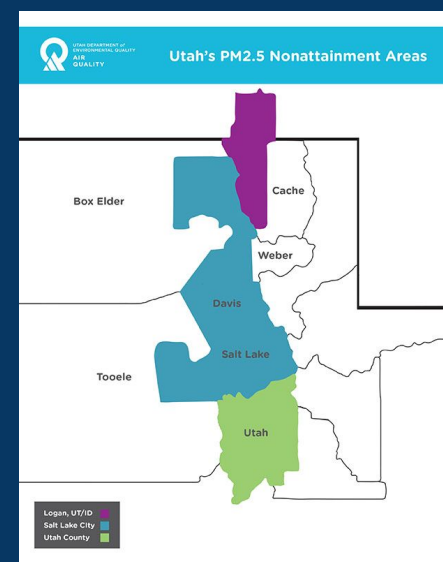
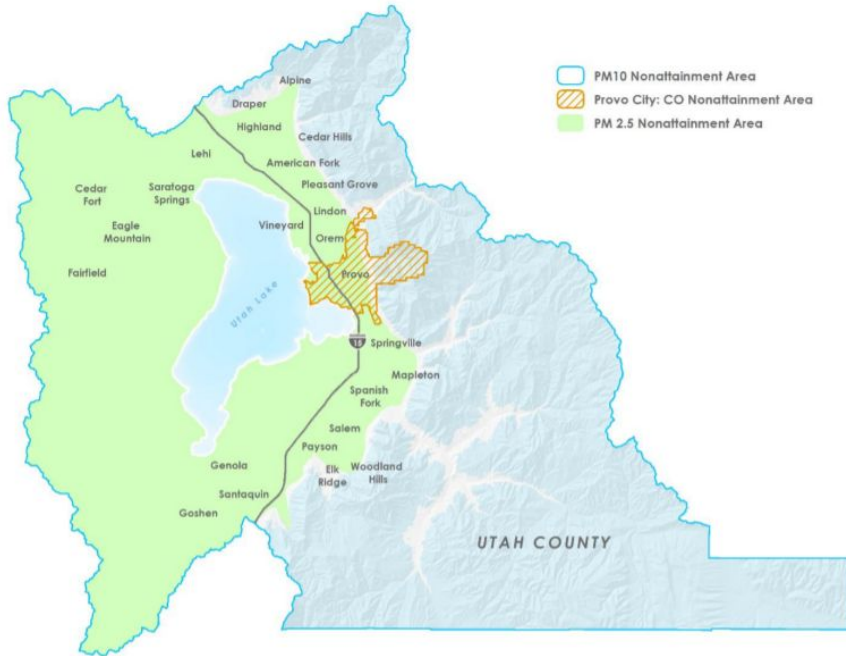
## Utah County Air Quality Monitoring Stations

Lindon	50 N Main St, Lindon	Ozone PM 2.5 PM 10 Carbon Monoxide Nitrogen Dioxide Weather
North Provo	1355 N 200 W	Ozone PM 2.5 PM 10 Carbon Monoxide Nitrogen Dioxide Weather



# Non-Attainment Areas

UTAH COUNTY STUDY AREA MAP



**Consequences:** The State must make a plan to reach Attainment (not exceed the Health Standards). This plan is called the State Implementation Plan, or SIP.



# Ideal Life Cycle of a Non-Attainment Area

3 years continuous Health Standards violations



Improving Air Quality through State Plan



3 years maintaining or below Health Standard

*Designated Non-Attainment*

*Attainment Date*

First 10 years of Maintenance Plan

Second 10 years of Maintenance Plan

*At least 25 years with a Non-Attainment designation*

*Request Maintenance Plan*

*Request withdrawal of Non-Attainment designation*





## **Transportation Demand Model**

- Road Network
- Transit Network
- Employment
- Mode Choice
- Trip Distribution
- Population
- Surveys



## **Motor Vehicle Emissions Model**

- Vehicle Type
- Speeds
- Fuel
- Road Type
- Inspection Programs
- Vehicle Miles Travelled
- Weather



## **Emissions Predictions**

- Criteria  
Pollutants
- Tons/ winter  
day



# Where does Transportation fit in?

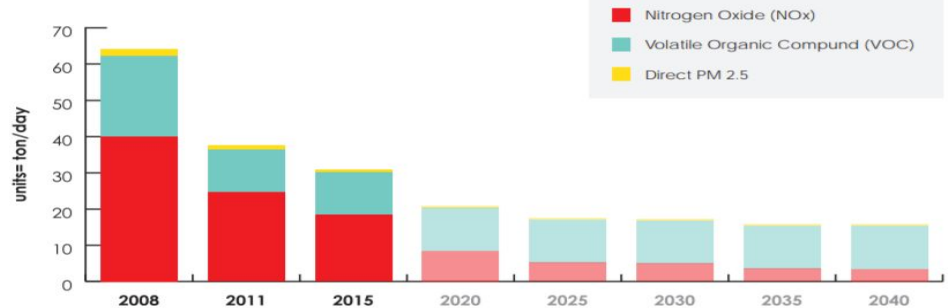
For a transportation plan to be approved, it must prove it supports/conforms to the State Plan. A complete conformity determination report is in the appendix of the plan.



**TransPlan40**  
Regional Transportation Plan  
2015-2040 Plan for the Provo/Deer Metropolitan Area

## TransPlan40

Utah County Vehicle Emission Trends





Next Time...

**What is Transportation Conformity?**





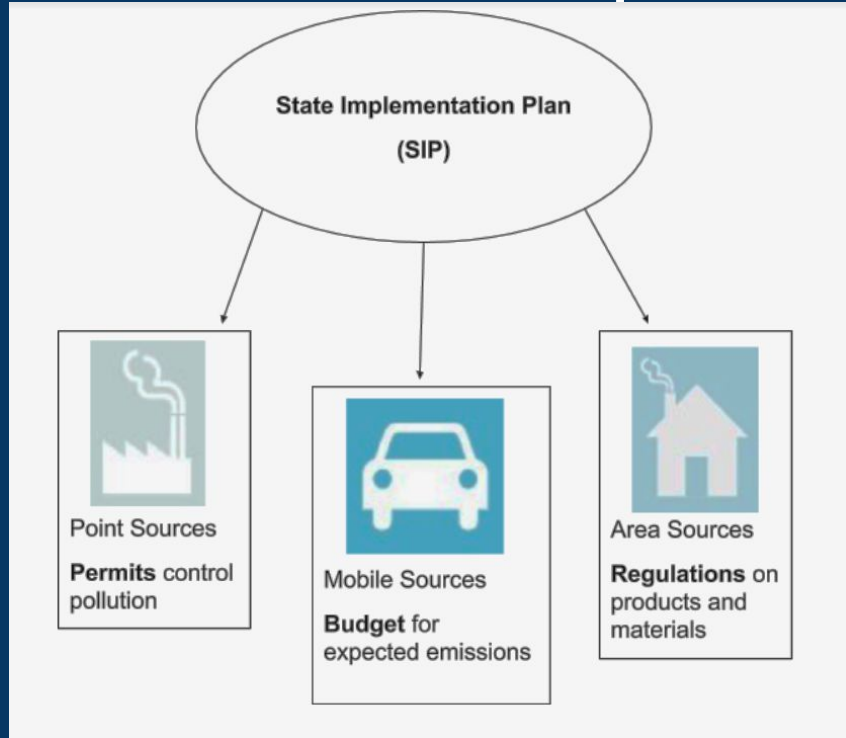
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# How does transportation fit into the State Implementation Plan (SIP)?



The Emissions Budget is a “not-to-exceed” value determined by the state for motor vehicles.



## To Review...

1. Clean Air Act sets health standards
2. State makes plan for achieving those standards
3. MPO must support State's plan
4. If conformity not demonstrated, no new capacity projects

## Air Quality affects:

- How we allocate funds (CMAQ, Alternative Transportation, etc.)
- Which projects are included in TIP/RTP
- Coordination between MAG, WFRC, EPA, FHWA, Utah Department of Air Quality, UDOT, and UTA.



**If the predicted emissions are less than the emissions budget, we are in compliance. We have a plan to eventually stop violating Health Standards.**

**Model Result < Budget = Conforming Plan**

Example: Provo City's CO Budget is 72.1 tons per weekday. Modelling shows that in 2025 vehicles will produce 10.60 tons of CO per weekday.

**10.6 Tons < 72.1 Tons = Conforming Plan**





## Point Sources



Geneva Steel, 1950's, Utah State Historical Society

## Area Sources



## Mobile Sources

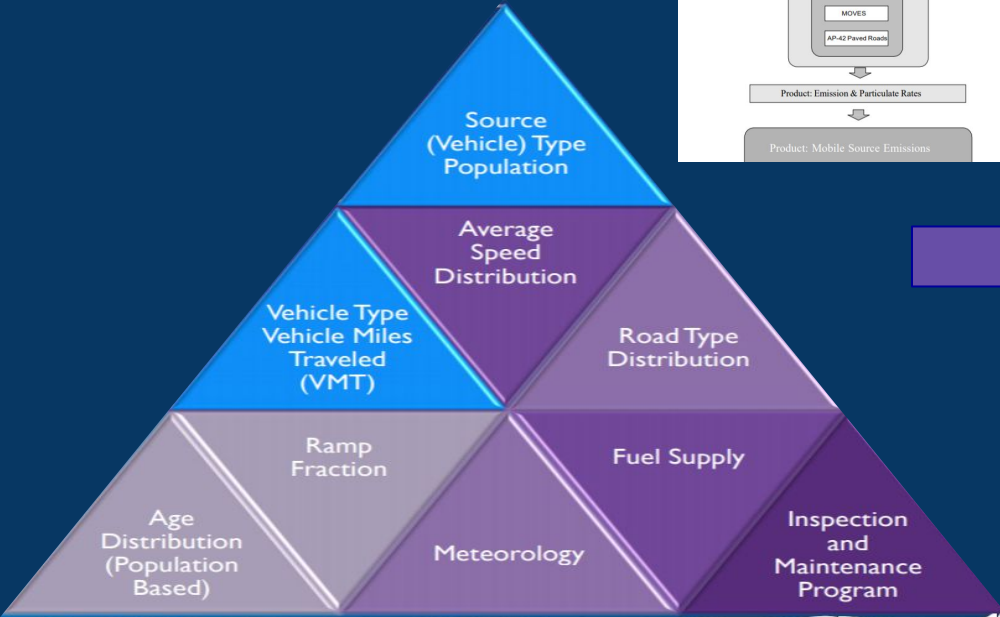
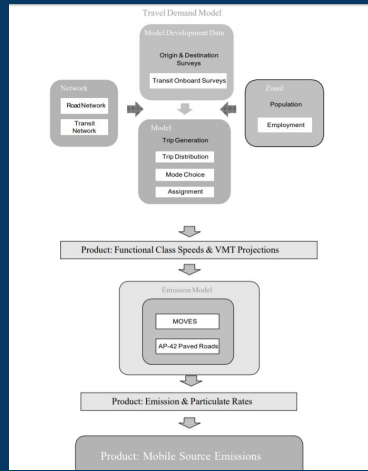


## Miscellaneous Sources





# Modelling



Pollutant	Tons/ winter day
NOX (precursor to PM 2.5)	5.235
VOC (precursor to PM 2.5)	4.593
Directly Emitted PM 2.5	0.337

Model Inputs

Modelled Emissions 2025



## Case study: PM 2.5

Original Standard was \_\_\_\_\_. We were designated as a Moderate Non-Attainment area in \_\_\_\_\_. The SIP was created \_\_\_\_\_ after, which means we had a conforming plan. The Health Standard was changed in \_\_\_\_\_. We began creating a new SIP, but monitoring stations indicated we would still be violating standards by our target attainment year. The EPA re-designated us as a Serious Non-Attainment



## ACRONYMS

- **MPO – Metropolitan Planning Organization**
- **FHWA – Federal Highway Administration**
- **FTA – Federal Transit Administration**
- **MAP-21 - Moving Ahead for Progress in the 21<sup>st</sup> century – current T Bill**
- **LRP, RTP – Long Range Plan , Regional Transportation Plan (20 to 30 yeas)**
- **TIP – Transportation Improvement Program - 4 years funded projects of LRP**
- **STIP – Statewide TIP**
- **CAA – Clean Air Act**
- **EPA – Environmental Protection Agency**
- **DAQ – Division Of Air Quality (of the Department of Environmental Quality)**
- **SIP – State Implementation Plan**
- **MVEB – Motor Vehicle Emission Budgets**
- **PM – Particulate Matter – PM<sub>10</sub>, PM<sub>2.5</sub> - number denotes size of particle**



## **Metropolitan Transportation and Air Quality Planning**

The Mountainland Association of Governments (MAG) is the designated Metropolitan Planning Organization (MPO) for transportation planning in the Utah Valley Metropolitan Area Boundary.

The current Transportation Bill -aka- FAST Act (Fixing America's Surface Transportation ) provisions require the MPO to develop Long Range Regional Transportation Plans (LRPs) and short-range transportation improvement programs (TIPs)

The CAA requires that, in areas experiencing air quality problems, transportation planning must be consistent with air quality goals. This is determined through the transportation conformity process.



# Criteria Pollutants

## The three major transportation-related criteria pollutants are:

- Ozone (O<sub>3</sub>) and its precursors, volatile organic compounds (VOC) and oxides of nitrogen (NO<sub>x</sub>)
  - Particulate Matter (PM) – 10 and 2.5 microns
    - Carbon Monoxide (CO)



# Air Quality Health Standards

## Current Primary National Ambient Air Quality Standards (Health Standards)

Pollutant	Type of Average	Concentration
<b>CO</b>	8 - Hour	9 ppm (10mg/m <sup>3</sup> )
<b>O<sub>3</sub></b>	8 - Hour	0.070 ppm
<b>PM<sub>2.5</sub></b>	Annual 24 hour	15 µg/m <sup>3</sup> 35 µg/m <sup>3</sup>
<b>PM<sub>10</sub></b>	24 hour	150 µg/m <sup>3</sup>



## Utah County – Non Attainment and Maintenance Areas

Areas that **do not** meet or **Previously** have not met the Air Quality Standards are known as **non attainment** areas.

Areas that have fulfilled the requirements and demonstrated they do not exceed the standards are known as maintenance areas

Currently, Utah county is designated as non attainment for PM10, PM2.5 & Ozone and Provo City is designated as Maintenance area (November 2005) for CO





# Transportation Conformity

- Transportation conformity is an analytical process that demonstrates that emissions from travel on the region's roads do not exceed the Budgets set for Mobile Sources in a State Implementation Plan (SIP).
- The Transportation Bill links compliance with the conformity requirements to continued FHWA and FTA funding of transportation plans, programs, and projects.
- It is a way to ensure that approval and funding goes to projects that are consistent with air quality goals of eliminating