Travel Efficiency Assessment Method (TEAM):
Case Studies in Austin, TX and Pittsburgh, PA

Presented by:

EPA

United States Environmental Protection Agency

Office of Transportation and Air Quality

Wednesday, December 2, 2020

2:00 PM - 3:00 PM EST

Housekeeping

- **Please mute** you microphones to reduce background noise.

- Please use the **chat** feature within MS Teams to send questions. We will try to respond to as many as possible at the end of the webinar.

- Direct any technical issues to: berry.laura@epa.gov

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- **Call-in (audio only)**
  - Phone: +1 202-991-0477
  - Conference ID: 157 758 436#

Outline

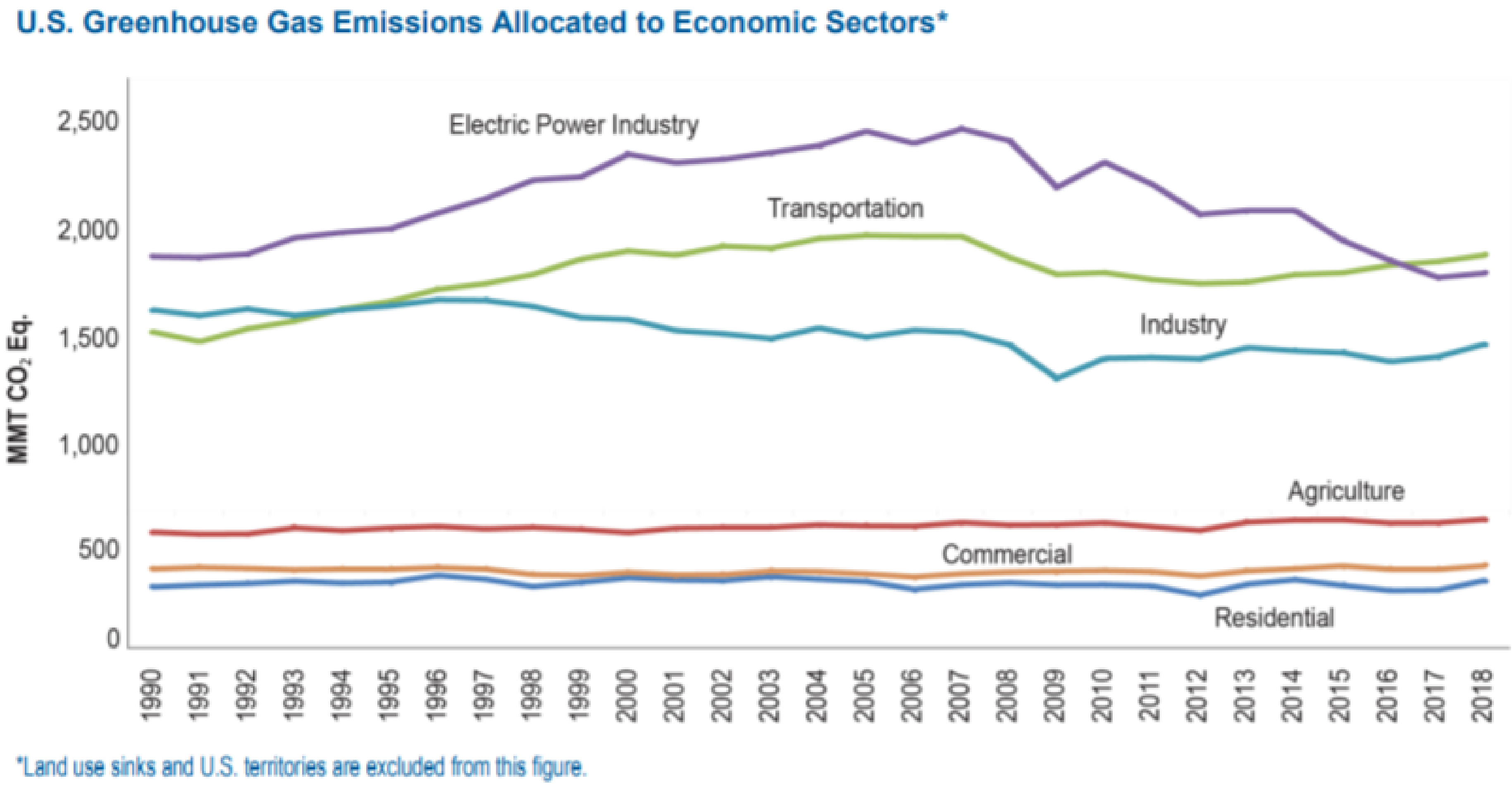
- Introduction and background on TEAM
- Capital Area Council of Governments in Austin, TX
- Southwestern Pennsylvania Commission in Pittsburgh, PA
- Lessons learned and key takeaways
- Questions

Travel Efficiency (TE) Strategies

Strategies to reduce emissions by affecting travel Activity. Generally fall into these 5 categories:

- Travel demand management (TDM)
  - Telecommuting
  - Transit subsidies
  - Carpool and vanpool programs
- Changes to public transit
  - Reduced fares
  - Increased frequency, range
- Travel pricing
  - Road pricing, parking pricing
- Changes to land use
  - Transit-oriented development, mixed use, jobs/housing balance
- Bicycle and pedestrian infrastructure
  - New infrastructure or improvements

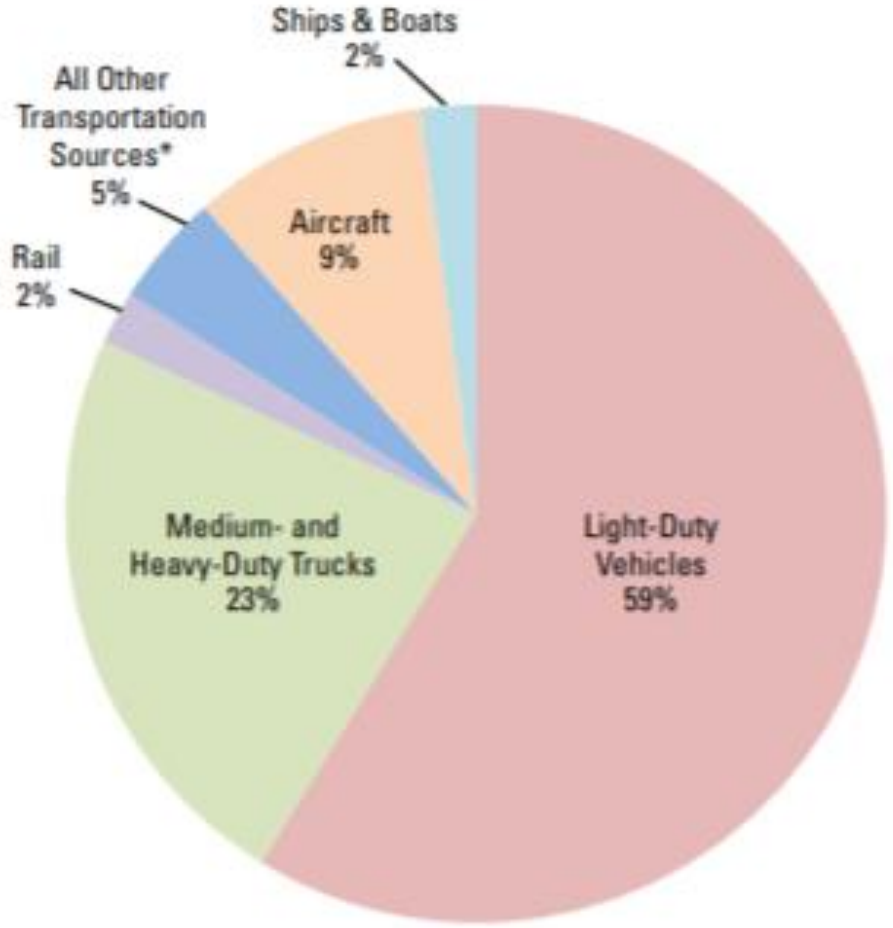
Why is travel efficiency important?



Source: Data Highlights: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018, found at www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-1990-2018-data-highlights.pdf

Why is travel efficiency important?

2018 U.S. Transportation Sector GHG Emissions by Source

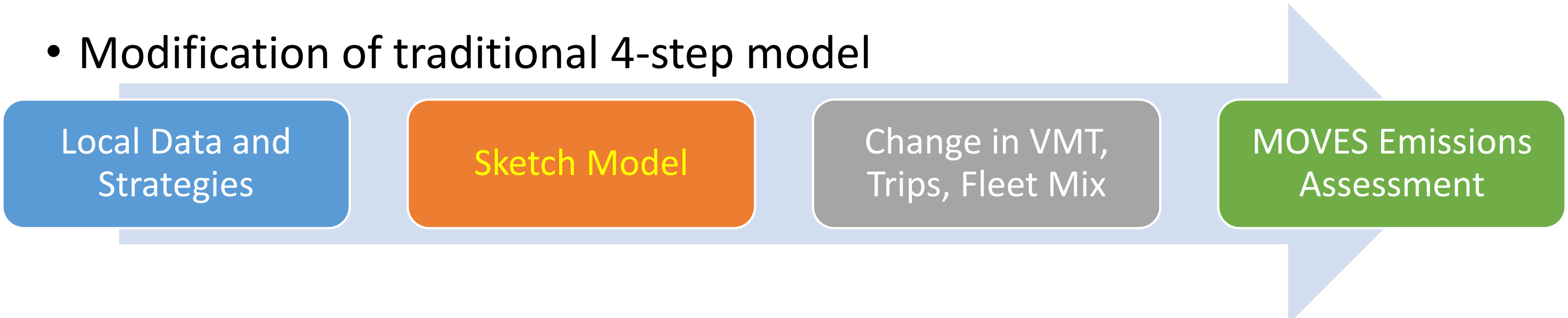


Source: Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions, 1990-2018 (EPA-420-F-20-037, June 2020), found at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100ZK4P.pdf

Travel Efficiency Assessment Method (TEAM)

- TEAM is a methodology to assess vehicle miles traveled (VMT) and multi-pollutant (CO_2e, NOx, $PM_{2.5}$, and VOCs) reductions from TE strategies at the local, state and national level

- Modification of traditional 4-step model



- Allows for scenarios or bundles of TE strategies to be analyzed.

From Scenario to Modeling

How do we take a TE scenario, and produce estimated emission reductions?

- Of the categories of strategies, some can be modeled with a sketch model, and some use a different "off-model" approach

Sketch Model	**Outside of Sketch Model**
• Transportation Demand Management or Employer Incentives • Transit • Pricing	• Land Use • Bicycle and Pedestrian Infrastructure Improvements

- Strategies like TDM, transit, and pricing strategies can all be "operationalized" in a sketch model because they either affect:
  - Travel costs, or
  - Travel times
- The sketch model can translate those into mode share and VMT

From Scenario to Modeling

Scenario: We want to estimate the effect of a pricing strategy such as increase the hourly cost of parking in the area from $3.00 to $5.00.

Overview of Process

1. Determine the "population" affected by the strategy
2. Collect relevant "background" data (e.g. regional travel behavior, average parking duration, etc.)
3. Conduct a model run for the base scenario ($3.00)
4. Conduct a model run for the new scenario ($5.00)
5. Evaluate change in mode share and VMT
6. Use EPA's MOVES model to estimate changes in emissions from that change in VMT, based on the local MOVES inputs for the specific area (such as fleet composition and age), for the pollutants of interest.

From Scenario to Modeling: Land Use

- EPA has developed some additional methods to estimate VMT changes from land use changes:

Neighborhood Approach

- Uses the existing relationships among neighborhood types and VMT per capita
- 5 - 6 neighborhood types identified on the basis of land use (urban core, suburban, employment/retail center, etc.)
- Shifting population to lower VMT neighborhood types results in changes in regional VMT

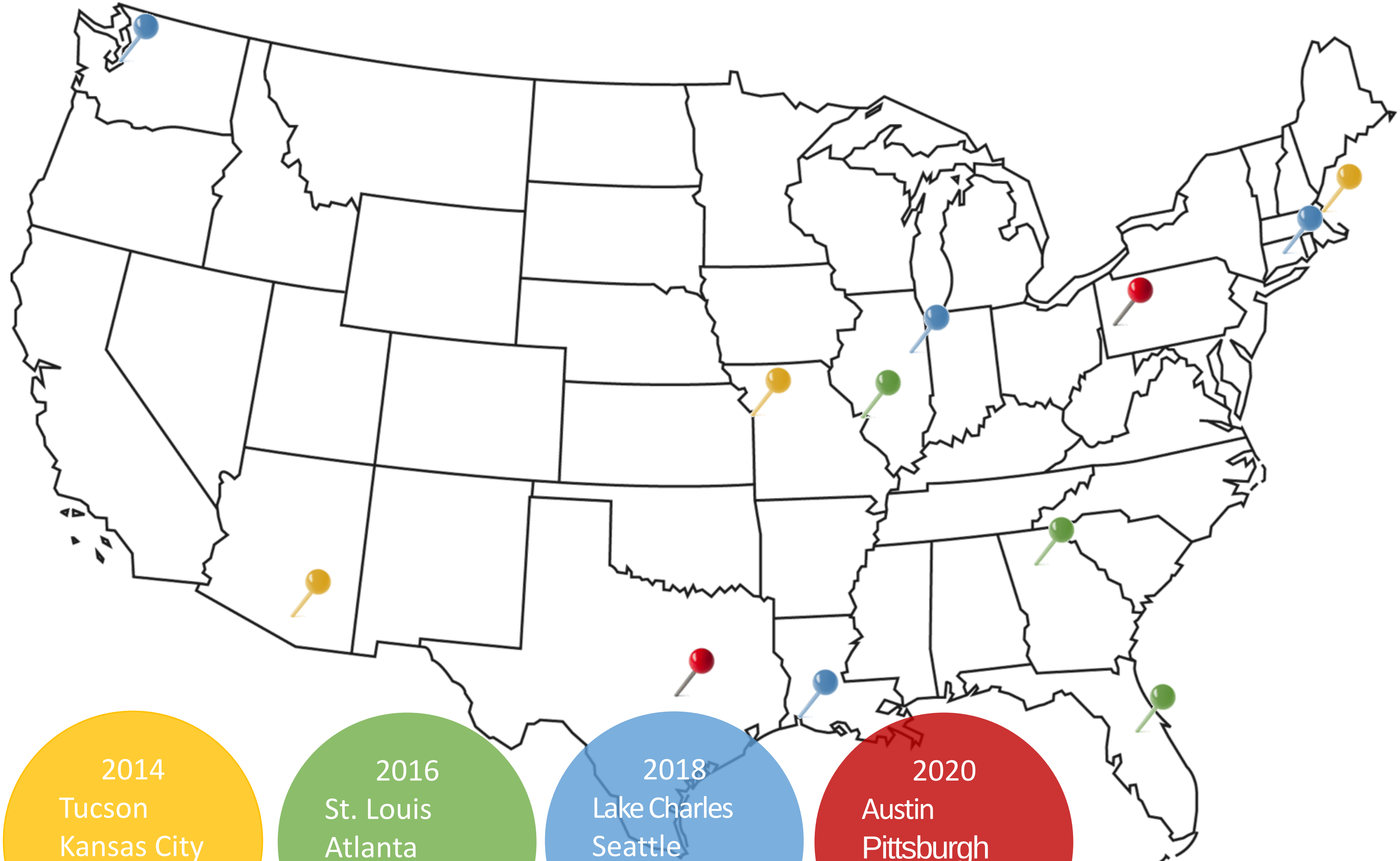
Multivariate Approach

- Uses elasticities (Ewing, Cervero 2010) among land use variables and VMT
  - Density (household/population)
  - Distance to transit
  - Job access by auto
  - Job access by transit
- Percent change in variable multiplied by elasticity, results in percent change in VMT

From Scenario to Modeling: Bike & Ped

- EPA's method of estimating mode shift (to biking and walking) as a result of investment in bicycle and pedestrian infrastructure is based on additional infrastructure miles
- Relies on estimate of "cross-elasticity:" how much does demand (e.g., VMT) change based on provision of additional bike/pedestrian infrastructure?
- For example, a strategy could be:
  - Increase sidewalk coverage on local and arterial roads, currently 56% to 75% , or
  - Expand miles of bicycle facilities by 200%

Case Studies with State and Local Partners



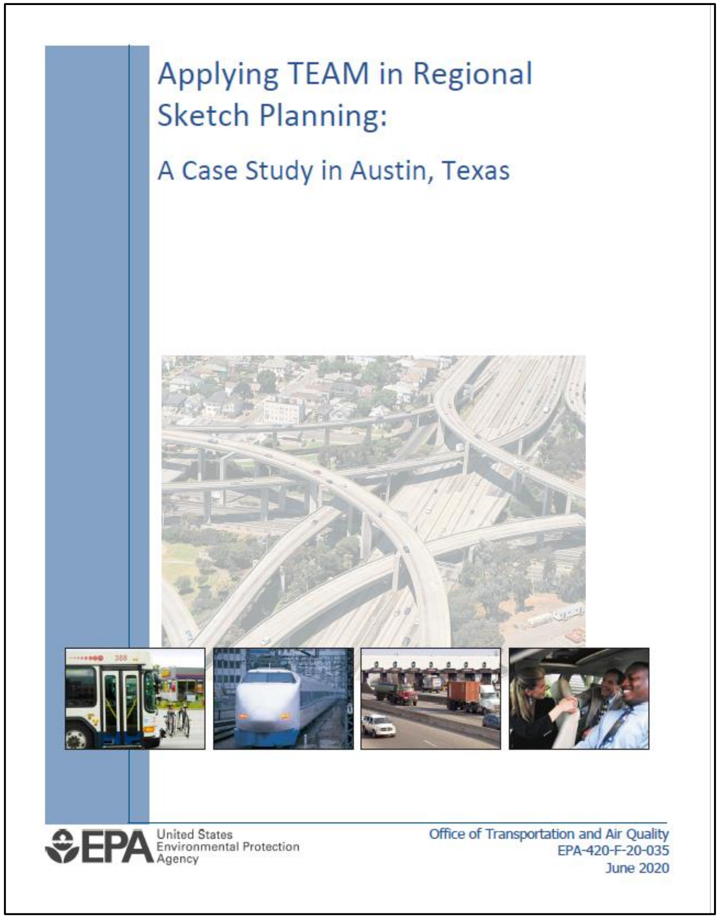
2014
Tucson
Kansas City
Boston

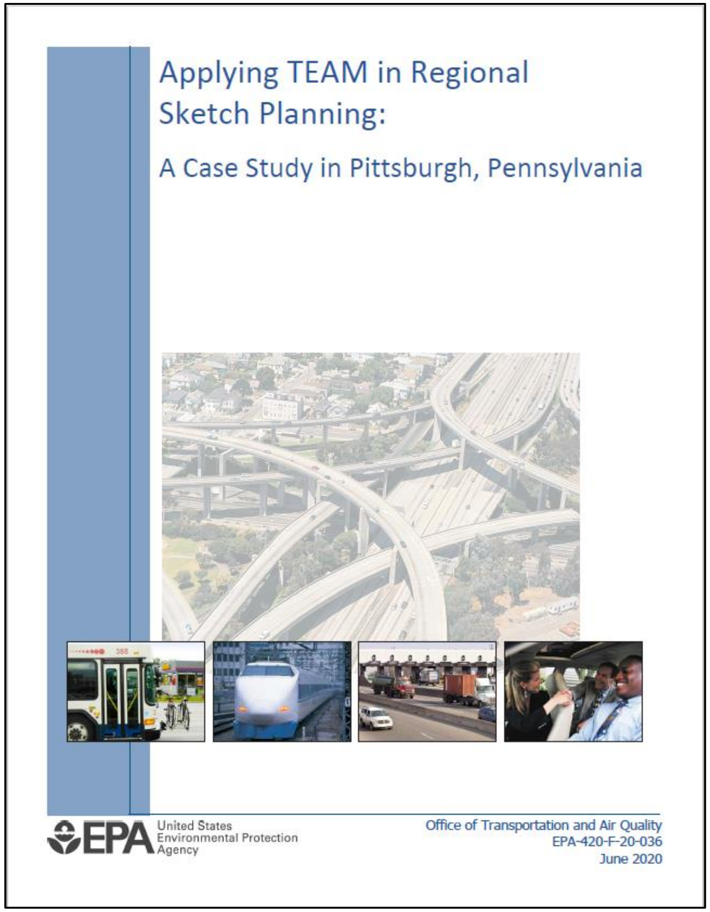
2016
St. Louis
Atlanta
Orlando

2018
Lake Charles
Seattle
Champaign
Connecticut

2020
Austin
Pittsburgh

Completed 2020 Case Studies



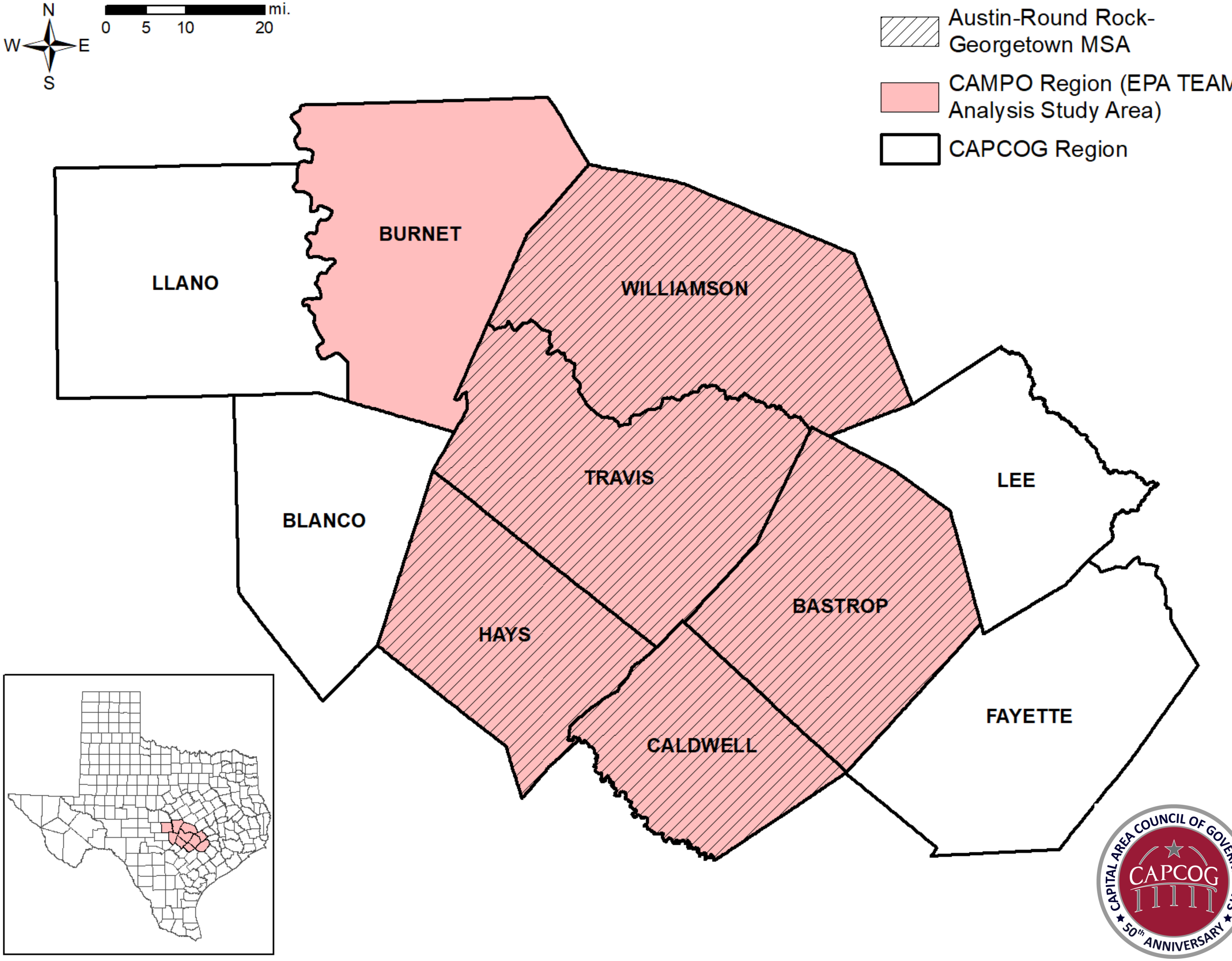


Available at: www.epa.gov/state-and-local-transportation/estimating-emission-reductions-travel-efficiency-strategies

Andrew Hoekzema

Director, Regional Planning and Services

Capital Area Council of Governments



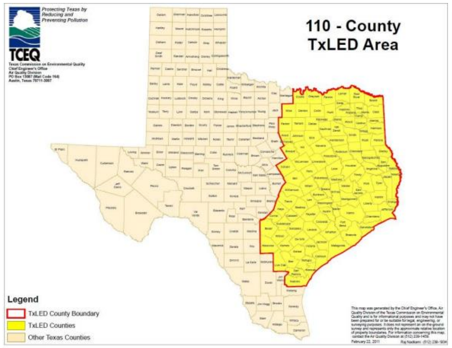
CAPITAL AREA COUNCIL OF GOVERNMENTS CAPCOG 50th ANNIVERSARY

Challenges for Managing Growth

- Austin is routinely considered among the best places to live in the U.S. (Business Insider ranks Austin #1, U.S. News and World Report ranks Austin #3)
- Austin is the largest city in the U.S. that is not designated a nonattainment area for any National Ambient Air Quality Standard (NAAQS), but is only barely in compliance with the federal ozone (O_3) NAAQS
- Vehicle emissions account for about half of the weekday summer emissions of NO_X, which contributes to regional O_3
- Growth in the Austin Area 2010-2019: +504,974 (29% increase), with population expected to double over next 20 years, most of which is expected to occur in the suburbs
- The percentage of commuters who primarily commute by single-occupancy vehicle has been increasing in recent years
- The Austin Urbanized Area has the 7th-highest "Commuter Stress Index" in the nation

Existing Technology-Based Control Measures Applicable to Mobile Sources

- Low-Reid Vapor Pressure (RVP) Gasoline
- Texas Low-Emission Diesel (TxLED)
- Texas Emission Reduction Plan (TERP) Grants
- Volkswagen Environmental Mitigation Program Grants
- Vehicle Emissions Inspection and Maintenance Program
- Electric Vehicle Programs



Opportunities to Reduce Emissions Through Travel Efficiency

New MoPac express lane causing a 'significant change in traffic'

Scenarios

- Scenario 1 – Improved Transit Frequency and Travel Times on Key Corridor
  - "A hypothetical high-frequency transit service along a major North/South corridor loosely based on the Orange Line route highlighted in Project Connect, CapMetro's long-term service vision. This transit service is expected to improve transit travel times and access times for residents and commuters within the corridor"
- Scenario 2 – Region-wide Transit Frequency Improvements
  - "Region-wide transit frequency improvements that reduce transit access and travel times, loosely based on what could be expected from implementation of CapMetro's Project Connect Vision Plan"
- Scenario 3 – Public Sector Worker Transit Subsidy
  - "Full transit fare subsidies for public sector workers."
- Scenario 4 - Region-wide VMT Pricing
  - "A hypothetical state VMT fee at a level needed to bring all modes up to a "state of good repair" beyond existing revenue"

Scenarios

Selected Strategies	Applied to	Details
Scenario 1: CapMetro Orange Line Improvements	523,371 residents that live within ½ mile of a transit stop along the proposed corridor.	A potential high-frequency transit service along a major North/South corridor, expected to improve transit travel times and access times.
Scenario 2: Region-wide Transit Frequency Improvements	The full analysis region population of 4,120,322.	This scenario is characterized as separate transit service frequency improvements at a regional level to improve transit access and travel time.
Scenario 3: Public Sector Worker Transit Subsidy	398,107 public sector employees within the analysis region.	Provide full transit fare subsidies for public sector workers.
Scenario 4: Region-wide VMT Pricing	The full analysis region population of 4,120,322.	Explore the impact of a hypothetical $0.0846 VMT fee, the level needed to fill the estimated gas tax revenue shortfall for a "state of good repair."

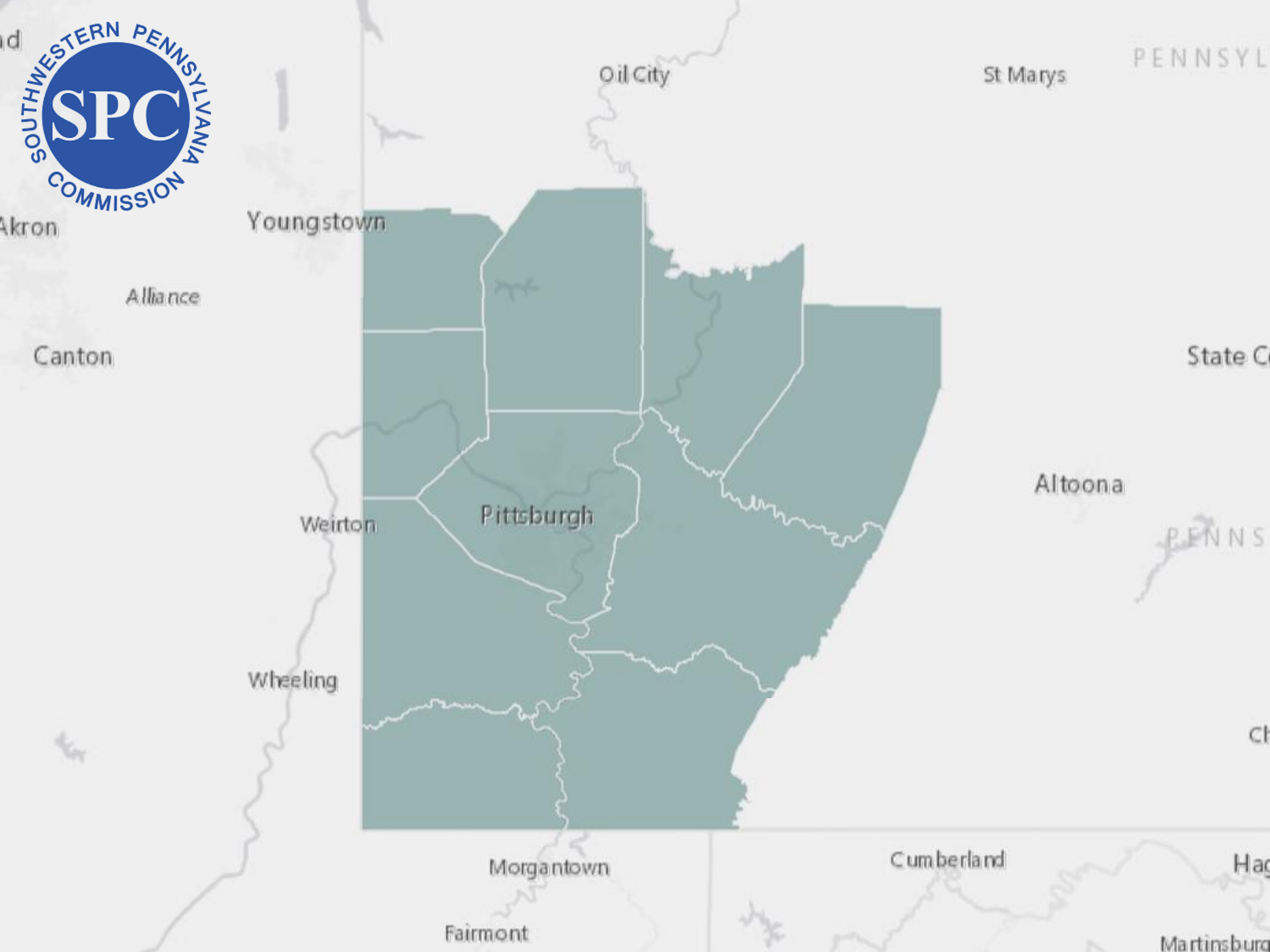
Results

Selected Strategies	Light-Duty VMT	CO_2e	$PM_{2.5}$	NOx	VOC
Scenario 1: CapMetro Orange Line Improvements	-0.10%	-0.10%	-0.09%	-0.09%	-0.08%
Scenario 2: Region-wide Transit Frequency Improvements	-0.40%	-0.40%	-0.35%	-0.39%	-0.31%
Scenario 3: Public Sector Worker Transit Subsidy	-1.01%	-1.00%	-0.98%	-1.00%	-0.96%
Scenario 4: Region-wide VMT Pricing	-4.18%	-4.19%	-4.33%	-4.21%	-4.47%

Chuck Imbrogno

Manager, Models and Data Analysis

Southwestern Pennsylvania Commission


SOUTHWESTERN PENNSYLVANIA COMMISSION
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Oil City
St Marys
PENNSYL
Youngstown
Akron
Alliance
Canton
State C
Altoona
Pittsburgh
Weirton
PENNS
Wheeling
Morgantown
Cumberland
Hag
Fairmont
Martinsburg

- *SmartMoves for a Changing Region*, SPC's Long Range Plan sets the vision, direction and context for this type of holistic corridor planning.
- This Framework is directly supported by several of the Smart Moves Strategies

PRIORITIZE AND STREAMLINE STRATEGY
Employ holistic planning for mobility and accessibility when developing and prioritizing projects. Make transportation improvements fit community context and enhance local quality of life and encourage strong, implementable complete streets policies.

PROMOTE INVESTMENT STRATEGY
Promote strategic infrastructure investment in communities that reduces physical exposure and vulnerability from natural hazards, including flooding and landslides.

INNOVATIVE IDEAS STRATEGY
Embrace emerging infrastructure innovations and technologies including planning, design, materials, and construction processes for an adaptable and resilient built environment.

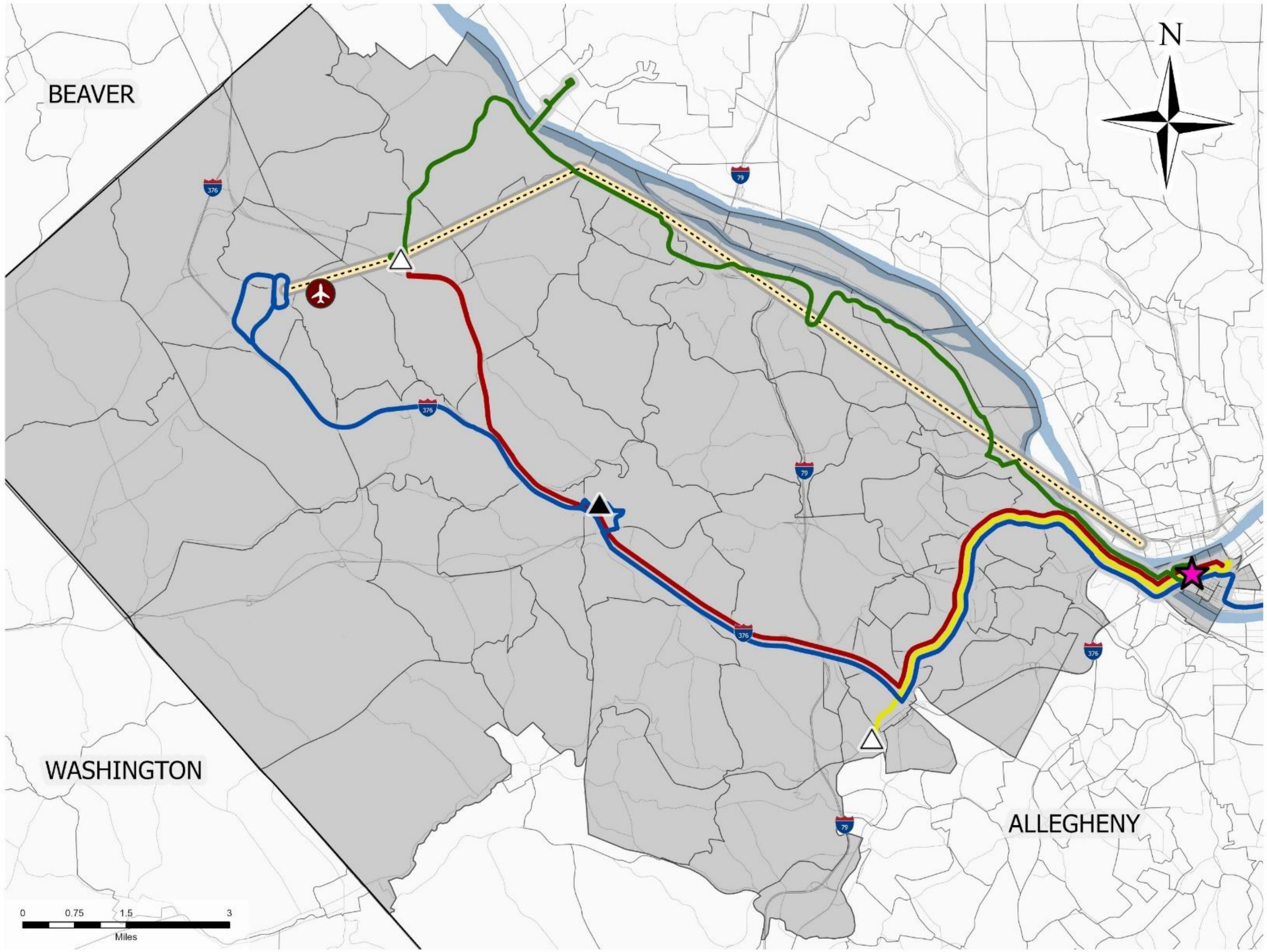
CLEAN AIR STRATEGY
Support and encourage transportation projects and programs that will contribute to attainment or maintenance of the national ambient air quality standards (NAAQS) for ozone, carbon monoxide (CO), and particulate matter (PM).

Scenarios

- Scenario 1 – Transportation Pricing

  "Explore impacts of hypothetical doubling of marginal operating cost of automobile vehicle trips within Allegheny County. This would likely be the result of one or more statewide or national initiatives. Implementation would be at a large geographic scale."

- Scenario 2 – Incremental transit improvements and enhancements in the corridor
  - "Explore hypothetical transit enhancements to the existing 28X bus route and G3 bus route, and implementation of additional first mile / last mile shuttle services between employment centers and major bus stops in the corridor."
- Scenario 3 – Major transit improvements and enhancements in the corridor
  - "Explore impacts of a potential new "high-capacity/high-speed" fixed route transit line with "frequent/all-day" service on dedicated right-of-way between the Airport and Downtown Pittsburgh. Includes significant increase in Park-n-Ride capacity along the route."



EPA TEAM Project Study Corridor

- PGH International Airport
- Downtown Pittsburgh
- Road
- Interstate
- County Border
- TAZ Border
- TAZ Study Area
- Rivers

PAAC Routes

- 21 - Corapolis
- 28X - Airport Flyer
- G2 - West Busway
- G3 - Moon Flyer

New Service Sketch

Park-N-Ride Facilities

- Proposed FM/LM Service
- Existing FM/LM Service

April 2020

Scenarios

Selected Strategies	Applied to	Details
Scenario 1: VMT Pricing	The full analysis region (the corridor) employment of 316,339.	Explore the impact of a hypothetical VMT fee applied to VMT in the corridor. This scenario is operationalized as a doubling of the marginal operating cost of automobile vehicle trips.
Scenario 2: Incremental transit improvements and enhancements in the corridor	289,162 residents that live within ½ mile of a transit stop along the transit corridor.	This scenario is characterized as transit enhancements to the existing 28X bus route and G3 bus route.
Scenario 3: Major transit improvements and enhancements in the corridor	308,501 residents within the corridor. (Scenario 2 population +2 TAZs with TOD enhancements)	Explore impact of a new "high-capacity/high-speed" fixed route transit line offering "frequent/all-day" service on dedicated right-of-way between the Airport and Downtown Pittsburgh.

Results

Selected Strategies	Light-Duty VMT	CO_2e	$PM_{2.5}$	NOx	VOC
Scenario 1: VMT Pricing	-3.33%	-3.33%	-3.33%	-3.33%	-3.32%
Scenario 2: Incremental transit improvement and enhancements in the corridor	-0.14%	-0.14%	-0.13%	-0.14%	-0.13%
Scenario 3: Major transit improvements and enhancements in the corridor	-0.13%	-0.13%	-0.12%	-0.13%	-0.12%

Lessons Learned and Key Takeaways

Major Findings

- **Transportation pricing strategies**, such as parking pricing and VMT fees, have the biggest potential impact on regional light-duty VMT
  - 3.83% - 9.56% decrease from the future Business-As-Usual (BAU)

- **Smart growth and land use strategies** also have large impact on VMT
  - Up to 6.43% decrease from BAU

Note: Range of reduction potential is based on aggressiveness of policies/strategy already implemented in area and on aggressiveness of proposed scenario for evaluation (i.e. areas with current or planned high access to transit will have smaller additional VMT reduction from BAU than areas with limited transit access.)

Major Findings (cont'd)

- **Transit improvements**, including increasing frequency and service area, decreasing wait times, or providing subsidies, generally had the highest potential impact

- **Bicycle and pedestrian infrastructure** were examined in several case studies
  - These are important investments for multimodal accessibility and improved quality of life

Note: Range of reduction potential is based on aggressiveness of policies/strategy already implemented in area and on aggressiveness of proposed scenario for evaluation (i.e. areas with current or planned high access to transit will have smaller additional VMT reduction from BAU than areas with limited transit access.)

Lessons Learned about TEAM

- TEAM is accessible to a wide variety of agencies with varying degrees of technical expertise, including:
  - large MPOs with populations in the millions and significant experience with transportation planning,
  - smaller MPOs with more limited technical expertise, and
  - state and local air agencies, non-governmental organizations, and other organizations interested in transportation and air quality issues

Lessons Learned about TEAM

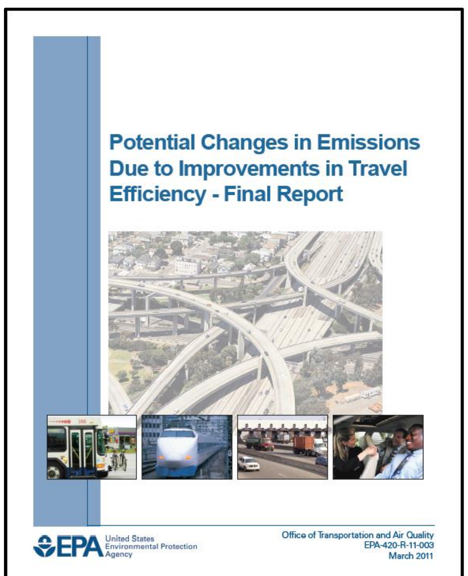
- TEAM is flexible, and can be used for
  - hypothetical "what-if" exercises early in the planning process, and
  - strategic planning decision-making
  - analyzing a range of strategy types, at varying degrees of implementation

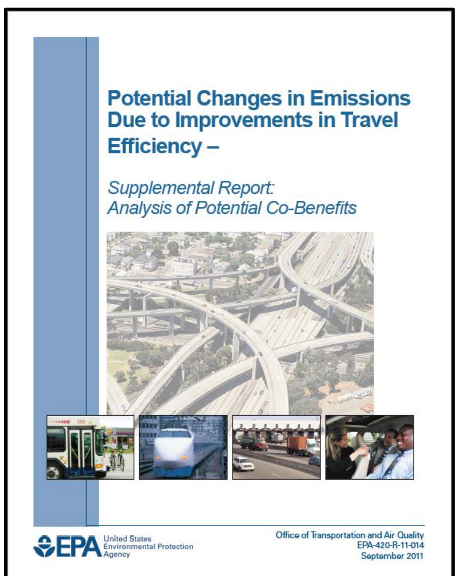
- TEAM is scalable, and can be used to analyze strategies:
  - applied to a corridor/project, a city or metropolitan area, or an entire state
  - applied to a region's entire population, or to a specific subset of that population

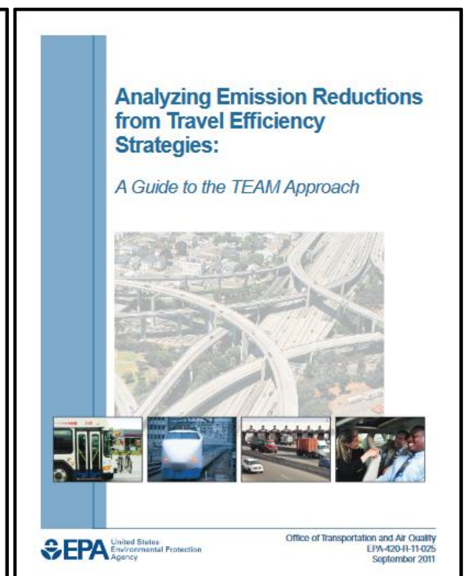
Partner Lessons Learned and Key Takeaways (Discussion)

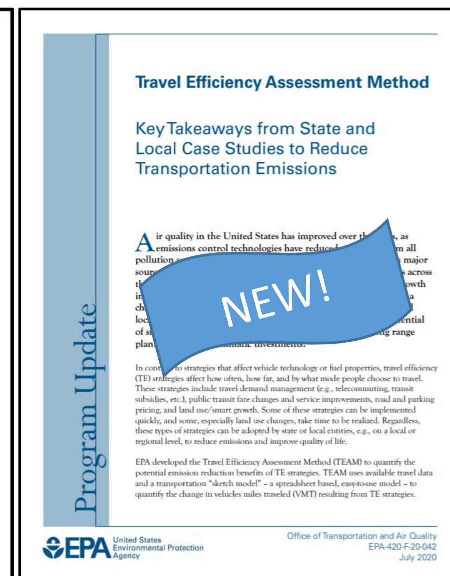
For more information on the TEAM approach, TEAM case studies, and other useful documents, please visit:

www.epa.gov/state-and-local-transportation/estimating-emission-reductions-travel-efficiency-strategies









Questions?