ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS

COST OF NONATTAINMENT STUDY FOR THE OKLAHOMA CITY AREA

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ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS

COST OF NONATTAINMENT (CNA) STUDY FOR THE OKLAHOMA CITY AREA
EXECUTIVE SUMMARY

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POTENTIAL ECONOMIC COSTS OF AN OZONE NONATTAINMENT DESIGNATION
Prepared by: ACOG Consultant - Capital Area Council of Governments (CAPCOG), Austin, TX and the Greater Oklahoma City Chamber

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Prepared by: ACOG Consultant - Texas A&M Transportation Institute (TTI)

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Prepared by: ACOG Consultant - Texas A&M Transportation Institute (TTI)

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AAA	American Automobile Association
AACOG	Alamo Area Council of Governments
AADT	Annual Average Daily Traffic
AAMPO	Alamo Area Metropolitan Planning Organization
ACOG	Association of Central Oklahoma Governments
AFB	Air Force Base
ARC	Atlanta Regional Commission
ATRI	American Transportation Research Institute
BCA	Benefit-Cost Analysis
CAA	Clean Air Act
CAMPO	Capital Area Metropolitan Planning Organization
CASAC	Clean Air Scientific Advisory Committee
CAPCOG	Capital Area Council of Governments
CBSA	Core Based Statistical Area
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality Improvement
CMF	Crash Modification Factor
CMP	Congestion Management Process
CO	Carbon Monoxide
CSA	Combined Statistical Area
CTG	Control Technique Guideline
DOT	Department of Transportation
EGU	Electric Generating Unit
EIA (USEIA)	U.S. Energy Information Administration
EMSI	Economic Modeling Specialists Intl.
EPA	U.S. Environmental Protection Agency
ERG	Eastern Research Group
FAST	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GDOT	Georgia Department of Transportation
GDP	Gross Domestic Product
GOKC	Greater Oklahoma City Chamber
GRP	Gross Regional Product
GVWR	Gross Vehicle Weight Rating
H-GAC	Houston-Galveston Area Council
HCI	Highway Cost Index
HOV	High-Occupancy Vehicle
I/M	Inspection and Maintenance
INCOG	Indian Nations Council of Governments
IRP	Integrated Resource Plan
ISA	Integrated Science Assessment
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation System
LADOTD	Louisiana Department of Transportation and Development
MAP-21	Moving Ahead for Progress in the 21st Century Act
MDA8	Maximum Daily 8-Hour Average
MPO	Metropolitan Planning Organizations
MSA	Metropolitan Statistical Area

µSA	Micropolitan Statistical Area
MTP	Metropolitan Transportation Plan
MVEB	Motor Vehicle Emission Budget
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NCTCOG	North Central Texas Council of Governments
NHTSA	National Highway Traffic Safety Administration
NMDOT	New Mexico Department of Transportation
NNSR	Nonattainment New Source Review
NO_X	Nitrogen Dioxide
O_3	Ozone
OBD	On-Board Diagnostic
OCARTS	Oklahoma City Area Regional Transportation Study (ACOG MPO Area)
ODEQ	Oklahoma Department of Environmental Quality
ODOT	Oklahoma Department of Transportation
OG&E	Oklahoma Gas and Electric
OMB	Office of Management and Budget
PA	Policy Assessment
Pb	Lead
PM	Particulate Matter
ppb	Parts per Billion
PSD	Prevention of Significant Deterioration
RACM	Reasonably Available Control Measure
RACT	Reasonably Available Control Technology
RFP	Request for Proposals
RIA	Regulatory Impact Analysis
ROP	Rate of Progress
SCR	Selective Catalytic Reduction
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulfur Dioxide
SPR	State Planning and Research
STIP	Statewide Transportation Improvement Program
TCEQ	Texas Commission on Environmental Quality
TCM	Transportation Control Measures
TDM	Travel Demand Model
TIP	Transportation Improvement Program
tpy	Tons per Year
TREDIS	Transportation Economic Development Impact System
TRID	Transportation Research Information Database
TTI	Texas A&M Transportation Institute
TWG	Technical Working Group
USC	United States Code
USDOT	U.S. Department of Transportation
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

1 CNA STUDY EXECUTIVE SUMMARY

Due to the near violation of the Ozone Standard in recent years, the Association of Central Oklahoma Governments (ACOG) has undertaken this study to help its regional stakeholders better understand the regulatory and economic risks associated with a nonattainment designation, and the corresponding potential benefits of taking action to avoid an Ozone nonattainment designation.

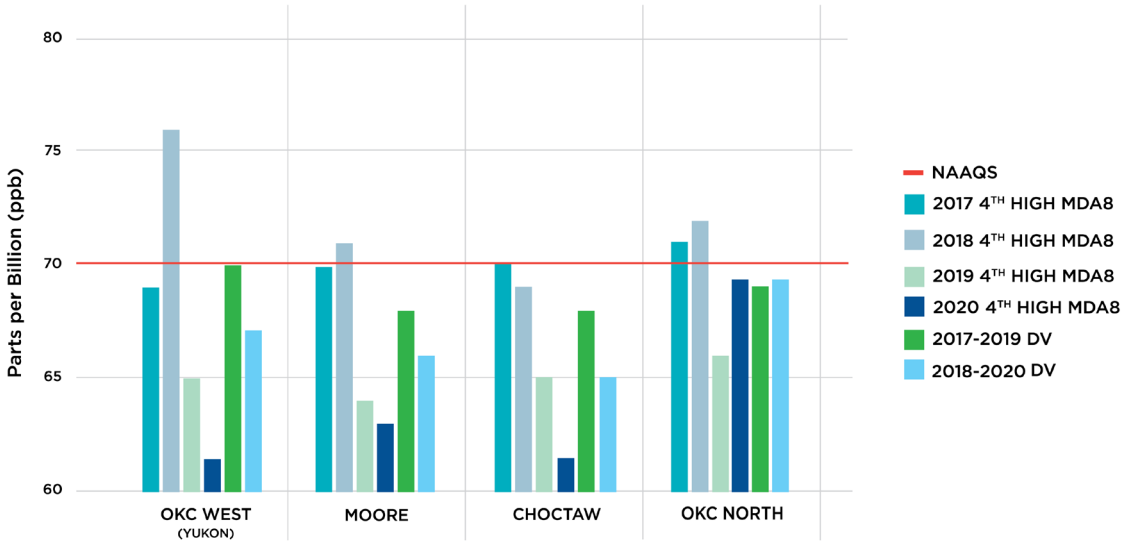
This study shows that a violation of federal air quality standards and ensuing federal regulatory requirements could cost the Oklahoma City–Shawnee Combined Statistical Area (CSA) as much as $9.6-$15.2 billion over a 20-30 year period.

Ground-level ozone (O_3) concentrations in and around the Oklahoma City area have been high enough in recent years that the region runs a significant risk of violating federal air quality standards known as National Ambient Air Quality Standards (NAAQS) or Ozone Standards. Areas that violate the Ozone Standards can be designated as a "nonattainment" area by the UJ Environmental Protection Agency (EPA) under certain circumstances, and this designation comes with significant new regulatory requirements.

Under the Clean Air Act (CAA), the EPA sets "primary" and "secondary" Ozone Standards for various chemicals, including ozone. Primary Ozone Standards are pollution limits that are considered necessary to protect human health, while secondary Ozone Standards are pollution limits that are considered necessary to protect public welfare (i.e., vegetation, ecosystems, visibility, physical structures, climate change, or any other public good other than public health) from known or anticipated adverse impacts.

EPA's Ozone Standards, most recently revised in 2015, limit the three-year average of the annual 4th-highest maximum daily 8-hour average (MDA8) to no more than 70 parts per billion (ppb). The EPA is required to review the Ozone Standards every five years and while EPA's 2020 review resulted in no

Figure 1. Oklahoma City Area 4th-Highest MDA8 Ozone Concentrations and Design Values



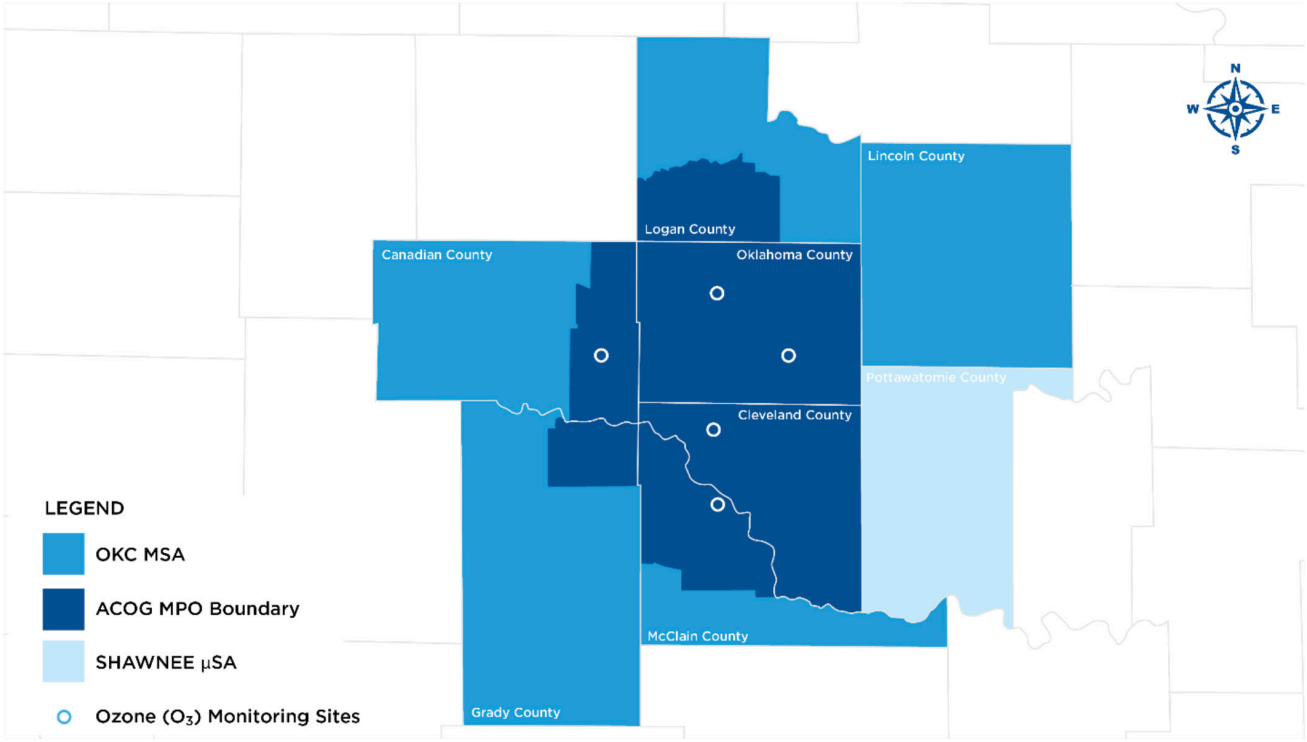
change in the standard, it is reasonable to assume there is some possibility that the standard could be identified in the future.

While all counties in Oklahoma are designated "attainment/unclassifiable" for all Ozone Standards, "design values" (statistics used to compare monitoring data to the Ozone Standards) from monitors in and around the Oklahoma City area from 2016-2018 and from 2017-2019 indicate that the area's ozone concentrations are at the maximum allowable levels. (Refer to Figure 1)

The Oklahoma City area's ground-level ozone levels are narrowly in compliance with the current Ozone Standards, but they can vary significantly year to year. While this study does not make any predictions or assumptions on EPA adjustments to Ozone Standards, the continued uncertainty reinforces the need to plan for possible nonattainment scenarios.

The following map (Figure 2) shows locations of the ozone monitors located in the Oklahoma City area that collected data in 2019, along with the boundaries of the ACOG Metropolitan Planning Organization (MPO), the Oklahoma City Metropolitan Statistical Area (MSA), and the Shawnee Micropolitan Statistical Area (μSA). The Oklahoma City–Shawnee CSA includes all of the counties highlighted on the map.

Figure 2: Ozone Monitors and Geographic Census/Service Boundaries in the Oklahoma City Area in 2019



OZONE & PUBLIC HEALTH

Public health ozone impacts (particularly for individuals with asthma, younger and older age groups, individuals with certain dietary deficiencies, and outdoor workers):

- Respiratory effects
- Cardiovascular effects
- Mortality

Public welfare ozone impacts:

- Damage to vegetation
- Damage to ecosystems
- Contribution to climate change

Voluntary reduction of emissions provides direct public health and economic benefits to Central Oklahoma communities.

Measures that reduce nitrogen oxides (NO_x) and volatile organic compounds (VOCs) emission rates, ambient concentrations of multiple pollutants, and emissions-forming activity lessen all manner of emissions which lead to positive health outcomes are key to reducing ambient ozone. Ambient air that complies with the Ozone Standard provides direct public health and economic benefits to Central Oklahoma communities.

REGIONAL IMPACTS OF A NONATTAINMENT STATUS

The Clean Air Act requires that EPA designate areas as "nonattainment" if they are violating the Standards or contributing to a violation nearby. The EPA imposes a number of regulatory requirements on these areas in order to ensure that the area attains the Standards as expeditiously as practicable and thereafter is able to maintain the Ozone Standards.

While these regulatory requirements provide a public benefit insofar as they reduce or control air pollution levels, they also come with a cost to the community's economy and its competitive ability in attracting new industries. For example, a business evaluating where to build a new manufacturing facility may rule out a nonattainment area due to the added regulatory requirements. A violation of the Ozone Standards puts the Oklahoma City–Shawnee CSA (eight total counties) at risk of being designated a "nonattainment" area by EPA. Many of the estimated costs in this study would still be applicable in the event the nonattainment area was smaller.

Communities in the Oklahoma City area that are close to violating the Ozone Standards can both protect public health and welfare, and protect the regional economy by taking action now to reduce ozone-forming emissions in order to remain in compliance with the Ozone Standards, rather than being forced to do so under a nonattainment designation.

STUDY STAKEHOLDERS

As mentioned previously, this study was developed by the Association of Central Oklahoma Governments (ACOG). The preparation of this report was financed through grants from the Federal Transit Administration (FTA) with financial contributions provided by the following regional stakeholders: City of Oklahoma City, Environmental Federation of Oklahoma, Greater Oklahoma City Chamber of Commerce, Oklahoma Department of Commerce, Oklahoma Department of Transportation (ODOT), Oklahoma Gas & Electric Company, ONE Gas, Sierra Club – Oklahoma Chapter, and Tinker Air Force Base.

Through an interlocal agreement procured by ACOG, with the Capital Area Council of Governments (CAPCOG) in Austin, Texas, and the Greater OKC Chamber (GOKC), stakeholders were assisted in the development of this report. CAPCOG conducted a similar study in 2015; the only other study comparable to this was conducted in 2017 by the Alamo Area Council of Governments (AACOG) in San Antonio, and this study was also modeled using CAPCOG's methodology. In 2020, CAPCOG prepared an initial "scoping report." This report provides useful context and information on the regulatory situation that the region would face and can be reviewed in order to understand some of these basic assumptions for this study. Following the completion of the scoping report, ACOG retained CAPCOG and GOKC to complete the project, and also contracted with Texas A&M Transportation Institute (TTI) through an interlocal agreement to analyze the costs associated with transportation conformity due to the specialized nature of that component of this study. TTI also provided the *Potential Off-Setting Benefits Associated with Congestion Mitigation and Air Quality (CMAQ) Fundings* report.

ECONOMIC COSTS TO THE OKLAHOMA CITY AREA

This section of the study identifies potential economic costs to the Oklahoma City area if it is designated nonattainment for the Ozone Standards. The Clean Air Act requires the EPA to establish Standards to protect public health and welfare, and to designate areas as "nonattainment" if they are violating the Standards or contributing to a nearby violation. Once designated nonattainment, an area is subject to a variety of new regulations intended to bring the area into compliance and remain in compliance for at least twenty years after the area is redesignated to "attainment." These regulations can have important implications for regional economic development and transportation planning. Staying in compliance with the Standards has important economic benefits in addition to the public health and welfare benefits of good air quality. The purpose of this study is to characterize the potential economic costs of a nonattainment designation

that the Oklahoma City area can avoid by remaining in compliance with the Ozone Standards, and to provide information for decision-makers to weigh the conceivable benefits of taking action to avoid or mitigate these possible economic impacts.

This study considers the likely economic costs of a nonattainment status over a 28-year period: from 2022 to 2050. While it is possible for an area to be designated nonattainment one year and be redesignated to attainment as soon as the following year, it will continue to be subject to regulations associated with that designation for at least another 20 years. Since being designated nonattainment even for a short amount of time can be a significant factor in a business' decision to locate in or expand within the region, even a brief period of nonattainment can carry a significant opportunity cost for the region for a long period of time.

The hypothetical scenario this report considers would be one in which the eight-county Oklahoma City–Shawnee CSA is designated "nonattainment" for the Ozone Standards in late 2022 under a "Marginal" classification, subsequently misses the attainment date, and is reclassified to "Moderate." While this specific scenario is not very likely, especially in light of EPA's decision in 2020 to retain the current Ozone Standards, the scenario illustrates the likely scale and scope of the economic costs the region could face from a nonattainment designation, and these economic costs would be similar even if a nonattainment designation occurred several years in the future. A situation in which an area is initially classified as "Marginal" but misses its attainment date is not unrealistic: the San Antonio area was the only new nonattainment area designated by EPA following the 2015 Ozone Standards, and it is facing this exact situation right now. The following table (Table 1) summarizes the total potential economic costs identified in this study for the full 28-year period.

This analysis is primarily concerned with characterizing the possible economic costs of a nonattainment designation, rather than speculating as to the probability of each of the various components of this analysis occurring. Decision-makers can use this study and assign their own probabilities to each situation in order to develop "expected fiscal costs" of a nonattainment designation to weigh those against the costs of taking various actions to reduce emissions or otherwise diminishes the economic risks associated with a nonattainment designation. These actions include coming into attainment of the Ozone Standards as expeditiously as possible, working towards limiting the geographic scope of a nonattainment area, and using what flexibilities exist under the Clean Air Act to minimize the economic scope of a nonattainment designation while still taking the action that may be needed to come into compliance with the Ozone Standards.

The analysis includes a reasonably foreseeable scenario in which an automotive manufacturing company decides not to build a plant in the Oklahoma City area as a result of a nonattainment designation. This industry sector was selected in large part due to increased automotive recruitment and expansion efforts led by Oklahoma Governor Kevin Stitt, the Oklahoma Department of Commerce, the Greater Oklahoma City Chamber and others.

Recent announcements of intentions to build manufacturing facilities in Oklahoma and Texas from electric car companies Canoo and Tesla have demonstrated the potential for additional electric car and battery manufacturing companies to locate in the Oklahoma City–Shawnee CSA.

Table 1. Summary of Potential Economic Costs of a Nonattainment Designation, 2022-2050

Classification	Requirement	Low (Cost)	High (Cost)
Marginal	Nonattainment New Source Revenue	$7,209,372,404	$10,141,843,457
Marginal	Transportation Conformity	$306,413,810	$565,441,517
Marginal	General Conformity	$0	$1,230,724,801
Marginal	**Subtotal for Classification**	**$7,515,786,214**	**$11,938,009,775**
Moderate	Nonattainment New Source Review	$0	$0
Moderate	15% VOC Reduction	$1,823,456,374	$2,808,066,244
Moderate	NO_x Reasonable Available Control Technology (RACT)-Electric Generating Units (EGUs)	$129,524,608	$172,699,477
Moderate	NO_x RACT-Non-EGUs	$0	$174,235,769
Moderate	Inspection and Maintenance Program	$82,952,287	$100,958,177
Moderate	**Subtotal for Classification**	**$2,035,933,269**	**$3,255,959,667**
	TOTAL	**$9,551,719,483**	**$15,193,969,442**

TRANSPORTATION CONFORMITY COSTS

This section of the study presents the findings of probable impacts of a nonattainment designation on transportation planning as a result of conformity requirements and sanction provisions of the Clean Air Act.

Transportation conformity will have a significant impact on the transportation planning process and could hinder ACOG and the ODOT's ability to conduct efficient transportation planning for the whole region. Conformity requirements remain in effect long after an area comes into compliance with the Ozone Standards.

The estimated likely impacts need to be readily translatable into regional economic effects. This study developed the potential transportation conformity costs arising from the following four cost categories with respect to the Oklahoma City–Shawnee CSA.

1. Costs to the Metropolitan Planning Organization (MPO) and other stakeholders to perform conformity
2. Increased costs of project delays in building new roads due to new requirements
3. Increased costs of building roads due to conformity lapse
4. The potential loss of federal revenue from long term conformity lapse

The transportation conformity process is a way to ensure that state and regional plans with federal funding meet air quality goals in order to be eligible for federal funding and approval.

Project delays due to conformity requirements generally tend to be less than 12 months based on similar regions around the country. It can take one to two years for the state and the MPO staff to effectively comprehend the conformity process and the emissions analysis component. This will entail additional staffing costs of approximately $200,000 per year.

This study estimated that a nonattainment re-designation for the EPA's proposed Ozone Standards could potentially cost the ACOG MPO and ODOT in the range of $135 million to $145 million between 2023 and 2050 for routine conformity analysis and project delays associated with it.

POTENTIAL OFF-SETTING BENEFITS ASSOCIATED WITH CONGESTION MITIGATION AND AIR QUALITY (CMAQ) FUNDING

This section of the study focuses on Federal Highway Administration (FHWA) CMAQ funding. Currently, ODOT retains full flexibility in distributing their statewide CMAQ funding ($12.8 million for FY 2022). A nonattainment designation for Central Oklahoma will bring a larger portion of CMAQ funding to the ACOG MPO from ODOT. The increase in funds provides an opportunity to advance certain projects or programs,

but it also brings challenges associated with meeting the greater local match requirement and ensuring that the region has the projects to support the use of the additional funds.

CONCLUSION

The $9.5-$15.2 billion in economic costs identified in this study reinforce the urgent need for the Oklahoma City area to remain in-attainment of the Ozone Standard. Failure to do so will result in the saddling of businesses, government agencies, and individuals with increased construction costs, delayed road projects, and new regulatory requirements.

This study only assumes the loss of an opportunity to attract one manufacturing plant, but it is reasonable to assume that additional recruitments and expansions could be lost in the event of a nonattainment designation, generating additional negative ripple effects across the regional and state economy.

And while this study is focused only on the Oklahoma City area, it is reasonable to assume that costs identified here could be transferrable to costs impacting the Tulsa and Lawton areas in the event one or both were to go out of attainment.

Clean air is essential to the quality of life for all Central Oklahomans, and the region's air quality attainment status is an economic strength that supports prosperity, opportunity, and economic development advantages over other regions. In ACOG's role as the regional planning organization, this study was undertaken to help plan for the consequences of a nonattainment designation that carries decades of additional federal regulations that can be avoided through continued local actions to reduce ozone emissions.

ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS

COST OF NONATTAINMENT STUDY FOR THE OKLAHOMA CITY AREA:

POTENTIAL ECONOMIC COSTS OF AN OZONE NONATTAINMENT DESIGNATION

PREPARED BY:
ACOG CONSULTANT - CAPITAL AREA COUNCIL OF GOVERNMENTS (CAPCOG) AUSTIN, TEXAS &
THE GREATER OKLAHOMA CITY CHAMBER

2 INTRODUCTION

This section provides an overview and explanations of some key assumptions and methodologies used for this study.

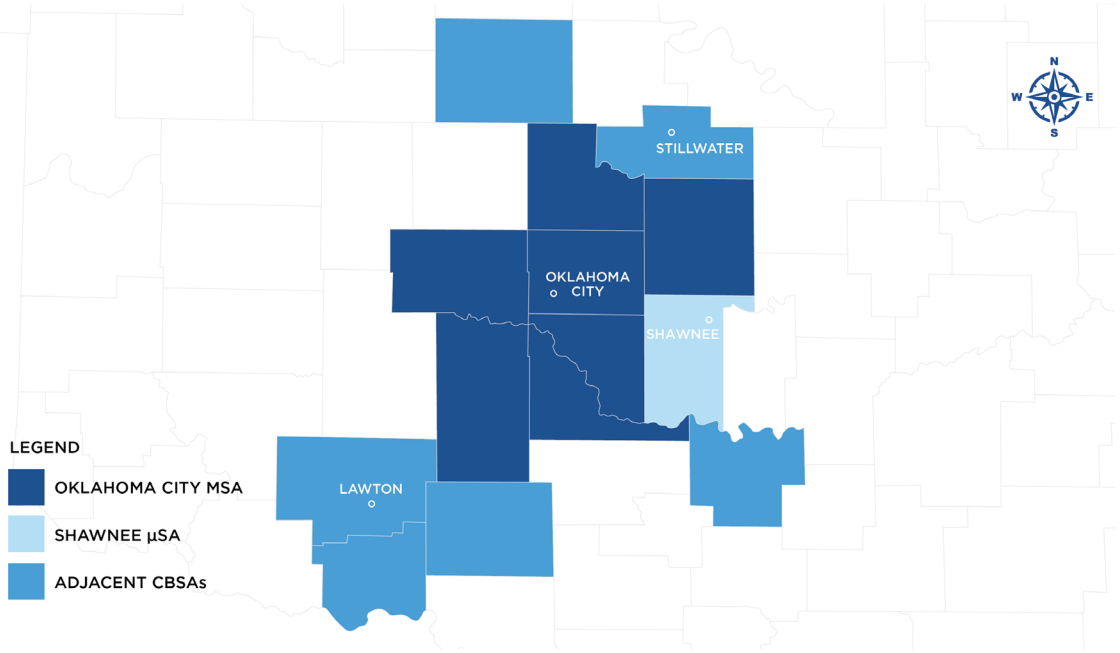
STUDY AREA

While there are many different potential geographies that were considered for this study, ACOG selected the eight-county Oklahoma City-Shawnee Combined Statistical Area (CSA), as defined by the Office of Management and Budget (OMB).[1] The CSA area consists of two adjacent Core-Based Statistical Areas (CBSAs):

1. **The Oklahoma City Metropolitan Statistical Area (MSA): Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma Counties.**
2. **The Shawnee Micropolitan Statistical Area (µSA): Pottawatomie County** (Refer to Figure 3 below).

The use of the CSA as the study area is based on EPA guidance for area designations for the 2015 Ozone Standards. In determining whether to designate an area nonattainment and the geographic extent of the area, EPA's guidance calls for the use of a five-factor analysis that considers air quality data, emissions and emissions-related data, meteorology, geography and topography, and jurisdictional boundaries. The first step in the process involves identifying monitors violating the Ozone Standards. Once it has identified violating monitors, EPA's guidance states that, "for analyzing whether nearby areas contribute to a violating area, the EPA intends to consider information relevant to designations associates with the counties in the CSA or, where appropriate, the Core Based Statistical Area (CBSA) in which the violating monitor(s) are located."[2]

Figure 3. Oklahoma City MSA, Shawnee µSA, and Other Adjacent CBSAs



[1] Available online at: https://www2.census.gov/programs-surveys/metro-micro/geographies/reference-files/2020/delineation-files/list1_2020.xls.

[2] Memorandum from Janet McCabe, EPA Acting Assistant Administrator for the Office of Air and Radiation to Regional Administrators. Subject: Area Designations for the 2015 Ozone National Ambient Air Quality Standards. February 25, 2016. Available online at: https://www.epa.gov/sites/default files/2016-02/documents/ozone-designations-guidance-2015.pdf.

This means that if any of ozone monitors located in the Oklahoma City-Shawnee CSA were violating the Ozone Standards, all eight counties could be included in a nonattainment designation. This includes counties that lack a monitor or that had monitoring data showing attainment of the Ozone Standards if EPA determined that they were contributing to the violation within the region.

In practice, it is not necessarily likely that all eight counties would be designated nonattainment if there was a violation that occurred within the region. For example, the only newly designated nonattainment area for the 2015 Ozone Standards was the San Antonio area, and for that area, EPA limited the geographic scope to just Bexar County where the violating monitors were located, and designated the other seven counties in the San Antonio-New Braunfels MSA attainment/unclassifiable. Elsewhere within EPA Region 6, there were no examples of EPA including a county that was located in the same CSA but outside of the same CBSA (i.e., like Pottawatomie County) in a nonattainment area. EPA's policies regarding the treatment of tribal areas separately for the purposes of area designations could also have a significant impact on the geographic scope or configuration of any potential nonattainment designation or designations arising from a violation of the Ozone Standards within the Oklahoma City-Shawnee CSA due to the extent to which parts of the CSA are in tribal areas. Notwithstanding these qualifications, it is important for all regional stakeholders to understand that if even one ozone monitor in the CSA was violating the Ozone Standards by just 1 ppb, all eight counties would face the possibility of being included in a nonattainment area. Area designations are made on case-by-case bases, and are very much a by-product of the administrations in which they occur. Since this study is concerned with characterizing the potential costs of a nonattainment designation rather than assigning probabilities to the different ways an actual nonattainment designation might occur in the future, ACOG and their consultant, CAPCOG, determined that the CSA was the appropriate geographic area for this study.

STUDY SCENARIO

This study involves a counterfactual scenario in which the EPA designated the entire eight-county CSA a nonattainment area for the ozone Standards in late 2022 based on its 2019-2021 Ozone "design value." "Design value" is the term EPA uses for the statistics it uses to compare a monitor's and area's air quality monitoring data to the Ozone Standards. For the Ozone Standards, this statistic is based on the 4th-highest Maximum Daily 8-Hour Ozone Average (MDA8), averaged over three years. The design value is calculated for each of the monitoring stations in an area, and the highest design value amongst all of the monitors is considered the area's design value. Therefore, if one area's design value is violating the Ozone Standards, the entire region is considered in violation of the Ozone Standards. The following table (Table 2) illustrates the 2018-2020 design value calculations for the Oklahoma City MSA:

Table 2. 2018-2020 Ozone Design Values and 4th Highest MDA8 Ozone for the Oklahoma City MSA

SITE NAME	AQS SITE NUMBER	2018 4TH HIGHEST MDA8 (PPB)	2019 4TH HIGHEST MDA8 (PPB)	2020 4TH HIGHEST MDA8 (PPB)	2018-2020 DESIGN VALUE (3-YR.AVG. PPB)
OKC West (Yukon)	400170101	76	65	62	67
Moore Water Tower	400270049	71	64	63	66
Choctaw	401090096	69	65	62	65
OKC North	401091037	72	66	69	69

Since the highest design value of the sites is 69 parts per billion (ppb), the entire MSA's and CSA's design value is considered to be 69 ppb, and therefore in attainment of the 70 ppb Ozone Standards.

There are two situations that would have made this scenario likely:

1. If EPA had tightened the Ozone Standards as part of the periodic review that was completed in late 2020, or
2. If the Oklahoma City area's 2019 and 2020 ozone levels had been somewhat higher, pushing the area's 2018-2020 design value and 2019-2021 design values above 70 ppb.

While it is now unlikely that an actual nonattainment designation would occur within this timeframe, the overall scenario and the timelines developed for this analysis are useful for characterizing the potential costs of a nonattainment designation, if it were to happen at some point in the future. EPA recently announced that it would be reconsidering the prior administration's decision not to tighten the Particulate Matter Ozone Standards and the White House has directed EPA to also evaluate whether to reconsider the decision on the Ozone Standards as well. Even if EPA did not initiate a reconsideration for the Ozone Standards, however, the next review of the Ozone Standards is now statutorily due by the end of 2025, and if EPA revised the Ozone Standards at that time, a new round of area designations would be due by the end of 2027. This analysis should still be valid for understanding the potential costs of a nonattainment designation under that scenario too, except shifted by five years into the future.

If an area is designated nonattainment, there are five classifications that it can fall into that each have a defined "attainment date" after the area is designated nonattainment. The lowest classification has the least stringent requirements and the shortest period of time to come into compliance, while the highest classification has the most stringent requirements and the longest period to come into compliance. Traditionally, EPA has classified areas based on the ratio of the area's design value to the Ozone Standards. For the 2015 Ozone Standards, the classifications were as follows (Refer to Table 3):

Table 3. 2015 Ozone Standards Nonattainment Classification Approach

CLASSIFICATION	REQUIREMENT	COMPLIANCE TIME
MARGINAL	71-80 ppb (up to 115% of the NAAQS)	3 Years from Designation
MODERATE	81-92 ppb (115%-133% of the NAAQS)	6 Years from Designation
SERIOUS	93-105 ppb (133%-150% of the NAAQS)	9 Years from Designation
SEVERE	105-163 ppb (150%-233% of the NAAQS)	15 or 17 Years from Designation
EXTREME	163 ppb+ (more than 233% of the NAAQS)	20 Years from Designation

If an area's ozone levels fail to meet the Ozone Standards by its attainment date, it is automatically "bumped up" to the next-highest classification, which gives it extra time to come into compliance, but also imposes extra regulatory requirements. For the 1997, 2008, and 2015 Ozone Standards, about 80% of all nonattainment areas have initially been classified as "Marginal," though many of them failed to attain the Ozone Standards within the specified timeframe. This study envisions a scenario in which Oklahoma City's ozone levels are exceeding the Ozone Standards within the range that EPA would assign a "Marginal" classification, but it then fails to attain the Ozone Standards within three years and the area is "bumped up" to "Moderate." This is a very plausible scenario. Of the 41 areas that EPA designated nonattainment for the 2015 Ozone Standards with a "Marginal" classification, 34 failed to meet their attainment date and are now facing a reclassification to "Moderate."

REGULATORY REQUIREMENTS

The following regulatory requirements apply to Marginal and Moderate ozone nonattainment areas:

- Marginal Classification:
  - Nonattainment New Source Review (NNSR) permitting for major new sources of nitrogen oxides (NO_X) or volatile organic compounds (VOC) and major modifications of existing sources of NO_X or VOC (only in effect while designated nonattainment);
  - Transportation conformity (in effect while designated nonattainment and during two subsequent 10-year maintenance periods); and
  - General conformity (in effect while designated nonattainment and during two subsequent 10-year maintenance periods).
- Moderate Classification (in addition to all Marginal requirements):
  - Increased offset requirements for NNSR permitting;
  - 15% reduction in emissions of VOC;
  - Reasonably Available Control Technology (RACT) for major sources of VOC, major sources of NO_X, and sources of VOC covered by a control technique guideline (CTG) or plan;
  - Vehicle inspection and maintenance (I/M) program; and
  - Any other Reasonably Available Control Measures (RACM) needed for the area to attain the Ozone Standards as expeditiously as practicable.

While the rules required for a "Moderate" classification don't specifically have to be implemented after an area is classified to "attainment," they must remain in effect until the EPA approves a State Implementation Plan (SIP) revision that demonstrates to its satisfaction that removal of the measure will not interfere with continued maintenance of the Ozone Standards. For the I/M program, there would be additional hurdles to removal of the program as described in applicable federal regulations.[3]

SCENARIO TIMELINE

The scenario developed by ACOG's consultant involves the following timeline and milestones (Refer to Table 4 on the following page):

[3] 40 CFR §51.350(c) states that "All I/M programs shall provide that the program will remain effective, even if the area is redesignated to attainment status or the standard is otherwise rendered no longer applicable, until the State submits and EPA approves a SIP revision which convincingly demonstrates that the area can maintain the relevant standard(s) without the benefit of the emission reductions attributable to the I/M program. The state shall commit to fully implement and enforce the program until such a demonstration can be made and approved by the EPA. At a minimum, for the purposes of SIP approval, legislation authorizing the program shall not sunset prior to the attainment date for the applicable National Ambient Air Quality Standards (Ozone Standards)."

Table 4. Nonattainment Designation and Reclassification Scenario

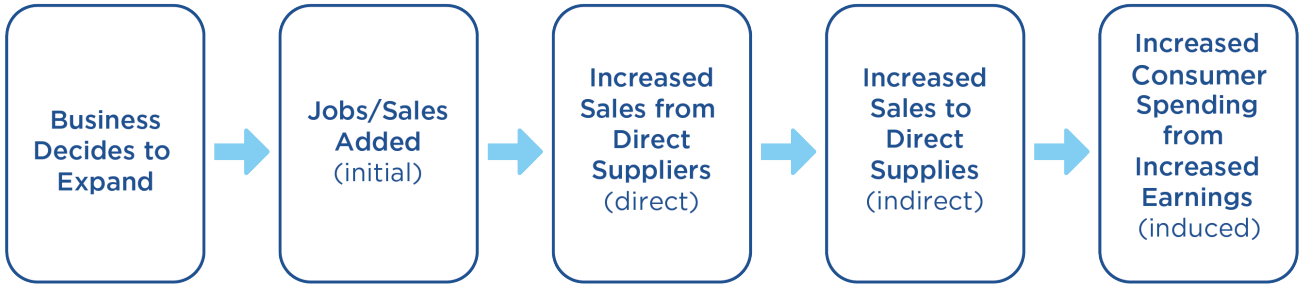
DATE/TIMEFRAME	MILESTONE(S)
Late 2022	Area designated nonattainment
Late 2023	Initial transportation conformity determination due
Late 2025	Attainment date for "Marginal" area, based on 2022-2024 Ozone Design Value; area fails to attain
Early to Late 2026	Attainment date for "Marginal" to "Moderate" due to failure to attain the Ozone Standard
January 1, 2027	RACT rules for "Moderate" classification must be implemented
Late 2028	Attainment date for "Moderate" nonattainment area based on 2025-2027 ozone Design Value, 15% VOC emission reduction must be achieved, redesignation to attainment
Early to Late 2030	Latest potential date for implementation of an inspection and maintenance (I/M) program (4 years from reclassification to Moderate)[4]
Late 2040	End of 1st ten-year maintenance period
Late 2050	End of 2nd ten-year maintenance period

OVERVIEW OF ECONOMIC IMPACT ASSUMPTIONS AND METHODOLOGIES

This study identifies potential economic costs to the region based on a comparison of the region's gross domestic product (GDP, or, for regional analysis, sometimes gross regional product/GRP) under a nonattainment designation to the GDP under a "business as usual" scenario in which the region remains designated attainment/unclassifiable for the Ozone Standards. There are three important concepts that the reader should keep in mind for understanding and interpreting the results of this analysis:

1. **Economic cost includes opportunity cost:** This report includes analysis not just of situations in which a regulation causes a change in existing patterns of economic activity, but situations in which new economic activity that would be expected to occur under a "business as usual" situation may not occur under a nonattainment designation. The regulations that a nonattainment designation entail constrain businesses and governmental entities from taking certain actions that they may otherwise take, and the region may lose the opportunity for higher economic output under a "business as usual" scenario as a result of a nonattainment designation.
2. **There is a difference between financial cost and economic cost:** Financial cost represents the cost to an individual or business, while economic cost represents diminished economic output for the region. Since financial cost to

Figure 4. Conceptual Model of Economic Impact Analysis Used for this Report



[4] Based on 40 CFR §51.373 (b): "For areas newly required to implement basic I/M as a result of designation under the eight-hour ozone standard, the required program shall be fully implemented no later than 4 years after the effective date of designation and classification under the 8-hour Ozone Standard."

one party represents revenue to another party, it is important for understanding the potential costs of a nonattainment designation not just the financial cost to a given party (for example, needing to pay for a vehicle inspection), but how that activity causes the region's overall economy to perform differently. There are some situations in which it was assumed that the financial cost does equal the economic cost, such as requirements to install new pollution control equipment on existing facilities. In these situations, it was assumed these expenditures were paid out to firms from outside of the region and none of the economic value of those expenditures were retained within the region. While this may not be realistic, it does provide a "worst case scenario" possibility.

3. **Economic activity at a single firm has effects throughout a regional economy:** While financial cost to a firm does not represent the regional economic impact of that expenditure, a firm's growth in employment or sales also does not capture the full impact of that growth on the broader economy. In partnership with the Greater Oklahoma City Chamber, CAPCOG used economic modeling software to calculate these broader economic impacts of firm-level decisions. CAPCOG and the Chamber used Economic Modeling Specialists International's input-output model (2020 input-output year) and its "what if" scenario, as well as information developed by TTI (for transportation conformity) and the U.S. Air Force (for Tinker Air Force Base's regional economic impact) in order to estimate these impacts. The diagram (Figure 4) shows the general conceptual model used for this analysis.

Study consultants used EMSI's most recent data on jobs, sales, and GDP by North American Industrial Classification System (NAICS) code for the Oklahoma City-Shawnee CSA to be able to relate jobs and sales if the number of added jobs was available but not the estimate of the number of added sales. Study consultants then used multipliers from the input-output model specific to the value added to sales and the direct, indirect, and induced impacts.[5] As one example, the following calculation shows how the impact of an extra 100 jobs in NAICS Code 325998 - All Other Miscellaneous Chemical Product and Preparation Manufacturing would be modeled:

- Current Jobs: 135
- Current Sales: $55,846,321
- 0.4205 – value added to sales multiplier
- 0.2097 – direct value added multiplier
- 0.0659 – indirect value added multiplier
- 0.5504 – induced value added multiplier

Sales per job = $55,846,321 in sales /135 jobs = $413,506.96 in sales per job

$413,506.96 sales per job * 100 jobs = $4,135,069.61 in sales

GDP added from sales = $4,135,069.61 * (0.4205 value added to sales + 0.2097 direct value added + 0.0659 indirect value added + 0.5504 induced value added) = $5,154,306.54

In this example, adding 100 jobs in NAICS code 325998 would mean an additional $4.1 million in sales from this sector, but would add $5.2 million per year to the region's GDP. The annual amount is then multiplied by a relevant timeframe for this analysis (20 years if it involved construction).

In the case of an expansion, the short-term impact from the construction phase of the project if the level of capital investment could be identified. This figure would represent sales into the industrial building construction sector (236210), and the same calculation would be performed but with the omission of the "induced" impact multiplier since that represents a broader, permanent expansion of other consumer sectors as a result of sustained higher employment levels within the region, rather than a short-term increase in employment associated with a construction project. This one-time economic impact would then be added to the overall economic impact that the project would be expected to have on the region over the analysis period.

In one of the key analyses of this report that analyzes the potential cost to the region of losing out on an automobile manufacturing plant as a result of a nonattainment designation, CAPCOG and the Greater Oklahoma City Chamber could not use local data from the input-output model since there are no auto manufacturing facilities currently in the region.

[5] In EMSI's model, these were referred to as "Value Added to Sales, "Direct Value Added," "Indirect Value Added," and "Induced Value Added."

Instead, they used EMSI's "what if" scenario that uses more generalized multipliers to simulate the impact of adding jobs to a particular sector, even if it doesn't already exist within the area. Conceptually, it works the same way as outlined above, but it is using multipliers from a broader geographic area that includes existing automobile manufacturing establishments.

In most of these analyses, a range of values (low and high) is presented. These are intended to represent the low and high negative economic impact of a nonattainment designation if it occurred and if some of the key assumptions in the relevant section hold true. In some cases, the estimate may be zero if it is concluded that it is possible that the specific provision may not entail any additional costs. For example, the Clean Air Act requires that a firm building a new major source of emissions obtain offsets for any new emissions from within the same nonattainment area, but this provision is not likely to add any costs for a firm choosing to build a new facility in the region in the second half of this decade if that firm already possesses the required offsets. Lastly, it is important for readers to understand that the identification of a potential cost is not the same thing as analyzing the expected cost (i.e., probably of event X times the cost of event X). Decision-makers who wish to use this report to understand the tradeoffs between taking action to reduce emissions now and the potential economic costs of a nonattainment designation in the future should adjust the figures presented in this report based on assessments of the probabilities of these situations occurring. For example, comparing the "expected cost" of losing out on an auto plant to the cost of additional pollution controls should include an assessment of the likelihood that a nonattainment designation would be the deciding factor in a businesses' decision to build an auto plant within the region, and then multiply the potential economic costs by that probability.

3 THE COSTS OF A MARGINAL CLASSIFICATION

A Marginal classification is unique among the five classifications in that it does not require that any new emission reduction measures be implemented, but does involve controls on the growth of emissions.

States are not required to submit a State Implementation Plan (SIP) showing how the region will attain the Ozone Standards within three years for Marginal areas. Despite this, Nonattainment New Source Review (NNSR) permitting, transportation conformity, and general conformity can have significant and long-lasting economic impacts on a region. NNSR permitting is only in effect while an area is designated nonattainment, but the added burdens associated with this type of permitting that a firm would not have to face if it instead built or expanded in an "attainment" area can cause a firm to make that business decision. Once a business decides to build somewhere else, that means that the region has lost out on that opportunity not just for that year, but for the entire useful life of the facility. And the requirements for "conformity" of federal actions to the SIP under the transportation and general conformity regulations persist for the area long after the area is redesignated to "attainment," since they also apply to the maintenance plans that the area remains subject to for the following 20 years.

NONATTAINMENT NEW SOURCE REVIEW

NNSR permitting is different from permitting in attainment/unclassifiable areas ("Prevention of Significant Deterioration" or PSD permitting) in three crucial ways:

1. Major new sources of emissions or major modifications of existing sources must achieve the "Lowest Achievable Emissions Rate" (LAER) in nonattainment areas regardless of cost, whereas they are only required to implement "Best Available Control Technology" (BACT), which includes cost considerations, in attainment/unclassifiable areas.
2. Any new emissions added are required to be fully offset by a ratio of more than 1 to 1. For Marginal areas, the offset ratio is 1.1 to 1.
3. A facility's status can change from a minor source in an attainment/unclassifiable area to major in a nonattainment area if it has the potential to emit between 100 tons per year (tpy) and 250 tpy, which would trigger an extra level of federal review of the permit and a longer period for obtaining a permit.

Any of these factors could cause a business to not locate in the region or not to expand within the region. To the extent NNSR permitting affected such decisions, it would represent an economic cost to the region.

SCENARIO OVERVIEW

Automobile manufacturing (NAICS Code 336111) is one of the key sectors that have been targeted for recruitment for economic development in the Oklahoma City area. Due to the processes involved with this type of manufacturing and the scale involved, these types of facilities typically have the potential to emit more than 100 tons per year (tpy) of Volatile Organic Compounds (VOC). This means that they would be considered a "major source" of VOC in an ozone nonattainment area, and subject to NNSR permitting. This would hinder a nonattainment area's ability to compete for a new automobile manufacturing relative to an "attainment" area. This does not mean that a firm would definitely not build a facility in the Oklahoma City area if it was designated nonattainment, since companies do build new facilities in nonattainment areas, but it does make an area less competitive for that growth, all other things being equal. This study focuses on evaluating the possibility that a vehicle manufacturing company decides not to build their plant in the Oklahoma City area as a result of a nonattainment designation.

The Oklahoma City area was in contention for Tesla's new manufacturing facility for pickup trucks that is currently under construction in Austin, and details about their request for proposals (RFP) for economic development incentives and the ultimate economic development incentive deal they secured are publicly available. Their air permit also requested authorization to emit more than 100 tpy of VOC, meaning it would have been subject to NNSR permitting if it was located in a nonattainment area. In its request for proposals (RFPs), Tesla claimed that the facility would create 7,000 jobs, while in the economic development deal reached with Travis County, Texas, it committed to create at least 5,000 jobs, so this range was used by the chamber and CAPCOG to estimate the broader regional economic impact of such a facility. The chamber also received RFPs for two additional companies interested in building an auto manufacturing facility in the region, but those are not publicly available. There are no other RFPs that the Chamber was aware of that would have entailed construction of a facility that would have been subject to NNSR permitting, but there are certainly a wide range of facilities that would also be affected by NNSR permitting, but this scenario appeared to be both the most plausible and the highest-impact of the various hypothetical scenarios contemplated.

EMSI'S "WHAT-IF" SCENARIO TOOL FOR LONG-TERM IMPACT

Since there is not currently an automobile manufacturing facility in the Oklahoma City area, the Chamber used EMSI's "What-if" Scenario Tool to model the economic impact of an automobile manufacturing facility in the area. Tesla's CEO Elon Musk claimed in an interview at one point that the facility could employ as much as 10,000 workers, and the impacts should be linear, so the Greater Oklahoma City Chamber used the 10,000 job number as the input for the model and then the effects were scaled back to 70% and 50% to correspond to the 7,000 and 5,000 jobs numbers that the company was willing to provide more direct backing for in their RFP and economic development deal. The Chamber of Commerce used the EMSI-type model with the 2020 input-output year to model this scenario for the eight-county study area.

Table 5 provides a summary of the estimated annual regional impact of these job estimates over a 20-year period.

Table 5. Estimated Regional Impact of a 5,000-job and 7,000-job Automobile Manufacturing Facility

ITEM	5,000 JOB FACILITY	7,000 JOB FACILITY
TOTAL JOBS REGION-WIDE	7,642	10,698
INITIAL EARNINGS	$7,217,880	$10,105,032
DIRECT EARNINGS	$6,725,550	$9,415,770
INDIRECT EARNINGS	$4,868,602	$6,816,043
INDUCED EARNINGS	$169,989,993	$237,858,591
LOCAL TAXES	$34,252,656	$47,953,719
STATE TAXES	$16,328,834	$22,860,367
TOTAL ANNUAL	$315,806,703	$442,129,384
TOTAL 20-YEARS	**$6,316,134,063**	**$12,632,268,127**

CAPCOG and the Chamber of Commerce excluded the $4.8 - $6.9 million per year in federal taxes generated from this facility, since this factor would not be relevant to the impact on the regional economy.

The following charts (Tables 6 & 7) show the impact by occupation and industry. This data helps illustrate the wide range of job types and industries that would be affected by such a project.

Table 6. Distribution of Region-Wide Jobs Created from Auto Manufacturing

OCCUPATION	%
Management Occupations	19.4%
Business and Financial Operations Occupations	2.7%
Computer and Mathematical Occupations	0.6%
Architecture and Engineering Occupations	2.1%
Life, Physical, and Social Science Occupations	0.1%
Community and Social Service Occupations	0.4%
Legal Occupations	0.3%
Educational Instruction and Library Occupations	0.8%
Arts, Design, Entertainment, Sports, and Media Occupations	1.1%
Healthcare Practitioners and Technical Occupations	1.8%
Healthcare Support Occupations	1.4%
Protective Service Occupations	0.3%
Food Preparation and Serving Related Occupations	2.9%
Building and Grounds Cleaning and Maintenance Occupations	1.3%
Personal Care and Service Occupations	1.4%
Sales and Related Occupations	6.6%
Office and Administrative Support Occupations	4.9%
Farming, Fishing, and Forestry Occupations	0.0%
Construction and Extraction Occupations	2.0%
Installation, Maintenance, and Repair Occupations	5.0%
Production Occupations	39.7%
Transportation and Material Moving Occupations	5.1%
Military-Only Occupations	0.0%
Unclassified Occupation	0.1%

Table 7. Regional Jobs from Auto Plant Facility by Industry

NAICS	OCCUPATION	%
11	Agriculture, Forestry, Fishing and Hunting	19.4%
21	Mining, Quarrying, and Oil and Gas Extraction	2.7%
22	Utilities	0.6%
23	Construction	2.1%
31	Manufacturing	0.1%
42	Wholesale Trade	0.4%
44	Retail Trade	0.3%
48	Transportation and Warehousing	0.8%
51	Information	1.1%
52	Finance and Insurance	1.8%
53	Real Estate and Rental and Leasing	1.4%
54	Professional, Scientific, and Technical Services	0.3%
55	Management of Companies and Enterprises	2.9%
56	Administrative and Support and Waste Management and Remediation Services	1.3%
61	Educational Services	1.4%
62	Health Care and Social Assistance	6.6%
71	Arts, Entertainment, and Recreation	4.9%
72	Accommodation and Food Services	0.0%
81	Other Services (except Public Administration)	2.0%
90	Government	5.0%

ONE-TIME IMPACT OF CAPITAL INVESTMENT

EMSI's "What-If" Scenario Tool considers the annual initial, direct, indirect, and induced economic impacts of adding jobs in a particular sector for a given region over multiple years, but it does not consider the short-term economic impact of the initial capital investment made in building the facility. The Greater Oklahoma City Chamber indicated that Tesla's proposal indicated that this would be $1.6 billion, though the investment announced for the Austin plant in summer 2020 was listed at $1.1 billion. Using these two figures for the range of capital investment, regional impact multipliers provided by the Chamber were used for NAICS Code 236210 – Industrial Building Construction in order to estimate the one-time expenditures associated with this investment. Since these are one-time investments, the "induced" impact was excluded from consideration.

The multipliers for this sector are the following:

- Value Added to Sales: 0.5325
- Direct Value Added: 0.2122
- Indirect Value Added: 0.0673
- Total Value Added: 0.8120

Total regional economic impact was modeled to be $893,238,340 - $1,299,255,768.

SUMMARY

Table 8 summarizes the combined economic impact to the region of a 5,000 – 7,000 job automobile manufacturing facility in the region over a 20-year time frame. For this report, the possibility of missing out on this economic growth represents an economic loss to the region's economy.

Table 8. Combined Estimated Regional Economic Impact of a 5,000-job and 7,000-job Automobile Manufacturing Facility

ITEM	5,000 JOB FACILITY	7,000 JOB FACILITY
TOTAL Annual Impact of Jobs	$315,806,703	$442,129,384
TOTAL 20-Year Impact of Jobs	$6,316,134,063	$8,842,587,689
1-Time Impact of Capital Investment	$893,238,340	$1,299,255,768
TOTAL 20-Year Impact	**$7,209,372,404**	**$10,141,843,457**

TRANSPORTATION CONFORMITY

"Transportation Conformity" refers to the Clean Air Act requirement that all federal actions related to surface transportation and transit must "conform" to the purpose of the State Implementation Plan (SIP). The rules for transportation conformity are found in 40 CFR Part 93, Subpart A. The transportation conformity rules require conformity of "transportation plans, programs, and projects which are developed, funded, or approved by the United States Department of Transportation (DOT), and by Metropolitan Planning Organizations (MPOs) or other recipients of funds under 23 U.S.C. or Federal Transit Laws (49 U.S.C. Chapter 53)."

In order to estimate the potential costs associated with transportation conformity requirements, ACOG contracted with the Texas A&M Transportation Institute (TTI), which assists MPOs and the Texas Department of Transportation in complying with these requirements.

There are five elements to the potential costs identified by TTI:

1. The routine annual costs to the MPO and ODOT to conduct transportation conformity analysis for the region once designated nonattainment;
2. Economic costs associated with routine project delays that arise as a result of the transportation conformity process;
3. Non-routine economic costs associated with delays that could arise as a result of a "lapse" in conformity;
4. Non-routine economic costs associated with the loss of federal funding as a result of a conformity lapse; and
5. Non-routine economic costs associated with project delays associated with the potential loss of federal funding as a result of a conformity lapse.

TTI estimates the total cost over the study period (i.e, out to 2050) as the following:

Table 9. Potential Costs Associated with Transportation Conformity

ELEMENT	LOW	HIGH
Conducting Conformity Analysis	$4,823,438	$5,602,344
Costs of Routine Delays	$130,054,028	$151,729,699
Cost of Delay due to Lapse	$139,998,564	$269,986,028
Cost of Potential Long-Term Loss of Federal Funding	$29,093,855	$90,271,143
Cost of a Project Delay Due to Loss of Federal Funding	$2,443,925	$47,852,303
TOTAL COST	**$306,413,810**	**$565,441,517**

GENERAL CONFORMITY

Background

"General Conformity" refers to the Clean Air Act requirement that all federal actions (other than those related to surface transportation or transit, which are handled under "Transportation Conformity") must "conform" to the purpose of the State Implementation Plan (SIP), the requirements of which are codified in 40 CFR Part 93 Subpart B. This helps ensure that federal activities do not cause or contribute to any new violations of the Ozone Standards, do not worsen existing violations of the Ozone Standards, and do not cause a delay in the attainment of the Ozone Standards. Under these rules, "no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable [state] implementation plan," and "a federal agency must make a determination that a federal action conforms to the applicable implementation plan in accordance with the requirements of this subpart before the action is taken." The key issue in conformity analysis is ensuring that a facility's or activity's emissions remain the same or lower than the emissions the state is planning for from that facility or activity. In the Oklahoma City-Shawnee CSA, federal action related to Tinker Air Force Base (AFB) would be the most likely to trigger General Conformity regulations. 40 CFR 93.153 establishes applicability thresholds and a list of exempt activities. Federal actions that result in an increase of less than 100 tpy of NO_x and VOC in an Ozone nonattainment area classified as "moderate" or lower or an Ozone maintenance area are considered "de minimis." 40 CFR 93.153(c) provides a long list of federal actions that are not considered applicable and are "presumed to conform," including actions that don't involve emissions, actions where the emissions are not reasonably foreseeable (including electric power marketing activities), and actions that implement a conforming program like prescribed burning actions that are consistent with a conforming land management plan.

Unique among the Clean Air Act requirements for nonattainment and maintenance areas, General Conformity requires consideration not only of direct emissions but also indirect emissions. Direct emissions are the "emissions of a criteria pollutant or its precursors that are caused or initiated by the federal action and originate in a nonattainment or maintenance area and occur at the same time and place as the action and are reasonably foreseeable." Indirect emissions are defined as emissions:

1. That are caused or initiated by the federal action and originate in the same nonattainment or maintenance area but occur at a different time or place as the action;
2. That are reasonably foreseeable;
3. That the agency can practically control; and
4. For which the agency has continuing program responsibility.

There are several different ways that a federal action can be determined to be conforming to the SIP, including fully offsetting any increase in emissions from the federal action with emission reductions elsewhere within the same area, and documenting that any emissions increase is within a facility-wide emissions "budget" established by an attainment demonstration, reasonable further progress, or maintenance SIP revision. Such budgets can be established at levels that allow for a certain amount of growth as long as they are consistent with the overall emission reductions needed to attain the Ozone Standards and make reasonable further progress or the overall emissions levels needed to maintain the Ozone Standards.

Tinker Air Force Base

For this report, the key federal action that would be expected to trigger General Conformity requirements would be expansion of Tinker AFB. Tinker AFB is home to the Air Force Sustainment Center, the mission of which is to "Sustain weapon system readiness to 'generate airpower for America,'" and is the largest single-site employer in the State of Oklahoma. The Air Force estimated that Tinker AFB accounted for $5.96 billion in economic impacts in fiscal year 2020:[6]

- **25,745 total personnel:**
  - 6,286 military
  - 17,463 civilian employees funded through appropriations
  - 1,196 non-appropriated fund and contract civilians
- **$3,079,419,508 in total direct impact:**
  - $1,650,214,706 in payroll
  - $158,526,487 in construction spending
  - $1,240,101,261 in locally purchased goods and services
  - $27,256,682 in local purchases produced elsewhere
  - $3,320,372 in other spending
- **$2,880,763,806 in total indirect impact:**
  - $1,781,901,839 in payroll expenditures
  - $143,942,050 in construction
  - $993,363,271 in locally produced goods and services
  - $18,868,680 in local purchases produced elsewhere
  - $2,687,966 in other spending

Analysis of existing emissions levels at Tinker AFB provides insight into the scale of change in activity that would need to occur on a permanent basis to trigger General Conformity requirements. The following table (Table 10) summarizes the total NO_x and VOC emissions at Tinker AFB each year from 2015-2020.

[6] https://www.tinker.af.mil/Portals/106/Documents/Economic%20Impact/2020%20EIS.pdf?ver=KYgPahtZjzS3_-v0eUj5Hg%3d%3d

Table 10. Tinker AFB NO_x and VOC Emissions Reported to ODEQ, 2015-2019 (tons per year)

POLLUTANT	2015	2016	2017	2018	2019	2020[7]
NO_x	105.596	109.404	114.812	121.675	132.902	97.641
VOC	486.935	443.527	561.229	467.337	415.614	381.681

Direct emissions include the additional emissions from planes coming and going, engine testing, additional maintenance, and emissions from construction activities needed for expansion. Indirect emissions might include additional passenger and commercial vehicle traffic associated with the expansion, both in the construction phase and on an ongoing basis.

VOC emissions from the facility relate mainly to repairing and maintaining aircraft, including painting aircraft, use of solvents in cleaning operations, and thinning. Manufacturers continue to reduce VOC emissions from these substances and average emissions per unit would be expected to decrease over time. VOC emissions have varied significantly year to year within this six-year timeframe due to changes in work orders of paints and solvents and variation in the degree to which maintenance operations require additional painting in any given year. Using the range of VOC emissions for this five-year period, growth of 18-26% would correspond to a 100 tpy increase in annual emissions.

NO_x emissions from the facility come from a variety of sources, including boilers and jet engine testing. Although NO_x emissions increased each year from 2015 – 2019 due to increases in engine testing, they decreased below 100 tpy due to a boiler decentralization project and are expected to continue to remain below 100 tpy moving forward.

Oklahoma Gas and Electric (OG&E) owns, operates, and has permitted a power plant on the premises of the base, but these emissions are not considered part of the facility totals for Tinker AFB. In the event of an outage electricity from the plant can be used for the surrounding community outside the base.
An OG&E integrated resource plan (IRP) indicated that the power plant units were going to be retired by 2025. Federal action taken to approve any re-activation of these units or construction of new units on-site would likely also trigger General Conformity.

In addition to Tinker's analysis, EMSI data for NAICS Code 901200 – Federal Government, Military for the Oklahoma City-Shawnee CSA was also reviewed. Data are shown below:

- Jobs: 11,243
- Sales: $4,135,174,401
- GRP: $1,450,482,788
  - Earnings: $565,102,485
  - Property Income: $885,380,303
- Multipliers:
  - Value added to sales: 0.3508
  - Direct value added: 0.3492
  - Indirect value added: 0.1019
  - Induced value added: 0.7592
  - Combined: 1.5612

EMSI shows the following sales, jobs, and GRP data for 2020 for this NAICS code:

The EMSI data appear to significantly under-count the number of employees at Tinker AFB, possibly instead classifying a large portion of them in NAICS Code 901199 (Federal Government, Civilian, Excluding Postal Service). However, using the $4.135 billion in "sales" in conjunction with the multipliers yields an estimated $6.456 billion in broader economic impact from the base, which is close to, though somewhat higher than the Air Force's estimate of $5.96 billion. Due to the availability of a detailed study from the Air Force supporting the $5.96 billion figure and the issues noted above with the employment figures and classifications in EMSI, the Air Force's estimate were chosen for the cost estimates for this section.

[7] Note – Tinker AFB personnel provided these numbers to ACOG and CAPCOG but they are not yet included in a publicly available summary spreadsheet from ODEQ as the other data were at the time this section was drafted.

Growth

The facility's growth projections suggest that it could trigger General Conformity requirements at some point within the study timeframe due to projected growth. While base personnel interviewed for this report did not have any specific projects in mind that they believed would trigger General Conformity requirements, the estimated growth in personnel from the current level of about 25,000 in 2020 to 30,000 through 2030 (20% growth) along with additions of 1.2 million square feet for hangars, ancillary support facilities, more engine testing, and engine runs that would go along with this growth strongly suggests that the base's expansion within the timeframe of this study could trigger General Conformity requirements. This growth falls within the range of growth in VOC emissions that would trigger General Conformity requirements, and construction-phase activities could also trigger General Conformity requirements.

Estimated Offset Costs

In order to calculate the cost to offset the increase in emissions associated with 22% growth in base activities, the assumed increase in VOC emissions was multiplied by an average cost/ton ratio of $15,000. This figure is about midway between the values used in the 2015 Ozone Standards RIA ($15,275.73 in the 70 ppb analysis and $14,696.68 in the 65 ppb analysis), and corresponds with the value cited by base personnel as to expected costs for thermal oxidation or an activated carbon capture system. While General Conformity requirements allow NO_x emission reductions to offset VOC emission increases, there would not be sufficient NO_x emission reduction offsets from within the base to account for this growth and it is uncertain whether there would be any NO_x reduction offsets that could be obtained from elsewhere within the region at a cost lower than what would be available for VOC emission reduction offsets. Calculations for assumed VOC emissions increases:

- Minimum:
  - 100 tpy VOC * $15,000 per ton = $1,500,000 per year
- Maximum:
  - 25,000 employees / 25,000 employees = 120% growth factor
  - 561.229 tpy VOC (maximum annual amount reported 2015-2020)* 20% growth * 1.15 offset * $15,000 per ton VOC = $1,936,240 per year

Assuming a 20-year timeframe for these emissions reductions (2030-2050), the total cost would be expected to be $30,000,000 - $38,724,801. For the purpose of this report, this would be considered an economic loss if these costs had to be paid for out of the base's existing appropriations based on the assumption that outside vendors would need to be brought into the region to supply, install, and maintain the equipment, and the money used for that purpose had to come out of the base's existing budget. In discussing this issue with base personnel, however, it appears the Air Force's most likely response to this requirement would be to increase the appropriations to the base to cover these added expenses.

Potential Delays in Construction

Much more significant than the cost of offsets, the potential delay that the General Conformity process might cause in an expansion project could result in an economic loss due to the delay in the economic activity that would occur from expanded base operations. For example, a one-year delay in completion of an expansion project that enabled the base to expand from 25,000 employees to 30,000 employees would postpone the regional economic gains that could have been achieved by adding those additional 5,000 employees. While there is no real risk that the Air Force would chose to expand at some other facility instead as a result of a nonattainment designation and they can take steps to minimize the disruption and delay that General Conformity requirements might entail, it is still possible for these requirements to cause such delays. Using the 20% growth projections provided by base personnel, the total regional economic impact of the base once expansion was complete would be expected to be $7.15 billion per year if using the Air Force's $5.96 billion as a baseline. If there was a one-year delay in the expansion, the difference between the one-year regional economic impact of an expanded base and the current base would represent the opportunity cost of a one-year delay in expansion of the base, and could therefore estimated to be $1.19 billion. This figure could be adjusted as needed to reflect estimated delay time for an expansion or different scales of expansion.

Summary

General Conformity requirements would be expected to affect the Air Force's ability to expand operations at Tinker AFB within the time frame covered by this study. The direct cost of VOC emission reduction offsets that would be expected to be needed for expansion at the levels discussed with base personnel would likely cost approximately $30 million - $39 million, and may or may not represent an economic cost to the region depending on if the money needed to be diverted from other base expenditures or if the Air Force increased appropriations to the base.

Of more concern for the regional economy would be that General Conformity requirements could slow down or delay expected expansions at the facility, which would likewise postpone the increased economic impact of that expansion. While the expansion would be expected to be incremental rather than all at once, the one-year difference in economic impact from the base as currently staffed versus expanded operations would be $1.19 billion. The range of potential costs would then be $0 (if expansion does not trigger any offsets or cause any delays) up to $1,230,724,801 (if $38,724,801 in emission offsets need to be paid for out of the base's budget and if there is a year of delay in the base's expansion).

4 THE COSTS OF A MODERATE CLASSIFICATION

In addition to the costs associated with a Marginal classification, the region would face significant additional economic costs if it failed to meet its three-year attainment date.

The Marginal classification basically relies on the momentum of existing measures such as fleet turnover causing the replacement of older, dirtier vehicles and equipment with newer, cleaner models that meet federal mobile source standards. However, once an area is classified as "Moderate," a whole new array of very strict regulations will go into effect. These include:

- An across-the-board 15% reduction in VOC emissions;
- Implementation of Reasonably Available Control Technology (RACT) on all existing major sources of NO_X and VOC, and any other sources of VOC covered by one of 48 EPA Control Technique Guideline (CTG) documents;
- An inspection and maintenance (I/M) program;
- Increased offsets for the NNSR program;
- Reasonably Available Control Measures (RACM); and
- Increased offsets for NNSR permitting.

The shift from a Marginal classification to a Moderate classification basically entails a shift from passive control of growth in emissions to active reductions in emissions from existing sources. While it is possible for areas to avoid or mitigate some of these requirements if they are able to reach attainment between when they are bumped up and when the measures are required to be implemented, this is not guaranteed. The added costs of a Moderate classification beyond what is triggered by a Marginal classification should provide a powerful incentive for decision-makers to reduce emissions early to ensure that even if the area is designated nonattainment, that it does not risk crossing the threshold into being reclassified to "Moderate" as a result of failing to attain the Ozone Standards on-time.

15% VOC REDUCTION

Background

Section 182(b)(1) of the Clean Air Act required ozone nonattainment areas classified as "Moderate" to achieve a 15% reduction in VOC emissions[8] from a 1990 baseline by 1996. Areas classified as "Serious" or higher were required to achieve additional emission reductions equivalent to 3% of 1990 baseline emission levels for each additional year needed to attain the Ozone Standards, though they could substitute NO_X reductions for VOC reductions once the 15% VOC reduction was achieved. This requirement is known as "Reasonable Further Progress" (RFP) or "Rate of Progress" (ROP). For the 2015 Ozone Standards, EPA has interpreted this provision as meaning that any newly designated "Moderate" nonattainment area must reduce VOC emissions by 15% from a "baseline" year corresponding with the most recent triennial National Emissions Inventory before designation, or the year of the effective date of a nonattainment designation. The reductions need to occur within six years of the baseline year.

If the Oklahoma City area were designated a "Marginal" nonattainment area in fall 2022 and failed to attain the Ozone Standards in 2025 based on its 2022-2024 design value, it would then get reclassified to "Moderate." There would be a new attainment value, and would be required to demonstrate that it would achieve this 15% reduction. It is assumed that the Oklahoma City area would use 2022 as its baseline year in order to give it the maximum time possible to implement these measures, and this would mean that the region's 2028 VOC emissions would need to be at least 15% lower than its 2022 emissions.

[8] 182(b)(1)(A)(ii) has conditions that a State could reduce VOC emission by less than 15% if approved by EPA. However, a full 15% reduction is assumed for the purposes of this study.

It is assumed that the Oklahoma City area would use 2022 as its baseline year in order to give it the maximum time possible to implement these measures, and this would mean that the region's 2028 VOC emissions would need to be at least 15% lower than its 2022 emissions.

The actual amount of emission reductions relative to a "business as usual" scenario for 2028 is affected by growth and emission reductions that would be occurring anyway as a result of nationwide VOC emission reductions from mobile sources due to federal engine standards and fleet turnover. In general, the emission reductions from these sources have been able to more than offset growth in emissions from stationary sources in most urban areas such that the general trend is towards lower VOC emissions in urban areas. These reductions would count towards the RFP requirement, but if the "business as usual" scenario does not reduce VOC emissions enough to reach the 15% mark, the area would need to achieve additional VOC emission reductions.

Section 182 of the Clean Air Act also includes three additional provisions[9] for "Moderate" nonattainment areas that would also reduce VOC emissions:

1. "Reasonably Available Control Technology" (RACT) for sources of VOC covered by any of EPA's 45 Control Technique Guideline (CTG)[10] even if not considered a "major" source ((§182(b)(2)(A) and (B)); and
2. "Reasonably Available Control Technology" (RACT) for "major" sources of VOC (potential to emit at least 100 tpy of VOC) even if not covered by a CTG (§182(b)(2)(C));
3. A "Basic" vehicle inspection and maintenance (I/M) program ((§182(b)(4)).

Example 1: If the region's base year emissions inventory was 100 tons per day (tpd) of VOC, then it would need to reduce it's VOC emissions to 85 tpd or less within six years (a 15 tpd reduction). The following is a potential way that the area could meet this requirement:

- 4 tpd reduction from "business as usual" projection as a result of federal engine standards[11]
- 3 tpd reduction from CTG RACT from business as usual projection
- 2 tpd reduction from Major Source RACT from business as usual projection
- 1 tpd reduction from the I/M program from business as usual projection

These reductions would account for a total of 10 tpd VOC reductions, meaning the area would need to achieve an additional 5 tpd of VOC reductions. The cost of achieving these emission reductions could be assigned exclusively to the RFP requirement if they were not needed for the region to attain the Ozone Standards (for example, if the region's ozone levels were NO_x-controlled).

Example 2: It is also possible for these independent requirements to result in more VOC emission reductions that are needed to meet the 15% requirement. For example, using the same 100 tpd baseline scenario, the following emission reductions would constitute more than the required 15 tpd reduction:

- 6 tpd reduction from "business as usual" projection as a result of federal engine standards
- 5 tpd reduction from CTG RACT from business as usual projection
- 4 tpd reduction from Major Source RACT from business as usual projection
- 3 tpd reduction from the I/M program from business as usual projection

These reductions would total 18 tpd, exceeding the 15 tpd required for RFP. In this case, there would not be any added cost associated with achieving the RFP requirements.

However, due to the complexity and difficult of itemizing the emission reductions and costs associated with implementing VOC RACT independent of the 15% VOC reduction requirement, it is assumed that the situation that the Oklahoma City area might face if designated nonattainment would be much more likely to be Example 1.

[9]Gasoline Vapor Recovery is also listed in Section 182, but has not been required recently for 'Moderate' nonattainment areas.

[10]https://www.epa.gov/ground-level-ozone-pollution/control-techniques-guidelines-and-alternative-control-techniques/

[11]May be impacted by recently proposed higher federal engine standards.

Estimating Baseline and "Business as Usual Emissions"

Summer weekday VOC emissions estimates from EPA's 2016v1 air quality modeling platform were assembled. The following spreadsheets were:[12]

- 2016fh_county_sector_average_summer_weekday_NOX_VOC_22jan2020.xlsx
- 2023fh_county_sector_average_summer_weekday_NOX_VOC.xlsx
- 2028fh_county_sector_average_summer_weekday_NOX_VOC.xlsx

EPA requires the baseline inventory for an RFP plan to be "the emissions inventory for the most recent calendar year for which a complete triennial inventory is required to be submitted to EPA." In the scenario under consideration, the area would be designated nonattainment in 2022, so the default baseline emissions inventory year would be 2020. States are allowed to use an alternative baseline year if the year selected corresponds with the year of the effective date of designation as nonattainment (i.e., 2022 in this case) (40 CFR §51.1310(b)).

Below is the general timeline being considered.

- 2022: Area designated nonattainment, based on 2019-2021 ozone levels
- 2025: Attainment date, based on 2022-2024 ozone levels
- 2028: Attainment date, based on 2025-2027 ozone levels

EPA's implementation rules requires that the 15% VOC reduction be achieved within six years from the baseline year (40 CFR §51.1310(a)(4)). If a 2020 base year was used, this would mean the 15% VOC reduction would need to be achieved by 2026, two years before the 2028 attainment date, and a year before the final ozone season that would be used to determine if the area was attaining the Ozone Standards.

In order to estimate the 2020 and 2026 emissions, the total anthropogenic VOC for 2016, 2023, and 2028 was calculating using the spreadsheets EPA produced. Next, the 2020 emissions were calculated by interpolating the 2016 and 2023 emissions (i.e., calculated the average annual change in emissions, multiplying that by four years, and adding the result to 2016 emissions). Then, 2026 emissions were calculated by interpolating the 2023 and 2028 emissions (i.e., calculating the average annual change in emissions, multiplying that by three years, and that to the 2023 emissions). Finally, 2026 emissions estimate was compared to the 2020 emissions and calculated the VOC reduction "deficit" that would need to be achieved through implementing additional VOC reductions.

- 2022 VOC emissions: 175.23 tpd
- 15% of 2022 VOC emissions: 26.28 tpd
- 2028 VOC emissions: 170.55 tpd
- 2022–2028 Change- in VOC emissions: -4.68 tpd

I/M Program VOC Reductions

Emission reductions from the I/M program required for "Moderate" areas count towards the required 15% reduction in VOC, and therefore should be subtracted from the amount of VOC emission reductions the region would need to attain through implementation of other measures, since the costs of the I/M program are calculated separately in this report. In order to do this, the share of on-road VOC emissions attributable to light-duty vehicles was calculated in EPA's 2016 modeling platform.[13]

- 2016: 87.15% of on-road VOC emissions are from light-duty vehicles
- 2023: 85.38% of on-road VOC emissions are from light-duty vehicles
- 2028: 83.77% of on-road VOC emissions are from light-duty vehicles

Since the I/M scenario being used for this study would apply only to Canadian, Cleveland, and Oklahoma Counties, the on-road VOC emissions from these three counties for 2028 was calculated and then applied the 83.77% adjustment to estimate the light-duty vehicle VOC emissions from these counties:

- 11.59 tons per day (tpd) on-road emissions in 2028 * 83.77% on-road emissions from light-duty vehicles = 9.71 tpd

[12] Available here: https://gaftp.epa.gov/Air/emismod/2016/v1/reports/

[13] 2016v1_201471_2011v63_country-SCC_summary_17-Oct-2019.xlsx

A 2010 analysis ERG conducted for Texas estimated I/M program benefits of 2018 (the latest year for which data was available) ranging from 10.8%-12.3% depending on the area.[14] This corresponds to a 1.05 tpd–1.19 tpd I/M program benefit. A 2020 I/M program benefit analysis for the Houston and Dallas-Fort Worth areas indicated a 10%-12% VOC reduction benefit, consistent with these levels.[15] Using the 2020 data, the benefits would be 0.97 tpd–1.16 tpd VOC.

Since the 2020 data and represented real-world program data, this range was chosen to represent the I/M VOC program benefit.

Calculation of Remaining VOC Reductions

The following estimates represent the VOC emissions reductions that would be needed to achieve the 15% RFP reduction once the I/M program benefits are considered.

- VOC Reductions needed for 15% reduction:

  21.60 tpd
- 2028 VOC I/M program benefit:

  0.97 tpd–1.16 tpd
- Additional VOC reductions needed:

  20.44 tpd– 20.63 tpd

On an annual basis, this represents 5,314–7,531 tpy VOC reductions, assuming that the summer weekday tpd figures translated into tpy by multiplying them by either 260 days (weekdays) or 365 days.

Cost Per Ton of VOC Reductions

EPA's Regulatory Impact Analysis (RIA) was used for the 2015 Ozone Standards in order to estimate the cost per ton of VOC reductions.[16] Using data from Tables 3A-9, 3A-11, 4A-2, and 4A-4 provided by EPA, this calculated an average cost per ton of $12,906-$13,415 in 2011 dollars.[17]

Using Bureau of Labor Statistic's Consumer Price Index Inflation Calculator, a +13.87% inflation factor was calculated for the 2011 dollars based on July 2011 and July 2021 buying power. This translates into $15,596.12-$16,210.61 per ton of VOC.

Total Cost Calculation

Using the annual tpy VOC estimates and cost per ton estimates, the following annual costs of VOC emission reductions that would be needed starting to achieve the 15% VOC reduction:

- Low: $83 million per year
- High: $122 million per year

The expected timeframe for these emission reductions would be from 2027 or 2028 (either the "attainment year" that the area's attainment of ozone would be based on as a "moderate" area or the year in whichthe 15% VOC reductions would need to be implemented by, if they had not occurred already) through 2049 (the expected end of two, ten-year maintenance periods that would follow attainment and redesignation). Over the course of this 22–23 year period, this would translate into costs of $1.8-$2.8 billion.

REASONABLY AVAILABLE CONTROL TECHNOLOGY (RACT)

Moderate ozone nonattainment areas are required to implement RACT rules for three types of sources:

- Major sources of VOC;
- Major sources of NO_X;
- Non-major sources of VOC covered by a Control Technique Guideline (CTG).

As with NNSR, the term "major source" for RACT means a source with the potential to emit at least 100 tpy of either VOC or NO_X.

As described in the 15% VOC reduction section, this study assumes that all of the VOC RACT rules are accounted for in the cost assessment for the 15% VOC reduction. It is technically possible, however, that these rules could result in costs beyond those included in the 15% VOC reduction to the extent that the RACT rules may result in area-wide emission reductions of more than 15%, and therefore could result in costs beyond what is accounted for in the 15% VOC reduction section. ACOG and their consultant, CAPCOG, elected not to evaluate that

[14] https://www.tceq.texas.gov/assets/public/implementation/air/ms/IM/2010ElimTailTstRpt.pdf

[15] https://www.tceq.texas.gov/assets/public/implementation/air/ms/IM/2020%20IM%20Program%20Eval.pdf

[16] https://www.epa.gov/sites/production/files/2016-02/documents/20151001ria.pdf

[17] https://www.bls.gov/data/inflation_calculator.htm, based on July 2021/July 2011 buying power ratio

possibility due to resource limitations and the low likelihood of such a situation occurring.

Therefore, the key RACT rules that could result in added costs would be NO_X RACT rules. Using the Oklahoma Department of Environmental Quality (ODEQ) annual point source emissions inventory summary for 2019, the following facilities (Table 11) were identified as most likely to be subject to NO_X RACT rules as a result of emitting at least 100 tpy NO_X in at least one of these years. Standard Industrial Codes (SIC) were used to identify and classify the source emissions from ODEQ.

Table 11. Facilities Emitting > 100 tpy NO_X in 2019

FACILITY ID	FACILITY NAME	COMPANY NAME	COUNTY	SIC CODE	NOx 2019 (TYP)
1021	Chitwood Gas Plant	DCP Operating CO LP	Grady	1321	489.051
1205	Mustang Energy Center	OG&E	Canadian	4911	449.665
1208	Horseshoe Lake Generating Station	OG&E	Oklahoma	4911	1,174.528
1226	West Edmond Station	ONEOK Gas Storage LLC	Logan	4922	323.455
1407	Frontier Generating Station	OG&E	Oklahoma	3999	149.91
1518	Midwest City Air Depot	Tinker AFB Logistics CTR	Oklahoma	9711	132.902
1565	Cox City Processing Plant	Enable Products LLC	Grady	1321	123.791
1566	Crescent Gas Plant	ETC Texas Pipeline LTD	Logan	1321	242.809
1763	Edmond Compressor Station	Southern Star CTL Gas Pipeline Inc.	Oklahoma	4922	272.143
2134	Pink CMPSR STA	Enable Oklahoma Intrastate Transmission LLC	Pottawatomie	4922	156.71
3694	McClain Energy Facility	OG&E	McClain	4911	294.253
4240	Redbud Power Plant	OG&E	Oklahoma	4911	287.624
SUM	**N/A**	**N/A**	**N/A**	**N/A**	**4,096.841**

Six of the eight counties in the region are host to at least one of these 12 major sources of NO_X– only Cleveland and Lincoln Counties do not have a point source of NO_X emissions that emitted more than 100 tpy. All of these sources fall into the following SIC codes:

- 1321: Natural Gas Liquids
- 4911: Electric Services
- 4922: Natural Gas Transmission
- 9711: National Security

The sum of all NO_X emissions from facilities reported in the 2019 point source inventory was 15,638.33 tpy NO_X, so these 12 facilities represent about 26% of all NO_X emissions from facilities reporting to the point source emissions inventory. Since it is possible for sources to be considered "major" even if they emit less than 100 tpy due to having a potential to emit greater than 100 tpy, it is also possible that there are other facilities that would be subject to NO_X RACT rules as listed below:

- 90-100 tpy: 3 facilities, 278.005 tpy total
- 80-90 tpy: 4 facilities, 323.967 tpy total
- 70-80 tpy: 14 facilities, 1,039.087 tpy total
- 60-70 tpy: 10 facilities, 633.609 tpy total

- 50-60 tpy: 17 facilities, 931.618 tpy total
- 40-50 tpy: 25 facilities, 1,118.169 tpy total
- 30-40 tpy: 40 facilities, 1,377.383 tpy total
- 20-30 tpy: 51 facilities, 1,271.986 tpy total
- 10-20 tpy: 100 facilities, 1,475.295 tpy total
- 0-10 tpy: 1,515 facilities, 3,092.37 tpy total

The vast majority (86% of the facilities and 94% of the NO_X emissions) of the sources with at least some NO_X emissions but less than 100 tpy reported in this summary from 2019 are from three SIC codes:

- 1311: Crude Petroleum and Natural Gas
- 1321: Natural Gas Liquids
- 4922: Natural Gas Transmission

Going down to 50 tpy, there are only two other facilities that have SIC codes outside of these three:

- The Heating and Cooling Plant at Vicinity Energy Oklahoma City Inc., in Oklahoma County (77.827 tpy NO_X), SIC Code 4961, and
- The University of Oklahoma in Cleveland County (82.236 tpy NO_X), SIC Code 4488.

Electric Generating Units

There are a total of seven power plants in the Oklahoma City-Shawnee CSA that report emissions to EPA's Air Markets Data Program. These include:

- Frontier Generating Station (1 combined cycle unit) – OG&E
- Horseshoe Lake (3 boiler units, 2 combustion turbine units) – OG&E
- McClain Energy Facility (2 combined cycle units) – OG&E
- Mustang (7 combustion turbines) – OG&E
- Tinker Turbines (4 combustion turbines) – OG&E, located on Tinker Air Force Base
- Redbud Power Plant (4 combined cycle units) – OG&E
- Spring Creek Power Plant (4 combustion turbines) – Evergy

Although many of these units have controls already, it is reasonable to expect that EPA would require that Oklahoma mandate selective catalytic reduction (SCR) on existing utility boilers and SCR plus either steam or water injection at gas turbines, which would require retrofits of all units except for the units at Redbud, which already have SCR and dry low-NO_X burners. These technologies are widely available and RACT rules elsewhere (such as Texas) account for emission rates consistent with the use of SCR. EPA's "Menu of Control Measures" were used to estimate the cost of retrofitting power plants within the region with NO_X controls. Several units already are equipped with steam injection, water injection, or low-NO_X burners. For these units, the estimated incremental cost of adding SCR was calculated by using the following equation:

- Incremental cost of SCR = (cost per ton SCR + extra control) * (control efficiency of SCR + extra control) * (uncontrolled emissions) – (cost of extra control) * (control efficiency of extra control) * (uncontrolled emissions)
- Uncontrolled emissions = controlled emissions * (1/control efficiency of extra control)

EPA's "Menu of Control Measures" provides a standardized set of tools for estimating the costs of implementing various emission control measures that were used for this analysis. Costs in the Menu of Control Measures are listed in 2006 dollars:

Utility Boiler – Oil-Gas/Tangential or Wall: Selective Catalytic Reduction (applicable to Horseshoe Lake units 6 and 8) (80% NO_X reduction):

- Capital Costs per kW: $72.49 * (200/Capacity (MW))^(0.35) 25 MW – 500 MW; $52.60 per kW above 500 MW
- Fixed Operation and Maintenance Costs per year: $1.07 * (200/Capacity (MW))^(0.35) 25 MW – 500 MW; $0.78 per kW above 500 MW
- Variable Operation and Maintenance Costs: 0.12 mills per kWh

Utility Boiler – Oil-Gas/Tangential: Selective Non-Catalytic Reduction (SNCR) (applicable to Horseshoe Lake Unit 7[18]) (50% reduction):

- Capital Costs per kW: $11.5 * (200/Capacity (MW))^(0.577) 25 MW – 500 MW; $6.78 per kW above 500 MW
- Fixed Operation and Maintenance Costs: $0.18 *

[18] OG&E indicated in an e-mail to ACOG & CAPCOG that unit 7 is in fact a boiler, even though it is listed in EPA's AMPD as a combined cycle unit. He also indicated that SCR is not compatible with Horseshoe Lake Unit 7: "SNCR would be a more appropriate NO_X control method for Horseshoe 7 – SCR is not compatible with the design of the unit because SCR inlet temperatures from the boiler would be too low for proper catalyst performance."

(200/Capacity (MW))^(0.577) 25 MW – 500 MW; $0.11 per kW above 500 MW

- Variable Operation and Maintenance Costs: 0.12 mills per kWh

SCR with steam injection (applicable to Frontier unit CC01 and Tinker Turbines units 5A-1, 5A-2, 5B-1, and 5B-2) (95% NO_X reduction)[19]:

- $1,348 per ton of NO_X reduced (relative to uncontrolled)

SCR with water injection (applicable to Horseshoe Lake units 9 and 10 and Mustang units T6, T7, T8, T9, T10, T11, and T12) (95% NO_X reduction):

- $4,382 per ton of NO_X reduced (relative to uncontrolled)

Non-EGU combustion turbines: SCR with dry low-NO_X burners (applicable to McClain Energy Center units CT1 and CT2 and Spring Creek Power Plant Units CT-01, CT-02, CT-03, and CT-04) (94% NO_X reduction)[20]:

- $4,125 per ton of NO_X reduced (relative to uncontrolled)

It was assumed costs were spread out over 20 years for calculating total costs.

OG&E's recent filing (August 2, 2021) of its triennial Integrated Resource Plan (IRP) with the Oklahoma Corporation Commission and the Arkansas Public Service Commission reaffirms the retirement of Horseshoe 6 in 2023, and also plans to retire Horseshoe 7 and the Tinker AFB turbines in 2025 and Horseshoe 8 in 2027.[21]

Since this study assumes that RACT rules would need to be in effect by either the beginning of 2027 or 2028, it appears likely that these retirements would negate any costs that could be assigned to installing pollution control systems on these plants. Table 12 shows adjusted totals by facility to reflect only the units expected to still be in service at the time the RACT rules will be in effect.

Table 12. Power Plant NO_X RACT Cost Estimates for Existing Sources as of 2020 Projected to be in Service in the 2027 and 2028 Ozone Seasons

FACILITY NAME	COMBINED NAMEPLATE OUTPUT	2020 OUTPUT (MW-HR)	ANNUAL COST RELATED TO RACT	TOTAL COST RELATED TO RACT OVER 20 YEARS
Frontier Generating Station	120.00	222,608.62	$173,395.08	$3,467,901.68
Horseshoe Lake	88.00	197,742.44	$1,227,174.06	$24,543,481.22
McClain Energy Facility	378.00	2,019,659.58	$1,587,271.11	$31,745,422.16
Mustang	401.00	1,086,266.80	$5,494,192.06	$109,883,841.24
Redbud Power Plant	616.00	6,064,366.30	$0.00	$0.00
Spring Creek Power Plant	338.00	60,856.96	$152,941.55	$3,058,830.94
TOTAL	1,941.00	9,590,843.74	$8,634,973.86	$172,699,477.23

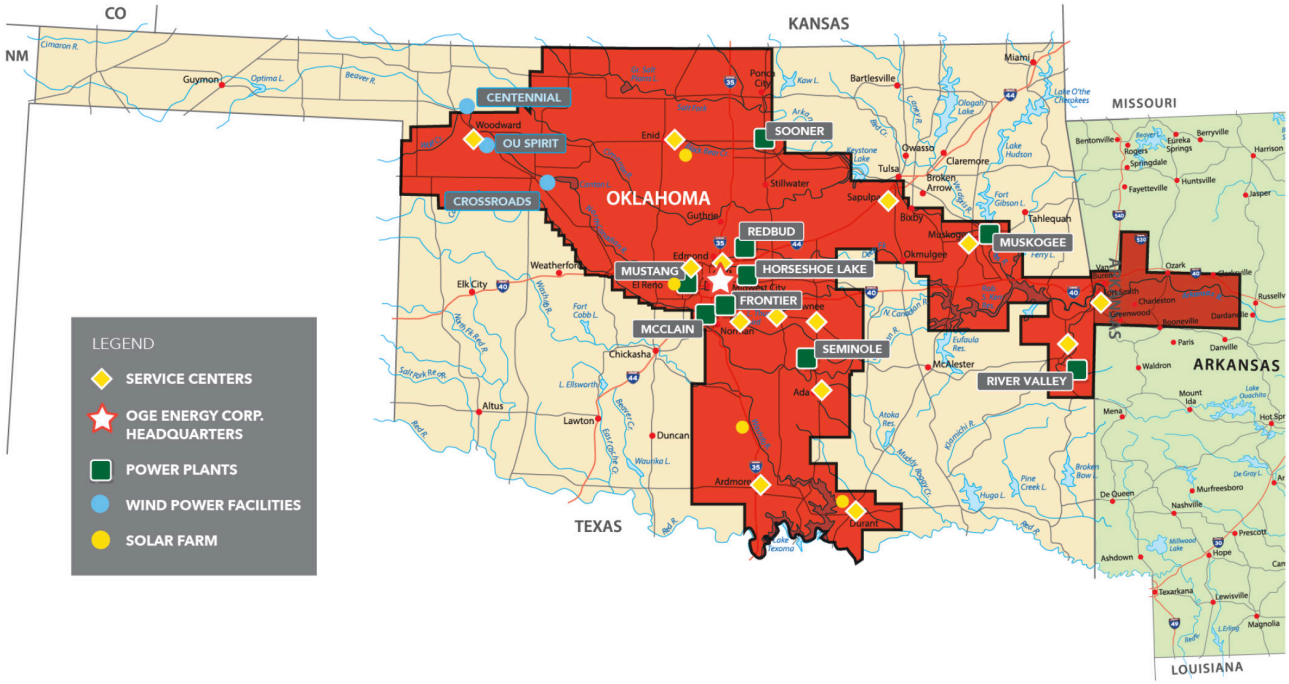
[19] Note: All of these turbines are already equipped with water injection, so this analysis estimates incremental cost of adding SCR.

[20] Note: These turbines are already equipped with dry low-NO_X burners, so this analysis estimates incremental cost of adding SCR.

[21] OG&E Draft Integrated Resource Plan, Finalized October 5, 2021. Available online at: https://ogeenergy.gcs-web.com/static-files/6fd094d7-f7d6-4dae-8ec9-7482d0071a34. See note on pg. 6 and 7.

Due to the nature of the various markets in which the electricity sector operates, it is difficult to assess how the costs of implementing NO_x RACT at power plants within the region would affect the regional economy within the Oklahoma City-Shawnee CSA. CAPCOG and ACOG interviewed OG&E, which owns and operates 6 of the 7 plants. OG&E has a service area that includes most but not all of the Oklahoma City-Shawnee CSA, and which extends across the state and into Arkansas (refer to Table 5). The added costs of operating the power plants in the region would be passed on to customers in the form of higher electricity costs, although the extent to which that would be concentrated in the Oklahoma City-Shawnee CSA is unknown.

Figure 5. OG&E Service Area



Note: Data available from the Energy Information Administration (EIA) on OG&E's customer counts was reviewed.[22] Table 13 shows the number of residential, commercial, and industrial customers in Oklahoma and Arkansas as of July 2020. This month matches the most recent county-level housing count data from the U.S. Census Bureau.

Table 13. OG&E Retail Customers by State and Type, July 2020

CUSTOMER TYPE	OKLAHOMA	ARKANSAS	TOTAL
RESIDENTIAL	681,011	56,906	737,917
COMMERCIAL	106,111	11,011	117,122
INDUSTRIAL	9,343	409	9,752
TOTAL	**796,465**	**68,326**	**864,791**

The total number of housing units in the eight-county region was 618,309 as of July 1, 2020, which – if all of these housing units were located within the OG&E Service Area, would represent 84% of OG&E's residential customers. There are in fact other electricity providers in the region, including Canadian Valley Electric Cooperative, City of Stroud, Edmond Electric, Kingfisher Public Works Authority, Oklahoma Electric Cooperative, Public Service Company of Oklahoma, and Stillwater Electric Utility.[23] In order to account for these other providers, for the purposes of this report, it is assumed that customers within the Oklahoma City-Shawnee CSA would need to bear roughly 75% - 100% of these pollution control costs.

[22] https://www.eia.gov/electricity/data/eia861m/

[23] https://www.greateroklahomacity.com/subdoingbusiness/infrastructure/

These expenses would be expected to be paid out to external firms, representing a simple loss to the regional economy.

All factors above considered, it is estimated that the total estimated economic cost of EGU NO_x RACT to the region could be $129,524,608 - $172,699,477 - through 2050. This accounts for NO_x RACT rules applying to all units except for Horseshoe Lake Units 6, 7, and 8, and the Tinker turbines, with the region paying for 75%-100% of the costs of the pollution control systems.

This estimate does not account for any business growth that might not occur as a result of higher electricity prices, which could also occur. The added costs result in electric bills in the Oklahoma City area and beyond going up somewhat to cover these added costs. Based on 2020 output of the units projected to still be in service in 2027 and 2028, this would be equivalent to $0.00088 per kWh of output. Compared to the average cost of $0.057 per kWh, this would be equivalent to a 1.6% increase in electric bills across the service area. While electric costs would still be much lower than many other areas, the higher electricity costs would be a factor that businesses considered in assessing whether to locate or expand within the region.

Non-EGUs

With the exception of Tinker AFB, all of the non-EGU point sources of NO_x emissions that emitted more than 100 tpy in 2019 were gas plants or compressor stations. The combined total NO_x emissions from these seven facilities was 1,607.959 tpy NO_x in 2019. As discussed elsewhere in the report, total NO_x emissions at Tinker AFB are now below 100 tpy and expected to remain below 100 tpy moving forward, so it is assumed that there would be no NO_x RACT rules that would apply to the AFB.

EPA's Menu of Control Measures identifies selective catalytic reduction (SCR) as a NO_x control for compressor stations, with the following control efficiencies and costs:

- 80% control efficiency
- $4,444 per ton of NO_x reduced for NO_x <1 tpd; $855 per ton of NO_x reduced for NO_x > 1 tpd ($2006)

All of the compressors within the region have NO_x emissions of less than 1 tpd, so the $4,444 per ton of NO_x was used for this analysis, adjusted to $5,962 in 2021 dollars.

For natural gas internal combustion engines, which would be the source of most NO_x emissions at a natural gas processing facility, there are four technologies identified in the Menu of Control Measures, all of which are listed in terms of 2006 dollars:

- Low-emissions combustion (low speed):
  - 87% removal efficiency
  - $2,696 per ton of NO_x removed for < 1 tpd and $1,011 for NO_x > 1 tpd
- Low-emissions combustion (medium speed):
  - 87% removal efficiency
  - $610 per ton of NO_x removed
- Non-selective catalytic reduction (NSCR):
  - 90% removal efficiency
  - $628-$836 per ton of NO_x removed
- SCR:
  - 90% removal efficiency
  - $4,444 per ton of NO_x removed.

Since low-emissions combustion (medium speed) and NSCR are each more cost-effective than the other technologies that achieve the same degrees of control, respectively, it is assumed that one of these two technologies would be used as the basis for any NO_x RACT rules applicable to these types of internal combustion engines, so the cost range would be $610 - $836 per ton of NO_x in 2006 dollars, and $818 - $1,122 in 2021 dollars.

Based on these technologies being applied to these sources, assuming none of them are controlled, the estimated total annual cost would be $4,197,269 - $4,451,756 per year. Over a 20-year timeframe, this would translate to $83,945,388 - $89,035,125. This translates into 1,346 – 1,372 tpy NO_x reductions.

This assumes that these facilities had no existing controls on them, which may not be a good assumption based on ACOG and CAPCOG's interview with Bud Ground from the Environmental Federation of Oklahoma. EPA has New Source

Performance Standards (NSPS) for Spark-Ignition engines rated at over 500 HP that require NSCR that were manufactured after July 1, 2007, and for engines rates 25–500 HP that were manufactured after July 1, 2008.[24] At least some of these facilities may already have these controls installed. Therefore, at the low end of the range for the cost associated with this requirement, it is possible that the cost would be $0.

It is assumed that these financial costs would simply represent a net economic loss to the region if required, and did not apply any multipliers to these figures.

A report produced by the EIA on gas processing plant capacities indicated that gas processing plants operated at approximately 66% of capacity.[25] This suggests that a typical gas processing plant emitting 70 tpy NO_X would be more likely than not to have a potential to emit of at least 100 tpy. It is assumed a similar operating capacity for the other sources in the 70–100 tpy range, and used an 80% control efficiency and an average $3,245 per ton of NO_X reduced cost for all sources within this range, representing the higher of the two average cost per ton for the six sources that emitted more than 100 tpy. This translated into an additional 1,313 tpy of NO_X emission reductions at a total 20-year cost of $85,200,644. Even if these reductions were not required as a result of RACT, it is possible that they would be required anyhow as "necessary to attain."

The total cost range for non-EGU NO_X RACT for the 20-year period is therefore $0-$174,235,769.

INSPECTION AND MAINTENANCE (I/M) PROGRAM

Summary of Requirements

Under the Clean Air Act, ozone nonattainment areas classified as "Moderate" are required to implement a "basic" vehicle emissions inspection and maintenance (I/M) program (42 U.S.C. §7511a(b)(4)). EPA's rules implementing this provision are in 40 CFR §§51.350 - 51.373. If the region was designated nonattainment and classified as "Marginal" and subsequently reclassified to "Moderate," this would mean annual on-board diagnostic testing of light-duty vehicles (≤ 8,500 lbs Gross Vehicle Weight Rating (GVWR)) in Oklahoma, Cleveland, and Canadian Counties within three to four years of the reclassification to "Moderate." Other I/M programs in EPA region 6 were reviewed to estimate the costs to motorists of an I/M program and then regional economic multipliers for the industries that would be directly affected in order to estimate the regional economic impact of those expenditures. Those regional economic impacts were compared to a "business as usual" scenario in which those expenditures were directed elsewhere in the regional economy.

CAPCOG's analysis indicates that from 2028-2050, an I/M program would cost motorists in the region $549-$809 million, although the impact on the regional economy would be a loss of $90-$110 million over this time frame as a result of the redirection of this spending away from consumer spending and into spending on fees and repairs that would go to vehicle maintenance stations and state and local governments.

I/M Programs in EPA Region 6

Since there are no vehicle safety inspection or emissions inspection programs already in place anywhere in Oklahoma currently, an analysis of the potential economic impact of an I/M program must be based on programs in place elsewhere. Since EPA's regional offices are responsible for approving State Implementation Plan (SIP) revisions, including any SIP revision that Oklahoma might need to submit for an I/M program, I/M programs elsewhere in EPA Region 6, which also includes Arkansas, Louisiana, New Mexico, and Texas were reviewed. According to EPA's documentation for the MOVES3 model, within EPA Region 6, there are I/M programs in Louisiana, New Mexico, and Texas:

- **Louisiana:**
  - Baton Rouge area: 5 counties
- **New Mexico:**
  - Albuquerque area: 1 county
- **Texas:**
  - Dallas-Fort Worth area: 9 counties
  - Houston area: 5 counties
  - Austin area: 2 counties
  - El Paso area: 1 county

[24] https://www.govinfo.gov/content/pkg/FR-2008-01-18/pdf/E7-25394.pdf

[25] https://www.eia.gov/todayinenergy/detail.php?id=38592

Geographic Applicability

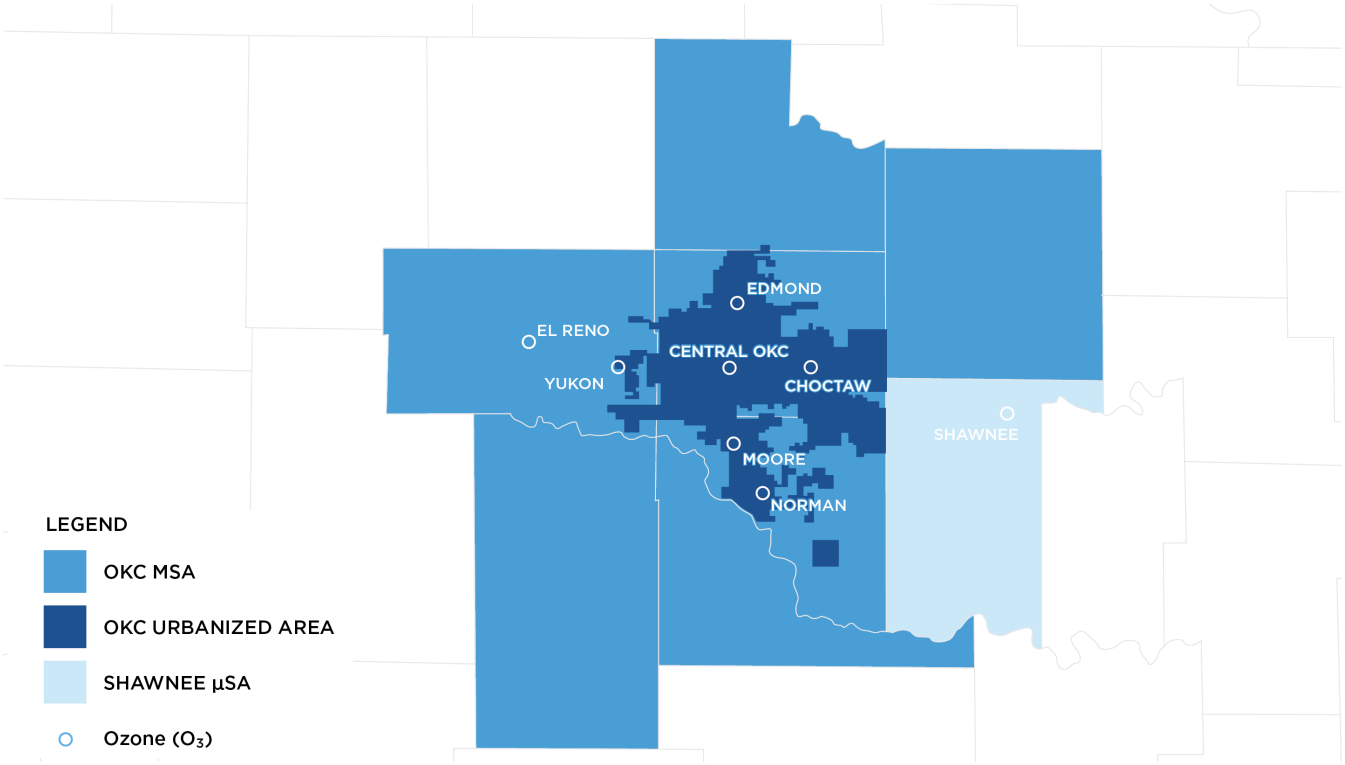
ACOG staff and their consultant, CAPCOG, have previously agreed that this study should evaluate a possible I/M program covering Canadian, Cleveland, and Oklahoma Counties. This analysis was based on EPA's rules for the I/M program, which are detailed in 40 CFR Subpart S. As detailed in the scoping report, 40 CFR §51.350 specifies applicability and the following provisions are significant for this study:

- §51.350(a)(8) requires that if a Marginal ozone nonattainment area is reclassified to Moderate, a basic I/M program is required in the 1990 Census-defined urbanized area or areas with a population of 200,000 or more.
- §51.350(b)(2) specifies that programs for ozone nonattainment areas outside of the northeast are required to "nominally cover at least the entire urbanized area, based on the 1990 census."

Exclusion of some urban population is allowed as long as an equal number of non-urban residents of the Metropolitan Statistical Area containing the urbanized area are included to compensate for the exclusion.

The map showing the extent of the 1990 Oklahoma City Urbanized Area from the scoping report is shown below (Figure 6). As depicted the Oklahoma City Urbanized Area includes parts of Canadian, Cleveland, Logan, and Oklahoma Counties.

Figure 6. 1990 Oklahoma City Urbanized Area



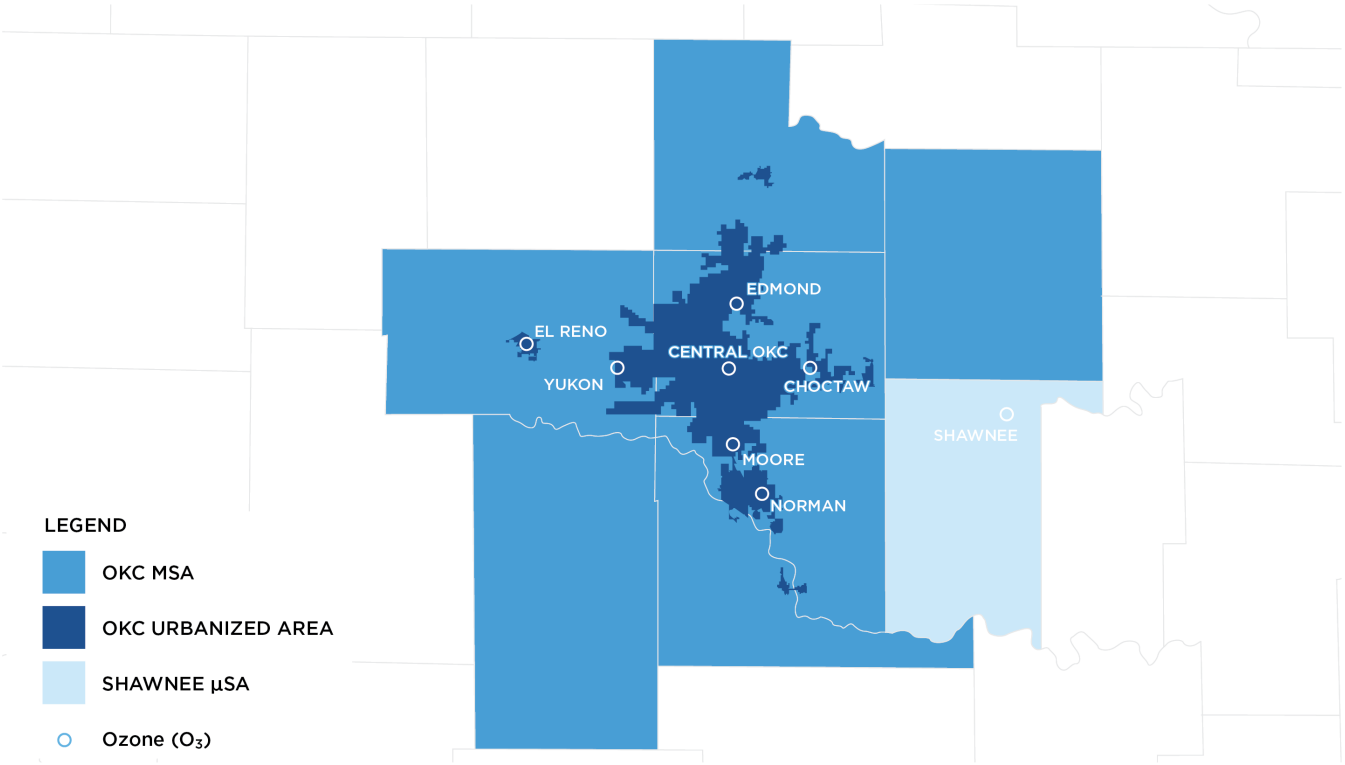
It is assumed that an I/M program for the Oklahoma City area would include all of Canadian, Cleveland, and Oklahoma Counties, but would not include Logan County despite there being a part of the 1990 urbanized area located in Logan County based on the provision allowing substitution of populations from Canadian, Cleveland, and Oklahoma Counties to cover the population living in Logan County's portion of the 1990 Census Urbanized Area.

Since the most recent population data (which would currently be July 1, 2019, population estimates from the Census Bureau) would need to be used for this analysis despite the geography being the 1990 Urbanized Area, it would be very resource-intensive

to try to estimate the exact current populations living in or out of the 1990 Urbanized Area boundaries in each county. However, analysis of the data that is available strongly suggests that Logan County could be excluded from an I/M program if the program applied to all three of the other counties, and it would be impractical for the I/M program to only cover portions of these counties.

An analysis of the 2010 Urbanized Area populations can help in identifying portions of these counties that were at the time definitively outside of the 1990 Oklahoma City Urbanized Area boundaries. The following map shows these areas along with the current Oklahoma City MSA and Shawnee µSA boundaries (Figure 7).

Figure 7. 2010 Urbanized Areas in OKC Area



Note: The six 2010 urban areas that cover a portion of these four counties are El Reno, Guthrie, Harrah, Norman, Oklahoma City, and Purcell, and these urban areas account for the "urban" population of these counties. Table 14 shows the total population, urban population, and the percentage of the population living in an urban area.

Table 14. 2010 County Urban/Rural Populations[26]

COUNTY	2010 POPULATION	2010 URBAN POPULATION	% URBAN
CANADIAN	115,541	89,535	64.45
CLEVELAND	255,755	212,574	82.31
LOGAN	41,848	18,675	25.05
OKLAHOMA	718,633	673,536	93.18
TOTAL	**1,131,777**	**994,320**	**87.85%**

[26] https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html

While the 2010 urban area boundaries separate the Norman and Harrah urban areas from the Oklahoma City urban areas, much of these two 2010 urban areas were included in the 1990 Oklahoma City urban area. However, the El Reno urban cluster in Canadian County, Guthrie urban cluster in Logan County, and the Purcell urban cluster in McClain County are all entirely outside of the 1990 Oklahoma City Urbanized Area boundary. Using the 2010 county and urban area population data, it's possible to approximate the populations in each county living in areas that were included in the 1990 Urban Area boundary. Table 15 below shows the share of each county's population living inside and outside of these areas.

Table 15. 2010 Urbanized Area Analysis

County	2010 Population	2010 Population in Oklahoma City, Norman, and Harrah Urban Areas	2010 Population Outside of Oklahoma City, Norman, and Harrah Urban Areas
CANADIAN	115,541	74,466	41,075
CLEVELAND	255,755	205,697	50,058
LOGAN	41,848	10,484	31,364
OKLAHOMA	718,633	673,536	45,097
TOTAL	**1,131,777**	**964,183**	**167,594**

As Table 15 shows, exclusion of Logan County would only mean that there would need to be an additional 11,000 people added from Canadian, Cleveland, or Oklahoma Counties in order to meet the requirements of §51.350(b)(2), and each of these counties has more than enough population outside of the 1990 Urbanized Area boundaries to meet this requirement.

It is also possible using these data to potentially exclude Canadian County if the program covered all of Cleveland and Oklahoma Counties. There is no way that this requirement could be met without including most, if not all, these two counties. These two counties collectively had a 2010 population of 974,388, which exceeds the target of 964,183 that accounts for the population in the four counties living in the 2010 Oklahoma City, Norman, and Harrah urban areas.

However, between 2010 and 2019, the population of Canadian County grew much faster (28%) than any of the other three counties (11-15%), and much of this population is located in the eastern part of the county that was included in the 1990 Oklahoma City Urbanized Area, so it might not be possible to make up for this population in Cleveland and Oklahoma Counties. The release of the 2020 Census data in 2021 and new urbanized area delineations will enable an updated analysis of this issue.

Eastern Research Group (ERG) conducted a similar analysis for the San Antonio area and is available on Texas Commission of Environmental Quality's (TCEQ) website at:

https://www.tceq.texas.gov/assets/public/implementation/air/ms/IM/2020%20Bexar%20County%20IM%20Prog%20Study%20Report.pdf.

Reference Case: Texas On-Board Diagnostic (OBD) Inspections

The reference case that will be used for this project is Texas's requirement for gasoline vehicles 2-24 years old (except for motorcycles) to pass an on-board diagnostic (OBD) test each year. More information on the program can be found here:

https://www.tceq.texas.gov/airquality/mobilesource/im.html#:~:text=The%20I%2FM%20program%20requires,X%2C%20VOC%2C%20and%20CO.

One notable deviation from the Texas program is that it is assumed that the program only applies to light-duty vehicles (vehicles with gross vehicle weight

ratings of 8,500 or less). While Texas's program includes heavy-duty gasoline vehicles, this is not required for a "basic" I/M program as defined under 40 CFR §51.352.

Estimates of Average Costs for Motorists

ERG has produced other reports available on TCEQ's website at:

https://www.tceq.texas.gov/airquality/mobilesource/vim/im_rules_links.html.

Using the 2020 Fee Analysis and 2020 Inspection and Maintenance Program Evaluation reports, it was determined that the following per-unit costs that can be used in conjunction with population data to estimate the likely annual costs to motorists of an I/M program in the Oklahoma City area if it was similar to the program in Texas. There are three basic components to these costs:

1. A per-test inspection fee paid to inspection stations;
2. A per-test administrative fee paid to the state government; and
3. Repair costs to enable a vehicle to pass an inspection.

ERG recommended a single per-test emissions inspection fee of $18 - $22 for all areas of the state, corresponding to the break-even price they calculated for 50% of all stations. Their survey indicated that station operators themselves indicated that an average fee of $29.15 was needed to cover costs ($18.00 and $29.15 for the low and high values were used). This does not include the $7.00 fee assessed for safety inspections statewide.

The other areas in EPA Region 6 with an I/M program have comparable fees:

- In the Albuquerque area, emission fees range from $15 - $25 per test, depending on the station, not including tax.
- In the Baton Rouge area, the incremental cost of an emissions test is $8 per test above the $10 per test fee for safety inspections.

Currently, Texas assesses a $2.50 per test administrative fee. The 7.88% sales tax applicable to Albuquerque corresponds to $1.18 - $1.97.

ERG's fee analysis report also showed that stations reported receiving an average of $100 - $200 per failed test, depending on area. Their performance report showed an average cost of $184.06 for 2018 and $176.32 for 2019. These two values for the high and low average repair cost per test failure were used.

ESTIMATE OF TOTAL ANNUAL COST TO MOTORISTS

Using the population data from the Oklahoma City area and I/M program data from the metro areas in EPA Region 6 with I/M programs (Albuquerque, Austin, Baton Rouge, Dallas-Fort Worth, El Paso, and Houston), the estimated total annual cost to motorists for the I/M program was calculated.

Testing Fees

The population and testing volume of the Austin, Texas area was used as the reference case for a program for the Oklahoma City area. The population of the two counties in the Austin metro area with an I/M program (Travis and Williamson) totaled 1,864,505 on July 1, 2019, based on the Census Bureau's 2019 Vintage County-Level Population Estimates, while the combined population of Canadian, Cleveland, and Oklahoma Counties was 1,229,754 (65.96% of the population of Travis and Williamson Counties).

In 2020, there were a total of 1,114,299 emission tests in the Austin area, based on a "waiver report" from 2020. This would translate into 734,948 tests in 2020 in the Oklahoma City area. Using the low end of ERG analysis's recommended fee range of $18-$22 for emission fees and a high of $29.15 (the amount survey respondents indicated would be needed to cover costs):

- A low of $13,229,059 paid to inspection stations; and
- A high of $21,243,725 paid to inspection stations.

Using the $1.17 per test administrative fee assessed in Albuquerque and the $2.50 per test administrative fee assessed in Texas, here are the following estimates:

- A low of $867,238 in administrative fees paid to the state and/or local government;

- A high of $1,837,369 in administrative fees paid to the state and/or local government.

Combining inspection station fees with the administrative fee, **total annual fees for motorists would be $14,096,297-$23,261,095 in 2020.**

Emissions Repairs

An I/M program requires vehicles that fail an emissions test to repair the failing components in order to pass the test and be in compliance with the program's rules. In the Austin area, there were 50,273 failing vehicles in 2020, which would translate into 33,158 failing vehicles in Oklahoma City area in 2020, if the failure rates were proportionate to population.

Using the average repair cost data from ERG's most recent report for Texas (an average of $176.32 per repair in 2019 and an average of $184.06 in 2018), CAPCOG calculated that repairing these 33,158 would cost $5,846,374-$6,102,977 per year based on 2020 data.

Total Costs to Motorists

Table 16 shows the low and high estimates of the total costs to motorists and the disposition of those costs.

Table 16. Costs to Motorists of an I/M Program in 2020

ITEM	LOW	HIGH
Inspection Fees – to Inspection Stations	$13,229,059	$21,423,725
Inspection Fees – Administrative	$867,238	$1,837,369
Repair Costs – to Inspection Stations	$5,846,374	$6,102,977
SUBTOTAL – to Inspection Stations	$19,075,433	$27,526,702
TOTAL COSTS TO MOTORISTS	$19,942,671	$29,364,071

CALCULATION OF IMPACT TO REGIONAL ECONOMY

The costs to motorists only represent one side of the transactions involved in a regional economy that would be affected by an I/M program, with vehicle maintenance businesses and state or local government receiving increased revenues in order to carry out the work involved with the program. The regional economic impact of this change would be the difference in the region's GRP with and without the I/M program and the shift of the $20-$29 million from motorists to inspection stations and state or local government.

Impact from Increased Revenue to Vehicle Maintenance Industry

In order to estimate the impact of increases in revenues to the vehicle maintenance industry, costs for inspections and repairs were used as inputs to the EMSI economic input-output model in the related vehicle maintenance sectors and the costs for administrative fees as an input in the state and local government sectors. These are represented as increased "sales" in these sectors and will be multiplied by the NAICS-specific GRP multipliers. Table 17 shows some of the key data for the vehicle maintenance industry that would see increased revenue as a result of the I/M program.

Using the weighted GRP multiplier of 1.203371 with the $19,075,433 - $27,526,702 in new revenue into these sectors yields the **estimated regional economic impact of $22,954,831 - $33,124,847 for inspections and repairs.**

Impact from Increased State or Local Government Revenue

The administrative fees paid by motorists for the I/M program would be expected to be directed to either state or local government, depending on how

the program was structured. Any fees paid to local governments to run such a program would obviously constitute an increase in local government revenues (i.e., "sales"), but fees to the state government would also generate local economic activity since Oklahoma City serves as the state's capital city (refer to Table 18).

Using the GRP multipliers from each and the $867,238 - $1,837,369 in administrative fees, CAPCOG calculated an estimated **$2,080,280 - $4,572,520 in GRP from these fees.**

Table 17. Data for Vehicle Maintenance Industry

NAICS	DESCRIPTION	SALES	% OF SALES	GRP MULTIPLIER
811111	General Automotive Repair	$263,499,038	84.64%	1.201895
811112	Automotive Exhaust System Repair	$4,830,213	84.64%	1.2131221
811191	Automotive Oil Change & Lubrication Shops	$35,899,366	84.64%	1.205583
811198	All Other Automotive Repair & Maintenance	$7,073,979	84.64%	1.240469
TOTAL	**TOTAL**	**$311,302,597**	**100.00%**	**1.203371**

Table 18. Data for State and Local Government

NAICS	DESCRIPTION	% OF SALES	GRP MULTIPLIER
902999	State Government, Excluding Education and Hospitals	$14,439,360,545	2.4886233
903999	Local Government, Excluding Education and Hospitals	$5,184,568,601	2.3987406

Impact from Reduced Consumer Spending

Under the "business as usual" scenario in which the region did not have to implement an I/M program, the $20 - $29 million in fees and repair costs that motorists would have to pay could instead be spent elsewhere in the economy. For this analysis, CAPCOG used data from NAICS codes 44-45 (retail), 71 (arts, entertainment, and recreation), 72 (accommodation and food services), and 81 (other services except public administration). NAICS codes were included when there were $0 sales – 712190: Nature Parks and Other Similar Institutions and 721120: Casino Hotels. "Casinos" and "Hotels" are both accounted for elsewhere in this list, and zoos are accounted for in a different NAICS code.

There were a total of 153 six-digit NAICS codes used for this analysis. GRP multipliers ranged from a low of 0.8328 (Funeral Homes and Funeral Services) to a high of 1.7906 (Religious Organizations). Using sales as the weighting factor, the weighted average across all of these sectors was 1.419331. The weighted averages for each two-digit subsector are shown below:

- 44-45 (Retail): 1.390783
- 71 (Arts, Entertainment, and Recreation): 1.437699
- 72 (Accommodation and Food Services): 1.469012
- 81 (Other Services Except Public Administration): 1.408445

Using the low and high estimates of the total shift in motorist spending with the weighted average GRP impact across these sectors, there is an estimated GRP loss of **$28,305,244 - $41,677,326** associated with the consumer spending that would otherwise need to be used for the I/M program.

Calculation of Net Impact

The net economic impact of the I/M program equals the added GRP from the vehicle inspection fees and repair costs that would occur under an I/M program minus the GRP from consumer spending with the same amount of money under the "business as usual" case. Table 19 summarizes these amounts.

Table 19. Net Economic Impact of I/M Program, 2020

COMPARISONS	LOW	HIGH
Business as Usual	$28,305,244	$41,677,326
I/M	$25,035,111	$37,697,367
Net Impact	**($3,270,134)**	**($3,979,959)**

Note: CPI adjustments were not made to these estimates since the data from the cost estimates are from much closer in time (2018 and 2019 data) than the other analyses that were using 2006 and 2011 dollars. The cost estimates for repairs also use a combination of 2018 and 2019 data, making it less obvious how to reconcile the costs. For reference the July 2021/July 2019 CPI ratio is 1.064045 and the July 2021/July 2018 CPI ratio is 1.083319.

PROJECTIONS

The scenario under consideration in which the area was designated a "Marginal" nonattainment area in 2022, missed its 2025 attainment date, and was reclassified to "Moderate" would result in the implementation of an I/M program by as soon as 2027 if the program was going to be used to achieve emission reductions in the final ozone season that would be used to determine attainment of the Ozone Standards by the 2028 deadline for a "Moderate area." 40 CFR §51.372(b)(2) requires submission of a SIP revision accounting for the I/M program no later than the deadline for submitting an attainment demonstration SIP revision. Assuming a 12-18 month timeframe for completing the reclassification after a late 2025 attainment date, that would be expected to occur between fall 2026 and summer 2027. The SIP revision would likely be due approximately one year after that date, so fall 2027 to summer 2028. The actual implementation date for I/M program could theoretically be as late as 2029 or 2030, although it would need to be implemented no later than the beginning of 2028 in order to be "creditable" towards the area's 15% VOC reduction required for a "Moderate" area. Conversations that have been had with TCEQ and EPA Region 6 as it relates to the potential timing of an I/M program that may be needed for Bexar County suggests that despite the very short time frame for implementation, it is likely that an I/M program would indeed be required to be implemented no later than the beginning of 2028. Therefore, this study will use 2028 as the "start year" for analysis and 2050 as the final year, corresponding to the end of the "maintenance" plan following redesignation to attainment.

The scenario contemplated in this study assumes that all controls other than nonattainment new source review (NNSR) permitting remain in place out to the final year of the second maintenance plan due to the "noninterference" requirements in Section 110(l) of the Clean Air Act. This section prohibits EPA from approving SIP revisions "if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress…or any other applicable requirement of this chapter," which would include maintenance of the Ozone Standards. While states can remove existing measures, the burden is high and uncertain, but removal of I/M programs faces the added burden of 40 CFR §51.350(c), which specifies that "All I/M programs shall provide that the program will remain effective, even if the area is redesignated to attainment status or the standard is otherwise rendered no longer applicable, until the State submits and EPA approves a SIP revision which convincingly demonstrates that the area can maintain the relevant standard(s) without benefit of the emission reductions attributable to the I/M program. The

State shall commit to fully implement and enforce the program until such a demonstration can be made and is approved by the EPA."

Figure 8 shows the range of the estimated cumulative impact on the regional GDP over time from 2028-2050 based on population projections that ACOG provided that were used for their Metropolitan Transportation Plan (MTP).

If an I/M program were only to be required starting in 2030, the cumulative cost through 2050 would be $82,952,287, while if it were implemented in 2028, the cumulative cost would be $100,958,177.

ATTAINMENT DEMONSTRATION, REASONABLY AVAILABLE CONTROL MEASURES, AND INCREASES IN OFFSET REQUIREMENTS

There are three sets of requirements that would apply to a "Moderate" area beyond what is required for a "Marginal" area that were not developed:

1. The requirement in Section 172 of the Clean Air Act for an "attainment demonstration" SIP revision;
2. The requirement to implement "Reasonably Available Control Measures" (RACM) as expeditiously as practicable under Section 172(c)(1); and
3. An increase in the NNSR offset ratio from 110% to 115%.

While it is certainly true that the state would incur additional costs to develop attainment demonstration SIP revisions that would be needed to fulfill this requirement, it is not clear that this added obligation would represent an economic cost to the regional economy. As the capital city for the state, ODEQ's offices are located within the Oklahoma City region, and any additional staff that might need to be hired to carry out this work would almost certainly also be located within the region. Some specialized work involved with these plans, such as photochemical modeling, may require contracting with consultants, which could represent a net cost to the state, but since the funds used for paying for such contracts would likely come out of the agency's statewide budget, it is not obvious that these costs either would represent a real cost to the regional economy, and it would be difficult to characterize these as such. It would be useful, however, for ODEQ to consult with their fellow state agencies in the region to assess what those resource requirements likely would be in the event the Oklahoma City area was designated nonattainment so that they could ensure that they were prepared for such an eventuality.

The requirement for RACM has been a bit difficult to pin down over the years, but it has variously meant:

- Operational controls (rather than technological controls) on point sources within the nonattainment area;
- Mobile source emissions reduction measures other than I/M programs within the nonattainment area;
- Measures that could be implemented sooner than the deadline for RACT implementation; or
- Measures implemented outside of the nonattainment area that would achieve ozone benefits within the nonattainment area.

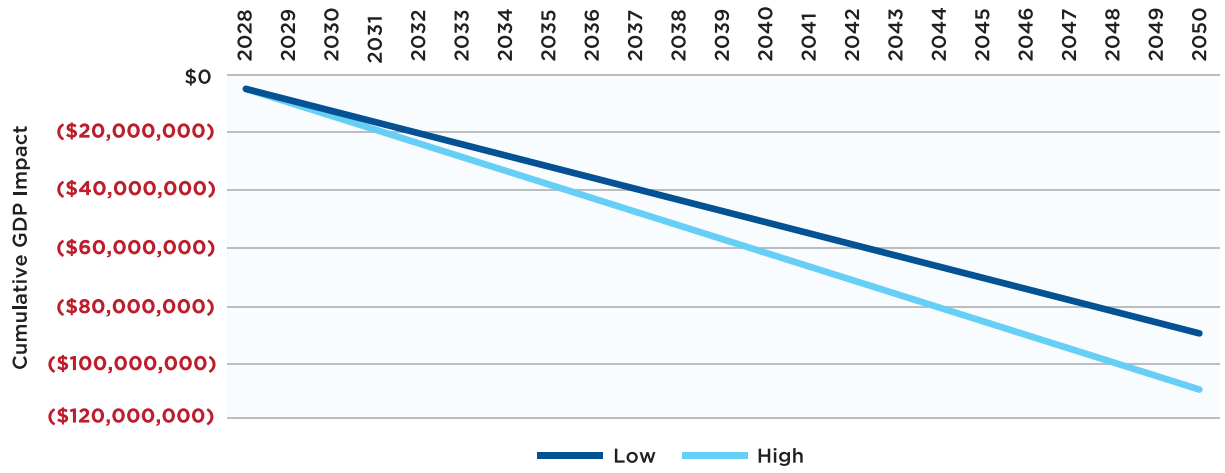
In practice, this requirement really amounts to the need for the state to demonstrate that it has considered implementing measures beyond those explicitly required by statute and explain why it is or is not implementing any such additional measures. While they may exist, CAPCOG and ACOG are not aware of any situation in which EPA has disapproved a state's SIP submission on the basis of RACM alone. Therefore, it is not necessarily the case that the requirement for RACM would actually mean that any additional measures would need to be implemented, which is why analysis of potential costs associated with this requirement are not included in this report.

There is a provision of Section 172 of the Act that seems to go further: Section 172(c)(6) does require "Such plan provisions shall include enforceable emissions limitations, and other control measures, means or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to provide for attainment of such standard in such area by the applicable attainment date specified in this part." This could theoretically mean that if, after implementing measures considered RACT and RACM, the state was not able to bring the area into attainment, that it would have to implement any additional measure that may not meet one of those

two definitions as may be necessary. In practice, though, it is not clear what types of measures might fall into that category, if any do.

Lastly, Section 182(b)(5) requires that NNSR offsets increase from 110% to 115% when an area is reclassified from Marginal to Moderate. While this increase certainly would mean some added cost to a firm if it decided to build a new major source or initiate a major expansion of an existing source and it had to obtain offsets from another firm within the region, the offset requirement can be achieved internal to a company that owns multiple facilities within a region. In such a case, if a firm did proceed with building a new plant in the region, the NNSR regulations would allow them to use the emission reductions associated with the planned closures of existing facilities to offset the emissions from the new facility. Since any new facility would be expected to be equipped with LAER pollution controls, the amount of emissions offsets that would be needed would likely be quite small, and the emissions reductions from the facilities that are expected to be closing may be more than enough to cover this requirement. Therefore, the extra requirement for a 115% offset rather than a 110% offset would increase the amount of "credit" consumed, but would not be expected to have an impact on the regional economy. Likewise, the availability of this pool of credits from the planned closures would likely mean that any other firm that needed to obtain offsets would likely be able to obtain them from this pool, meaning funds would just be transferred from one firm to another within the region, but would not necessarily cost the region as a whole anything. Therefore, the increase in offset costs associated with a Moderate classification is assumed to not add to the overall economic cost to the region.

Figure 8. Cumulative Economic Impact of an I/M Program 2028-2050



5 CONCLUSIONS AND RECOMMENDATIONS

This report estimates that a nonattainment designation could cost the Oklahoma City area's economy $9.6-$15.2 billion through 2050 (Table 20). Averaged over the 28-year time frame covered by this study, that averages $341-$542 million per year.

Compared to an annual GDP of approximately $78 billion, this would represent about 0.4%-0.7% of total economic output for the region.

Most of the cost of a nonattainment designation would be associated with NNSR permitting and the potential lost opportunity for an automobile manufacturing plant. This single item represents between 67% and 75% of the total potential cost of a nonattainment designation identified in this report. One unique aspect of NNSR among all of the regulatory requirements analyzed in this report is that it is the only one that would only be in effect during the few years that the area would be expected to be actually designated nonattainment – as soon as it was redesignated to "attainment," PSD permitting rules are immediately back in effect. So the scenario envisioned in this report is really focused on one in which a company is making a decision about locating a plant in the eight-county region between 2022 and 2028. The best way to avoid that cost entirely is obviously therefore to avoid a nonattainment designation entirely as well, but short of that, every year that it can accelerate its attainment of the Ozone Standards is a year less that it is at risk of this situation occurring. Taking early action and positioning itself to come into attainment quickly if designated nonattainment could therefore have very significant benefits for ensure that a nonattainment designation does not cause it to lose an opportunity.

The next-largest potential cost of a nonattainment designation is the 15% VOC reduction requirement. This requirement would carry with it a very hefty pricetag without necessarily providing much in the way of an ozone reduction benefit. It would also be the requirement most likely to have the broadest economic impact in that it could result in new regulations on a lot of small businesses since there would be no other way to achieve such a large

Table 20. Summary of Potential Economic Costs of a Nonattainment Designation, 2022-2050

CLASSIFICATION	REQUIREMENT	LOW	HIGH
MARGINAL	NNSR	$7,209,372,404	$10,141,843,457
MARGINAL	Transportation Conformity	$306,413,810	$565,441,517
MARGINAL	General Conformity	$0	$1,230,724,801
MARGINAL	**Subtotal for Classification**	**$7,515,786,214**	**$11,938,009,775**
MODERATE	NNSR	$0	$0
MODERATE	15% VOC Reduction	$1,823,456,374	$2,808,066,244
MODERATE	NOx RACT-EGUs	$129,524,608	$172,699,477
MODERATE	NOx RACT-Non-EGUs	$0	$174,235,769
MODERATE	I/M Program	$82,952,287	$100,958,177
MODERATE	**Subtotal for Classification**	**$2,035,933,269**	**$3,255,959,667**
TOTAL	**TOTAL**	**$9,551,719,483**	**$15,193,969,442**

reduction in VOC emissions. This requirement is specific to the "Subpart 2" implementation scheme for ozone nonattainment areas, however, and there is a possibility that EPA could be persuaded to consider using the more general "Subpart 1" implementation scheme for newly designated nonattainment areas in the future, and this could help the region significantly limit the economic impact of a nonattainment designation. Due to the complexity of these sources, future research into the actual emission reductions that might be achievable through implementation of VOC RACT within the region, which companies would likely be affected, and what costs those would entail would be valuable.

A nonattainment designation would also be expected to cost the region hundreds of millions of dollars in economic output associated with transportation conformity, NO_X RACT rules, and an Inspection and Maintenance (I/M) program. It is possible that general conformity requirements may not result in any economic cost the region, although if they caused a delay in the expansion of Tinker Air Force base compared to a "business as usual" scenario, these requirements could represent a significant economic impact to the region as well.

The large jump in economic impact associated with going from a "Marginal" to "Moderate" classification could be particularly painful if the timeframes for implementing all of the various "Moderate" area requirements is compressed as the result of a reclassification. While "Marginal" areas are not required to have contingency measures in place, "Moderate" areas are, and these measures are supposed to go into effect immediately upon reclassification. If the area was designated nonattainment and classified as "Marginal," one option the state and region may wish to consider would be adopting the RACT and I/M rules on a contingency basis so that they would go into effect automatically, if the area was reclassified. This could improve the planning and implementation of any such rules, provide the area with the maximum benefit of the emissions reduction as soon as possible, and also providing a powerful incentive for the region to take action as soon as possible in order to avoid a reclassification altogether.

If EPA does initiate a process of designating a part of the region as nonattainment, the region should also consider both the benefits and costs associated with a smaller or larger nonattainment area. A larger nonattainment area provides a wider base of emissions reductions that could be used for offsets and to meet the 15% VOC emission reduction requirement, but would also expand the risks and potential costs of a nonattainment designation. As a general rule of thumb, it would be in the region's interest to limit the geographic scope of a potential nonattainment area to as few counties as possible. One of the factors EPA will consider in evaluating whether to include a given county in a nonattainment area or not is the extent of control of emissions already in place in those areas. In this way, each county within the region should have an incentive to take action to control emissions so that if they ever face such a situation, they will be able to credibly say to EPA that emissions within their county are well-controlled.

Similarly, the Oklahoma City area has some unique opportunities to take advantage of EPA's policy towards separate treatment of tribal areas when it comes to area designations. While EPA's default is to consider an entire CSA when evaluating the boundaries of a potential nonattainment area, it can treat any parts of the Oklahoma City-Shawnee CSA that are within what is associated Tribal Lands as separate from the areas that are outside of associated Tribal Lands. This could mean that large parts of the Oklahoma City-Shawnee CSA could be excluded from a nonattainment designation if the tribes in the region petitioned EPA to do so. This could be a valuable strategy for the Tribes, the State, and the region alike to minimize the potential economic and social costs of a nonattainment designation and maximize the opportunities for development within the Oklahoma City-Shawnee CSA even if some parts are designated nonattainment.

This report shows significant potential costs to the region's economy of a nonattainment designation, and hopefully helps convey the extent to which it is in the region's interests to remain in attainment of the Ozone Standards even beyond the public health benefits of doing so.

ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS

COST OF NONATTAINMENT STUDY FOR THE OKLAHOMA CITY AREA:

TRANSPORTATION PLANNING IMPACT

PREPARED BY:
ACOG CONSULTANT - TEXAS A&M TRANSPORTATION INSTITUTE

6 EXECUTIVE SUMMARY

The purpose of the study is to examine potential transportation funding and programming impacts for regions being designated as air quality nonattainment areas. This report presents the findings of potential impacts of a nonattainment designation on transportation planning as a result of conformity requirements and sanction provisions of the Clean Air Act (CAA).

The U.S. EPA is required to designate areas based on the National Ambient Air Quality Standards (Ozone Standards) as follows: attainment (meeting air quality standards), nonattainment (not meeting air quality standards), and maintenance (previously in nonattainment and now meeting air quality standards). Once nonattainment designations take effect, the state and local governments have three years to develop a state implementation plan (SIP) to reduce air pollutant emissions. The severity level or classification of the designation determines the time deadline an area has to meet the Ozone Standards. Specific classifications apply for each pollutant. For example, ozone (O_3) has six: Marginal, Moderate, Serious, Severe-15, Severe-17, and Extreme.

Conformity requirements apply in nonattainment and certain maintenance areas. Conformity relating to the SIP means federal funding and approvals are given to highway and transit activities that will not cause new air quality violations or worsen existing air quality violations. Therefore, emissions estimates based on the Metropolitan Transportation Plan (MTP) and Transportation Improvement Programs (TIP) need to be compared to the SIP motor vehicle emission budgets (MVEB). If no MVEB is established, then an alternative conformity test will be needed to demonstrate the conformity of the regional MTP and TIP.

ACOG has commissioned studies to assess the potential economic impacts of the CSA being designated nonattainment by the EPA for exceeding ground-level Ozone Standards. This study that the Texas A&M Transportation Institute (TTI) assisted with aimed at characterizing the potential impacts of a nonattainment designation on transportation planning as a result of conformity requirements and sanction provisions of the Clean Air Act (CAA). The estimated potential impacts estimated need to be readily translatable into regional economic impacts. This study developed the potential costs arising from the following four cost categories with respect to the Oklahoma City-Shawnee CSA.

a. The costs to the metropolitan planning organization (MPO) and other stakeholder organizations to perform conformity analyses and make conformity determinations
b. The increased costs of project delays in building new roads that may result from transportation conformity requirements
c. The increased costs of building new roads associated with project delays caused by a transportation conformity lapse
d. The potential loss of federal revenue that a nonattainment or maintenance area could experience from a prolonged transportation conformity lapse

The analysis was conducted and summarized for the areas responsible by ACOG and ODOT for performing conformity within the CSA. Currently, all counties in Oklahoma are designated as “attainment” or “unclassifiable” for all Ozone Standards. However, ozone design values from monitoring stations around Oklahoma from 2016-2018, and 2017-2019, indicate the levels to be at the maximum allowable levels. This data, and EPA’s guidance for initial area designations for the 2015 Ozone Standards, could imply that one or more counties in the Oklahoma City-Shawnee CSA might be at risk of being designated as nonattainment under the category moderate or marginal. As a worst-case scenario, the entire eight-county Oklahoma City-Shawnee CSA was considered in this analysis.

For this study, TTI assumed that the region would first be designated as marginal, and if the region fails to attain by the "Marginal" attainment date, it would be reclassified as "Moderate". The timeline used in the analysis are provided below:

- The area will be designated as nonattainment in 2022 with an attainment date in the year 2025
- Initial transportation conformity determination is due 12 months from the designation i.e 2023
- If the area fails to attain the standard by 2025, EPA reclassifies the area from "Marginal" to "Moderate" with an attainment date of 2028 - 2030 (depends on the EPA action timeline)
- End of first ten-year maintenance period (2040)
- End of second ten-year maintenance period (2050)

As part of this study, a state of the practice review was performed covering the history of federal regulations and requirements pertaining to the SIP and regional transportation conformity requirements. The study team also reviewed how other state departments of transportation (DOTs) and MPOs are meeting conformity requirements and the costs associated with completing conformity analyses. Nonattainment areas that have experienced a lapse and the duration of the lapse were collected to assess the minimum and maximum duration of a lapse. The latest cost values associated with transportation performance aspects, including transportation operation, emissions, and safety were gathered from various organizations including, but not limited to, the American Transportation Research Institute (ATRI), American Automobile Association (AAA), United States Department of Transportation (USDOT), and Transportation Economic Development Impact System (TREDIS, an economic analysis system). These values were used to estimate the potential cost of project delay for one, two, three, and five years.

An online data collection Qualtrics form was developed (using Qualtrics, an online survey tool) and implemented to collect information on transportation conformity costs and MPO experiences with conducting transportation conformity for MTP and TIP updates and amendments. The information sought to include additional costs to the MPO as a result of conformity requirements, time to complete a conformity analysis, etc. In addition, select interviews were conducted with federal agencies and Oklahoma MPO staff to gather their experiences in the review and demonstration of transportation conformity.

The information on projects programmed in their Statewide Transportation Improvement Program (STIP) was provided by Oklahoma Department of Transportation (ODOT). Information from the STIP such as project length, project cost, speed, along with cost values associated with several transportation performance aspects was used to estimate the cost of project delay for each project. This study estimated that a nonattainment designation for the EPA's proposed Ozone Standards could potentially cost ACOG and ODOT in the range of $135 million - $157 million between 2023 and 2050 for routine conformity analysis and project delays associated with it. It is assumed that the resources needed for demonstrating conformity for counties within the ACOG MPO boundary and outside the ACOG MPO boundary are the same.

The cost of delay per project as a result of conformity lapse is assumed to be the same for ACOG and ODOT areas, however, the number of projects within ACOG and ODOT areas are different. The loss of federal funding for ACOG and ODOT areas is dependent on the number of projects programmed in each year of the STIP within each area. Conformity lapse and loss of federal funding is an unlikely event and its occurrence affects the estimated cost of other conformity scenarios. The final estimated costs associated with the nonattainment designation under different scenarios are summarized in Table 21. To be consistent with the regional economic analysis, these estimates does not include environmental costs in estimating the overall project delay costs with delayed projects.

Table 21. Summary of Estimated Impacts on Regional Transportation Planning Due to Nonattainment Designation (without environmental costs)

AREA	ANALYSIS SCENARIOS	COST VALUE (2019 DOLLARS)	
		LOW	HIGH
CSA or MPO or Non-MPO[27]	Routine conformity analysis cost	$4,823,438	$5,602,344
	Cost of project delay due to routine conformity analysis	$129,923,895	$150,563,990
CSA[28]	Cost of project delay due to conformity lapse (1-year versus 2-year)	$138,923,895	$267,907,022
MPO		$129,054,849	$150,563,990
Non-MPO		$9,869,046	$117,343,032
CSA	Cost of potential long-term loss of federal funding	$29,093,855	$90,271,143
MPO		$17,459,620	$75,768,873
Non-MPO		$11,634,235	$14,502,270
CSA	Cost of project delay due to loss of federal funding	$2,435,939	$47,313,242
MPO		$1,367,865	$39,704,777
Non-MPO		$1,068,074	$7,608,465

[27] ACOG is responsible for conformity determinations in a geographic area known as the ACOG MPO Boundary, and for areas outside this boundary, ODOT will be responsible for coordinating the conformity determinations.

[28] The areas covered by Oklahoma City-Shawnee CSA, which consists of the eight counties Canadian, Cleveland, Grady, Lincoln, Logan, McClain, Oklahoma, and Pottawatomie.

7 INTRODUCTION

Under this study, TTI is assisting ACOG in evaluating and estimating the potential costs to the Oklahoma City-Shawnee CSA that could arise from transportation planning and conformity requirements and funding sanctions under the Clean Air Act (CAA), resulting from the CSA being designated as an ozone nonattainment area.

These potential impacts will be able to be readily translated into regional economic impacts. The study included three major tasks as listed below:

1. **Study background:** The objective of this task is to help stakeholders understand the policy content of transportation conformity. The key information about the Ozone Standards, SIP, and the general process of transportation conformity are summarized to provide a high-level overview of transportation conformity and its requirements at the state and local levels.
2. **Gather Information Needed for Understanding Potential Transportation Conformity and Sanctions Impacts (data collection plan):** The objective of this task is to develop inputs and assumptions required to understand the potential conformity determination and sanction impacts. Synthesize relevant literature, including prior studies[29, 30, 31] conducted by the Capital Area Council of Governments (CAPCOG), Alamo Area Council of Governments (AACOG), and the South Texas Economic Development Center. The plan will document the different costs associated with conformity determination, identify projects in short-term and long-term transportation planning that may be affected, and data elements related to conducting the conformity determination.
3. **Develop Relevant Inputs Usable for an Economic Input-Output Model:** Task 3 will build on the data collection plan proposed in Task 1. Task 2 will assemble relevant inputs for use in economic analysis to translate the transportation conformity-related impacts into regional cost estimates. The study will focus on developing the potential cost arising from the following four cost categories as per the scope of work:
   a. The costs to the MPO and other stakeholder organizations to perform conformity analyses and make conformity determinations
   b. The increased costs of project delays in building new roads that may result from transportation conformity requirements
   c. The increased costs of building new roads associated with project delays caused by a transportation conformity lapse
   d. The potential loss of federal revenue that a nonattainment or maintenance area could experience from a prolonged transportation conformity lapse

This technical memorandum describes the key input parameters, assumptions, and data gathered to develop the methodology for assessing the impact of conformity requirements on regional transportation planning. The report is organized as follows:

- Section 8 provides an overview of the Ozone Standards, SIP, and transportation conformity analysis, and key categories to be considered for economic analysis
- Section 9 presents the data collection methods consisting of a literature review of prior studies, surveys, and interviews of local, state, and federal agencies.
- Section 10 presents the cost analysis of transportation conformity, including geographic scope, input data requirements, assumptions, and results, for different categories of the transportation conformity assessment. A summary of the major findings in this study and proposed recommendations for practitioners is included.

[29] Capital Area Council of Governments. The Potential Costs of an Ozone Nonattainment Designation to Central Texas. 2015

[30] Alamo Area Council of Governments. Potential Cost of Nonattainment in the San Antonio Metropolitan Area. 2017

[31] South Texas Economic Development Center. Potential Costs of Ozone Nonattainment in the Corpus Christi Metropolitan Area. 2020

8 BACKGROUND

The EPA revised the 8-hour Ozone Standards from 75 parts per billion (ppb) set in 2008 to 70 ppb in 2015[32]. The rules categorize states and portions of states into attainment areas (meeting the Ozone Standard) or nonattainment areas classified as marginal, moderate, serious, severe, or extreme. The nonattainment classification depends on its current air quality, and indicates the severity of its Ozone Standard exceedance. Each nonattainment classification has different requirements including the timelines by which a nonattainment area must develop plans towards meeting the Ozone Standard. This section provides an overview of Ozone Standard, ozone nonattainment requirements, different elements of the SIP, and the transportation conformity process.

NATIONAL AMBIENT AIR QUALITY STANDARDS

As mandated by the CAA, the EPA established the Ozone Standards for six common air pollutants also known as "criteria pollutants". These criteria pollutants are particulate matter (PM), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ground-level ozone, and lead. The Ozone Standards established for each pollutant is further divided into primary and secondary standards.

Table 22 lists the current primary and secondary standards for the criteria pollutants.[33] Units of measurement for the standards are in parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air (µg/m3). While the primary standards are intended to protect public health, the secondary standards are intended at protecting the public from adverse environmental effects.

The CAA requires EPA to conduct a periodic review of the Ozone Standards once every five years. The review conducted in an Integrated Science Assessment (ISA) evaluates the scientific studies and literature published since the last review to assess the relationship between pollutant level and adverse effects on the public health and environment. The EPA then prepares a Policy Assessment (PA) which evaluates the potential policy implications of the information within the ISA. The PA also includes the findings of the independent review of the ISA by the Clean Air Scientific Advisory Committee (CASAC).[34]

The EPA requires states to monitor ambient air quality levels measured by ambient air monitors to assess compliance with the Ozone Standards. Based on the compliance criteria, the EPA characterizes the air quality within a defined area (that can vary in size ranging from portions of cities to the metropolitan statistical area [MSA]), with respect to each of the six criteria pollutants. Areas are designated as in "attainment" if the pollutant level meets or is less than its Ozone Standards. Areas are designated as "nonattainment" if the pollutant level is above the Ozone Standards. When a nonattainment area attains the Ozone Standards, the EPA designates the area as a "maintenance area."

A nonattainment area can include the area violating the Ozone Standards (e.g., the area around violating monitor or encompassing modeled violations), as well as any nearby areas (e.g., counties or portions thereof) that contain emissions sources contributing to the violation (CAA107(d)(I)(A)(i)). When the monitor in the county exceeds the standards, EPA can designate the violating county and adjacent counties within the CSA as nonattainment areas.

[32] U.S. Environmental Protection Agency. Federal Register. Review of Ozone NAAQS. https://www.federalregister.gov/documents/2020/08/14/2020-15453/review-of-the-ozone-national-ambient-air-quality-standards. Accessed May 12, 2021

[33] Oklahoma Department of Environmental Quality. National Ambient Air Quality Standards (NAAQS). https://www.deq.ok.gov/air-quality-division/ambient-monitoring/national- ambient-air-quality-standards/. Accessed May 12, 2021

[34] U.S. Environmental Protection Agency. Integrated Science Assessments (ISAs). https://www.epa.gov/isa. Accessed May 12, 2021.

Table 22. Ozone Standards for Criteria Pollutants

POLLUTANT		STANDARD	AVERAGING TIME	LEVEL	FORM
Carbon Monoxide (CO)		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead (Pb)		Primary & Secondary	Rolling 3-month average	0.15ug/m3	Not to be exceeded
Nitrogen Dioxide (NO_2)			1-hour	100 ppm	98th percentile (3 yr avg)
		Primary & Secondary	Annual	53 ppm	Annual mean
Ozone (O_3)		Primary & Secondary	8-hour	0.070 ppm	Annual 4th-highest daily max 8-hour concentration (3 yr avg)
Particulate Matter	**PM_{10}**	Primary & Secondary	24-hour	150 ug/m3	Not to be exceeded more than once per year
	$PM_{2.5}$	Primary	Annual	12 ug/m3	Annual mean (3 yr avg)
		Secondary	Annual	15 ug/m3	Annual mean (3 yr avg)
		Primary & Secondary	24-hour	35 ug/m3	98th percentile (3 yr avg)
Sulfur Dioxide (SO_2)		Primary	1-hour	75 ppm	99th percentile of 1-hour daily max concentrations (3 yr avg)
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

EPA recommends states/tribes base boundary recommendations on an evaluation of five factors:[35]

1. Air quality data,
2. Emissions and emissions-related data,
3. Meteorology,
4. Geography/topography, and
5. Jurisdictional boundaries.

Areas designated as nonattainment for ozone can be further classified into six categories depending on the degree to which ozone exceeds the Ozone Standards (Table 23).[36] Depending on the nonattainment classification, various requirements are imposed to help nonattainment areas reach attainment status. Each higher-level nonattainment status includes additional requirements plus all the requirements of the preceding, lower status level. For example, requirements at the serious classification level include all requirements imposed on the marginal and moderate classifications, in addition to those requirements introduced specifically for the serious classification. A comparison of the requirements and controls at different designation status levels is listed in Table 24.[37, 38]

Table 23. 8-Hour Design Values for the 2015 Ozone Standard of 70 ppb.

AREA CLASS	8-HOUR DESIGN VALUE (ppb)
Marginal	≥70 to ≤81
Moderate	≥70 to ≤81
Serious	≥93 to ≤105
Severe - 15	≥105 to ≤111
Severe - 17	≥111 to ≤163
Extreme	≥163

STATE IMPLEMENTATION PLAN (SIP)

The CAA requires that each state's environmental agency develop a SIP. The SIP shows how the state will implement measures designed to improve air quality and meet Ozone Standards for each type of air pollutant, according to the schedules included in the CAA. During the SIP development process, an emissions limit is established for on-road mobile sources, called a motor vehicle emissions budget (MVEB). MPOs actively work with the state to set MVEBs.

[35] U.S. Environmental Protection Agency. Ozone Designations Guidance and Data, https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data Accessed September 5, 2021.

[36] U.S. Environmental Protection Agency. Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements. Federal Register Vol. 81, No. 222. 2016.

[37] EPA. Status of SIP Requirements for Designated Areas, Nonattainment Area & OTR SIP Requirements. State Implementation Plan Accessed at https://www3.epa.gov/airquality/urbanair/sipstatus/reports/tx_elembypoll.html#ozone-8hr__2008__1404

[38] EPA. 2016b. Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements. Federal Register Vol. 81, No. 222. November 17, 2016. (81276 – 81317). Accessed at: https://www.gpo.gov/fdsys/pkg/FR-2016-11-17/pdf/2016-27333.pdf

Table 24. List of Requirements and Controls for Different Ozone Nonattainment Designation Status

MARGINAL	• 3 years to attain • Marginal area Nonattainment New Source Review (NNSR) permitting rules • Transportation Conformity • General Conformity • Emission Statements	
MODERATE	• 6 years to attain • All Marginal area requirements • Moderate area NNSR permitting rules NSR offset of 1.15:1 • Attainment demonstration • Reasonable Further Progress (RFP) demonstration (15% reduction in VOC emissions)	• Reasonably available control technology (RACT) for main sources of NO_x • RACT for major sources of VOC • RACT for VOC sources covered by an EPA Control Technique Guideline (CTG) document • Contingency measures for attainment and RFP; and a basic vehicle inspection and maintenance (I/M) program
SERIOUS	• 9 years to attain • All Marginal & Moderate area requirements • Serious area NNSR permitting rules; Enhanced (I/M) program • Enhanced monitoring • Clean Fleet program	• Transportation Control Measures (TCMs) to offset growth in vehicle miles traveled; and • Additional 3% per year reductions in NO_x and VOC emissions for RFP
SEVERE - 15/17	• 15-17 years to attain • All Marginal, Moderate, and Serious area requirements; Severe area NNSR permitting • An emissions fee program if the area fails to attain its standards by its attainment deadline; and • Additional 3% per year reduction in NO_x and VOC emissions for RFP	
EXTREME	• 20 years to attain • All Marginal, Moderate, Serious, and Severe area requirements; Extreme area NNSR permitting • Clean Fuel for Boilers; and • Additional 3% per year reduction in NO_x and VOC emissions for RFP	

Important components of a SIP include emission inventories, MVEBs, control strategies, and attainment demonstration. After the SIP is developed at the statewide level, portions of the plan are specifically developed to address each of the nonattainment areas in the state. Revisions to the SIP are often made corresponding to new federal or state regulations, changes in the Ozone Standards or the area's attainment status, or availability of new modeling techniques. The SIP for Oklahoma is prepared by the Oklahoma Department of Environmental Quality (ODEQ) in cooperation with the state's MPOs. The SIP is approved by the EPA in coordination with USDOT.

The lack of an approved SIP can also have an impact on regional transportation planning. A conformity freeze occurs if EPA disapproves a control strategy SIP without a protective finding for the MVEBs in that SIP (40 CFR 93.120(a)(2)). During a freeze, projects that are included in the first four years of the conforming metropolitan transportation plan (MTP) and TIP can be advanced, but the MPO cannot make any new conformity determinations on the MTP and TIP as a result of a MTP/TIP revision until a new SIP is submitted with MVEBs that EPA approves or finds adequate. If the SIP disapproval is not resolved within two years, highway sanctions would apply and the conformity freeze becomes a lapse. In this case, the lapse grace period would not apply.

The lapse grace period would only apply during a freeze if the MTP or TIP expires before highway sanctions apply. An area that is in a conformity freeze and subsequently enters the lapse grace period would be in a conformity lapse at the end of the grace period, or when highway sanctions apply, whichever comes first.[39]

[39] Federal Highway Administration. Frequently Asked Questions on the Transportation Conformity Lapse Grace Period. https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/faqs/la psegrace.cfm. Accessed August 03, 2021.

TRANSPORTATION CONFORMITY PROCESS

The transportation conformity process is a way to ensure that MTPs, TIPs, and FHWA/FTA projects meet air quality goals in order to be eligible for federal funding and approval. When a MTP or TIP is updated or amended with a non-exempt project, the MPO must address transportation conformity requirements. According to the CAA, transportation plans, TIPs, and projects cannot do the following:

- Create new violations of the Ozone Standards;
- Increase the frequency or severity of existing violations of the standards;
- Delay timely attainment of the standards or any interim milestones.

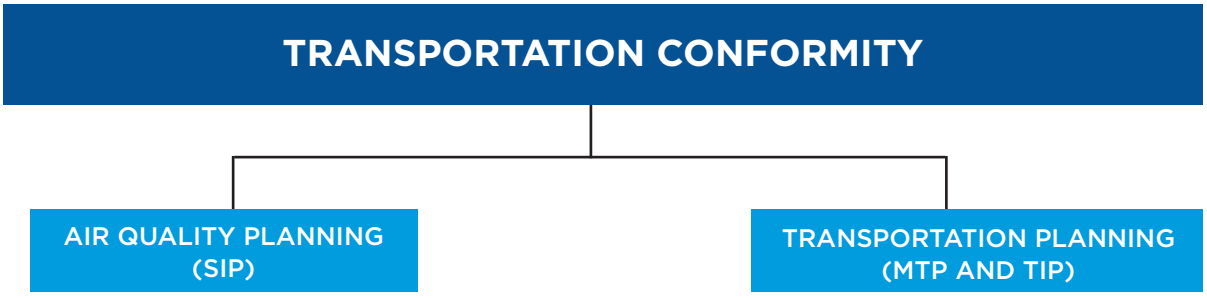
A conformity determination is a finding by the MPO policy board, and subsequently by FHWA and FTA, that the MTP and TIP meet all transportation conformity requirements. While the MPO is responsible for ensuring a conformity determination is made, the conformity process depends on federal, state, and local transportation and air quality agencies working together to meet the transportation conformity requirements.

Conformity regulations mandated by the CAA require all nonattainment and maintenance areas to be subject to the requirements of the SIP to ensure there is no worsening of current air quality relative to Ozone Standards. As per EPA regulations 40 CFR 93, conformity is broadly categorized into general and transportation conformity. While transportation conformity requirements apply to all transportation plans, transportation improvement programs, highway, and transit projects funded by federal grants, General Conformity applies to all federal actions not covered by the transportation conformity.

Transportation conformity establishes a basic framework that links air quality planning and transportation planning as shown in Figure 9.[40] Transportation planning is a process used by the state and local governments to decide which transportation projects to fund at the statewide and metropolitan planning levels. Transportation planning consists of planning at different levels including the (a) statewide long-range transportation plan (includes the planning of the state-maintained roadways for a period of 24 years), (b) MTP (includes transportation plans over 20-25 years for urban areas that exceed 50,000 people), (c) TIP (represents a medium-term - typically four years - capital improvement program of multimodal transportation projects) and (d) STIP comprises of all the regional TIPs developed in the state.

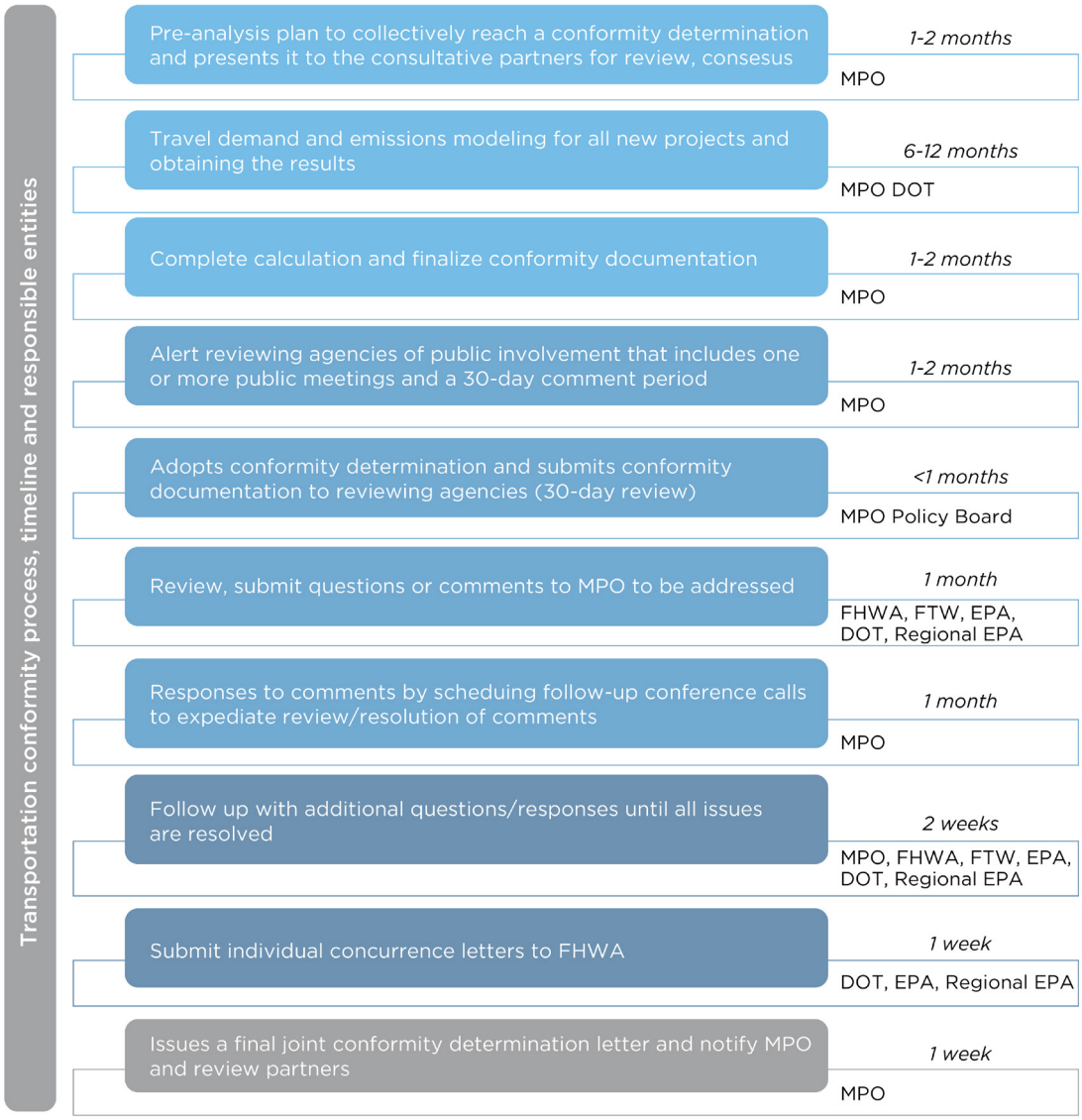
To ensure conformity, a MPO evaluates regional emission estimates from the proposed projects in comparison with the emission budgets from the SIP. A conformity determination ensures the proposed emissions are less than the emission budgets established in the SIP. In cases where the proposed emissions are higher than the emission budgets, transportation control measures (TCM) are employed to reduce on-road emissions through measures such as reduced traffic activity, relieving congestion, etc. The conformity determination is made by the federal agencies (FHWA, FTA) in consultation with interagency consultative partners consisting of representatives from the EPA, the state DOT, the state air agency, and other stakeholders. The different steps and possible time ranges involved in conducting a transportation conformity

Figure 9. Basic Transportation Conformity Process



[40] Texas A&M Transportation Institute. Maintaining Project Consistency with Transportation Plans throughout the Project Life Cycle with an Emphasis on Maintaining Air Quality Conformity: Technical Report. 2016.

Figure 10. Transportation Conformity Process



analysis, as laid out in a previous report by TTI, are shown in Figure 10.[40] These steps relate to the preparation of the pre-analysis plan, travel demand modeling and emissions analysis, conformity determination, public meetings, documentation, consultation with interagency partners, review, and revisions to address comments (if needed). Typically, it takes about 12-18 months depending on the complexity of the region.

The transportation conformity process is typically conducted at least every four years but can occur more frequently if the MTP and TIPs are more frequently modified.[41] The triggers for transportation conformity demonstration are listed below:

- Within one year of an area being designated nonattainment or reclassification;
- Within two years of EPA approving or finding adequacy of MVEB for the area;
- Before an MPO approves or DOT accepts a new transportation plan or TIP;
- Before an MPO approves or DOT accepts MTP amendments or TIP; and

[41]Federal Highway Administration. Transportation Conformity: A Basic Guide for State and Local Officials. https://www.fhwa.dot.gov/environment/air_quality/conformity/guide/. Accessed May 12, 2021.

- At least once every four years for an existing transportation plan or TIP, with a 12-month grace period.

In cases when, after an initial nonattainment designation, an area fails to perform the transportation conformity during the applicable deadline, two possibilities could occur.

First, is the grace period wherein the areas are given 12 months to demonstrate conformity before the lapse occurs. However, the conformity lapse grace period does not apply to newly designated nonattainment areas that fail to make a conformity determination by the end of the one-year grace period for new nonattainment areas. Regionally significant non-federal projects can be approved during the grace period if they were included in the previous regional emissions analysis.[42]

If the area fails to conform (i.e., no conformity determination is made) by the end of the applicable deadline, the area enters a conformity lapse. This can be attributed to several reasons such as higher growth in vehicle miles traveled (VMT) than expected, delays in fleet turnover, disapproval of a SIP, difficulties encountered with a new emissions model, or human error in preparing the emissions estimates. Once in the lapse, federal funding for projects in the TIP or transportation plan is suspended until the TIP or transportation plan conforms to the SIP requirements. During the lapse period, only certain types of projects may proceed, for instance, those related to (a) exempt projects such as safety improvements, road maintenance, rehabilitation, and certain mass transit or bicycle/pedestrian projects that have exhibited they will not have a negative impact on air quality, (b) TCMs in an approved SIP, and (c) projects approved by FHWA/FTA before the lapse. MPOs can prepare an Interim Plan and TIP to advance eligible projects during a lapse, eligible projects should come from or be consistent with the most recent conforming plan and TIP, which may be subject to interagency consultation. New eligible projects in the Interim Plan and TIP must meet all planning requirements.

[42]Federal Highway Administration. Frequently Asked Questions on the Transportation Conformity Lapse Grace Period. https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/faqs/la psegrace.cfm. Accessed August 03, 2021.

9 DATA COLLECTION METHOD AND RESULTS

This section provides an overview of the data collection methods proposed to develop inputs required for the economic cost analysis. First, a literature review on previous studies was performed to collect relevant information on current conformity practice and preparing analysis assumptions. Second, an online Qualtrics data request was administered to collect information from various MPOs that are under nonattainment or maintenance designation. The survey results reveal how different MPOs and state DOTs are performing conformity analysis in practice, as well as their management of time and resource allocations to meet conformity requirements. Finally, some federal and local agencies were invited to in-depth interviews to understand their perspective on the current conformity process and gathering their suggestions for the region that performs a conformity analysis for the first time.

LITERATURE REVIEW

The primary source of gathering information is a literature review based on a review of current practices, findings from published and internet sources, and other information sources. Other sources include those available through university system libraries, the Transportation Research Board's Transportation Research Information Database (TRID), EPA, state DOTs, and general website searches. TTI gave specific attention to agencies within the EPA Region 6 for the literature review. Key topics identified for the literature review are as follows:

- States or regions currently undergoing the transportation conformity process due to the revisions of the 2015 Ozone Standards
- Frequency and length of delays in transportation projects as a result of conformity requirements
- States or regions that experienced conformity lapses and the frequency and duration of lapses that occurred
- Input data required and assumptions for determining the cost incurred as a result of conformity determinations or loss of funding due to conformity lapse.

EPA's List of Nonattainment Areas

Currently, there are 119 nonattainment areas nationwide for various pollutants designated by EPA.[43] Among those areas, 50 areas are designated as nonattainment areas under the revision of the 2015 Ozone Standards. Counties and areas of Oklahoma have never been designated as nonattainment for any of the criteria pollutants. The complete list of those areas and their nonattainment classification by pollutant are available upon request.

Nonattainment Areas that Experienced the Conformity Grace Period

During the years 2007-2014, 34 nonattainment areas have triggered and experienced a 12-month conformity grace period under the provisions of CAA Section 176(c)(9). Table 25 lists the areas that have been subjected to the grace period since 2007-2014.[44] Among those areas, more than half (19 areas) finalized their revision within six months during the grace period. A total of eight areas have used their one-year grace period completely, which is nearly a quarter of all areas. There were 20 areas affected by not meeting the 1997 Ozone Standard requirements.

[43] U.S. Environmental Protection Agency. Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements. Federal Register Vol. 81, No. 222. 2016.

[44] Transportation Conformity Under the Clean Air Act, https://www.everycrsreport.com/reports/R44050.html#fn18. Accessed August 03, 2021.

Table 25. Nonattainment Areas that Failed to Obtain a Conformity Determination by the Applicable Deadline, 2007-2014

NONATTAINMENT/ MAINTENANCE AREA(S) AFFECTED	POLLUTANT	START DATE OF LAPSE GRACE PERIOD	LENGTH OF LAPSE GRACE PERIOD
New Castle County, DE/Cecil County, MD	1997 Ozone	4/16/2007	1 month
Christen County, KY	1997 Ozone	7/7/2007	3 months
Montgomery, TN	1997 Ozone	7/1/2007	7 months
Southern Portion of NJ MPO	1997 Ozone	5/24/2008	4 months
Memphis, TN	1997 Ozone	3/23/2008	1 week
Wheeling, WV-OH	1997 Ozone	2/1/2008	1 month
Parkersburg-Marietta, WV-OH	1997 Ozone	2/1/2008	1 month
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE	1997 Ozone	4/15/2009	2 weeks
Terre Haute, IN	1997 Ozone	6/1/2009	4 weeks
Parkersburg-Marietta, WV-OH	1997 Ozone	2/1/2009	2 months
Fort Wayne, IN	1997 Ozone	5/15/2009	3 weeks
Munchie, IN	1997 Ozone	6/13/2009	1 month
Charlotte-Gastonia-Rock Hill, NC-SC	1997 Ozone	5/3/2009	1 year
Clarksville-Hopkinsville, TN-KY	1997 Ozone	7/28/2009	9 months
Louisville, KY-Southern IN MPO	1997 Ozone	12/8/2009	11 months
Sussex County, DE (WILAMPCO)	1997 Ozone	2/17/2010	1 month
St. Louis, MO	1997 Ozone	6/29/2011	2 months
Birmingham, AL	1997 Ozone	11/1/2011	1.5 months
Beaumont, TX	1997 Ozone	9/25/2011	1 year
Huntington-Ashland, KY	1997 Ozone	6/16/2013	1 year
Great Falls, MT	CO	3/22/2008	1 year
Billings, MT	CO	6/29/2009	1 year
Great Falls, MT	CO	4/23/2013	1 year
Wheeling, WV	PM and 1997 Ozone	3/20/2012	3.5 months
Missoula, MT	PM_{10}	6/7/2008	1 year
Reno, NV	PM_{10}	4/8/2009	3 months
Yuma, AZ	PM_{10}	3/1/2010	9 months
Yakima, WA	PM_{10}	6/1/2011	10 months
Knoxville, TN	$PM_{2.5}$	7/1/2007	5 months
Chattanooga, TN	$PM_{2.5}$	7/1/2007	7 months
Triad Area, NC	$PM_{2.5}$	10/1/2008	5 months
Evansville, IN	$PM_{2.5}$	11/30/2012	1 year
Steubenville-Wierton, OH-WV	$PM_{2.5}$ and 1997 Ozone	8/1/2008	1 month

Nonattainment Areas that Experience the Conformity Lapse

A handful of areas have experienced a conformity lapse in previous practice. Table 26 lists 7 areas that have experienced a conformity lapse during the period 2007-2014.[45] The range of conformity lapse ranges from one month to two years and five months, suggesting different levels of impact on regional transportation planning and economic growth. Once the area develops a new conforming TIP, the projects in that TIP become eligible to receive funds. To resolve the lapse, the areas are allowed to demonstrate conformity by adopting additional emission reduction measures, by updating the data in the models, or by modifying the list of projects included in their TIP.[46]

Table 26. Nonattainment Areas That Experienced a Conformity Lapse, 2007-2014

NONATTAINMENT/ MAINTENANCE AREA(S) AFFECTED	POLLUTANT	START DATE OF LAPSE GRACE PERIOD	LENGTH OF LAPSE
Great Falls, MT	CO	3/22/2009	1 month
Billings, MT	CO	6/20/2010	1 day
Beaumont, TX	1997 Ozone	9/25/2012	2 years, 5 months
Pinal County, AZ	PM_{10}	7/2/2013	6 months
Evansville, IN	$PM_{2.5}$	11/30/2013	6 months
Reading, PA (Berk County)	2008 Ozone	7/20/2013	5 months
Huntington-Ashland, KY	1997 Ozone	6/16/2014	10 months

Economic Analysis Inputs

The last part of the literature review gathers cost analysis inputs and assumptions from existing studies. Those cost values are associated with several transportation performance aspects, including transportation operation, emissions, and safety.

The default cost values used for this analysis were obtained from multiple sources and are displayed in Table 27-Table 32. All of the cost values have been adjusted to 2019 dollars for maintaining consistency in the subsequent analysis.

Table 27. Vehicle Cost Factors

NONATTAINMENT/ MAINTENANCE AREA(S) AFFECTED	VALUE	SOURCE
Personal Vehicle Operating Cost ($ per Hour)	$4.92	AAA Your Driving Cost[47]
Commercial Truck Operating Cost ($ per Hour)	$24.11	ATRI[48]
Truck Fuel Consumption (Gallons of Diesel per Hour)	9.84	TTI Estimate
Personal Vehicle Fuel Consumption (Gallons of Gasoline per Hour)	1.83	TTI Estimate
Truck Cost ($ per Gallon)	$2.31	US EIA[49]
Personal Vehicle Cost ($ per Gallon)	$1.92	US EIA

The values from Table 27 are used to calculate the operating costs of the vehicle. The base operating costs listed include maintenance, tires, mileage-based depreciation, and insurance cost. Passenger vehicle values were collected from American Automobile Association (AAA) while truck values were collected from American Transportation Research Institute (ATRI). Fuel costs are calculated independently using the fuel values listed, obtained from the U.S. Energy Information Administration (USEIA), based on 2020 Gulf Coast fuel prices.

[45] Transportation Conformity Under the Clean Air Act, https://www.everycrsreport.com/reports/R44050.html#fn18. Accessed August 03, 2021.
[46] Congressional Research Service. Transportation Conformity Under the Clean Air Act. 2015.
[47] AAA. Your Driving Costs. https://exchange.aaa.com/wp-content/uploads/2019/09/AAA-Your-Driving-Costs-2019.pdf. Accessed June 10, 2021.
[48] American Transportation Research Institute. An Analysis of the Operational Costs of Trucking: 2017 Update. 2017.
[49] U.S. Energy Information Administration. Weekly Retail Gasoline and Diesel Prices. https://www.eia.gov/dnav/pet/pet_pri_gnd_a_epd2d_pte_dpgal_a.htm. Accessed May 14, 2021.

Table 28. Value of Time Factors

VALUE OF TIME FACTORS	VALUE	SOURCE
Truck Labor Cost ($ per Hour per Crew Member)	$30.80	USDOT BCA Guidance[50]
Passenger Personal Cost Factor ($ per Hour per Occupant)	$16.50	USDOT BCA Guidance
Passenger Business Cost Factor ($ per Hour per Occupant)	$27.90	USDOT BCA Guidance
Truck Crew per Vehicle	1.0	USDOT BCA Guidance
Passengers per Personal Vehicle	1.67	USDOT BCA Guidance
Passenger Business Time	43%	TTI Estimate
Passenger Personal Time	57%	TTI Estimate

The values in Table 28 are used to calculate personal time costs associated with travel. These include the labor cost of commercial truck drivers, and the value of time for both business and personal travel in other vehicles. These cost values were primarily collected from the USDOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grant Programs document. This document is updated annually and includes many recommended values for benefit-cost analyses.

Table 29. Emission Factors

EMISSIONS FACTORS (TONS PER MILE)	VALUE	SOURCE
Truck VOC Emissions Rate	0.00000022	TREDIS[51]
Truck NO_X Emissions Rate	0.00000430	TREDIS
Truck SO_X Emissions Rate	0.00000001	TREDIS
Truck PM Emissions Rate	0.00000009	TREDIS
Passenger Vehicle VOC Emissions Rate	0.00000026	TREDIS
Passenger Vehicle NO_X Emissions Rate	0.00000024	TREDIS
Passenger Vehicle SO_X Emissions Rate	0.00000000	TREDIS
Passenger Vehicle PM Emissions Rate	0.00000001	TREDIS

Table 30. Emission Costs

EMISSIONS COSTS ($ PER TON)	VALUE	SOURCE
VOC	$2,138	USDOT BCA Guidance
NO_X	$15,700	USDOT BCA Guidance
SO_X	$40,400	USDOT BCA Guidance
PM	$729,300	USDOT BCA Guidance

Table 29 and Table 30 show the emission factors and their associated costs applied in the analysis. TREDIS, a web based economic tool, is used to generate the average emission rates for different types of vehicles and various pollutants. TREDIS is a fully multimodal analysis system designed to estimate transportation and economic outcomes under various transportation and policy scenarios. The emission rate values were taken from TREDIS' default values and adapted to U.S. tons per mile rates for the analysis. The emissions costs are based on the 2021 USDOT BCA Guidance recommended values.

The costs associated with traffic safety are summarized in Table 31, on the following page. Similar to other cost components, the safety costs related to different severity levels of a traffic accident are identified from the USDOT BCA guidance. Those collected cost values will be adopted in "Transportation Planning Impact Cost analysis."

[50]U.S. Department of Transportation. Benefit-Cost Analysis Guidance for Discretionary Grant Programs. 2021.
[51]TREDIS Software. TREDIS® Technical Documentation: Data Sources and Default Values. 2021.

Table 31. Safety Factors

SAFETY FACTORS	VALUE	SOURCE
O - No Injury	$3,700	USDOT BCA Guidance
C - Possible Injury	$72,500	USDOT BCA Guidance
B - Non-Incapacitating	$142,000	USDOT BCA Guidance
A - Incapacitating	$521,300	USDOT BCA Guidance
K - Killed	$10,900,000	USDOT BCA Guidance
U - Injured (Severity Unknown)	$197,600	USDOT BCA Guidance
# Accidents Reported (Unknown if Injured)	150,200	USDOT BCA Guidance
Property Damage Only Crashes (per Vehicle)	$4,500	USDOT BCA Guidance
Oklahoma Urban Fatality Rate per 100m VMT	1.94	NHTSA[52]

Table 32. Project Specific Factors

PROJECT SPECIFIC FACTORS	SOURCE
Length of Project	Oklahoma STIP
Work Type	Oklahoma STIP
Construction Start Year	Oklahoma STIP
Construction Cost	Oklahoma STIP
Average Annual Daily Traffic	ODOT
Percent Trucks	ODOT
Base Speed	ODOT
Project Speed	ODOT

Table 32 includes the remaining factors necessary for the analysis which are specific to each project. Length of the project, the type of project, the construction start year, and the construction cost were each obtained from the Oklahoma STIP. The remaining factors will each have a large impact on the results of the analysis.

CONFORMITY DATA INPUTS FROM AGENCIES

In addition to gathering and synthesizing data elements from literature, the research team developed several ways (online data request forms, select interviews, and targeted online agency search) to obtain data from the EPA Region 6, FHWA, MPOs, and other relevant state and local agencies. The main focus was to gather information related to the current practices on the frequency and duration of conformity lapses, length of project delays because of conformity requirements, and costs associated as a result of demonstrating conformity. To ensure the data collection is based on sound regulatory and realistic assumptions, the state and local agencies are categorized based on the amount of experience in dealing with ozone-related conformity processes. For example, Bexar County, Texas has experience dealing with conformity requirements subjected to 2015 Ozone Standards revisions, while Dallas County, Texas and Fort Bend County, Texas have experience from the revoked ozone 1997.

Qualtrics Online Data Collection Forms

This section provides an overview of the data collection process conducted by TTI. Conformity-related activities and costs information were collected from transportation agencies across the U.S. including MPOs and state DOTs. The research team reviewed the 119 nonattainment areas nationwide and extracted the list of agencies that had experience with 2008 and 2015 Ozone Standards. The research team visited each of the agency websites to identify the right contacts to send the Qualtrics online data collection forms. On March 9, 2021, a recruitment email was sent to a list of 45 target agencies (see Table 33).

[52] National Highway Traffic Safety Administration. Traffic Safety Facts 2018 Data. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812957. Accessed June 10, 2021.

Table 33. Outreach Contact List and Date of Information Requests

STATE(S)	AREA	ATTAINMENT STATUS FOR OZONE (2008)	ATTAINMENT STATUS FOR OZONE (2015)	MPO	DATE OF INITIAL REQUEST	DATE OF FOLLOW-UP REQUEST	DATE OF FOLLOW-UP REQUEST	DATE OF FOLLOW-UP REQUEST
AR	West Memphis	Marginal	-	WMATS	3/9/2021	3/16/2021	3/23/2021	3/30/2021
AZ	Phoenix-Mesa	Moderate	Marginal	AZMAG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
AZ	Yuma	-	Marginal	YMPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	Calaveras County	Marginal	Marginal	CALACOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	Morongo Band of Mission Indians	Serious	Serious	SCAG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	Butte County	-	Marginal	BCAG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	Ventura County	Serious	Serious	SCAG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	San Francisco Bay Area	Marginal	Marginal	MTC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	San Joaquin Valley	Extreme	Extreme	SJCOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	Los Angeles-San Bernardino Counties (West Mojave Desert)	Severe 15	Severe 15	SCAG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	San Diego	Serious	Moderate	SANDAG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CA	Sacramento Metro	Severe 15	Moderate	SACOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CO	Denver-Boulder-Greenley-Ft. Collins-Loveland	Serious	-	DRCOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CO	Denver Metro	-	Marginal	DRCOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
CT	Greater Connecticut	Serious	Marginal	MetroCOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
DC	Washington DC	Marginal	Marginal	TPB	3/9/2021	3/16/2021	3/23/2021	3/30/2021
GA	Atlanta	Moderate	Marginal	ARC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
IL-IN	Chicago (Chicago-Naperville)	Serious	Marginal	CMAP	3/9/2021	3/16/2021	3/23/2021	3/30/2021
KY-IN	Louisville/Jefferson County	-	Marginal	KY-IN MPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
MD	Baltimore	Moderate	Marginal	BMC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
MD	Baltimore	Moderate	Marginal	BRTB	3/9/2021	3/16/2021	3/23/2021	3/30/2021
MI	Muskegon County	-	Marginal	WMSRCD	3/9/2021	3/16/2021	3/23/2021	3/30/2021
MI	Detroit	-	Marginal	SEMCOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
MI	Berrien County	-	Marginal	SWMPC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
MI	Allegan County	-	Marginal	MACC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
MO-IL	St. Louis, MO-IL	Marginal	Marginal	EWGateway	3/9/2021	3/16/2021	3/23/2021	3/30/2021
NC-SC	Charlotte-Rock Hill	Marginal	-	CRTPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
NV	Las Vegas	-	Marginal	Southern Nevada	3/9/2021	3/16/2021	3/23/2021	3/30/2021
NY	New York-N. New Jersey-Long Island, NY-NJ-CT	Serious	Moderate	NJTPA	3/9/2021	3/16/2021	3/23/2021	3/30/2021
OH	Cleveland	Marginal	Marginal	NOACA	3/9/2021	3/16/2021	3/23/2021	3/30/2021
OH	Columbus	Marginal	Marginal	MORCP	3/9/2021	3/16/2021	3/23/2021	3/30/2021
OH-KY-IN	Cincinnati	Marginal	Marginal	OKI	3/9/2021	3/16/2021	3/23/2021	3/30/2021

Table 33. Outreach Contact List and Date of Information Requests Cont.

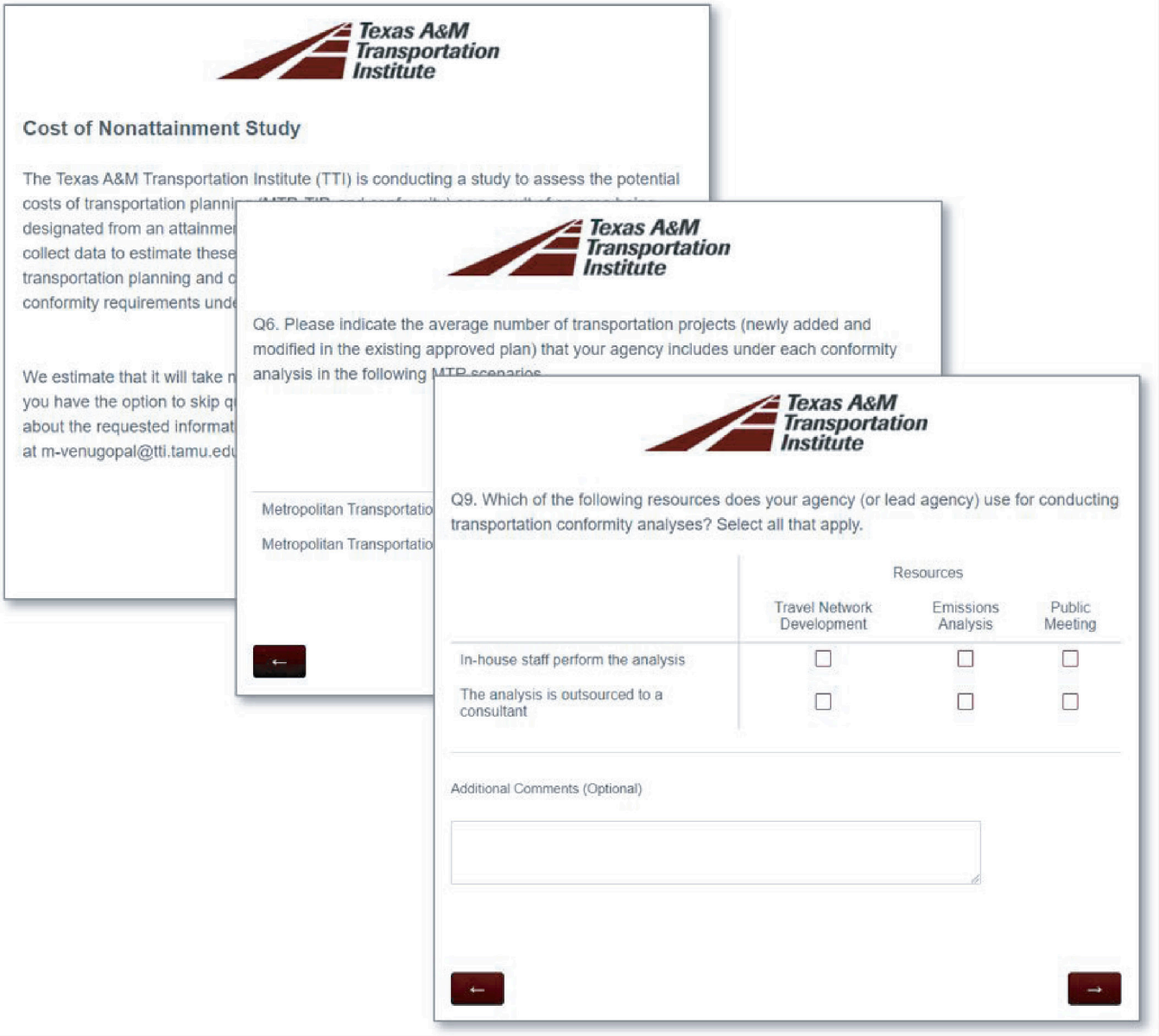
STATE(S)	AREA	ATTAINMENT STATUS FOR OZONE (2008)	ATTAINMENT STATUS FOR OZONE (2015)	MPO	DATE OF INITIAL REQUEST	DATE OF FOLLOW-UP REQUEST	DATE OF FOLLOW-UP REQUEST	DATE OF FOLLOW-UP REQUEST
PA	Lancaster	Marginal	-	Lancaster MPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
PA	Reading	Marginal	-	RATS	3/9/2021	3/16/2021	3/23/2021	3/30/2021
PA	Pittsburg-Beavers Valley	Marginal	-	SPC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
PA	Allentown-Bethlehem-Easton	Marginal	-	LVTS	3/9/2021	3/16/2021	3/23/2021	3/30/2021
PA-DE	Philadelphia-Wilmington-Atlantic City	Marginal	Marginal	DVRPC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
TN	Knoxville	Marginal	-	Knoxville Regional TPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
TN-MS-AR	Memphis	Marginal	-	Memphis MPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
TX	San Antonio	-	Marginal	AAMPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
TX	Houston-Galveston-Brazoria	Serious	Marginal	H-GAC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
TX	Dallas-Fort Worth	Serious	Marginal	NCTCOG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
TX	El Paso	-	Marginal	El Paso MPO	3/9/2021	Retired	-	3/30/2021
TX	El Paso	-	Marginal	El Paso MPO	3/9/2021	-	3/23/2021	3/30/2021
UT	Northern Wasatch Front (Salt Lake City)	-	Marginal	WFRC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
UT	Southern Wasatch Front (Orem)	-	Marginal	MAG	3/9/2021	3/16/2021	3/23/2021	3/30/2021
WI	Sheboygan County	Moderate	Marginal	SMPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021
WI	Northern Milwaukee/ Ozaukee Shoreline	-	Marginal	SEWRPC	3/9/2021	3/16/2021	3/23/2021	3/30/2021
WI	Green Bay	-	-	Green Bay MPO	3/9/2021	3/16/2021	3/23/2021	3/30/2021

The Qualtrics online data collection form was collaboratively designed by all members of the project team to ensure the questionnaires in these forms were easily understood by the intended audience. This initial recruitment message included a description of the research effort, a form link, and TTI contact details. Reminders were sent to the recipients weekly and final results were collected on April 12, 2021. A total of 14 agencies completed the survey (31 percent completion rate). Figure 11 provides selected screenshots of the web survey program, which was implemented using Qualtrics survey software.

Qualtrics Results

The results provide useful information about the organization category, their conformity requirements, conformity process, and costs. In the following sections, the survey results will be summarized to reflect the current practice of conformity analysis.

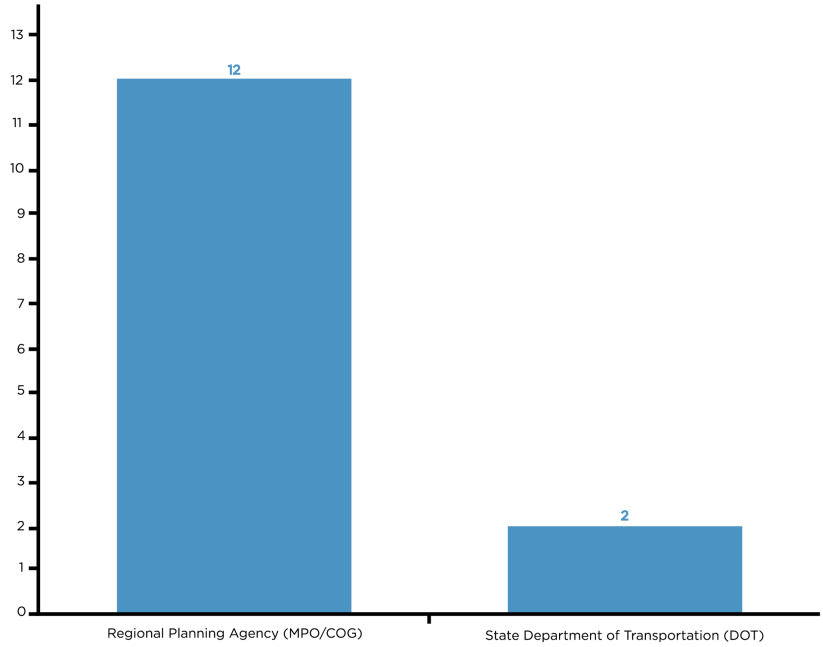
Figure 11. Selected Screenshots of Qualtrics Online Data Collection Form



Organization Type

The majority of responding organizations were regional planning organizations. The organization type information is provided in Figure 12.

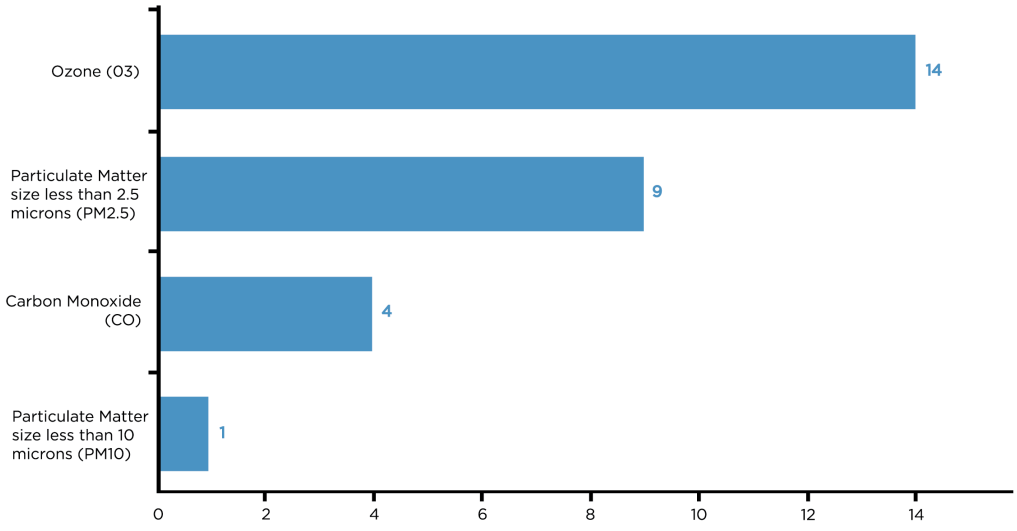
Figure 12. Organization Type



Nonattainment Designation

Figure 13 suggests that all organizations' conformity activities focus on ozone and a majority on $PM_{2.5}$. The pollutants CO and PM_{10} were the focus of fewer agencies.

Figure 13. Pollutant on Which Conformity Activity is Focused



Conformity Experience

All but one agency reported having greater than ten years of experience conducting regional transportation conformity analysis. All of the agencies have more than two years of experience in performing conformity analysis. See Figure 14 for details.

Conformity Timeline and Levels of Effort

Organizations were asked about the typical duration required for completing the transportation conformity process for MTP updates and MTP amendments. Half reported that updates required less than 12 months, while half reported that it required at least 12 months.

Three organizations reported that updates required more than 18 months. A majority of organizations reported that amendments required less than 12 months. See Figure 15 for details.

Organizations were asked to indicate the average number of transportation projects included under each conformity analysis for MTP updates and MTP amendments. Figure 16 suggests that a majority of organizations include more than 20 projects in updates. Half of the organizations include no more than ten projects in amendments, while half choose to include more than ten.

Figure 14. Years of Conformity Analysis Experience

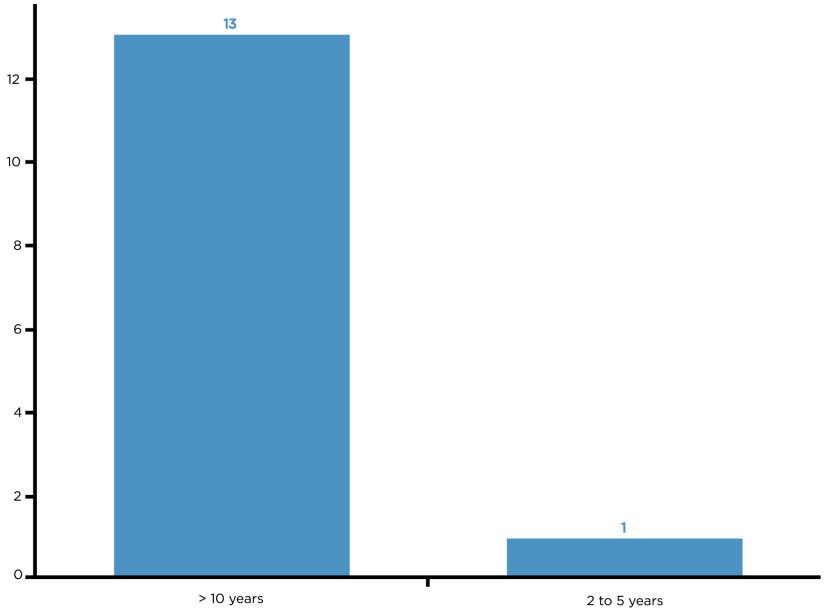


Figure 15. Typical Duration for Completing the Conformity Process

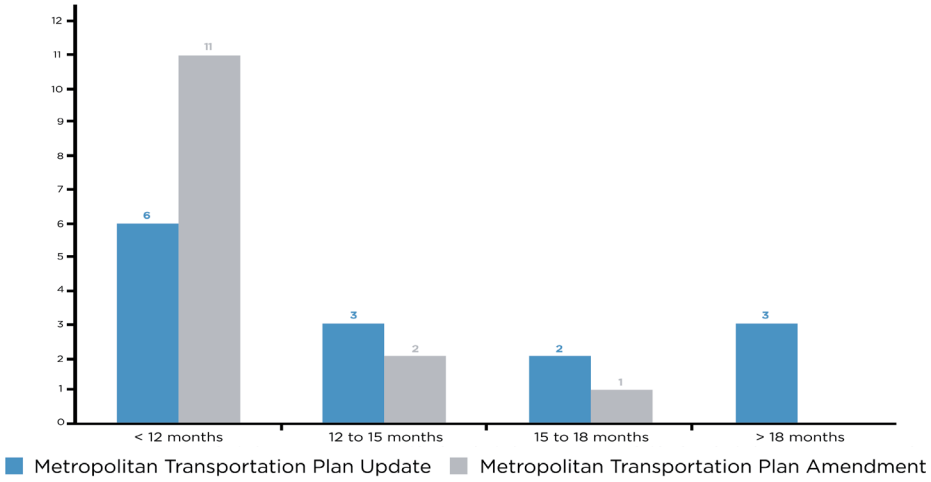
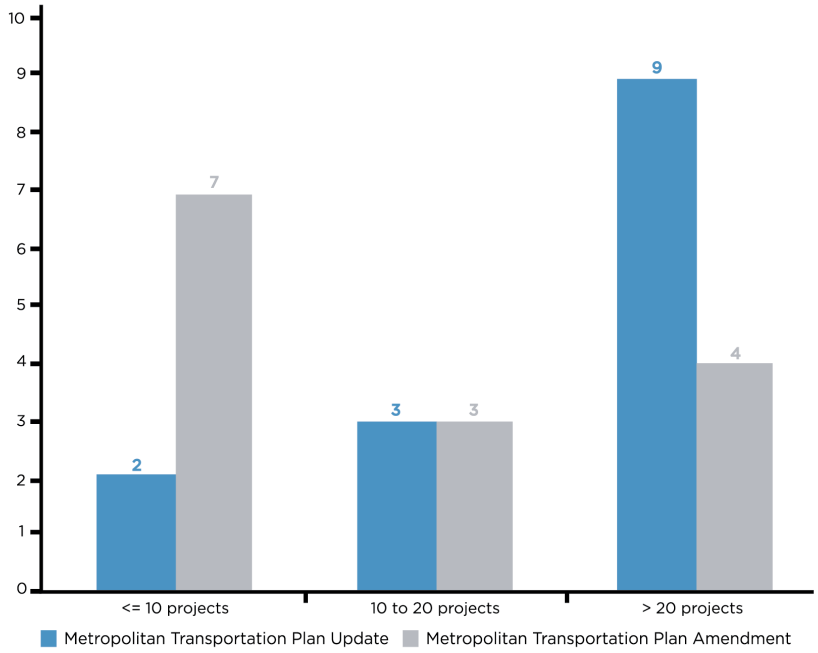


Figure 16. Average Number of Projects Included under Each Conformity Analysis



Conformity Costs and Resources

When asked about resources used to conduct conformity analysis, a majority of organizations relied more heavily on in-house resources than they did outside consultants for travel network development, emissions analysis, and public meetings. Consultants were used only for travel network development and emissions analysis. See Figure 17 for details. Additional comments collected in the survey suggest that some agencies include "partner agencies" as an in-house resource. For example, one responding state DOT stated that they do not use consultants for public meetings and they do rely on the local MPO staff for assistance. The comments also suggest a significant level of collaboration between state DOTs and MPOs on travel demand modeling and emissions modeling.

Agencies responsible for demonstrating transportation conformity were asked to provide the estimated average cost incurred for conducting the conformity analysis, both pre-nonattainment and post-nonattainment designations. Table 34 presents the sample size (the number of agencies that provided applicable information), minimum cost, maximum cost, mean cost, median cost, and the percent change for each specific area of focus, both pre-nonattainment and nonattainment. The general trend is that costs increase as an agency achieves nonattainment status, this implies that MTP and TIP development will be more intensive to meet the conformity requirements.

Figure 17. Resources Used for Conformity Analysis

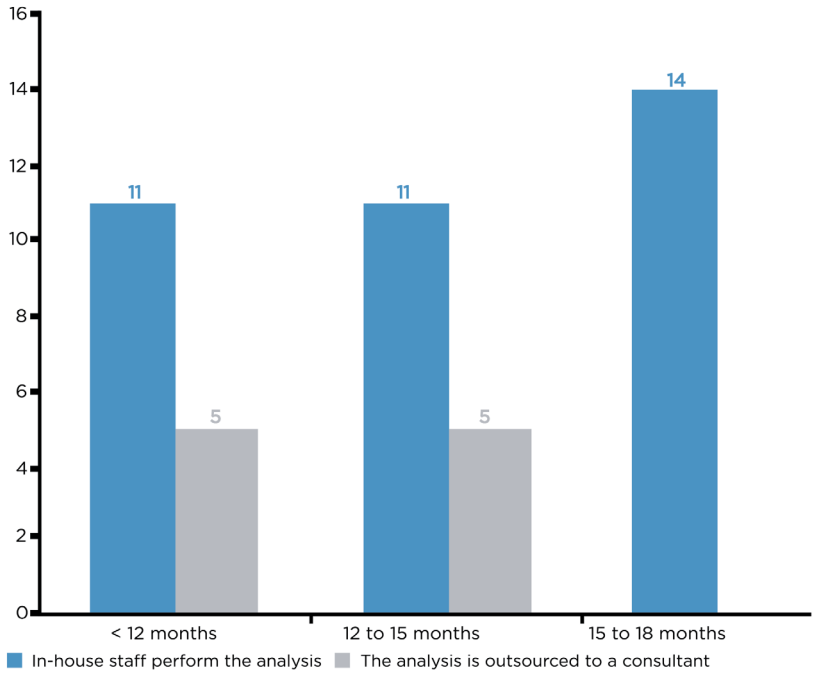


Table 34. Estimated Average Cost Incurred for Conducting Conformity Analysis[53]

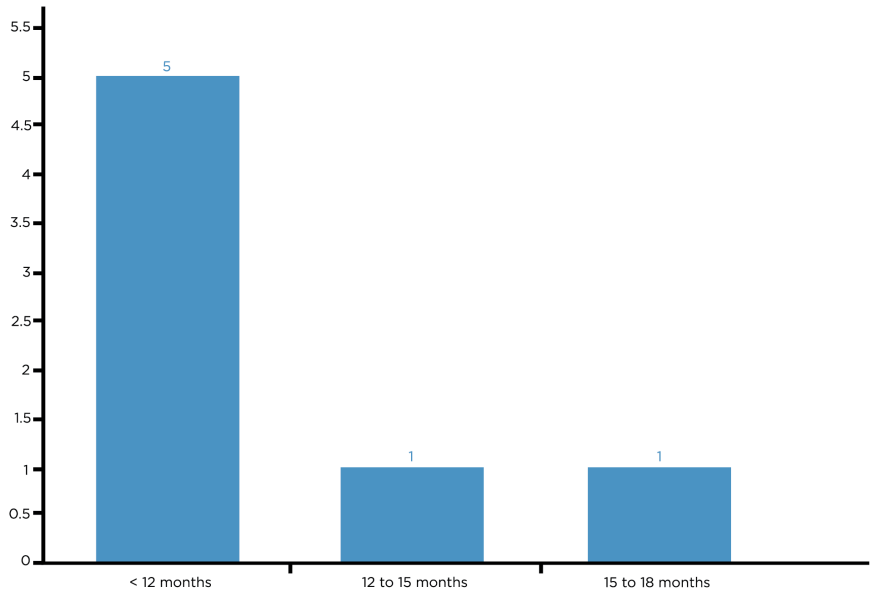
FOCUS	STATISTIC	PRE-NON-ATTAINMENT	POST-NON-ATTAINMENT	CHANGE[54]
MTP DEVELOPMENT	Sample Size[55]	4	5	N/A
	Minimum	$150,000	$190,000	+27%
	Maximum	$1,300,000	$1,800,000	+38%
	Mean	$531,250	$738,000	+39%
	Median	$337,500	$500,000	+48%
TIP	Sample Size[55]	4	5	n/a
	Minimum	$25,000	$27,000	+8%
	Maximum	$1,500,000	$2,300,000	+53%
	Mean	$440,625	$675,400	+53%
	Median	$118,750	$500,000	+321%
CONFORMITY ANALYSIS	Sample Size[55]	0	5	n/a
	Minimum	N/A	$16,000	+8%
	Maximum	N/A	$500,000	+53%
	Mean	N/A	$181,600	+53%
	Median	N/A	$25,000	+321%

[53]https://www.texastwg.org/

[54]Change = (Non-Attainment - Pre-Non-Attainment)/Non-Attainment

[55]The sample size indicates the number of agencies that provided applicable responses. The statistics are based on data available form the questionnaire.

Figure 18. Average Delay in Projects from Conformity Demonstration Process



Project Delay Due to Conformity

Half of the organizations had experienced project delays due to conformity requirements. Of these seven organizations, five reported that the average length of the delay as a result of the conformity demonstration process was less than 12 months. See Figure 18 for details.

Only three organizations reported being in a region that had experienced a conformity lapse, all of which lasted less than six months. One organization reported failing a conformity emissions test and another organization reported a "one-day lapse" resulting from MTP expiration.

No organizations reported experiencing a conformity freeze due to disapproval of the SIP or failure to submit the SIP.

In conclusion, all but one of the 14 reporting agencies had at least ten years of conformity analysis experience. While the survey sample is small, the responding organizations collectively represent at least 140 years of combined conformity analysis experience. Ozone and $PM_{2.5}$ are the two pollutants upon which most agencies' conformity activities are focused, with ozone being a focus of all reporting agencies. The conformity process for MTP updates tends to take a bit longer than that for MTP amendments, and this may be a result of the former including more projects (on average) than the latter. While the use of in-house resources for conducting conformity analysis is more prevalent than the use of external consultants, consultant assistance is utilized for travel network development and emissions analysis by about one-third of reporting organizations. Furthermore, agencies that utilize fellow governmental partner agencies may not consider this arrangement as an "external consultant." Conformity analysis cost information collected suggests a trend of increasing analytical costs, as agencies move from attainment to nonattainment. Lastly, half of the agencies experienced project delays due to conformity requirements.

SELECT INTERVIEWS

In this study, federal, state, and local agencies were also invited for in-depth interviews with TTI researchers and shared their perspectives about transportation conformity in practice. The invited agencies include the following:

- Federal agencies reviewing conformity analysis
- Local agencies conducting conformity

During the interviews, TTI researchers asked about previous experience in conformity analysis and suggestions on the conformity process. The major findings from the interview are summarized into three sections below:

1. Previous experience with conformity analysis,
2. advice on performing conformity analysis in general, and
3. Suggestions to the agencies performing conformity analysis for the first time.

Previous Experiences with Conformity Analysis

The conformity process takes around 12-18 months. With 12 months being the best-case scenario. The first conformity analysis can have a longer duration to completion, and subsequent analyses can be done on a shorter timeline.

- The MTP update can take a longer duration when compared to the MTP amendment and it depends on the complexity of the regional projects.
- At the agency level, about a 20-25 percent increase in effort as a result of nonattainment designation can be attributed to the conformity requirements, including transportation planning, conformity analysis, and other non-modeling efforts.
- The conformity review can take six months or more. MTP updates and amendments generally yield a similar workload for the emissions analysis and review period.
- The MTP amendments would take 70-75 percent in terms of the MTP update cost/effort when whole agency efforts are considered. This may be due to the number of projects considered in the MTP amendment versus update.
- The review process will be faster if the conformity documentation submitted is complete and contains all elements needed for federal review.

General Advice for Conformity Analysis

- Align needed resources for conformity analysis early.
- Ensure timely, transparent, and effective communication between MPOs and state DOT to maintain project consistency (design and scope) throughout the project lifecycle.
- Project descriptions are important information in conformity and agencies should start preparing them early. They need to be clear and should contain all needed information to make the review process go smoothly.
- An interagency group, such as the Texas Technical Working Group (TWG)[56] for mobile sources, is beneficial during the conformity process regarding providing technical support and ensuring project consistency.
- Having experienced modelers and institution knowledge can greatly contribute to the successful completion of conformity analysis.
- Develop a consensus on the analysis plan with all the partners early and avoid the need to change something in the middle of the process.
- Allocate sufficient time to prepare the conformity documents and allow more flexibility during the process.
- Coordinate with the TIP and MTP development team (right model years, etc.).

Suggestions for First-Time Conformity Analysis

- It can take about one year for MPOs with enough resources (trained people, access to data, etc.) to learn the conformity process, including 6-8 months to understand the process itself and some time to learn the emissions analysis part. For agencies with fewer resources, it could take one and a half to two years.
- Training staff on emission modeling and gathering needed data is important during the conformity process.
- Work towards identifying and implementing emission reduction strategies. strategies Idling reduction and congestion reduction are effective to reduce emissions within the region.
- Understanding the MVEB from an applicable SIP is important in the conformity process.
- Communication with other experienced agencies early would be helpful to understand the context and prepare the conformity analysis accordingly.

[56] https://www.texastwg.org/

FINDINGS AND DISCUSSION

In this section, the major inputs and assumptions for analyzing the cost impact of a nonattainment designation were collected from three resources:

1. A comprehensive literature review;
2. An online survey on agencies from nonattainment areas, and
3. From in-depth interviews with federal and local agencies. The major findings from this section are summarized below:

Literature Review:

- Several areas were designated as nonattainment areas under the revision of the 2015 Ozone Standards.
- A total of 34 agencies experienced the conformity grace period during 2007 and 2014.
- A total of seven agencies experienced a conformity lapse during 2007 and 2014.
- The empirical values for cost analysis were collected from various sources.

Survey Results:

- All but one of the 14 reporting agencies had at least ten years of conformity analysis experience
- Ozone and $PM_{2.5}$ are the two pollutants upon which most agencies' conformity activities are focused, with ozone being a focus of all reporting agencies.
- The conformity process for MTP updates tends to take a bit longer than that for MTP amendments, and this may be a result of the former including more projects (on average) than the latter.
- While the use of in-house resources for conducting conformity analysis is more prevalent than the use of external consultants, consultant assistance is utilized for travel network development and emissions analysis by one-third of reporting organizations.
- Conformity analysis cost information collected suggests a trend of increasing analytical costs, as agencies move from attainment to nonattainment.
- Half of the agencies experienced project delays due to conformity requirements.

Interview Findings:

- Generally, the conformity process takes around 12-18 months. The first conformity demonstration can take longer, and later analysis can be done with a shorter timeline.
- About 20-25 percent increase in effort is estimated as a result of conformity analysis.
- It can take about one year for MPOs with enough resources (trained people, access to data, etc.) to learn the conformity process, including six to eight months to understand the process itself and some time for the travel model networks development and modeling part. For agencies with fewer resources, it could take one and a half to two years.
- Communication and outreach, aligning people and resources, as well as understanding the project definitions are key elements for performing a conformity analysis for the first time.

10 TRANSPORTATION PLANNING IMPACT COST ANALYSIS

This section describes inputs, assumptions, and the methodology used to develop the potential costs or economic consequences, to the Oklahoma City-Shawnee CSA, of a nonattainment designation on transportation planning as a result of conformity requirements.

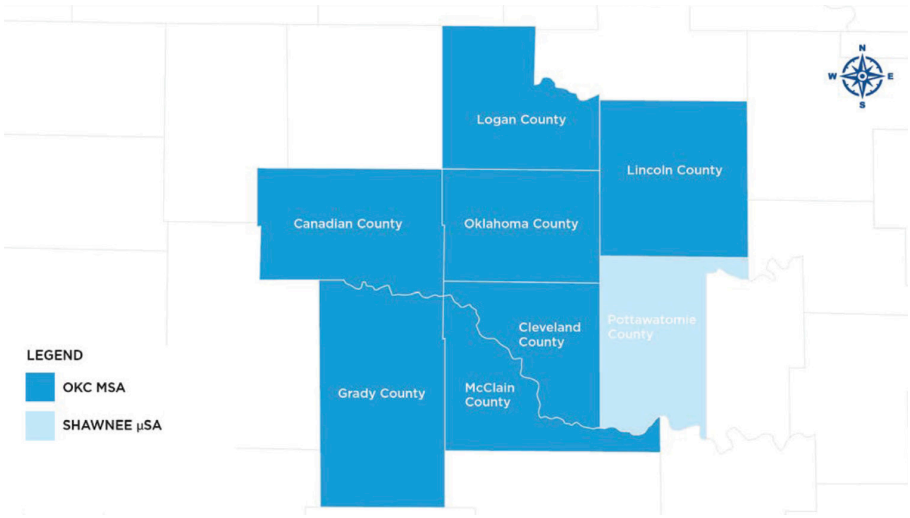
As per the scope of this study, TTI established the costs associated with performing a transportation conformity process classified into four cost categories listed below.

1. The costs to the MPO and other stakeholder organizations to perform conformity analyses and make conformity determinations
2. The increased costs of project delays in building new roads that may result from transportation conformity requirements
3. The increased costs of building new roads associated with project delays caused by a transportation conformity lapse
4. The potential loss of federal revenue that a nonattainment or maintenance area could experience from a prolonged transportation conformity lapse

GEOGRAPHIC SCOPE

The geographic scope of this study is the Oklahoma City-Shawnee CSA, which consists of eight counties: Canadian, Cleveland, Grady, Lincoln, Logan, McClain, Oklahoma, and Pottawatomie (Figure 19).[57] The area is currently under attainment for all six criteria pollutants. ACOG is responsible for the transportation planning for the region and also serves as the MPO. As part of the planning process, ACOG works with local governments, transit providers, ODOT, FHWA, and other transportation agencies, stakeholders, and the public towards developing the region's long-term and short-term transportation plan and ensuring conformity towards the Ozone Standards set by the EPA. Within the study area of focus, ACOG is responsible for conformity determinations within the MPO boundary consisting of 37 communities located within Oklahoma and Cleveland Counties, and portions of Logan, Canadian, Grady, and McClain Counties as shown in Figure 20.[58] For areas outside the MPO boundary, the ODOT will be responsible for coordinating the conformity determinations.

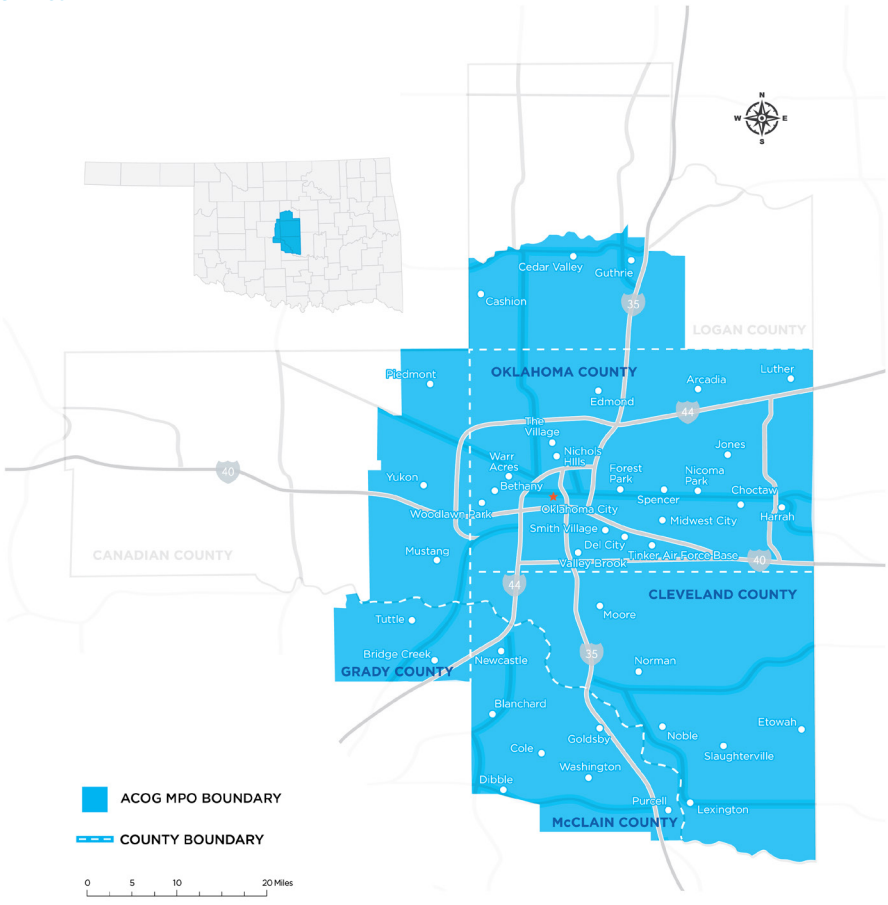
Figure 19. Oklahoma City-Shawnee Combined Statistical Area (CSA)



[57] https://www.texastwg.org/

[58] Change = (Non-Attainment - Pre-Non-Attainment)/Non-Attainment

Figure 20. ACOG MPO Area



ESTIMATE THE IMPACT OF TRANSPORTATION CONFORMITY ON REGIONAL TRANSPORTATION PLANNING

The following sections describe the generalized assumptions, input data requirements, and cost estimates to being subjected to the process of transportation conformity for all four cost categories.

1. Currently, all counties in Oklahoma are designated as "attainment" or "unclassifiable" for all Ozone Standards. However, ozone design values[59] from monitoring stations around Oklahoma City from 2016-2018, and 2017-2019 indicate the levels to be at the maximum allowable levels. As per this data and EPA's guidance for initial area designations for the 2015 Ozone Standards could imply that one or more counties in the Oklahoma City-Shawnee CSA might be at the risk of being designated as nonattainment under the category moderate or marginal. As a worst-case scenario, the entire eight-county Oklahoma City-Shawnee CSA was considered in this analysis.
2. Although four counties of the Oklahoma City-Shawnee CSA are within the MPO travel demand model (TDM) boundary, conformity must be demonstrated by emissions analysis for all eight counties. Four counties within the MPO boundary using detailed link-level activity for emissions analysis. For counties outside the MPO boundary, FHWA will utilize the county-level highway performance monitoring system activity data. The resources needed for demonstrating inside the MPO boundary and outside are assumed to be the same.

[59] Statistical metric to assess attainment status based on comparing the monitoring data with the Ozone Standards.

3. Once the region is classified as nonattainment, the region will have 12 months to conduct a conformity analysis and will have an option to perform a less than baseline or build no-build test for conformity, as the SIP MVEB may not be available.
4. Since the Oklahoma State conformity stakeholders have limited experience with the conformity process, they may need to have a head start of two years to ensure that staff is well trained on the conformity process, data requirements, and modeling for the analysis. This will incur staff hiring and training costs.
5. The MPOs and the state DOT will need to allocate resources and hire additional staff to conduct emissions analyses (with no experienced staff in-house) to get approval for projects included in the transportation plans, TIPs, and STIPs.
6. Once the Oklahoma City-Shawnee CSA has attained the Ozone Standards, the state may request that EPA classify the region to attainment. However, conformity will be effective for the 20 years from the effective date of EPA's redesignation of the area to attainment for that Ozone Standards, known as the maintenance period. If the Oklahoma City-Shawnee CSA is designated in the 2022 time frame, the conformity requirements will apply until 2050 if the initial designation status is moderate.
7. Conformity demonstration for the Oklahoma City-Shawnee CSA will be required for 23 years if designated as marginal, or 26-28 years if designated as moderate. A maximum of 28 years will be used for developing cost estimates of transportation planning impacts. The timeline used in the analysis are provided below:
    - The area will be designated as nonattainment in 2022 with an attainment date in the year 2025
    - Initial transportation conformity determination is due 12 months from the designation i.e 2023
    - If the area fails to attain the standard by 2025, EPA reclassifies the area from "Marginal" to "Moderate" with an attainment date of 2028 - 2030 (depends on the EPA action timeline)
    - End of first ten-year maintenance period (2040)
    - End of second ten-year maintenance period (2050)
8. The need to conduct conformity analysis for projects might result in construction delays which are directly proportional to the conformity timeline and other unforeseen consequences such as conformity lapse, and the associated increase in costs.
9. The area being subjected to a conformity demonstration may face a conformity lapse, furthermore, the area could face a risk of losing federal funds or funds being temporarily allocated to other projects within the state until the area comes back to the attainment status. The area will be given a 12-month grace period before going into a lapse.
10. In general, obtaining approvals for capacity expansion projects becomes more complicated with the added requirement for conformity determination.

The following sections describe the detailed assumptions and costs related to being subjected to the process of transportation conformity and input data requirements for all four cost categories listed at the beginning of the Transportation Planning Impact Cost Analysis section.

Routine Costs of Conducting Conformity Analysis

The routine analysis for conformity demonstration includes travel model development, project selection, emission estimation, public meetings, document development, interagency consultation, etc. This cost may be higher for the first few iterations of conformity analysis for newly designated areas and may stabilize as the regional MPOs gain experience in the conformity process.

As discussed in the stakeholder interview, the conformity requirements could increase agency-wide efforts 20-25 percent, and the cost-increment associated with increased efforts need to be considered. In this study, the cost increment associated with MTP and TIP update/amendment is also included as part of the

conformity routine costs. The following steps assumptions are considered for establishing routine costs an MPO incurs for conducting regional transportation conformity:

1. Staff expertise at the MPO is a key factor influencing the routine conformity process cost. If there is a need to train the current staff, an additional twelve months can be added to the initial conformity schedule.
2. Discussions with the newly designated nonattainment MPO revealed that they started the process twelve to twenty-four months ahead of the area being designated as nonattainment.
3. The TTI research team's prior experience working with MPOs suggests that an upfront cost of $150,000 is needed. These resources are needed for staff hiring and training, emissions and activity model data needed for conformity emissions analysis, and any overhead cost associated with the computing needs.
4. Based on a review of published conformity reports, transportation conformity is performed on an average every two years. It may vary based on the regional infrastructure needs, project updates (design and scope), and project complexity.
5. Even though the total conformity demonstration timeline may not change for the MTP/TIP update versus amendments. Fewer staff resources are needed for amendments due to the number of projects added or deleted from the MTP. Also, the public meeting requirements are different for the MTP/TIP update when compared to the MTP/TIP amendments. Discussions with MPOs showed that MTP/TIP amendments required 0.75 times the resources required for MTP/TIP update.
6. The "mean" cost (see Table 34) estimated using the data collected from the MPOs and state DOTs was used for developing cost routine analysis for conformity demonstration.

The input data parameters and assumptions are provided in Table 35. The cost of regional transportation conformity for marginal and moderate designations is provided in Table 36. An average annual cost in the

Table 35. Input Variables and Assumptions Associated with Routine Conformity Analysis Cost

INPUT CATEGORY	INPUT ITEM	MARGINAL DESIGNATION	MODERATE DESIGNATION	DESCRIPTION
ANALYSIS SCOPE	Number of nonattainment counties	8	8	Oklahoma City Area-Cost of nonattainment analysis scoping report
	MPO population	1,469,124	1,469,124	2018 population, Oklahoma City Area-Cost of nonattainment analysis scoping report (Canadian, Cleveland, Grady, Lincoln, Logan, McClain, Oklahoma, and Pottawatomie Counties)
CONFORMITY REQUIREMENTS	Nonattainment designation	Marginal	Moderate	The initial designation will be marginal. If the standard is not attained within three years, the region will be designated as moderate
	Analysis period	23	28	Nonattainment plus maintenance period
	Conformity frequency	Every 2 years	Every 2 years	Assume that conformity will be conducted every two years
	Total conformity analysis performed	12	14	Users can overwrite this value with customized input
COST ASSUMPTIONS	Include first-year upfront cost for conformity anaysis? (e.g., staff hiring, training, and modeling inputs)	Yes	Yes	An upfront cost of $150,000 is included
	Number of MTP/TIP amendments	6	7	This is estimated by dividing the analysis period by 4 and subtracting by total conformity analysis performed (ROUND (12-23/4))
	Fraction of discounted conformity analysis	25%	25%	Discount is applied if performing conformity analysis for minor TIP adjustment/MTP amendment
	Numbers of discounted conformity analysis	3	4	Users can overwrite this value with customized input

Table 36. Routine Conformity Analysis Cost Estimates

ITEM	MARGINAL	MODERATE
Initial investment	$150,000	$150,000
Cost per analysis	$623,125	$623,125
Total number of conformity analysis	12	14
Total number of MTP updates	6	7
Discount for MTP and TIP amendments	25%	25%
Total cost of conformity analysis during planning horizon	$4,823,438	$5,602,344
Total cost of conformity analysis per year	$209,715	$200,084

range of $200,084 to $209,715 can be expected as a result of routine conformity analyses. The cost estimate was normalized by the combined population of the MSA (1.469 million) resulting in a maximum of 0.14 cents per person increase in cost.

In comparison with previous studies, the CAPCOG report for the Austin-Round Rock MSA estimates the conformity analysis cost to the Capital Area MPO (CAMPO) to be approximately $100,000 to $250,000 annually. They estimated this amount based on estimates provided by Houston Galveston Area Council (H-GAC) ($794,079), North Central Council of Governments (NCTCOG) ($394,000), and Beaumont-Port Arthur ($38,043) for annual conformity analysis; TTI reports[60], and personal communication. The estimate was normalized by the combined population of the MSA (1.9 million) resulting in an average of 0.10 cents per person. However, those cost analysis results do not include other agency-level efforts, such as transportation planning, network modeling, and other non-modeling efforts.

Cost of Project Delay Due to Routine Conformity Analysis

In addition to the direct costs related to the delay in construction, there are additional costs related such as delayed accrual of travel benefits, an increase in emissions as a result of traffic congestion likely to occur during construction, and delay in employing construction workers.[61] Increased emissions will be based on the additional hours of travel as a result of increased congestion. This cost will be quantified using values from the USDOT BCA Guidance.[62] Similarly, a delay in employing construction workers will result in a reduction in consumer spending in the analysis region, creating a negative economic impact.

The duration to complete the conformity analysis can be attributed to the region and project complexity, established pre-analysis conformity process and documentation requirements, staff error in the modeling/analysis, significant findings by review partners, public comment period, project staging years mismatch, etc., and can add to the project delay. With staff familiar with the conformity process and requirements, a timeline of 12-18 months is expected based on the complexity of the region and project. The input variables and assumptions that have been currently utilized for this type of analysis are listed in Table 37.

[60] Texas A&M Transportation Institute. Assessing the Costs Attributed to Project Delay During Project Pre-Construction Stages. 2016. https://static.tti.tamu.edu/tti.tamu.edu/documents/0-6806-FY15-WR3.pdf. Accessed June 10, 2021.
[61] Texas A&M Transportation Institute. 2019 Urban Mobility Report. 2019
[62] U.S. Department of Transportation. Benefit-Cost Analysis Guidance for Discretionary Grant Programs. 2021.

Table 37. Input Variables and Assumptions Associated with Roadway Construction Delay

INPUT VARIABLES	ASSUMPTIONS	SOURCE
1. Project size and cost	Based on the project cost, the size of the project is determined as per the following - Small projects (less than 10 million) - Medium projects (between 10 million and 20 million) - Large projects (greater than 20 million)	ODOT
2. Number of months of delay	12, 24, and 36 months of delay was used for the calculation	ODOT
3. Change in highway cost index (HCI)	Assumed at 11% for small, 29% for medium, and 3% for large projects	FHWA National Highway Construction Cost Index[69, 72, 73]
4. Length of the project	Obtained based on the project. Assumed 1 mile if the distance was shorter than 1 mile	ODOT
5. Average annual daily traffic before and after improvement	This determined for the segment that most closely represents the roadway segment under construction	ODOT
6. Percent of trucks before and after improvement	This determined for the segment that most closely represents the roadway segment under construction	ODOT
7. Persons per vehicle	Default value of 1.25 persons per personal vehicle[70]	USDOT Benefit-Cost Analysis Guidance[64]
8. Average speed before and after improvement	This is determined for the segment that most closely represents the roadway segment under construction	ODOT
9. Value of time	This is determined by using the value of personal time used in a TTI report[68]. The value of time for cars and trucks is estimated at $16.28 and $107.42 per hour[71]	USDOT Benefit-Cost Analysis Guidance[64]
10. Return on investment	USDOT recommends a default value of 7% annually	Assumption
11. Cost of fuel	Assumed from the current fuel price	EIA[63]
12. Construction cost	Each month of pre-construction delay in road projects is assumed to result in a 0.5% increase in construction costs for small projects and a 1.3% increase for large projects	FHWA National Highway Construction Cost Index[66, 67]
13. Level of risk	CAPCOG report considers the risk of routinely occuring project delays due to conformity requirements as moderate to high	CAPCOG[65]

[63]Texas A&M Transportation Institute. Maintaining Project Consistency with Transportation Plans throughout the Project Life Cycle with an Emphasis on Maintaining Air Quality Conformity: Technical Report. 2016

[64] Federal Highway Administration. Transportation Conformity: A Basic Guide for State and Local Officials. https://www.fhwa.dot.gov/environment/air_quality/conformity/guide/. Accessed May 12, 2021.

[65]American Transportation Research Institute. An Analysis of the Operational Costs of Trucking: 2017 Update. 2017.

[66]U.S. Energy Information Administration. Weekly Retail Gasoline and Diesel Prices. https://www.eia.gov/dnav/pet/pet_pri_gnd_a_epd2d_pte_dpgal_a.htm. Accessed May 14, 2021.

[67]U.S. Department of Transportation. Benefit-Cost Analysis Guidance for Discretionary Grant Programs. 2021.

[68]Texas A&M Transportation Institute. 2019 Urban Mobility Report. 2019

[69]Federal numbers will be assumed in case local data specific to Oklahoma is not available.

[70]The default value will be updated to 2020 federal number in case local data specific to Oklahoma is not available.

[71]These numbers will be updated to 2020 numbers.

[72]Federal Highway Administration. National Highway Construction Cost Index. 2020. https://www.fhwa.dot.gov/policy/otps/nhcci/. Accessed May 20, 2021

[73]Texas Department of Transportation. Highway Cost Index Report (2012 Base). 2021.

Methodology Overview

A complete list of projects in the Oklahoma STIP was provided by ODOT. The cost of delay in implementation for each project within the eight counties of the Oklahoma City-Shawnee CSA was estimated and considered in the analysis. The following considerations and assumptions were applied to quantify the cost of routine project delays due to transportation conformity:

- Model inputs include construction cost; start year; project length; years of delay; base and project speed; truck percent; and crash modification factor (CMF).
  - All inputs except CMF and project speed were obtained from ODOT or the STIP. CMF was estimated separately for each project.
  - Project speed was estimated based on previous TTI research. Values were applied based on the cost of the project.
  - Construction costs were divided over a three-year period and discounted.
- Benefits are based on a baseline scenario versus project scenario. Benefits are created by an increase in travel speed, increase in safety, and economic impact of construction.
  - Travel benefits include operating cost savings, the value of time savings, environmental cost savings, and safety benefits.
  - Each of the benefit items was calculated for the baseline and project scenarios and discounted. The difference between project and baseline scenarios is the total benefit.
  - The total discounted costs were subtracted from the total discounted benefits giving the net present value of travel benefits.
- Economic impacts were calculated and discounted giving the total economic impact of the project.
- To calculate the cost of additional delay or lapse, this entire process was repeated accounting for a later start date associated with a delayed start to the project.
  - Delaying the start date reduces the total benefits due to the increased effect of discounting on benefits further in the future.
  - The estimated cost of delay was the difference in total benefits between delayed and non-delayed scenarios.
- Projects were then divided into small, medium, and large, based on construction cost. Small projects were less than $10 million, medium projects were $10 to $20 million, and large projects were over $20 million
  - An average delay cost for each of these categories was calculated by averaging the delay cost of each project for the three categories.

The total costs associated with routine conformity analysis delay are classified into

1. increase in construction costs due to delay calculated based on highway cost index,
2. vehicle operating costs,
3. business and personal time and reliability cost savings,
4. environmental and safety benefits, and
5. impact on economic activity due to a delay.

The detailed calculation methodology is introduced in the following sections.

Increase in Construction Costs

First, construction costs were calculated. The list of projects and their budgets were provided by ODOT. These costs were distributed evenly over the construction period, which is assumed to be three years, and discounted. All costs and benefits assumed a 7 percent discount rate. The model then generated travel impact costs for the baseline (no-build) scenario and the project (build) scenario. The difference in discounted costs between the baseline and project scenario is the cost savings or benefit of the project.

To estimate the impacts of the project delay resulting from routine conformity analysis, the entire process was repeated assuming the project has been delayed by the specified period. This delay results in increased construction costs due to increasing highway construction costs, as measured by the FHWA National Highway Construction Cost Index, as well as reduced benefits due to a longer discount period. The decrease in net benefits between the on-time and delayed projects is the cost of delaying the project. In order to calculate these costs, first the number of

trips, VMT, vehicle hours traveled (VHT), are calculated. VHT is used to calculate most of the costs in the analysis. Project speed was estimated based on previous TTI research.[74] It was assumed that a project that costs less than $30.5 million would increase speeds by 8.7 percent, while a project that costs more would result in a speed increase of 3.45 percent.

- Trips
  - Annual Trips = Average Annual Daily Traffic (AADT) * 365
  - Truck Trips = Annual Trips * Percent of Truck Traffic
  - Passenger Trips = Annual Trips – Truck Trips
- VMT = Trips * Project Length
- VHT = VMT / Average Speed

Vehicle Operating Cost Savings

The model calculated both truck and passenger vehicle operating cost which is the cost per hour of operating a passenger vehicle or truck. This factor includes maintenance, tires, mileage-based depreciation, and insurance. Fuel costs are also calculated and added. An increase in speed in the project scenario will result in fewer vehicle hours of travel, leading to less operating costs, consequently creating a benefit.

- Vehicle Operating Costs
  - Base Operating Cost (Truck and Passenger) = (VHT * Vehicle Operating Cost per Hour)
  - Fuel Operating Cost (Truck and Passenger) = (VHT * Gallons per Hour) * Fuel Cost per Gallon

Business and Personal Time and Reliability Cost Savings

Next, business and personal time cost savings were calculated. This is the crew cost for trucks and the personal time costs for passenger vehicles. Time-saving results from multiplying the number of crew or passengers per vehicle by the crew or passenger cost per hour factor for each crew-member/passenger, and then multiplying by the VHT in each scenario. The difference between the two scenario costs is the cost savings.

- Value of Time
  - Truck Business Time Cost = (Number of Crew per Vehicle * Crew Cost per Hour per Crew Member) * Truck VHT
  - Passenger Business Time Cost = (Number of Passengers per Vehicle * Passenger Cost per Hour per Passenger) x (Passenger VHT * Percentage of Business Personal Time
  - Personal Time Cost = (Passengers per Vehicle * Passenger Cost per Hour per Passenger) * (Passenger VHT * Percentage of Passenger Personal Time)

Environmental and Safety Benefits

Environmental costs are the truck and passenger vehicle emissions cost. Reduced congestion results in lower idle times for all vehicles, which reduces vehicle emissions per trip. Emission costs are calculated using the per hour rate for VOC, Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Particulate Matter (PM).

- Environmental Costs (Truck and Passenger)
  - VHT x Environmental Cost per Hour

Safety costs are the truck and passenger property damage, injury, and fatality costs. The project scenario assumes a decrease in crash rates, based on the CMF associated with the type of project, which reduces safety costs. Crash modification factors were selected using CMF Clearinghouse,[75] which provides factors for different types of roadway projects based on aggregated published safety research. If no relevant CMF could be found, a default value of 0.95 was used, which is equal to the lowest modification factor of those used in the analysis. Since data on existing crashes was not available, the urban fatality rate per 100 million(m) VMT for Oklahoma[76] was used, then multiplied by VMT on each project segment to estimate the existing number of fatal crashes. This estimate does not account for non-fatal crashes.

- Safety Costs (Truck and Passenger)
  - ((VMT / 100,000,000) * Fatality Rate per 100m VMT) x $ per Fatality

[74] Texas A&M Transportation Institute. Assessing the Costs Attributed to Project Delay During Project Pre-Construction Stages. 2016. https://static.tti.tamu.edu/tti.tamu.edu/documents/0-6806-FY15-WR3.pdf. Accessed June 10, 2021.
[75] Crash Modification Factors Clearinghouse. https://www.cmfclearinghouse.org/. Accessed June 10, 2021.
[76] National Highway Traffic Safety Administration. Traffic Safety Facts 2018 Data. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812957. Accessed June 10, 2021.

Economic Effects

The economic effects of the project were also calculated. These include the business output and wage income. Business output is associated with construction spending on the project, that is the nonwage impacts of the construction contractors spending money on the construction project. The multiplier used for this was derived from a sample of 59 urban projects in Texas. While not exact, the multiplier should be similar and Oklahoma data was not available.

The positive economic effect of wage income is the impact of increased worker income associated with construction spending on the economy. The construction wage multiplier used for this was taken from the Bureau of Labor Statistics for each county in the analysis, then averaged to create an average wage multiplier. The economic effect of wage income can be divided into direct, indirect, and induced effects. In this case, the direct impact is the wages being paid to the construction workers, the indirect impact is the impact of workers spending their wages in the economy which creates additional jobs, and the induced impact is the impact of the additional wage income created by those additional jobs.

- Business Output = Discounted Construction Cost * Business Output Multiplier
- Economic Effect of Wage Income = Discounted Construction Cost * Wage Income Multiplier

Using the methodology described in the previous sections, project delay cost associated with 12, 24, 36, and 60 months of delay for a small, medium, and large project type (based on construction cost) were estimated for all the projects in the STIP within the Oklahoma City-Shawnee CSA. The results were used to develop polynomial equations for small, medium, and large project types as shown in Figure 21, Figure 22, and Figure 23. By changing the value of "x" (duration of delay in months) project delay cost can be estimated. These equations were used to estimate the impact of delay for the months needed in the analysis. To be consistent with the overall regional economic analysis, overall project delay costs were estimated without including environmental costs. To calculate the impact of project delays due to routine conformity analysis, the TTI research team used a 15-month delay in the project implementation which is the amount of time it takes to complete the analysis and this delay would affect an average of five projects during each conformity analysis. The ratio of the large, medium, small projects from the STIP was used to develop an average cost of the projects that are delayed during conformity analysis. Table 38 shows the average project cost associated with 15-

Figure 21. Delay Cost Associated with Small Projects

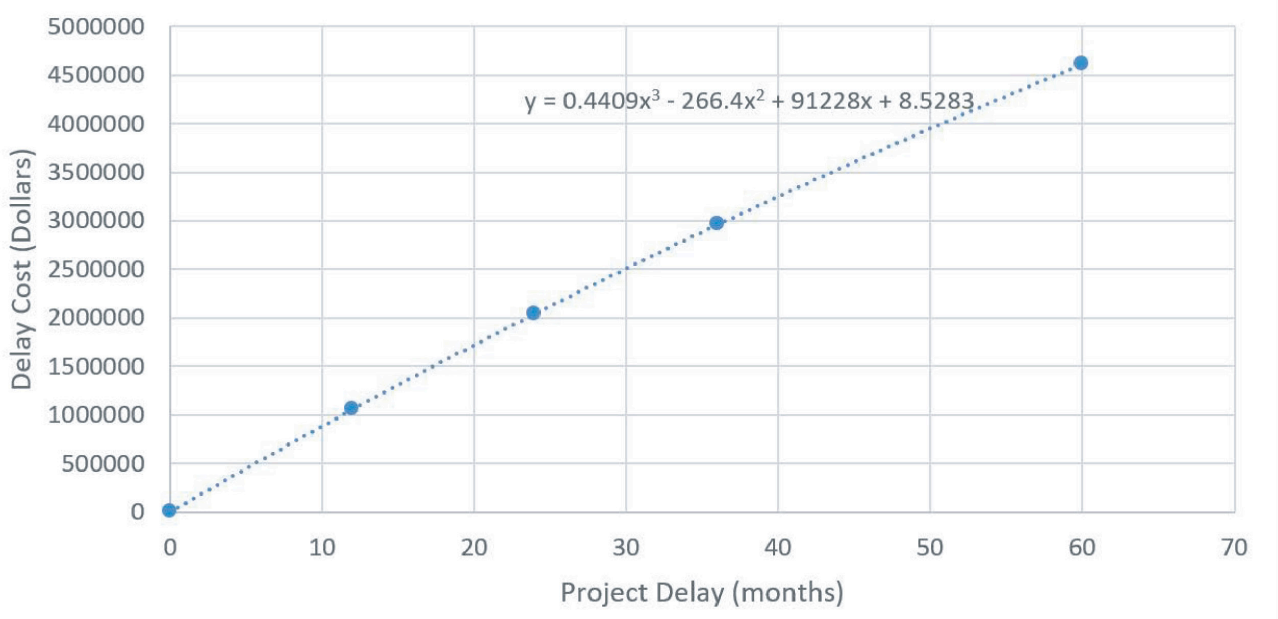


Figure 22. Delay Cost Associated with Medium Projects

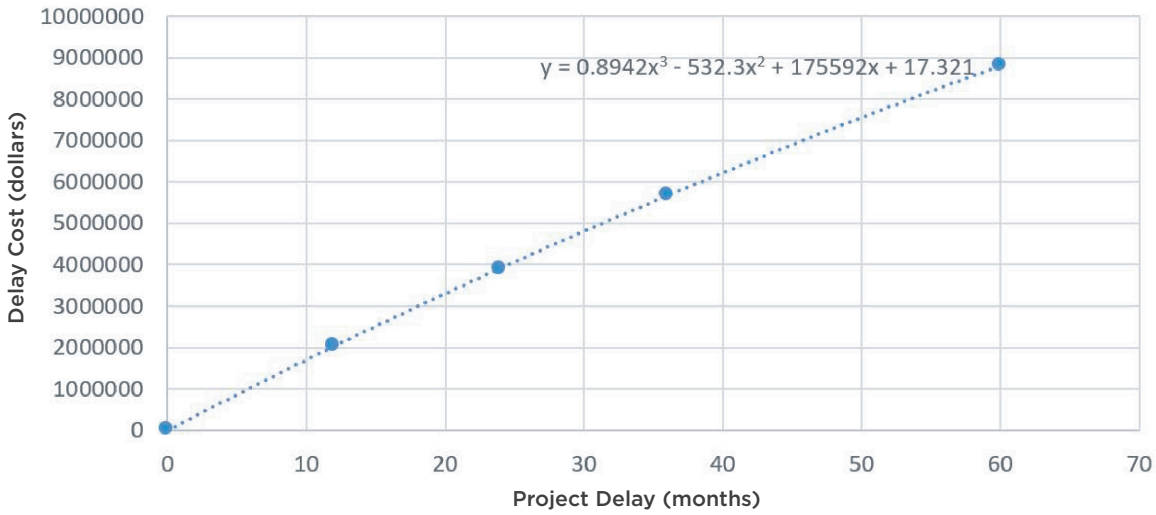
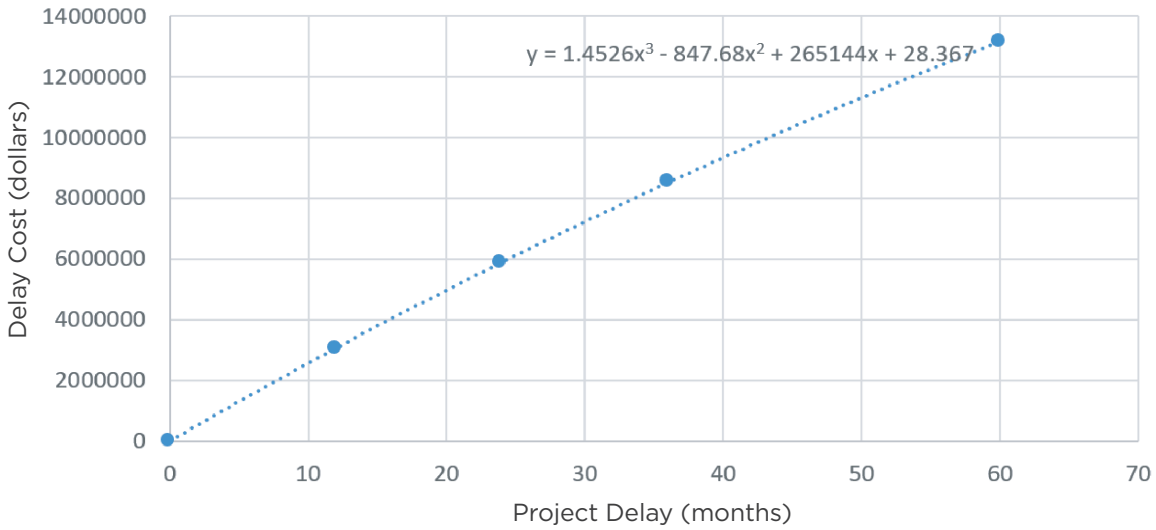


Figure 23. Delay Cost Associated with Large Projects



month of delay for large, medium, small projects and their ratios. It was estimated that $2,167,567 is the cost per project for delaying for 15 months.

An average annual cost in the range of $5,377,285 to $5,611,080 can be expected as a result of project delays associated with routine conformity analysis as shown in Table 39. The estimate was normalized by the combined population of the MSA (1.469 million) resulting in a maximum of $3.66 per person increase in cost. In contrast, the CAPCOG report for the Austin-Round Rock MSA estimates the routine conformity cost to be approximately $4,100,000 to $5,570,000 annually.

Cost of Project Delays Due to a Transporation Conformity Lapse

If an area misses the conformity determination by the intended deadline, areas have a one-year grace period after the missed deadline before a conformity lapse applies. This one-year grace period does not apply to newly designated nonattainment areas. During the 12-month grace period, only transportation projects in the most recent conforming MTP and TIP can be funded or approved. Once an area is in a conformity lapse, the use of federal transportation funds is restricted to certain kinds of projects and no new non- exempt projects can be amended into the MTP/

Table 38. Average Delay Cost per Project based on project types in the STIP

PROJECT SIZE	LARGE	MEDIUM	SMALL	WEIGHTED AVERAGE
15 Month Delay Cost	$3,791,363	$2,517,148	$1,309,977	
Percent of Total Projects in the STIP (No. of projects)	18.75%[78]	32.50%[79]	48.75%[80]	$3,791,363

Table 39. Delay Cost Associated with Routine Conformity

ITEM	MARGINAL	MODERATE
Planning horizon in years	23	28
Number of conformity analysis	12	14
Average delay in months	15	15
Average number of projects delayed per analysis	5	5
Total cost of conformity analysis during planning horizon	$129,054,849	$150,563,990
Total cost of conformity analysis per year	$5,611,080	$5,377,285

TIP.[77] This implies that these projects can resume only after the conformity requirements have been met by the region. However, completing these projects would likely be associated with higher costs.

During the conformity lapse, if the plan has expired, but the STIP/TIP are still in effect, the regional DOT/MPO can continue to authorize projects in the STIP/TIP and cannot amend the TIP or affected portion of the STIP. If the plan is still in effect, but the STIP/TIP has expired, the regional DOT/MPO can authorize projects until a new STIP/TIP is developed consistent with the plan. If the plan and STIP/TIP have expired, the regional DOT/MPO cannot authorize any projects.

Based on the information presented in Table 25 and Table 26, most of the lapsed areas returned to conformity quickly with the exception of Huntington-Ashland, Kentucky, and Beaumont, Texas that had been in lapse for more than six months since 2007. Before 2007, in the 1997–2003 period, of the 63 areas that experienced a lapse, 40 conformed within six months. None of the lapsed areas have lost transportation funding. During this period, the department of transportation does not reduce funding but allows only exempt projects, and projects approved before the lapse. Once the TIP conforms, the projects in that TIP are eligible to receive funding. The TTI research team used the methodology described in Section 10 to estimate the delay cost associated with the one-year and two-year conformity lapse period.

To conduct this analysis, the amount of funding currently allocated to projects in the analysis region, by category, as well as the types of projects receiving funding was used. If the Oklahoma City-Shawnee CSA was to be subjected to lapse, the worst-case scenario (i.e., the expiration of both MTP and STIP/TIP scenario) was assumed. This implied that all non-exempt projects in the STIP were stalled until the lapse was corrected. The estimated cost of project delay due to a transportation conformity lapse is provided in Table 40.

An average cost in the range of $139,998,564 to $269,986,028 can be expected as a result of project delays associated with conformity lapse for one to two years. The estimate was normalized by the combined population of the MSA (1.469 million) resulting in a $95.29 per person increase in cost. However, the delay cost is driven by the number of projects affected in the STIP, the total estimated cost will be lower if the number of projects affected is less. Figure 24 and Figure 25 shows the total estimated cost due to project delays associated with conformity lapses of one and two years by varying the number of projects affected in the STIP.

[77] Federal Highway Administration. Transportation Conformity: A Basic Guide for State and Local Officials. https://www.fhwa.dot.gov/environment/air_quality/conformity/guide/. Accessed May 12, 2021.
[78] Congressional Research Service. Transportation Conformity Under the Clean Air Act. 2015.
[79] Texas A&M Transportation Institute. 2019 Urban Mobility Report. 2019
[80] New Mexico Department of Transportation. Congestion Mitigation And Air Quality Improvement (CMAQ) Non- Mandatory Program Guide. 2021.

In the Austin area CAPCOG report, the estimated probability of an area experiencing at least one conformity lapse lasting one to two years to be low to moderate. CAPCOG estimated the increased cost for completing the same project to range between 5.1 to 12.9 percent per year of delay. This estimate is based on the difference in the HCI between 2014 and 2015 combined with an inflation rate of 3 percent.

Cost of Potential Temporary Loss of Federal Funding

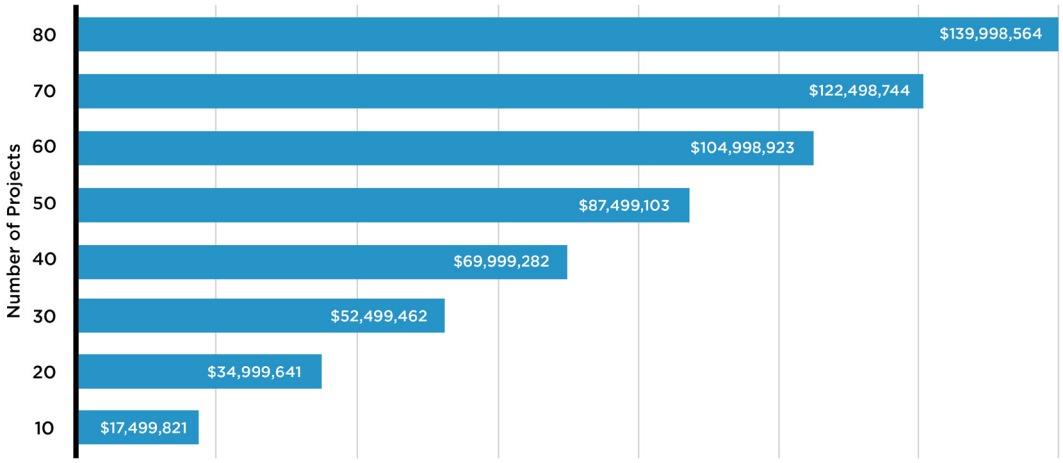
The EPA administrator is required to impose highway funds and other sanctions on areas that have not submitted or not implemented adequate plans to attain air quality standards. In addition, federal departments and agencies may not approve, permit, or provide financial support to transportation improvements in areas that have not attained air quality standards, unless such improvements conform with the State Implementation Plan for achieving air quality. Highway sanctions cannot be imposed until 24 months after the EPA administrator makes such a determination, and they may not be imposed if a deficiency has been corrected within 18 months.[81]

To conduct this analysis, the TTI research team gathered the amount of federal funding currently allocated to projects in the STIP in different years. The largest costs would be incurred in the 2020 year projects as these account for a greater proportion of the STIP than subsequent years. To estimate the impact due to the loss of federal funds, the TTI research team used

Table 40. Delay Cost Associated with Conformity Lapse

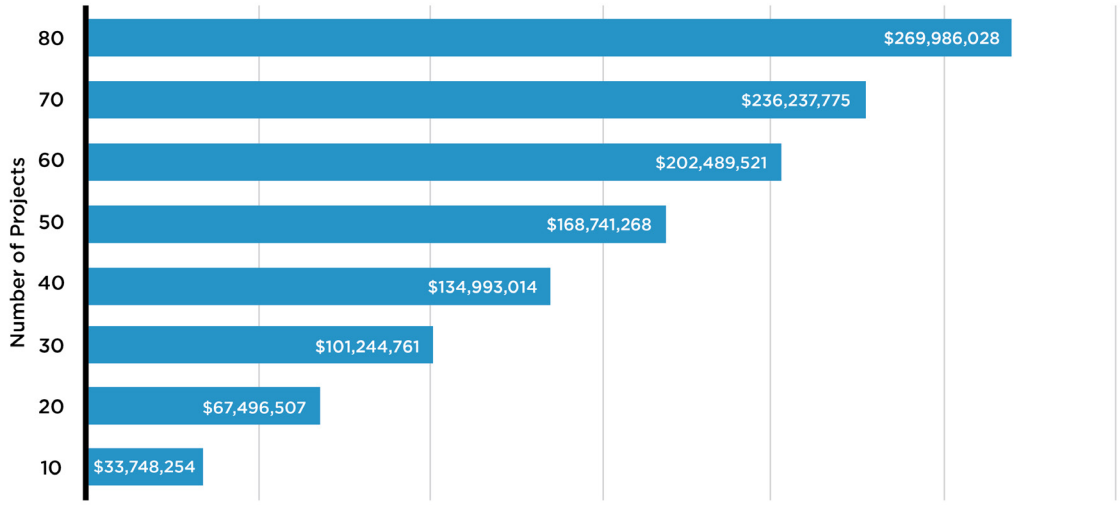
PARAMETERS	VALUES
Total Projects in the Stip	80
Percent of Large Projects in Stip	18.75%
Percent of Medium Projects in Stip	32.50%
Percent of Small Projects in Stip	48.75%
1 Year Delay - Average Cost/Project	$1,736,549
2 Year Delay - Average Cost/Project	$3,348,838
1 Year Delay Cost	$138,923,895
2 Year Delay Cost	$267,907,022

Figure 24, Project Delay Cost Associated with Conformity Lapse for One-Year



[81] Environmental Policy Resources, James E. McCarthy, Hlighway Fund Sanctions and Conformity Under the Clean Air Act Accessed September 06, 2021. https://digital.library.unt.edu/ark:/67531/metacrs936/m1/1/high_res_d/RL30131_1999Oc t15.html#Table%2022.

Figure 25. Project Delay Cost Associated with Conformity Lapse for Two-Years



the methodology described in Section 10 to estimate the delay cost assuming 1-year of loss of funding. The results in Table 41 show delay costs ranging from $2.4 million to $47.3 million and loss of federal funding ranged from $29 million to $90 million.

As per the CAPCOG report, this scenario may be highly unlikely. Exempt projects can proceed at any time as long as all planning requirements are met. In case of a prolonged conformity lapse, as per the CAPCOG report, it is noted that state DOT will shift the funds between areas to ensure there is only a temporary loss of federal funding for construction projects. CAPCOG estimated this amount to be $23,746,747 per year for 2013 for the Austin area calculated based on the total amount of federal funding in the TIP.

COST ANALYSIS SUMMARY

The potential costs arising to meet the regional transportation planning requirements as a result of nonattainment status are summarized in Table 42 and Table 43. The cost summaries include with and without environmental costs associated with the project delays. Two scenarios, a low and high based on the different update frequencies of transportation plans/programs, duration of the lapse, and potential federal funding loss were considered in the analysis. This study estimated that a nonattainment designation for the EPA's proposed Ozone Standards could potentially cost ACOG and ODOT in the range of $135 million to $157 million between 2023 and 2050 for routine conformity analysis and project delays associated with it. It is assumed that the resources needed for demonstrating conformity for counties within the ACOG boundary and outside the ACOG boundary are assumed to be the same.

The cost of delay per project as a result of conformity lapse is assumed to be the same for ACOG and ODOT areas, however, the number of projects within the ACOG and ODOT area is different (42 versus 38 projects). The loss of federal funding for the ACOG and ODOT area is dependent on the number of projects programmed in each year of the STIP within the ACOG and ODOT area.

The costs summaries without including environmental costs associated with the project delays are summarized in Table 43. As shown in the table, the change in the estimated costs is minimal when compared to the costs estimated including environmental costs summarized in Table 43.

Table 41. Loss of Federal Funding Impact on Transportation Projects

PERAMETERS	2010	2021	2022	AVERAGE
Federal Funding	$90,271,143	$58,534,896	$29,093,855	$59,299,965
1 Year Project Delay Cost	$47,313,242	$17,316,682	$2,435,939	$22,355,288

Table 42. Summary of Estimated Impacts on Regional Transportation Planning Due to Nonattainment Designation (without environmental cost)

AREA	ANALYSIS SCENARIOS	COST VALUE (2019 DOLLARS)	
		LOW	HIGH
CSA or MPO or Non-MPO[82]	Routine conformity analysis cost	**$4,823,438**	**$5,602,344**
	Cost of project delay due to routine conformity analysis	**$129,054,849**	**$150,563,990**
CSA[83]	Cost of project delay due to conformity lapse (1-year versus 2-year)	**$138,923,895**	**$267,907,022**
MPO		$72,935,045	$140,651,187
Non-MPO		$65,988,850	$127,255,835
CSA	Cost of potential long-term loss of federal funding	**$29,093,855**	**$90,271,143**
MPO		$17,459,620	$75,768,873
Non-MPO		$11,634,235	$14,502,270
CSA	Cost of project delay due to loss of federal funding	**$2,435,939**	**$47,313,242**
MPO		$1,367,865	$39,704,777
Non-MPO		$1,068,074	$7,608,465

Table 43. Summary of Estimated Impacts on Regional Transportation Planning Due to Nonattainment Designation (with environmental cost)

AREA	ANALYSIS SCENARIOS	COST VALUE (2019 DOLLARS)	
		LOW	HIGH
CSA or MPO or Non-MPO[82]	Routine conformity analysis cost	**$4,823,438**	**$5,602,344**
	Cost of project delay due to routine conformity analysis	**$130,054,028**	**$151,729,699**
CSA[83]	Cost of project delay due to conformity lapse (1-year versus 2-year)	**$139,998,564**	**$269,986,028**
MPO		$73,499,246	$141,742,665
Non-MPO		$66,499,318	$128,243,363
CSA	Cost of potential long-term loss of federal funding	**$29,093,855**	**$90,271,143**
MPO		$17,459,620	$75,768,873
Non-MPO		$11,634,235	$14,502,270
CSA	Cost of project delay due to loss of federal funding	**$2,443,925**	**$47,852,303**
MPO		$1,372,296	$40,131,984
Non-MPO		$1,071,629	$7,720,319
	TOTAL	$306,413,810	$565,441,517

[82] ACOG is responsible for conformity determinations within the MPO boundary, and for areas outside the MPO boundary, the ODOT will be responsible for coordinating the conformity determinations

[83] The areas covered by Oklahoma City-Shawnee CSA, which consists of the eight counties Canadian, Cleveland, Grady, Lincoln, Logan, McClain, Oklahoma, and Pottawatomie

CONCLUSION AND RECOMMENDATIONS

The summary results (Table 42 and Table 43) provided an overview of potential cost impacts associated with Oklahoma City-Shawnee CSA meeting conformity requirements as a result of nonattainment status. There are many alternative ways to attempt to estimate these costs, TTI's efforts were based on assumptions that are laid out in the previous section for estimating costs arising from the four categories. As mentioned previously, it is assumed that the resources needed for demonstrating conformity for counties within the ACOG MPO boundary and outside the MPO boundary are assumed to be the same. There may be slight variations in the cost estimates of these two boundaries that are influenced by factors such as duration of routine conformity process, duration of the project delays, and a number of projects that are affected meeting conformity requirements. Spreadsheets were provided to ACOG and they were designed such that staff can use them to alter the assumptions and input factors to model other alternatives such as different geographic boundaries.

Conformity lapse and loss of federal funding is an unlikely event and its occurrence affects the estimated cost of other conformity scenarios, the research team recommends that only routine conformity analysis costs be used in further analysis. Cost estimates of impact from conformity lapse and loss of federal funding should be used for reference purposes.

The review finds that demonstrating transportation conformity is a complex, resource-intensive, and time-consuming process that requires the development of travel demand networks at various intervals out to at least 20-30 years into the future, and associated motor vehicle emissions estimation using EPA's latest model. In addition, the review suggests that at least 12-15 months is needed to complete a conformity analysis. The MPOs and the state DOT will need to invest and get a head start because regions will only have 12-months to demonstrate conformity when they are designated as nonattainment for the first time.

The questionnaires in the Qualtrics data request forms were designed to capture the cost of the conformity process with minimal burden to the responders. However, the results suggest that these cost-related questions did not communicate how information was to be reported. Additional outreach with a few more questions aiming to extract the information needed would have provided better results.

While conformity requirements are guided by an overarching framework prescribed by federal regulations and guidance, the conformity demonstration process emphasizes the use of local data wherever feasible and relies on interagency consultation and public involvement at the state and regional level. Further, a state's environmental or air quality agency's approach to the development of the SIP will also affect assumptions, methods, and procedures for quantitative elements of the process.

The findings suggest that a nonattainment designation results in layers of restrictions on transportation project implementation, specifically the regionally significant added capacity projects. TTI recommends that regional transportation planning agencies work closely with project sponsors to implement the projects and avoid any errors coding project information used in the emissions modeling. Also set processes in-house to identify projects that yield air quality benefits and projects at risk under a federal funding freeze, this will enable MPOs to respond appropriately.

Since the 1990s when conformity requirements were established, agencies have come a long way in developing processes to meet transportation conformity requirements. Over the years, several of these problems have been resolved, as agencies have developed methods, procedures, and systems to navigate conformity requirements, usually coordinated on a statewide basis. A platform such as TWG provided MPOs the opportunity for a statewide discussion of topics related to air quality planning, and a framework for interagency consultation procedures that are required for each nonattainment area's MTP. The formation of such an interagency consultation group for Oklahoma will be beneficial during the conformity process with regards to providing technical support and ensuring project consistency.

Finally, the classification of nonattainment, such as marginal or moderate, remains to be an outcome based on the monitoring data. It is evident that future transportation planning in the Oklahoma City-Shawnee CSA area will be influenced by the air quality requirements surrounding ground-level ozone pollution.

ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS

COST OF NONATTAINMENT STUDY FOR THE OKLAHOMA CITY AREA:

BENEFITS ASSOCIATED WITH CONGESTION MITIGATION & AIR QUALITY FUNDING

PREPARED BY:
ACOG CONSULTANT - TEXAS A&M TRANSPORTATION INSTITUTE

11 EXECUTIVE SUMMARY

The purpose of the study is to examine potential transportation funding and programming impacts for regions being designated as air quality nonattainment areas. This report presents the findings to Characterize Potential Off-Setting Benefits Associated with Congestion Mitigation and Air Quality (CMAQ) funding.

Currently, all areas in Oklahoma are designated "attainment" and so the ODOT retains full flexibility in distributing their CMAQ funding. Recent air quality monitoring indicates that the Oklahoma City-Shawnee Combined Statistical Area (CSA) may enter nonattainment in the near future. Since Federal Highway Administration (FHWA) CMAQ funds must be invested in nonattainment and maintenance areas on projects that reduce criteria pollutants, the state funding allocations would likely change and direct CMAQ funding to newly designated nonattainment areas.

In determining the amount of funding for a 21-27 year-period following the designation, the research team used three different scenarios based on planned apportionments from the Infrastructure Investment and Jobs Act (2021), which included the authorization bill for transportation funding from Fiscal Year (FY) 2022 through FY 2026. The total CMAQ funding for the State of Oklahoma is set at $12.8 million for FY 2022.

Three CMAQ funding scenarios were examined in this report. The first scenario assumes that 88 percent of CMAQ funding is allocated to ACOG for transportation projects. The second scenario assumes that 50 percent is allocated to ACOG. The third scenario includes the possibility that the Tulsa metro area may also enter nonattainment at the same time as the Oklahoma City-Shawnee CSA and the funding will be split between the two metro areas.

The Scenario One split results in a funding allocation for FY 2022 of approximately $12.5 million to the State of Oklahoma, after set-asides, with $11 million for the ACOG region and a match requirement of $2.2 million. Scenario Two allocates a 50-50 split of CMAQ funding between ACOG, with a FY 2022 allocation of approximately $6.3 million to ACOG and a $1.2 million non-federal match. Scenario Three, with the Tulsa entering nonattainment, projected allocations for FY 2022 are approximately $6.8 million to ACOG with a $1.3 million non-federal match (See Table 44).

The non-federal match requirement under each scenario is $2,209,181, $1,255,217, and $1,355,634 respectively for FY 2022. This represents a sharp increase from the approximately $130,000 required to meet the current match needs for ACOG. Certain safety-related projects are eligible for the full 100 percent federal cost share, but these projects cannot account for more than 10 percent of the total funding across the

Table 44. FY 2022 CMAQ Funding Allocation - Scenarios One, Two and Three

SCENARIO	FY 2022 ALLOCATION SPLIT	CMAQ FUNDING - STATE OF OKLAHOMA	ACOG ALLOCATION (UNDISCOUNTED)	MATCH REQUIREMENT (UNDISCOUNTED)
One	88% ACOG	$12.5 million	$11 million	$2.2 million
Two	50% ACOG	$12.5 million	$6.3 million	$1.2 million
Three	39% Tulsa 54% ACOG	$12.5 million	$6.8 million	$1.3 million

Note: The analysis assumes a 20% nonfederal match and a 3% discount rate.

base apportionment programs. ACOG could also consider options for generating the additional non-federal match, including:

- Expand current air quality programming to include the Small Air Quality Grant Program and the Fleet Conversion Grants.
- Engage with local city and county project sponsors to understand their ability to allocate additional matching funds.
- Explore full utilization of the 100 percent federal share for safety-related projects in coordination with ODOT.
- Request additional state funding to target CMAQ projects. Assess the eligible CMAQ planned projects and optimize match availability with the match needs among project priorities.

Currently, planned projects could utilize CMAQ funding to cover bicycle and pedestrian facilities as well as any intelligent transportation system (ITS) or intersection improvements that would reduce congestion and/or emissions. However, ACOG will need to consider adding additional CMAQ-eligible projects in future years. The following options should be considered to maximize the use of CMAQ funds:

- Shift current air quality-related projects to be funded through CMAQ.
- Explore new project options, including electric vehicle infrastructure and transit improvements that reduce mobile source emissions.
- Maximize the use of grant programs, such as the Small Air Quality Grant Program and their Fleet Conversion Grants.

The economic impacts to the regions from additional CMAQ funding were found to be generally positive. Additional CMAQ funding would likely lead to increased construction spending and associated increases in worker income. Indirect impacts from increased spending may also induce impacts for potential job creation. The magnitude of the economic impacts is presented in the report for various funding scenarios.

Overall, the research recommends the following actions to maximize the utilization of CMAQ funds allocated to ACOG and offset the negative impacts of a nonattainment designation:

- Coordinate with ODOT to leverage additional state funds for a match where possible as well as to utilize the 100 percent federal cost-share on safety-related projects.
- Expand the two grant programs to increase access to match and provide additional CMAQ-eligible projects.
- Consider transferring CMAQ funds, in cooperation with ODOT, to other programs within the base apportionment especially in the initial years following the nonattainment designation.
- Utilize additional CMAQ funding to the fullest extent possible in order to maximize the economic benefits to the region.

12 INTRODUCTION

CMAQ funding was first introduced in 1991 through the Intermodal Surface Transportation Efficiency Act (ISTEA). The program is intended to provide funds to reduce the environmental impact of transportation by promoting non-motorized travel and other projects that can improve air quality. As ACOG and ODOT prepare for a potential nonattainment designation in the Oklahoma City-Shawnee Combined Statistical Area (CSA), the importance of CMAQ funding increases.

CMAQ funds must be spent on projects within nonattainment areas if a nonattainment area exists within the state. Currently, all areas in Oklahoma are designated "attainment" and so the State retains full flexibility in distributing its CMAQ funding. A nonattainment designation would direct a greater proportion of that funding to the CSA. The Texas A&M Transportation Institute (TTI) was tasked with characterizing potential offsetting benefits associated with CMAQ funding for ACOG. In doing so, the study addressed the following:

a. The estimated amount of CMAQ funding that the CSA would qualify for if the area is designated nonattainment for ozone.
b. The required non-federal match to access the additional CMAQ funding directed to the CSA.
c. Possible sources for the non-federal match.
d. Assess the eligible projects for funding through CMAQ that are currently planned by ACOG.
e. The impact to the highway construction industry in the CSA due to the shift in funding to the region.

The above tasks were achieved through a review of the literature of CMAQ funding and nonattainment status as well as a review of documentation on CMAQ funding from other states, especially those in Environmental Protection Agency (EPA) Region 6. In addition, the research team developed three scenarios for the potential allocation of CMAQ funding. These scenarios drove the analysis of match requirements, available projects, and the economic impact of increased funds to the region. Finally, the team reviewed planning documentation by ACOG and ODOT to understand the potential project eligibility and areas where CMAQ funding may be utilized effectively.

This report describes the literature review and review of relevant documentation, and data gathered to support the analysis of CMAQ funding for the CSA. The report is organized as follows:

1. The background section provides an overview of the CMAQ program and the various requirements for utilizing funding as well as project eligibility. In addition, a review of CMAQ guidance from states outside of Oklahoma is included with a focus on states within EPA Region 6.
2. The method section details the data sources and assumptions used in estimating CMAQ funding for the ACOG MPO. The funding level analysis was utilized in the remaining subtasks to understand the potential required nonfederal match, and an assessment of CMAQ-eligible planned projects.
3. The study results are presented for each scenario to show the range of possible outcomes should the CSA enter nonattainment. Results are presented in two sections; the first details the implications of the increased CMAQ funding for ACOG and the section assesses the economic impact to the highway construction sector due to the increased funding to the region.

13 BACKGROUND

The CMAQ program was first authorized in 1991 through ISTEA. ISTEA further established a link between transportation and the environment that first began with the Clean Air Act Amendments (CAA) of 1990.

The 1990 CAA amendments created stronger measures for areas that failed to meet the National Ambient Air Quality Standards (Ozone Standards), now known as nonattainment areas, as well as creating a more rigorous link between transportation and air quality planning.[84] The CMAQ program is administered by the FHWA and focused on surface transportation projects that contribute to air quality improvements and/or congestion relief. CMAQ has been reauthorized with every Transportation Bill including the most recent effort, the FAST Act in 2015. The FAST Act provided for between $2.3 to $2.5 billion in CMAQ funding, for each year of authorization (2016-2020), that is distributed to nonattainment or maintenance areas for ozone, carbon monoxide, and/or particulate matter as well as providing a minimum apportionment to states with neither of those designated areas. The Infrastructure Investment and Jobs Act was signed into law on November 15, 2021; this bill includes new spending for a variety of different infrastructure but also reauthorizes surface transportation funding. CMAQ has again been reauthorized through this legislation.

CMAQ PROGRAM OVERVIEW

ISTEA guaranteed each state 0.5 percent of the funding allocated to CMAQ with the remaining funds allocated to states with areas that do not meet air quality standards for the criteria pollutants, such as ozone and carbon monoxide.[85] The funding outside of the 0.5 percent is allocated based on a formula that considers the severity of the air pollution as well as the population of the nonattainment areas within each state. State DOTs can use the same criteria in dispersing their funds to multiple nonattainment areas in the state.[84, 86, 87]

The CMAQ program has two main requirements for the usage of funds; the money must be spent on projects that reduce air pollutants from transportation sources, and the money must be used in a nonattainment area if one exists in the state. If no attainment area exists, the state has a greater degree of flexibility with the funds including control over where the money is allocated within the state and the ability to transfer to other programs. Funds can be directed to MPOs in the state or utilized by the DOT to fund projects. All projects seeking CMAQ funding must be included in a transportation plan or TIP.

CMAQ offers a great deal of flexibility in terms of project type; projects can range from traditional highway and transit to public outreach, clean fuel vehicles, and emissions testing programs. Although there is flexibility, CMAQ projects must focus on emissions reduction that improves air quality and generally have these characteristics: they are developed through a coordinated planning process, target the emissions for which the area was designated nonattainment, and produce emissions reductions in line with the time frames established by the CAA.[85] Projects tend to fall into one of five categories: travel demand management strategies, transit improvements, shared-ride services, traffic flow improvements, and pedestrian and bicycle programs. Updates to transportation legislation have also included diesel engine retrofits and other advanced truck technologies and carpooling and vanpooling. Shared mobility and diesel vehicle replacements have been added through the Infrastructure Investment and Jobs Act.

[84] U.S. Department of Transportation. Federal Programs Directory: Congestion Mitigation and Air Quality (CMAQ) Improvement Program. Office of Planning, Environment, & Realty (HEP). https://www.transportation.gov/sustainability/climate/federal-programs-directory-congestion-mitigation-and-air-quality-cmaq. Accessed Aug. 10, 2021.

[85] U.S. Environmental Protection Agency. The Congestion Mitigation and Air Quality Improvement Program (CMAQ). U.S Environmental Protection Agency, 1997.

[86] Texas Department of Transportation. Unified Transportation Program 2021. 2020, p. 211.

[87] Rowangould, G., R. Nadafianshahamabadi, and A. Poorfakhraei. Programming Flexible Congestion Mitigation and Air Quality Program Funds: Best Practices for State DOTs. Transportation Research Record, Vol. 2672, No. 51, 2018, pp. 99–108. https://doi.org/10.1177/0361198118782801.

FHWA CMAQ INTERIM PROGRAM GUIDANCE UNDER MAP-21 AND THE FAST ACT

New guidance was issued after the passage of the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the FAST Act. MAP-21 guidance outlined FHWA's expectations as well as encouraging states and MPOs to coordinate with air quality agencies during their project selection process. Other FHWA expectations include:

- The project selection process should be transparent, well-documented, and made available to the public.
- Agencies and committees involved in rating proposed projects and making final project selection decisions should be clearly identified. Project rating systems should be transparent and made clear to the public and other entities.
- The basis for rating CMAQ funding of proposed projects, along with the process, is clear.

The November 2013 CMAQ Interim Program Guidance identified 17 eligible types of projects under MAP-21. The project types represented in the guidance are as follows[89]:

1. Diesel Engine Retrofits and Other Advanced Truck Technologies
2. Idle Reduction
3. Congestion Reduction and Traffic Flow Improvements
4. Freight/Intermodal Improvements
5. Transportation Control Measures
6. Transit Improvements
7. Bicycle and Pedestrian Facilities and Programs
8. Travel Demand Management
9. Public Education and Outreach Activities
10. Transportation Management Associations
11. Carpooling and Vanpooling
12. Carsharing Programs
13. Extreme Low-Temperature Cold Start Programs
14. Training
15. Inspection/Maintenance (I/M) Programs
16. Innovative Projects
17. Alternative Fuels and Vehicles

The CMAQ program is also subject to performance measures under MAP-21 and the FAST Act. MPOs and state DOTs must report CMAQ performance measures to the U.S. Department of Transportation (USDOT). The measures required by the USDOT focus on congestion reduction, measured by annual hours of peak excessive delay per capita and non-single occupancy vehicle travel measures, and emissions reduction, which is the two and four year total emission reductions for each criteria pollutant and precursor that is applicable.[90]

The FAST Act amendments include adding diesel retrofits and other strategies to reduce particulate matter ($PM_{2.5}$) from on-road and non-road equipment into the CMAQ eligible activities. The Act also provided flexible funding for projects or programs included in statewide or MTP as well as TIPs that reduce air pollution. Other new features of the CMAQ program under the FAST Act include continued eligibility for electric vehicle and natural gas vehicle infrastructure, eligibility for port-related freight operations projects, as well as amendments to the eligible uses of set-aside funds for $PM_{2.5}$.

STATE IMPLEMENTATION OF THE CMAQ PROGRAM

The implementation of CMAQ occurs at the state level with DOTs distributing funding to the nonattainment areas, generally through the MPO, and utilizing funding at the state level where possible or necessary. States have differing levels of discretion to utilize the funding based on current air quality standards and the amount of flexible CMAQ funding they receive. Most states have developed tools and guidance to assist in the usage of CMAQ funds at the local level, including project selection matrices, emissions reduction tools, and full guidance documentation. Cost-effectiveness tables for CMAQ projects are maintained at the federal level. In addition, research has shown the power of interagency cooperation in utilizing CMAQ funds to the best possible outcome.

MPOs and state-level agencies often develop project scoring criteria or matrices to assist proposers with the funding criteria and allow them to create an effective proposal. Scoring criteria present themes and assign weights to those themes, the projects are then selected based on the score received. Criteria can include emissions reduction, cost-effectiveness,

[89] New Mexico Department of Transportation. Congestion Mitigation And Air Quality Improvement (CMAQ) Non- Mandatory Program Guide. 2021
[90] Federal Highway Administration. Congestion Mitigation & Air Quality Program. https://www.fhwa.dot.gov/environment/air_quality/cmaq/. Accessed Sep. 6, 2021.

impact to transportation, available funding for match, and benefits to the community.[91] ACOG currently uses a scoring criteria worksheet for their Air Quality Small Grant Program.[92] Different projects may demand different or additional criteria, such as ridership impacts for transit projects. One consideration for scoring criteria can be the lack of flexibility; a project may fit the goals of the region but not be as cost- effective as a less regionally important project, for example.[91] Other agencies have developed project focus areas and prioritization tables that focus on the types of projects that the region is hoping to fund rather than strict criteria. The Louisiana Department of Transportation and Development (LADOTD) and Georgia Department of Transportation (GDOT) use a table similar to Figure 26 to show their CMAQ priority projects.[93]

Providing an overview of project types that are important to the region assists local agencies in developing proposals and can provide the MPO with a better sense of the breadth of projects that CMAQ can fund. However, the DOTs do note that the table serves as a guide and is not the sole determinant of project selection or rating.

Figure 26. Project Selection Tool

PRIORITY	TRAFFIC FLOW & ITS	ALTERNATIVE FUEL/ DIESEL RETROFITS	TRANSIT/DIESEL RETROFITS	TDM	BIKE/PED
High Priority	Traffic signal coordination Intersection improvements (CMP routes & roundabouts)	Idling Controls Diesel Fleet Conversion/Retrofit Purchase (start-up or expansion) of alternative fuel fleet (non-transit) vehicles Passenger vehicle I/M controls	Fleet retrofitting Start-up or expansion of alternative fuel transit vehicles	Employer incentives Alternative transporation incentive program (ex. transit incentives) Carpool/Vanpool programs, start-up or expansion PR, advertising, and outreach (employer & school) Improved transit information to the public congestion/value pricing	New bike/ped facilities providing direct access to existing transit and/or schools
Medium Priority	Roadway ITS Transit ITS Speed Limit Enforcement Intersection improvements (low truck traffic volume) Intermodal freight improvements Access management indident management improvements	Clean fuel incentive programs, infastructure or vehicles Heavy duty I/M controls	Transit start-up or expansion Start-up or expansion of diesel transit vehicles	Start-up or expansion of employer services organizations	New bike/ped facilities linking existing bike/ ped facilities (addresses "missing link" sections) Installing pedestrian or bike access to facilitate high use during peak travel times (access to major destinations)
Low Priority	Interoperable communications HOV lanes	Vehicle repair subsidy (in I/M areas)		Park and ride lots Shared car program	Pedestrian and bicycle projects intended primarily for use during non-work trip times

[91] Rowangould, G., R. Nadafianshahamabadi, and A. Poorfakhraei. Programming Flexible Congestion Mitigation and Air Quality Program Funds: Best Practices for State DOTs. Transportation Research Record, Vol. 2672, No. 51, 2018, pp. 99–108. https://doi.org/10.1177/0361198118782801.

[92] Association of Central Oklahoma Governments. Air Quality Grants for Central Oklahoma. ACOG. https://www.acogok.org/transportation-planning/air-quality/grants/. Accessed Aug. 17, 2021.

[93] Louisiana Department of Transportation and Development. CMAQ Project Selection. LADOTD, 2010

Utilizing CMAQ funding requires that a quantifiable reduction in emissions be reported for the planned project. Local agencies that often implement CMAQ projects do not always have the resources or capacity to complete these calculations. MPOs and DOTs have generally used two different methods to overcome this barrier:

1. a data request from the local agency to conduct the calculation themselves or
2. providing a tool to assist in calculating the emissions reduction.[66]

Depending on the complexity of the tool, it can be easier to require the local agency to provide data to the MPO or DOT to ensure the accuracy of the emissions reduction calculation. MPOs or DOTs that perform the calculations and conduct the project selection process may require additional time and resources. The USDOT provides guidance of emissions tools, which can assist the MPO or DOT in creating their own tool or completing an analysis.[94] The coordinating agency must consider the most effective method for determining the emissions reduction to ensure timely project proposals and selection.

Many states and MPOs utilize similar procedures to ACOG and their small grant program in distributing and using CMAQ funding. New Mexico DOT (NMDOT) has a large portion of flexible CMAQ funding as the only nonattainment area is located within the El Paso MPO boundary. NMDOT also sends out a call for proposals each year to spend their CMAQ allocation. The guidance document provided includes a list of their eligible projects based on the needs of the state as well as the CMAQ guidelines.[95] NMDOT includes screening and evaluation criteria in its project selection process. The screening criteria reduce the burden on the DOT as not all proposals will require a full review. ACOG's small grant program includes a similar set of eligible projects based on current needs and to meet the rules of the program. ACOG could work to expand this program as their level of CMAQ funding increases.

The cost-effectiveness of any project is a key concern for transportation planning agencies as stewards of public money. Cost-effectiveness guidance for CMAQ is developed for the FHWA and assesses the dollars per ton of emissions reduced for eligible project types.[96] The most cost-effective projects for reducing NO_x and VOCs that create ozone are:

- Idle Reduction Strategies
- Car Sharing
- Intermodal Freight Facilities

Other projects to consider for cost-effectiveness are diesel engine retrofits, incident management, and natural gas refueling infrastructure. Although these project types are the most cost-effective, the most effective method of reducing mobile source emissions would be reducing vehicle trips, especially single- occupancy trips, and promoting transit or bicycle and pedestrian travel. Table 45 presents an overview of the cost-effectiveness of CMAQ projects measured in median cost per ton of pollutants reduced. While cost-effectiveness should not be the sole criteria from which to select a project, it is important to understand what projects will be able to reduce pollutants for a reasonable cost. Additional funding from CMAQ should be used to reduce mobile source pollutants and enable the area to enter maintenance status and eventually be redesignated as attainment in the future. Cost-effectiveness tables can assist with project prioritization and selection to meet that goal.

[94] U.S Department of Transportation. Models and Analysis Tools. Analyzing GHG Emissions Tools. https://www.transportation.gov/susta inability/climate/models-and-analysis-tools. Accessed Aug. 17, 2021.
[95] New Mexico Department of Transportation. Congestion Mitigation And Air Quality Improvement (CMAQ) Non-Mandatory Program Guide. 2021.
[96] Pildes, R., A. Mittelman, G. Bucci, C. Foreman, and G. Noel. Congestion Mitigation and Air Quality Improvement (CMAQ) Program: 2020 Cost-Effectiveness Tables Update. Publication FHWA-HEP-20-039. Volpe National Transportation Systems Center, Cambridge, Massachusetts, 2020.

Table 45. Cost-Effectiveness of CMAQ Projects by Type and Pollutants

PROJECT TYPE	CO	NO_x	VOCs	PM_{10}	$PM_{2.5}$	TOTAL MEDIAN COST PER TON
Dust Mitigation				A	B	$15,932
Idle Reduction Strategies	A	A	A	B	B	$58,999
Diesel Engine Retrofit Technologies	B	B	C	D	D	$407,684
Intermodal Freight Facilities and Programs	B	A	C	D	D	$494,834
Carsharing	A	B	B	D	E	$766,199
Incident Management	B	B	D	D	D	$1,071,991
Transit Service Expansion	A	C	C	E	F	$2,766,431
Traffic Signal Sychronization	C	D	F	D	F	$3,042,095
Park and Ride	A	C	D	E	F	$3,622,288
Natrual Gas Re-Fueling Infrastructure	A	B	D	F	F	$3,675,107
Electric Vehicle Charging Stations	A	C	D	F	F	$6,380,581
Transit Amenity Improvements	B	D	D	F	G	$7,457,446
Rideshare Programs	B	D	D	F	G	$8,194,085
Roundabouts	D	D	G	G	F	$8,786,402
Extreme Temperature Cold-Start Technologies	B	F	D	F	F	$10,850,034
Bikesharing	B	G	F	F	G	$13,834,816
Bicycle and Pedestrian Improvement Projects	B	D	F	F	G	$19,423,016
Intersection Improvements	D	F	F	H	H	$30,823,921
Employee Transit Benefits	D	F	F	H	I	$50,281,268
Subsidized Transit Fares	D	F	F	H	I	$50,281,268
Heavy Duty Vehicle Replacements	D	D	F	I	I	$69,830,233

Table 46. Median Cost-Effectiveness Letter Grades[72]

MEDIAN COST-EFFECTIVENESS (DOLLARS PER TON REDUCED)	
A	<10,000
B	10,000 - 50,000
C	50,000 - 100,000
D	100,000 - 500,000
E	500,00 - 1,000,000
F	1,000,000 - 5,000,000
G	5,000,000 - 10,000,000
H	10,000,000 - 20,000,000
I	>20,000,000

Interagency cooperation can help to establish priorities at a higher level including regional and state priorities for CMAQ funding. The Atlanta Regional Commission (ARC) and Arkansas have all used interagency coordination to their advantage when planning and programming their CMAQ funding. ARC coordinated with state and local officials to develop emphasis areas for their CMAQ program.[96] In addition, ARC utilizes a project scoring and weighting scheme that is created via input from municipalities in the region.[97] ARC has also streamlined its call for projects to include three different programs: CMAQ, Transportation Alternatives Program, and the Surface Transportation Block Grant Program.[98] This allows their Transportation and Air Quality Committee to select the best overall projects for the region and ensure full utilization of funding. Arkansas credits its inter-agency cooperation among Arkansas DOT, the West Memphis MPO, Arkansas Department of Environmental Quality, FHWA – Arkansas Division, and EPA – Region 6 with the West Memphis MPO for establishing conformity after receiving a nonattainment designation. The different agencies began cooperating over 15 years ago in preparation for missing the Ozone Standards for attainment.[99]

Overall, the implementation of a strong CMAQ program requires effective guidance, state and region-specific focuses for projects, effective selection methods, and cooperation between agencies. Strong guidance to outside agencies ensures a smooth process in terms of call for projects meeting the needs of the region. ACOG's small grant program establishes a baseline from which to develop more detailed guidance for larger projects. Selection tools and methods should be based on regional targets and built through coordination with key stakeholders. Quantifying the emissions reduction often requires the use of a tool by either the local agency or the funding agency. Ensuring cooperation between stakeholder agencies throughout the process ensures that local, regional, and state needs are met and that emissions reductions are provided through cost-effective projects.

[96] Rowangould, G. R. Nadafianshahamabadi, and A. Poorfakhraei. Programming Flexible Congestion Mitigation and Air Quality Program Funds: Best Practices for State DOTs. Transportation Research Record, Vol. 2672, No. 51, 2018, pp. 99–108. https://doi.org/10.1177/0361198118782801.
[97] Atlanta Regional Commission. Air Quality. ARC. https://atlantaregional.org/natural-resources/air-quality/air-quality/. Accessed Aug. 17, 2021.
[98] Atlanta Regional Commission. Atlanta Regional Commission Congestion Mitigation and Air Quality (CMAQ) Program Overview. 2017.
[99] Arkansas Department of Transportation. We Move Arkansas - 2040 Long Range Intermodal Transportation Plan. 2017.

14 METHOD

This section describes the approach to estimating the CMAQ funding for the Oklahoma City-Shawnee CSA and the subsequent impact of that funding change to non-federal match requirements.

CMAQ FUNDING ANALYSIS

This funding analysis assesses potential changes to CMAQ funding for the CSA and potential challenges that arise from an increased non-federal match requirement. This section details how TTI and ACOG:

- estimated the increase in CMAQ funding for the region,
- the non-federal match requirement related to that estimate, and
- the method for evaluating the non-federal match, and the availability of planned CMAQ-eligible projects.

Changes to CMAQ Funding Levels

If the Oklahoma City-Shawnee CSA is designated as nonattainment for ozone, the federal apportionment of CMAQ funding for Oklahoma could remain the same; however, the proportional amount of funding directed to ACOG, or the CSA, would increase. The Oklahoma apportionment could increase in the next fiscal year to take into account the nonattainment designation but current formulas utilize FY 2009 as a baseline when Oklahoma was still fully in attainment. Federal guidelines state that CMAQ funds must be invested in nonattainment or maintenance areas on projects that reduce criteria pollutants.[100] The State of Oklahoma currently has attainment status for all counties. Recent air quality monitoring data suggests that the CSA may enter nonattainment status in the near future. This would alter the current framework for CMAQ funding because it would reduce the flexibility the State has in spending the apportionment. The following constraints would apply:

- The funds would have to be spent on projects that reduce criteria pollutants within the CSA once it enters nonattainment status.
- The funding allocation would be split between ACOG and ODOT; ACOG would receive funding for air quality projects in the ACOG MPO area and ODOT would be responsible for projects outside the ACOG MPO area but within the CSA.

The research team discussed the potential funding amount for ACOG with ODOT to determine a baseline should the CSA enter nonattainment status.

In determining the amount of funding over the 21-27 years following the designation, the research team used three different scenarios based on planned apportionments from the Infrastructure Investment and Jobs Act (2021), which included the authorization bill for transportation funding from FY 2022 through FY 2026.

The first scenario assumes that 88 percent of CMAQ funding is allocated to ACOG for projects. The second scenario assumes that 50 percent is allocated to ACOG. The third scenario includes the possibility that the Tulsa metro area may also enter nonattainment at the same time as the Oklahoma City-Shawnee CSA. This third scenario splits the funding between the two metro areas. After FY 2026, there are two funding level options; the first assumes a 2 percent annual increase, based on funding tables in the bill, and the second funding level will freeze the funding amount after FY 2026. For all three scenarios, a three percent discount rate was used to show the decline in purchasing power of those funds over time. It should be noted that these scenarios are estimates. The funding amount to the State of Oklahoma could increase with future changes to the CMAQ program; currently, the amount they receive is based on their full attainment status.

Non-Federal Match Requirement

The typical non-federal match for CMAQ funding is 20 percent.[101] The current CMAQ funding allocated to ACOG applies a 20 percent local match in their air quality grant program.[102] Current eligibility requirements for the federal share of 100 percent are limited

[100] https://www.fhwa.dot.gov/ENVIRonment/air_quality/cmaq/reference/cmaq_essentials/
[101] https://www.law.cornell.edu/uscode/text/23/120
[102] http://www.acogok.org/transportation-planning/air-quality/grants/

to safety projects that include air quality or congestion relief components.[103] These safety projects cannot amount to more than 10 percent of the total funds apportioned to the State under 23 United States Code (USC) 104.[104] The required non-federal match will be estimated using the typical 20 percent. Projects in the current TIP and ACOG's long-range plan that could qualify for full coverage through CMAQ funds will be identified later in the report.

Potential Funding Sources for Non-Federal Match

Non-federal match requirements are common across most funding categories. The match requirement can differ for a number of reasons, including the amount of public land (Federal and Native American) in the state. In determining possible local or non-federal match sources, the research team discussed current funding sources with both the Oklahoma DOT and ACOG. In addition, the team reviewed guidance from other states in EPA Region 6, especially those with nonattainment areas currently, on local match requirements.

Project Eligibility Review and Funding Differential Analysis

A nonattainment area designation will provide greater restrictions on how CMAQ funding can be utilized. Currently, Oklahoma's CMAQ funding is 100 percent flexible.[105] Flexible CMAQ funding allows the Oklahoma DOT to direct the CMAQ funding to agencies, or DOT-led projects, based on their discretion and needs. Once an area is designated nonattainment, the State must direct CMAQ funds to that area. If an area in a state is designated nonattainment for ozone, a portion of CMAQ funding is set aside for air quality projects that reduce ozone in the nonattainment area. Set-asides have greater restrictions on usage and cannot be transferred to other funding programs by the State. If the Oklahoma City-Shawnee CSA was designated nonattainment for ozone, their CMAQ funds would be restricted in terms of usage. ACOG would see an increase in CMAQ funding for their area should the Oklahoma City-Shawnee CSA enter nonattainment status. This will necessitate additional air quality improvement projects, or projects with a component that improves air quality impacts from transportation, to utilize these additional funds. The research team reviewed the current STIP for Oklahoma and ACOG's TIP and MetropolitanTransportation Plan (MTP) to identify eligible projects and establish a current funding need. ACOG will be responsible for the MPO area projects and ODOT will have control over projects outside of the MPO boundary that are in the CSA. The team assessed the current funding needs for ACOG including projects from the long-range plan where possible.

[103] Federal Highway Administration. CMAQ Essentials. Air Quality. https://www.fhwa.dot.gov/ENVIRon ment/air_quality/cmaq/reference/cm aq_essentials/. Accessed Aug. 10, 2021.
[104] https://www.fhwa.dot.gov/map21/qandas/qacmaq.cfm
[105] https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm

15 RESULTS

CMAQ funding is tied to authorizing legislation at the federal level, which can change over time. The results presented here utilize the proposed funding levels from the Infrastructure Investment and Jobs Act as a baseline.

The funding tables show a two percent annual increase, which was then used to estimate funding levels to 2050. A conservative scenario was used where funding is frozen at FY 2026 for the remaining years to 2050. The two percent set-aside for State Planning and Research (SPR) was allocated from the total funding and then the three different scenarios are presented to show a range of options should metro areas (Oklahoma City and Tulsa) in Oklahoma receive a nonattainment designation. Each scenario assumes that all eight counties would fall under the nonattainment designation. The results are presented as undiscounted and discounted dollar amounts; the discount rate utilized is three percent.

SCENARIO ONE: CMAQ FUNDING ALLOCATED TO OKLAHOMA CITY-SHAWNEE CSA

The first scenario assumes that the Oklahoma City-Shawnee CSA is the only metro area to be designated nonattainment for ozone. The full amount of CMAQ funding for the State of Oklahoma would be allocated to the CSA with the responsibility for utilizing the funding being split between ACOG and ODOT. The scenario utilizes population estimates from the 2020 Census to split funding between ACOG and ODOT. ACOG would receive funding for the MPO area, which is approximately 88 percent of the population of the CSA. The remaining 12 percent would remain with ODOT to fund projects outside of the MPO area (Table 47). This scenario assumes that ODOT would provide the majority of funding to ACOG; however, DOT ultimately determines the amount of funding that would be provided to ACOG. A number of factors could alter the amount of funding that ODOT decides to retain for projects in the CSA, including the current needs of the State, planned projects in the CSA at the DOT level, and geographic boundary changes due to the latest Census. Table 48 presents an overview of the CMAQ funding amount for the state and the allocation to ACOG under Scenario 1.

Table 47. Scenario 1 Funding Distribution

ACOG	ODOT
88 percent	12 percent

Table 48. CMAQ Funding Allocation - Scenario 1

YEAR	CMAQ FUNDING-OKLHAOMA	ACOG ALLOCATION (UNDISCOUNTED)	ACOG ALLOCATION (DISCOUNTED)	MATCH REQUIREMENT (UNDISCOUNTED)
FY 2022	$12,552,166	$11,045,906	$11,045,906	$2,209,181
FY 2023	$12,803,210	$11,266,825	$10,938,665	$2,253,364
FY 2024	$13,059,274	$11,492,161	$10,832,464	$2,298,432
FY 2025	$13,320,459	$11,772,004	$10,727,294	$2,344,400
FY 2026	$13,586,868	$11,956,444	$10,623,145	$2,391,288
28-Year Total	**$486,926,563**	**$428,495,376**	**$280,366,710**	**$85,699,075**

Note: Analysis assumes a 20 percent match requirement and uses a 3 percent discount rate.

SCENARIO TWO: ODOT RETAINS CMAQ FUNDING

The second scenario still assumes that only the Oklahoma City-Shawnee CSA enters nonattainment for ozone, but under this scenario, ODOT would retain a greater amount of the funding either due to project considerations or the State maintaining some flexible CMAQ funds. The scenario modeled 50 percent of the funding being allocated to ACOG and the remaining 50 percent staying with ODOT, as shown in Table 49. Table 50 presents an overview of the CMAQ funding allocation to ACOG under Scenario 2.

Table 49. Scenario Two Funding Distribution

ACOG	ODOT
50 percent	50 percent

Table 50. CMAQ Funding Allocation - Scenario 2

YEAR	CMAQ FUNDING-OKLHAOMA	ACOG ALLOCATION (UNDISCOUNTED)	ACOG ALLOCATION (DISCOUNTED)	MATCH REQUIREMENT (UNDISCOUNTED)
FY 2022	$12,552,166	$11,045,906	$11,045,906	$2,209,181
FY 2023	$12,803,210	$11,266,825	$10,938,665	$2,253,364
FY 2024	$13,059,274	$11,492,161	$10,832,464	$2,298,432
FY 2025	$13,320,459	$11,772,004	$10,727,294	$2,344,400
FY 2026	$13,586,868	$11,956,444	$10,623,145	$2,391,288
28-Year Total	**$486,926,563**	**$428,495,376**	**$280,366,710**	**$85,699,075**

Note: Analysis assumes a 20 percent match requirement and uses a 3 percent discount rate.

SCENARIO THREE: TULSA METRO AREA AND OKLAHOMA CITY-SHAWNEE ENTER NONATTAINMENT

The third scenario accounts for the possibility that Tulsa would also enter nonattainment alongside the Oklahoma City-Shawnee CSA. Population estimates from the 2020 Census were used to determine a potential split of funding between the Indian Nations Council of Governments (INCOG), ACOG, and ODOT. INCOG would receive 39 percent of the funding for the Tulsa area, ACOG would receive 54 percent for the MPO, and seven percent would remain with ODOT for the area outside the MPO boundary that is in the CSA (Table 51). If both areas were to enter nonattainment, ODOT would determine the amount of funding allocated to each MPO and the amount it would retain. Again, this would depend on the factors mentioned previously, but may also take into account the severity of the air quality issues in each nonattainment area. Table 52 presents an overview of the CMAQ funding allocation to ACOG under Scenario 3.

Table 51. Scenario Three Funding Distribution

INCOG (TULSA REGION)	ACOG REGION	ODOT
39 percent	54 percent	7 percent

Table 52. CMAQ Funding Allocation - Scenario 3

YEAR	CMAQ FUNDING-OKLHAOMA	ACOG ALLOCATION (UNDISCOUNTED)	ACOG ALLOCATION (DISCOUNTED)	MATCH REQUIREMENT (UNDISCOUNTED)
FY 2022	$12,552,166	$6,778,170	$6,778,170	$1,355,634
FY 2023	$12,803,210	$6,913,733	$6,712,363	$1,382,747
FY 2024	$13,059,274	$7,052,008	$6,647,194	$1,410,402
FY 2025	$13,320,459	$7,193,048	$6,582,658	$1,438,610
FY 2026	$13,586,868	$7,336,909	$6,518,748	$1,467,382
28-Year Total	**$486,926,563**	**$262,940,344**	**$172,043,208**	**$52,588,069**

Note: Analysis assumes a 20 percent match requirement and uses a 3 percent discount rate.

NON-FEDERAL MATCH

An increase in CMAQ funding does allow for greater project coverage or the option to expand or increase the number of planned projects. However, CMAQ funding could limit capacity projects as these are considered emission-inducing and not eligible for CMAQ funds. In addition, CMAQ funding does require a non-federal match; this is generally set at 20 percent with some caveats. Table 53 presents an overview of the required matching funds to support the full CMAQ funding amount under each scenario. The next section will discuss potential opportunities for generating the additional match as well as considering the difference between planned projects and available funding.

Table 53. March Requirement Overview

YEAR	MATCH REQUIREMENT (UNDISCOUNTED)		
	SCENARIO 1: 88% ACOG	SCENARIO 2: 50% ACOG	SCENARIO 3: 54% ACOG
FY 2022	$2,209,181	$1,255,217	$1,355,634
FY 2023	$2,253,364	$1,280,321	$1,382,747
FY 2024	$2,298,432	$1,305,927	$1,410,402
FY 2025	$2,344,400	$1,332,046	$1,438,610
FY 2026	$2,391,288	$1,358,687	$1,467,382
28-Year Total	**$85,699,075**	**$48,692,656**	**$52,588,069**

CHALLENGES AND OPPORTUNITIES WITH CMAQ FUNDING ALLOCATION

A nonattainment designation will bring greater funding to ACOG for the MPO area through the CMAQ program. The increase in funds provides an opportunity to advance certain projects or programs of projects, but it also brings challenges associated with meeting the greater match requirement and ensuring that the region has the projects to support the use of the additional funds. The different options available to ACOG to tackle the challenges and meet the opportunities will be presented in this section.

Currently, ACOG receives approximately $650,000 per year in CMAQ funding that is allocated by ODOT. Oklahoma's CMAQ funding is 100 percent flexible at present since no areas are designated nonattainment. Once an area enters nonattainment, ODOT will lose that flexibility and a greater proportion of the CMAQ

funding will have to be allocated to projects in the nonattainment area. The potential change in CMAQ funds allocated to ACOG should the Oklahoma City-Shawnee CSA enter nonattainment is presented in Table 54.

The change under each scenario is presented as multiple factors that could affect the amount of CMAQ funding that is allocated to ACOG by ODOT. Although the funding levels are estimates, each estimate represents a significant increase in CMAQ funding to ACOG.

Table 54. Potential Increase in CMAQ Funds to ACOG

	SCENARIO 1: 88% ACOG	SCENARIO 2: 50% ACOG	SCENARIO 3: 54% ACOG
FY 2022	$10,395,906	$5,626,083	$6,128,170
28 Year Toal	$263,868,438	$142,800,995	$155,544,936

Table 55. Average Annual Cost of Project Delay

Average Cost of 1-Year Delay	PROJECT SIZE		
	LARGE	MEDIUM	SMALL
	$3,054,522	$2,013,603	$1,044,933

Impact of Non-Federal Matching Requirement

The impact of this additional funding is most acute in terms of the non-federal match requirement. The non-federal match requirement under each scenario is $2,209,181, $1,255,217, and $1,355,634 respectively for FY 2022. This represents a sharp increase from the approximately $130,000 required to meet the current match needs for ACOG. The non-federal match for other projects at ACOG is derived from a number of sources that include funds set-aside by ODOT to assist in the use of federal projects as well as sources from their local agencies. ACOG could consider the following options for generating the additional non-federal match:

- Expand current air quality programming that includes the Small Air Quality Grant Program and the Fleet Conversion Grants.
- Engage with local city and county project sponsors to understand their ability to allocate additional matching funds.
- Explore full utilization of the 100 percent federal share for safety-related projects in coordination with ODOT.
- Request additional state funding to target CMAQ projects. Assess the eligible CMAQ planned projects and optimize match availability with the match needs among project priorities.

If additional match requirements cannot be generated through the above options, ACOG may need to explore the possibility of delaying certain transportation projects to ensure full usage of the CMAQ funds allocated to the MPO. While this would ensure that ACOG does not lose CMAQ funding, other costs are incurred through delaying projects. Table 55 shows the average cost of delay by project size.

The size of the project that would need to be delayed would depend on the ability to find non-federal matching funds through existing sources. If ACOG is unable to do so, there is a potential for planned projects to be delayed. ACOG and ODOT may need to assess the trade-off between delaying a project and full utilization of CMAQ funds should this situation occur. Before exploring that trade-off, ODOT could consider transferring up to 50 percent of the CMAQ funds allocated to the state, after set-asides, to the following programs:

- National Highway Performance Program,
- National Highway Freight Program,
- Surface Transportation Block Grant Program,
- Transportation Alternatives, and
- Highway Safety Improvement Program.[106]

If Oklahoma retains flexible funding through CMAQ, those funds can be used for transit projects with an air quality benefit. Transferring funds to the other programs under the base apportionment may ease the burden in the initial years after a nonattainment designation. If there are unfunded projects under these programs within the CSA, both ACOG and ODOT should explore transferring funds to allow additional time to plan for CMAQ eligible projects.

CMAQ Eligible Projects Overview

An increase in CMAQ funding through a nonattainment designation would see ACOG receive between $6.1 to $10.3 million in additional federal funds. ACOG would need to plan and program eligible projects to utilize the additional funds. The following is the CMAQ eligible project list:

1. Diesel Engine Retrofits and Other Advanced Truck Technologies
2. Idle Reduction
3. Congestion Reduction and Traffic Flow Improvements
4. Freight/Intermodal Improvements
5. Transportation Control Measures
6. Transit Improvements
7. Bicycle and Pedestrian Facilities and Programs
8. Travel Demand Management
9. Public Education and Outreach Activities
10. Transportation Management Associations
11. Carpooling and Vanpooling
12. Carsharing Programs
13. Extreme Low-Temperature Cold Start Programs
14. Training
15. Inspection/Maintenance (I/M) Programs
16. Innovative Projects
17. Alternative Fuels and Vehicles

Current usage of CMAQ funds is relatively low with the majority funding programs led by ACOG with some small bicycle and pedestrian facility projects. Table 56 presents an overview of the projects utilizing CMAQ funds for the Fiscal Year 2021.

Table 56. FY 2021 ACOG CMAQ Projects

PROJECT SPONSOR	PROJECT DESCRIPTION	LENGTH (MILES)	FUNDING SOURCE	ESTIMATED FEDERAL SHARE	ESTIMATED LOCAL SHARE	TOTAL
University of Central Oklahoma (UCO)	UCO Campus Bicycle Infrastructure Improvement (bike racks, signs, markings)	VAR	CMAQ 70%/ 30%	$4,470	$1,916	$6,386
Edmond	Ayers Lane Reapportionment and Dedicated Bycycle Lanes	0.83	CMAQ 70%/ 30%	$108,500	$46,500	$155,000
Oklahoma City	Downtown Bike Racks and Repair Stations	VAR	CMAQ 80%/ 20%	$22,080	$5,520	$27,600
ACOG MPO Line Item	ACOG Air Quality Programs: Air Quality Public Education, Public Fleet Conversion, Air Quality Awareness Grants	N/A	CMAQ	$600,000	$0	$600,000
Totals				$735,050	$735,050	$735,050
Apportioned CMAQ Totals				**$135,050**	**$53,936**	**$188,986**

[106]Congestion Mitigation and Air Quality Improvement Program - FAST Act Fact Sheets - FHWA | Federal Highway Administration. https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm. Accessed Aug. 10, 2021.

Table 57. CMAQ Funding Scenarios - Economic Impacts

SCENARIO	CMAQ	JOBS PER YEAR	INCOME	OUTPUT	AGGREGATE
S1 FY 2022	$10,395,906	234	$10,000,000	$11,600,000	$21,600,000
S1 28 Year Total	**$263,868,438**	**5,9937**	**$254,000,000**	**$294,800,000**	**$548,800,000**
S2 FY 2022	$5,626,083	127	$5,400,000	$6,300,000	$11,700,000
S2 28 Year Total	**$142,800,995**	**3,213**	**$137,500,000**	**$159,500,000**	**$297,000,000**
S3 FY 2022	$6,128,170	138	$5,900,000	$6,800,000	$12,700,000
S3 28 Year Total	**$155,544,936**	**3,500**	**$149,800,000**	**$173,800,000**	**$323,500,000**

The following project types are included in the long-range plan and may be eligible for CMAQ funding. These project types will only be eligible if they meet additional CMAQ criteria—such as including a nonmotorized component that could lead to mode shift or reducing congestion and improving traffic flow.

- Road Diet
- ITS
- Intersection Improvements
- Interchanges

In addition, Bicycle and Pedestrian projects are eligible for CMAQ funding.

ACOG's long-range plan does include projects that would be eligible for CMAQ funding, but this analysis has shown that a gap between programmed projects and CMAQ funds is probable. ACOG should explore the following options to maximize their use of CMAQ funds:

- Shift current air quality-related projects to be funded through CMAQ.
- Explore new project options, including electric vehicle infrastructure and transit improvements that reduce mobile source emissions.
- Maximize the use of grant programs, such as the Small Air Quality Grant Program and their Fleet Conversion Grants.

A shift in projects to CMAQ could release funds with greater flexibility in project type to maintain capacity and other non-air quality-related projects in the long-range plan. Projects planned for later cycles in the long range-plan could be brought forward with access to additional funds, including bicycle and pedestrian projects or even projects that promote electric vehicles. If funds have the flexibility to be utilized for transit projects; marketing, reduced fares, and circulars are easy to implement solutions that can help reduce emissions from mobile sources in the region.

ECONOMIC IMPACTS FROM CMAQ FUNDING INCREASE TO OKLAHOMA CITY - SHAWNEE CSA

The economic impacts of additional CMAQ funding in three scenarios were calculated. These impacts include the business output and wage income. The aggregate impact is the sum of these two impacts.

Business output is associated with construction spending resulting from CMAQ funding, that is the nonwage impacts of the construction contractors spending money on the construction project. The multiplier used for this was derived from a sample of 59 urban projects in Texas. While not exact, the multiplier should be similar and Oklahoma data was not available.

The positive economic effect of wage income is the impact of increased worker income associated with the additional economy. The construction wage multiplier used for this was taken from the Bureau of Labor Statistics for each county in the analysis, then averaged to create an average wage multiplier. NAICS Code 1012: Construction was used for this.

The economic effect of wage income can be divided into direct, indirect, and induced effects. In this case, the direct impact is the wages being paid to the construction workers, the indirect impact is the impact of workers spending their wages in the economy which creates additional jobs, and the induced impact is the impact of the additional wage income created by those additional jobs.

- Business Output = Discounted Construction Cost * Business Output Multiplier
- Economic Effect of Wage Income = Discounted Construction Cost * Wage Income Multiplier

Table 57 shows the economic impacts and jobs supported for each CMAQ funding scenario. The 28-year total is equal to the FY 2022 CMAQ funding, multiplied by 28 years, then discounted to current dollars. The jobs per year column shows the number of jobs supported per year in each scenario. The jobs per year are slightly lower in the 28-year total scenarios due to discounting, since there is less real money available in the later years of the analysis. The income column shows the economic effect of wage income, the output column shows the economic effect of business output, and the aggregate column shows the sum of these two impacts. Aggregate impacts for FY 2022 ranged from a high of $21.6 million in scenario one to a low of $11.7 million in scenario two. Jobs supported by the increased funding are shown as jobs per year.

16 CONCLUSION AND RECOMMENDATIONS

A nonattainment designation for ozone would alter the current framework for CMAQ funding in Oklahoma. If the CSA enters nonattainment, ACOG will receive a greater proportion of the CMAQ funding allocated to the State of Oklahoma.

While this increase in funding expands ACOG's ability to complete projects, specifically in terms of CMAQ-eligible projects that reduce pollutants from mobile sources, it also requires additional matching funds and may limit their ability to fund capacity-related projects. This report has provided an overview of the CMAQ program, specifically addressing:

- Projects eligible for CMAQ funds
- The cost-effectiveness of different project types at reducing emissions from mobile sources
- Guidance from other states on effectively managing a CMAQ program of projects.

In addition, the research team developed three scenarios to estimate the amount of CMAQ funding that ACOG would receive under a nonattainment designation for ozone. These three scenarios all indicate an increase in CMAQ funding that would then require additional matching funds as well as an increase in projects that are directed at reducing emissions from mobile sources. The research team recommends the following actions to address both issues:

- Coordinate with ODOT to leverage additional state funds for a match where possible as well as to utilize the 100 percent federal cost-share on safety-related projects.
- Expand the two grant programs to increase access to match and provide additional CMAQ-eligible projects.
- Consider transferring CMAQ funds, in cooperation with ODOT, to other programs within the base apportionment especially in the initial years following the nonattainment designation.
- Utilize additional CMAQ funding to the fullest extent possible in order to maximize the economic benefits to the region.

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