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The Potential Costs of an Ozone Nonattainment Designation to Central Texas

Prepared by the Capital Area Council of Governments Air Quality Program

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Executive Summary

This study estimates that a nonattainment designation for the U.S. Environmental Protection Agency's (EPA's) proposed ozone National Ambient Air Quality Standards (NAAQS) could cost the Central Texas economy $24 - $41 billion between 2018 and 2046. On an annual basis, that would be $0.9 - $1.4 billion per year. This estimate is based on extensive consultation with local stakeholders and detailed analysis of the potential regulatory and economic consequences of an ozone nonattainment designation for the Austin-Round Rock Metropolitan Statistical Area (MSA), which includes Bastrop, Caldwell, Hays, Travis, and Williamson Counties. For this analysis, CAPCOG used the following general assumptions:

- the EPA sets the new ozone standard at 65 parts per billion (ppb) by October 1, 2015;
- the EPA designates all five counties of the Austin-Round Rock MSA as a Marginal nonattainment area in late 2017 based on a projected 2014-2016 ozone design value of 66-68 ppb;
- the MSA's ozone levels do not decrease quickly enough to attain the new standard by the end of the 2019 ozone season and is reclassified to "Moderate," and
- the EPA will implement the new ozone standard in the same way it is implementing the current 75 ppb ozone standard for both nonattainment and maintenance areas.

Under this scenario, CAPCOG analyzed each of the Clean Air Act's requirements for ozone nonattainment areas and the economic consequences for the Austin-Round Rock MSA if it is designated nonattainment for EPA's proposed ozone standard. Under a Marginal classification and subsequent maintenance period, the region's initial nonattainment designation could prevent Samsung and Texas Lehigh from expanding manufacturing within the region, lead to delays in infrastructure improvements and temporary losses in federal funding for highway construction projects; this could cost the local economy $21.3 - $37.9 billion through 2046. If the area were to miss its anticipated fall 2020 attainment date for Marginal areas based on the region's 2017-2019 design value, the additional regulations associated with the Moderate classification could cost another $1.0 - $3.7 billion. These estimates indicate that the Austin-Round Rock MSA could face significant economic consequences for even briefly being designated nonattainment, with those consequences growing with each year that the region remained designated nonattainment.

This analysis is intended to provide the Central Texas community, the TCEQ, and the EPA with an understanding of the stakes that the region faces if it is designated nonattainment. Local elected officials, the state, and the EPA have worked together for over a decade to help keep the region designated attainment, and this study helps provide a basis for understanding the economic benefits of investing time, effort, and financial resources to voluntarily reduce ozone-forming emissions in order to reduce the risk of being designated nonattainment. These cost estimates also highlight the economic consequences of the EPA applying the same approach to implementing the new ozone standard as it is taking for the 2008 ozone NAAQS.

A nonattainment designation is a threshold that, once crossed, has at least 23 years of economic consequences for the region for some of the regulatory requirements even under the most optimistic circumstances. While this study is intended to provide an understanding of the economic costs of an ozone nonattainment designation, it does not cover all of the costs that the region may face as a result of the EPA's implementation of the ozone NAAQS. The area could also face costs associated with

reducing interstate ozone impacts, the impacts of the Austin-Round Rock MSA's emissions on ozone levels in other parts of the state, or to bring the area's ozone levels into attainment of the standard beyond those directly associated with a nonattainment designation. This study also does not include a comprehensive analysis of the economic consequences of the somewhat higher local ozone levels that might occur if the area remains designated attainment than if it was designated nonattainment, although a limited analysis of data provided by the EPA in its Regulatory Impact Analysis for the ozone standard proposal does provide an approximation of the estimated economic benefits of a 1 ppb reduction in ozone, which is a level that local efforts could currently be achieving. CAPCOG plans on updating this analysis in the future as new information becomes available and new analyses are completed. While this analysis has some limitations, there are clear policy implications– it shows that there can be substantial economic benefits to taking voluntary action to reduce ozone levels in areas that are at risk for being designated nonattainment and, by the same logic, there are also substantial economic benefits for finding creative and flexible ways to implement any new standards short of designating an area as nonattainment.

This analysis focused on reasonably foreseeable scenarios that could arise as a result of a nonattainment designation, but does not represent all costs that the region might face. For example, while this study specifically analyzes the economic consequences of the loss of potential expansions at Samsung and Texas Lehigh, it does not mean that there wouldn't be economic consequences of other expansions that might not occur due to a nonattainment designation. This report also does not account for any actions that EPA might take that could reduce these risks, such as designating only part of the MSA as nonattainment or implementing the standard differently than it is implementing the 2008 standard. The following table provides a summary of CAPCOG high and low estimates of these reasonably foreseeable economic costs that the region could face if the Austin-Round Rock MSA is designated nonattainment for the new ozone standard.

Table 1. Estimated economic impact of an ozone nonattainment designation on the Austin-Round Rock MSA 2018 - 2046

Scenario	Low	High
Loss of Samsung Expansion	($21,340,142,448)	($33,893,167,418)
Loss of Texas Lehigh Expansion	($1,811,586,399)	($3,700,575,961)
Decker and Sim Gideon Boiler Replacements	$0	$0
Transportation Conformity-Routine Analysis	($2,300,000)	($7,000,000)
Transportation Conformity-Routine Project Delays	($27,407,176)	($41,471,216)
Transportation Conformity-Lapse-Project Delays	($18,298,801)	($93,012,795)
Transportation Conformity-Loss of Federal Funds	($23,746,747)	($74,646,101)
General Conformity-Rail Expansion Delays	($7,182,369)	($14,364,738)
General Conformity-Aviation Expansion Delays	($22,449,120)	($44,898,240)
NO_x Point Source Emission Reductions	($141,494,537)	($2,047,800,546)
VOC Reductions	($904,917,445)	($1,630,209,506)
TOTAL ECONOMIC IMPACT	**($24,299,525,042)**	**($41,547,146,520)**

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1 Introduction

In November 2014, the U.S. Environmental Protection Agency (EPA) proposed to lower the level of the ozone National Ambient Air Quality Standards (NAAQS) from its current level of 75 parts per billion (ppb) to a range of 65-70 ppb, and is under a court order to finalize this rulemaking by October 1, 2015. Compliance with the standard is based on a region's three-year average of its annual fourth-highest maximum daily eight-hour ozone averages, a statistic known as an ozone "design value." The Austin-Round Rock Metropolitan Statistical Area (MSA) has a 2012-2014 ozone design value of 69 ppb, and is projected to have a design value of 66-68 ppb for 2014-2016, putting it at risk for being designated nonattainment for the proposed standard.

This study estimates the potential costs for Central Texas if the region is designated nonattainment for the EPA's proposed NAAQS for ground-level ozone. Since 2002, the Central Texas Clean Air Coalition (CAC) and the Texas Commission on Environmental Quality (TCEQ) have taken significant steps to reduce the region's ozone-forming emissions, both to improve public health and to ensure that the region remained designated "attainment" for the ozone NAAQS. One of the benefits of taking voluntary action to reduce ozone-forming emissions is the impact that these efforts can have in reducing the economic risks associated with an ozone nonattainment designation.

While many stakeholders mention reducing these economic risks as a primary reason for their involvement in the local air quality planning efforts, there has not been a clear understanding within the community of the nature or scale of these economic risks. This study is designed to provide such an assessment, which can in turn be used in cost/benefit analyses for taking voluntary actions to reduce ozone-forming emissions or taking flexible approaches to implementing the new ozone standard.

An understanding of the potential costs to Central Texas of a nonattainment designation for the EPA's proposed ground-level ozone NAAQS should help decision-makers within the Austin-Round Rock MSA, at the state level, and at the national level understand the potential impact to the region if the EPA implemented the proposed NAAQS in the same way it is implementing the 2008 ozone NAAQS. An understanding of these risks should help local and state policymakers better understand the benefit of reducing the risks of a nonattainment designation for the proposed ozone NAAQS, and should help federal policymakers better understand the potential consequences for the region of a decision by the EPA to implement the proposed NAAQS the same way it is implementing the 2008 ozone NAAQS.

A nonattainment designation for the proposed ozone NAAQS would likely have 23-29 years of economic consequences for the region, including the 3-9 years that the area would be designated nonattainment and an additional two, 10-year maintenance periods that would begin when the area was redesignated to attainment. Given its ozone levels, it is likely to be initially designated at the lowest classification of "Marginal." However, even if the region were to measure attainment of the proposed ozone NAAQS by the end of the 2017 ozone season, it is unlikely that the area would be able to be redesignated to attainment any sooner than 2020, and it would still be subject to maintenance requirements for an additional 20 years afterwards. It is also possible that the region could miss the attainment deadline for Marginal areas and be reclassified to Moderate, which would entail an additional set of requirements for the region.

This study analyzes the impacts of the following nonattainment and maintenance area requirements:

- Nonattainment New Source Review (NNSR) Permitting;
- Transportation Conformity;
- General Conformity
- Restrictions on "Backsliding."
- A 15% Reduction in Volatile Organic Compounds (VOC) emissions;
- Reasonably Available Control Technology (RACT);
- Other emission reduction measures necessary for an attainment demonstration, including implementation of "Reasonably Available Control Measures" (RACM); and
- A "Basic" Vehicle Emissions Inspection and Maintenance (I/M) program.

This report describes each of these requirements, presents the likelihood that the requirement could affect the local economy, and the scale of the potential impacts on the economy. Section 2 provides background on the various requirements for nonattainment areas. Section 3 provides detailed descriptions of CAPCOG's regulatory assumptions while Section 4 provides detailed descriptions of CAPCOG's economic assumptions. Section 5 provides the potential cost analyses for each of the specific scenarios CAPCOG examined. Section 6 provides context for these costs, including potential offsetting financial and health benefits, costs that the region is already voluntarily incurring to reduce ozone, and how some of the voluntary measures that are currently implemented could impact the cost of a nonattainment designation.

The specific scenarios that CAPCOG analyzed costs for can be found in the following sections:

- Loss of Samsung Expansion: Section 5.1
- Loss of Texas Lehigh Expansion: Section 5.2
- Decker and Sim Gideon Boiler Replacements: Section 5.3
- Transportation Conformity – Routine Analysis: Section 5.41.
- Transportation Conformity – Routine Project Delays: Section 5.4.2
- Transportation Conformity – Lapse Project Delays: Section 5.4.3
- Transportation Conformity – Loss of Federal Funds: Section 5.4.4
- General Conformity – Rail Expansion Delays: Section 5.5
- General Conformity – Aviation Expansion Delays: Section 5.5
- NOX Point Source Emission Reductions: Section 5.6
- VOC Reductions: Section 5.7

1.1 EPA's Proposed Ozone Standard

On November 25, 2014, the EPA proposed tightening the ground-level ozone NAAQS from a level of 75 ppb to a level of 65-70 ppb. Under a consent decree, the EPA is required to finalize the new ozone NAAQS no later than October 1, 2015. Hereafter in this report, this proposed standard will be referred to as the 2015 ozone NAAQS. Compliance with the 2015 ozone NAAQS would be based on the same statistic as the current standard: the three-year average of the annual fourth highest daily maximum 8-hour ozone averages, a statistic known as the ozone "design value." While the Austin-Round Rock MSA's 2012-2014 ozone design value of 69 ppb is in compliance with the current standard and ozone levels are

expected to continue to decrease, the region's design value is likely to fall in the middle of the range being considered by EPA at the time it will be designating areas as nonattainment for the 2015 ozone NAAQS in late 2017.

1.2 Analysis Included in this Study

This study focuses on characterizing economic risks that the region would face specifically as a result of a nonattainment designation for the new ozone NAAQS. The focus on characterizing the risks arising from a nonattainment designation does not mean that the region might not still face some of the same economic consequences as a result of the nation-wide implementation of the proposed NAAQS. In particular, the Clean Air Act's (CAA's) requirement that states abate interstate air pollution and the potential need to reduce emissions within the region in order to assist reaching attainment in other parts of the state may entail regulations that require local emission reductions and the costs associated with them even if the region is not designated nonattainment. To the extent that emission reductions required as a result of one of these two situations may reduce the additional emission reductions that would be required only because of a nonattainment designation, including them in this analysis would obscure the fact that the region would face these costs as a result of a nonattainment designation whether or not some additional emission reductions would otherwise be required.

Furthermore, the costs arising specifically from a nonattainment designation are different from the costs arising from the need to actually bring an area into attainment of the NAAQS. The measures that are necessary specifically as a result of a nonattainment designation may be neither necessary nor sufficient to bring that area into attainment of the new ozone NAAQS. Likewise, putting in measures that would achieve attainment does not waive the area's obligations to enact other measures required as a result of a nonattainment designation. For example, the VOC emission reductions required for certain ozone nonattainment areas would not be particularly useful to reducing ozone in a NO_X-limited area (an area where peak ozone formation is limited by NO_X emissions and concentrations) like Central Texas, but would be required nonetheless if the area was designated nonattainment. Moreover, under §110(a) of the CAA, states are responsible for attaining and maintaining the NAAQS throughout the geographic extent of their jurisdiction, including in areas that are designated attainment or unclassifiable. If an area is designated attainment or unclassifiable in EPA's initial round of designations and subsequently measures ozone levels that exceed the NAAQS, there are no mandatory statutory consequences for the area that are triggered by measuring levels of the standard. However, the state is still required to bring that area's ozone levels into attainment of the standard, and may need to enact local emission reductions to achieve that objective, especially if EPA issues a "SIP Call" indicating that the state's SIP is not fulfilling the requirement to attain and maintain the standard throughout the state's jurisdiction.

For a nonattainment area, failure to attain the NAAQS within specified timeframes does have specific consequences, and it is possible and useful to characterize those. VOC and NO_X emissions are projected to decline year after year for many years to come (see EPA's 2025 and 2030 emissions projections used in its modeling for the 2014 ozone NAAQS proposal and the Tier 3 vehicle standards)[1], both nationwide and within the MSA. Therefore, the emission reductions that a nonattainment area would need to enact

[1] http://www.epa.gov/ttnchie1/emch/

in order to reach attainment of the standard changes depending on which year is analyzed. For example, the cost of attaining the standard by the end of 2019 would be significantly higher than the cost of attaining the standard by the end of 2022, since the extra time would produce three extra years of emission reductions from fleet turnover. However, failure for a Marginal ozone nonattainment area to attain the standard by the end of 2019 would trigger a number of requirements associated with being "bumped up" to a "Moderate" classification, and the costs of those requirements could exceed the reduced cost of attaining the standard three years later. For these reasons, while this study includes some analysis of the costs of attaining the standard by certain key dates for a nonattainment area, the focus will be on the costs and risks that are specific to the designation itself. The requirement for a nonattainment area to implement RACM can theoretically advance the area's attainment date by at least a year, but – given the timing of the scenario laid out in this analysis, CAPCOG is not assuming that this requirement would impose costs on the region beyond what was necessary to attain the standard by the end of 2022.

The region may face costs associated with attaining the standard, reducing intrastate ozone impacts, or reducing intrastate ozone impacts regardless of whether or not the area is designated nonattainment. However, the statutory requirements that could lead to such costs are far less specific and it is also true that the area may face no direct costs associated with implementing the new ozone NAAQS if the region is not designated nonattainment. However, there are specific types of costs that can be analyzed for the region based on the specific statutory requirements for ozone nonattainment areas that the region would have to contend with if designated nonattainment. Therefore, it is useful to distinguish between: a) the cost of bringing the Austin-Round Rock MSA's ozone levels into attainment of a standard; b) the cost of reducing the Austin-Round Rock MSA's emissions on ozone levels elsewhere in the state; c) the cost of reducing the Austin-Round Rock MSA's emissions on ozone levels in other states; and d) the costs of a nonattainment designation.

The first step in characterizing the potential economic consequences of an ozone nonattainment designation is to describe, in detail, the requirements for such areas. The statutory requirements for ozone nonattainment areas can be found in §171-179 (Title I, Part D, Subpart 1) and §181-182 (Title I, Part D, Subpart 2) of the 1990 CAA Amendments. Over the last 25 years, these requirements have been interpreted by the EPA's Office of Air Quality Planning and Standards (OAQPS) in rulemakings and guidance document and have been litigated in various court cases. They have also been interpreted by state agencies with authority for air quality within their states, such as the Texas Commission on Environmental Quality (TCEQ), and EPA regional offices, including EPA Region 6 office that covers Texas. For Texas, the TCEQ is the state agency responsible for preparing, adopting, and implementing revisions to the State Implementation Plan (SIP) to attain and maintain air quality within the state. These have included SIP revisions applicable to four areas of the state that have been designated nonattainment for ozone at various times since 1990: the Dallas-Fort Worth (DFW) area, the Houston-Galveston-Brazoria (HGB) area, the Beaumont-Port Arthur Area (BPA), and the El Paso area. In order to provide a comprehensive description of exactly what would be required for the Austin-Round Rock MSA if designated nonattainment, CAPCOG has reviewed the relevant portions of the CAA, relevant rulemakings and guidance documents implementing the ozone NAAQS, relevant court cases, TCEQ SIP

revisions, and EPA actions on those SIP revisions. Section 1 provides a review of the requirements for nonattainment areas.

The second step in this process is to characterize the likelihood that certain specific requirements might apply to the Austin-Round Rock MSA in light of the region's unique characteristics and the specific circumstances surrounding the proposed ozone NAAQS. For example, what an ozone designation might mean for the Tyler-Longview-Marshall area would likely be quite different from what it might mean for the Austin-Round Rock MSA due to the amount of ozone reduction required to reach attainment, differences in the impact of local emissions compared to emissions outside of the region, the types and scale of industrial sources in each area, growth rates, transportation patterns, and the level of urbanization of each area, among others. Each of these factors can have a significant influence on the likelihood that each set of requirements might be triggered for the Austin-Round Rock MSA if it were to be designated nonattainment. In order to conduct a proper risk assessment, it is also important to distinguish between requirements that will definitely apply or situations that will definitely occur if the area gets designated nonattainment and requirements or situations that may have a low chance of applying or occurring, but if they did, could result in high costs.

One of the primary benefits for a community like Central Texas to take voluntary actions to reduce ozone-forming emissions is that these measures can help the community avoid being designated a nonattainment area by the EPA for ground-level ozone NAAQS. The purpose of this study is to characterize what an ozone nonattainment designation could cost Central Texas. This study should help policymakers and air quality planners understand and communicate the benefits of taking voluntary actions to reduce the chances of the region being designated nonattainment for EPA's proposed ozone NAAQS, which are expected to be finalized by October 1, 2015. While this study focuses on the possibility of being designated nonattainment for an expected 2015 ozone NAAQS, the CAA requires EPA to complete its next ozone NAAQS review by 2020, and this analysis should also be useful for air quality planners to understand the potential costs of a nonattainment designation for that and any future ozone NAAQS.

1.3 Summary of Key Assumptions Used in this Analysis

This study is based generally on several key assumptions, each of which are important to elaborate upon before getting into the analysis. These include assumptions about the timing and level of the NAAQS, the timeframe and criteria used for designations, the EPA's implementation rules for the new standard, the region's projected ozone levels and likely classification, and the nature of what a "no nonattainment designation" scenario might look like as a point of comparison.

First, this study assumes that the new ozone standard will be finalized by October 1, 2015, and that the standard will be set at a level of 65-70 ppb, using the three-year average of the fourth-highest daily maximum eight-hour ozone averages as the form of the standard as was proposed. As will be discussed further in Section 3, CAPCOG used an assumption of a 65 ppb standard for this analysis in order to analyze the highest end of costs that a nonattainment designation could result in, but many of the analyses remain valid for higher levels of the standard within this range if the area's 2016 ozone design value is above that level. All of the assumptions about requirements for a Marginal area and maintenance areas would remain valid, albeit for shorter periods of times, even if the area was able to

measure attainment of the standard the very next year after being designated nonattainment. While it is possible that the finalization of the standard could be delayed, CAPCOG considers this unlikely, since EPA is under a court order to finalize the standard by October 1 and will at that point already be more than two and a half years beyond the five-year review timeframe following the promulgation of the 2008 ozone standard. And while it is also possible that EPA could set the standard at a level outside of this range, CAPCOG considers that very unlikely.

Second, this study also assumes that the EPA will make designations in September 2017 based on 2014-2016 ozone design values. Under §107 of the CAA, the EPA administrator must make designations for a new or revised standard no later than two years after promulgation, and can extend that timeframe by up to a year if insufficient information exists to complete designations within that timeframe. The EPA indicated in the preamble to the proposal for the ozone NAAQS that they were likely to set the schedule such that designations would occur in September 2017. CAPCOG also assumes that the EPA's guidance for designating areas as nonattainment is likely going to closely resemble the guidance it issued following the promulgation of the 2008 ozone NAAQS.[2] In this guidance, the EPA specifies that the presumptive boundaries of a nonattainment area would be the entire Consolidated Statistical Area (CSA) or Core-Based Statistical Area (CBSA) in which a violating monitor was located. The most recent definitions of statistical areas issued by the OMB in February 2013 define the Austin-Round Rock Metropolitan Statistical Area (MSA) as the CBSA centered on the City of Austin, which includes Bastrop, Caldwell, Hays, Travis, and Williamson Counties.[3] While there will be opportunities for the region and each jurisdiction to make a case for not being designated nonattainment, this study uses the assumption that all five counties would be designated nonattainment – not because CAPCOG believes that this would occur, but because it would illustrate the cost to the entire region if this were to occur based on the default approach used to designate areas nonattainment.

Third, this study assumes that the EPA will implement the new ozone standard in a manner very similar, if not identical, to the way it is currently implementing the 2008 ozone NAAQS. The EPA's two rules relating to the implementation include an initial rulemaking related to the classification scheme and transportation conformity,[4] while the second rulemaking addressed SIP submission requirements for areas designated nonattainment.[5] A recent decision in *NRDC v. EPA* regarding the initial rulemaking has altered some of these requirements, and this study incorporates the impact of that decision.[6]

1.4 Background on this Study's Development

This report was developed between September 2014 and August 2015 by CAPCOG with extensive participation and input from regional stakeholders, and experts. In support of this project, the CLEAN AIR Force of Central Texas convened four workshops between January and May 2015 to discuss specific

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2 http://www.epa.gov/ozonedesignations/2008standards/documents/Area_Designations_for_the_2008_Revised_Ozone_NAAQS.pdf

3 http://www.whitehouse.gov/sites/default/files/omb/bulletins/2013/b-13-01.pdf

4 http://www.gpo.gov/fdsys/pkg/FR-2012-05-21/pdf/2012-11618.pdf

5 http://www.gpo.gov/fdsys/pkg/FR-2015-03-06/pdf/2015-04012.pdf

6 http://www.cadc.uscourts.gov/internet/opinions.nsf/E97A64FFBFE4DC1D85257DB70054D5EE/$file/12-1321-1528834.pdf

regulatory requirements, what type of costs those requirements might create, and how to estimate those costs. Individuals who participated in these workshops and subsequent conversations include:

- Joe Black, Lone Star Rail District;
- David Boucher, Camp Mabry;
- Bob Breeze, Zephyr Environmental;
- Holly Brightwell Ferguson, TCEQ;
- Morris Brown, TCEQ;
- Elena Craft, Environmental Defense Fund;
- Rob Chambers, Austin White Lime;
- Brett Davis, Zephyr Environmental;
- Sarah Holland, CLEAN AIR Force of Central Texas;
- Donna Huff, TCEQ;
- Tim Jones, Samsung & CLEAN AIR Force of Central Texas;
- Ravi Joseph, Austin Energy;
- Eddie Lin, TCEQ;
- Bonnie Lister, TxDOT Austin District;
- Joseph Marini, Texas Lehigh Cement Company;
- Shana Norton, CAMPO (retired);
- Jackie Ploch, TxDOT;
- Jan Prusinski, Texas Cement Council;
- Jeff Riley, EPA Region 6;
- Celina Romero, Duggins, Wren, Mann & Romero (representing Texas Pipeline Association);
- Cathy Stephens, CAMPO (retired);
- Ryan Thompson, the University of Texas at Austin;
- Lisa Weston, CAMPO; and
- Jaime Zech, TCEQ.

Within CAPCOG, this project involved both the Air Quality Program and the Economic Development Program. The economic model used to assess potential costs of a nonattainment designation is called the Economic Modeling Specialists International (EMSI) Input-Output model and can be used to analyze economic relationships between sectors within a regional economy and the impact that changes in one sector can have throughout the region's gross regional product (GRP).

CAPCOG conducted preliminary presentations of the study's findings to the board of the CLEAN AIR Force of Central Texas on August 5, 2015, and the Central Texas Clean Air Coalition (CAC) on August 11, 12, 2015, in order to solicit any final input prior to finalizing the study. CAPCOG submitted a draft of this report to the TCEQ on August 14, 2015, and subsequently received comments from TCEQ staff, including the Air Quality Division, Air Permitting Division, and the Environmental Law Division. CAPCOG also received additional information on specific plans for expansions at Austin-Bergstrom International Airport that were incorporated into the report.

While this study is CAPCOG's analysis, and none of the analysis in this report should be ascribed to the individuals or organizations described above, the information and analysis in this report has been shaped to a significant degree by the input provided above.

2 Background on Nonattainment Area Requirements

This section provides a general background on major nonattainment area requirements applicable to an ozone nonattainment area with a Marginal or Moderate classification.

2.1 Overview of Nonattainment Area Requirements

There are a total of 69 distinct requirements that EPA lists for areas designated nonattainment for the 2008 ozone NAAQS.[7] There are also an additional two requirements (transportation and general conformity) that apply to both nonattainment and maintenance areas.

- Marginal: 5 requirements
  - Marginal area NNSR permitting rules;
  - Transportation Conformity;
  - General Conformity;
  - Emissions Inventory;
  - Emission Statements;
- Moderate: 56 requirements
  - All Marginal area requirements;
  - Moderate area NNSR permitting rules;
  - Attainment demonstration;
  - Reasonable further progress (RFP) demonstration (15% reduction in VOC emissions);
  - Reasonably available control technology (RACT) for major sources of NO_X;
  - RACT for major sources of VOC;
  - RACT for VOC sources covered by an EPA control technique guideline (CTG) document (44 total);
  - Contingency measures for attainment and RFP;
  - A basic vehicle inspection and maintenance (I-M) program;
- Serious: 60 requirements;
  - All Marginal and 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 reduction in NO_X and VOC emissions for RFP;
- Severe: 62 requirements;
  - All Marginal, Moderate, and Serious area requirements;
  - Severe area NNSR permitting;
  - An emissions fee program if the area fails to attain its standard by its attainment deadline;
  - Additional 3% per year reduction in NO_X and VOC emissions for RFP;
- Extreme: 64 requirements;
  - 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.

[7] http://www.epa.gov/airquality/urbanair/sipstatus/reports/ozone-8hr_2008_en.html

Table 2. Summary of Ozone Nonattainment Area Requirements by Classification

Requirement	Marginal	Moderate	Serious	Severe	Extreme
Clean Fuels for Boilers	☐	☐	☐	☐	☒
Clean Fuels for Fleets 182(c)(4)	☐	☐	☒	☒	☐
Contingency Measures VOC and NO_X	☐	☒	☒	☒	☒
Contingency Provisions for RFP Milestones 182(c)(9)	☐	☒	☒	☒	☒
Emission Inventory	☒	☒	☒	☒	☒
Emission Statement	☒	☒	☒	☒	☒
Enhanced Monitoring (PAMS)	☐	☐	☒	☒	☒
I/M Enhanced	☐	☐	☒	☒	☒
Nonattainment NSR rules - Marginal	☒	☐	☐	☐	☐
Nonattainment NSR rules - Moderate	☐	☒	☐	☐	☐
NSR rules - OTR	☐	☐	☐	☐	☐
Nonattainment NSR rules - Serious	☐	☐	☒	☐	☐
Nonattainment NSR rules - Severe 15	☐	☐	☐	☒	☐
Nonattainment NSR rules - Extreme	☐	☐	☐	☐	☒
Ozone Attainment Demonstration	☐	☒	☒	☒	☒
RACT Non-CTG VOC for Major Sources	☐	☒	☒	☒	☒
RACT NO_X for Major Sources	☐	☒	☒	☒	☒
RACT VOC CTG Aerospace	☐	☒	☒	☒	☒
RACT VOC CTG Auto and Light-Duty Truck Assembly Coatings (2008)	☐	☒	☒	☒	☒
RACT VOC CTG Bulk Gasoline Plants	☐	☒	☒	☒	☒
RACT VOC CTG Equipment Leaks from Natural Gas/Gasoline Processing Plants	☐	☒	☒	☒	☒
RACT VOC CTG Factory Surface Coating of Flat Wood Paneling	☐	☒	☒	☒	☒
RACT VOC CTG Fiberglass Boat Manufacturing Materials (2008)	☐	☒	☒	☒	☒
RACT VOC CTG Flat Wood Paneling Coatings (2006)	☐	☒	☒	☒	☒

Requirement	Marginal	Moderate	Serious	Severe	Extreme
RACT VOC CTG Flexible Packaging Printing Materials (2006)	☐	☒	☒	☒	☒
RACT VOC CTG Fugitive Emissions from Synthetic Organic Chemical Polymer and Resin Manufacturing Equipment	☐	☒	☒	☒	☒
RACT VOC CTG Graphic Arts - Rotogravure and Flexography	☐	☒	☒	☒	☒
RACT VOC CTG Industrial Cleaning Solvents (2006)	☐	☒	☒	☒	☒
RACT VOC CTG Large Appliance Coatings (2007)	☐	☒	☒	☒	☒
RACT VOC CTG Large Petroleum Dry Cleaners	☐	☒	☒	☒	☒
RACT VOC CTG Leaks from Gasoline Tank Trucks and Vapor Collection Systems	☐	☒	☒	☒	☒
RACT VOC CTG Leaks from Petroleum Refinery Equipment	☐	☒	☒	☒	☒
RACT VOC CTG Lithographic Printing Materials and Letterpress Printing Materials (2006)	☐	☒	☒	☒	☒
RACT VOC CTG Manufacture of High-Density Polyethylene, Polypropylene, and Polystyrene Resins	☐	☒	☒	☒	☒
RACT VOC CTG Manufacture of Pneumatic Rubber Tires	☐	☒	☒	☒	☒
RACT VOC CTG Manufacture of Synthesized Pharmaceutical Products	☐	☒	☒	☒	☒
RACT VOC CTG Metal Furniture Coatings (2007)	☐	☒	☒	☒	☒
RACT VOC CTG Miscellaneous Industrial Adhesives (2008)	☐	☒	☒	☒	☒
RACT VOC CTG Miscellaneous Metal Products Coatings (2008)	☐	☒	☒	☒	☒
RACT VOC CTG Paper, Film, and Foil Coatings (2007)	☐	☒	☒	☒	☒
RACT VOC CTG Petroleum Liquid Storage in External Floating Roof Tanks	☐	☒	☒	☒	☒
RACT VOC CTG Plastic Parts Coatings (2008)	☐	☒	☒	☒	☒
RACT VOC CTG Refinery Vacuum Producing Systems, Wastewater Separators, and Process Unit Turnarounds	☐	☒	☒	☒	☒
RACT VOC CTG SOCMI Air Oxidation Processes	☐	☒	☒	☒	☒
RACT VOC CTG SOCMI Distillation and Reactor Processes	☐	☒	☒	☒	☒
RACT VOC CTG Shipbuilding/repair	☐	☒	☒	☒	☒
RACT VOC CTG Solvent Metal Cleaning	☐	☒	☒	☒	☒

Requirement	Marginal	Moderate	Serious	Severe	Extreme
RACT VOC CTG Stage I Vapor Control Systems - Gasoline Service Stations	☐	☒	☒	☒	☒
RACT VOC CTG Storage of Petroleum Liquids in Fixed Roof Tanks	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating for Insulation of Magnet Wire	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Automobiles and Light-Duty Trucks	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Cans	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Coils	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Fabrics	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Large Appliances	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Metal Furniture	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Miscellaneous Metal Parts and Products	☐	☒	☒	☒	☒
RACT VOC CTG Surface Coating of Paper	☐	☒	☒	☒	☒
RACT VOC CTG Tank Truck Gasoline Loading Terminals	☐	☒	☒	☒	☒
RACT VOC CTG Use of Cutback Asphalt	☐	☒	☒	☒	☒
RACT VOC CTG Wood Furniture	☐	☒	☒	☒	☒
RFP VOC and NO_X - Moderate	☐	☒	☒	☒	☒
RFP VOC and NO_X - Serious	☐	☐	☒	☒	☒
RFP VOC and NO_X - Severe 15	☐	☐	☐	☒	☒
RFP VOC and NO_X - Extreme	☐	☐	☐	☐	☒
Severe/Extreme Area Fee Program (Section 185)	☐	☐	☐	☒	☒
VMT - TCMs to Offset Growth	☐	☐	☒	☒	☒

2.2 Nonattainment New Source Review

Nonattainment New Source Review (NNSR) refers to the permitting requirements in §173 (42 U.S. Code §7503). Under NNSR, a company cannot obtain a permit to build and operate a new major source or significantly modified source of emissions in a nonattainment area unless the company demonstrates that it meets a number of special requirements. The most important of these are the demonstration that the proposed source complies with the "lowest achievable emissions rate" (LAER) and the company demonstrates that it has been able to obtain emission reduction offsets from elsewhere within the same nonattainment area.

For Marginal and Moderate ozone nonattainment areas, a "major source" is defined as having the "potential to emit" 100 tons per year (tpy) or more of NO_X or VOC. A "major modification" is defined as physical modification or operational change that would result in a net increase of 40 tpy or more of either NO_X or VOC. A source's potential to emit is based on being used at 100% capacity, 24 hours a day, 365 days a year. Pollution control devices or operational restrictions can reduce a proposed source's PTE to the extent that those limits are legally enforceable on the source through a rule or permit condition.

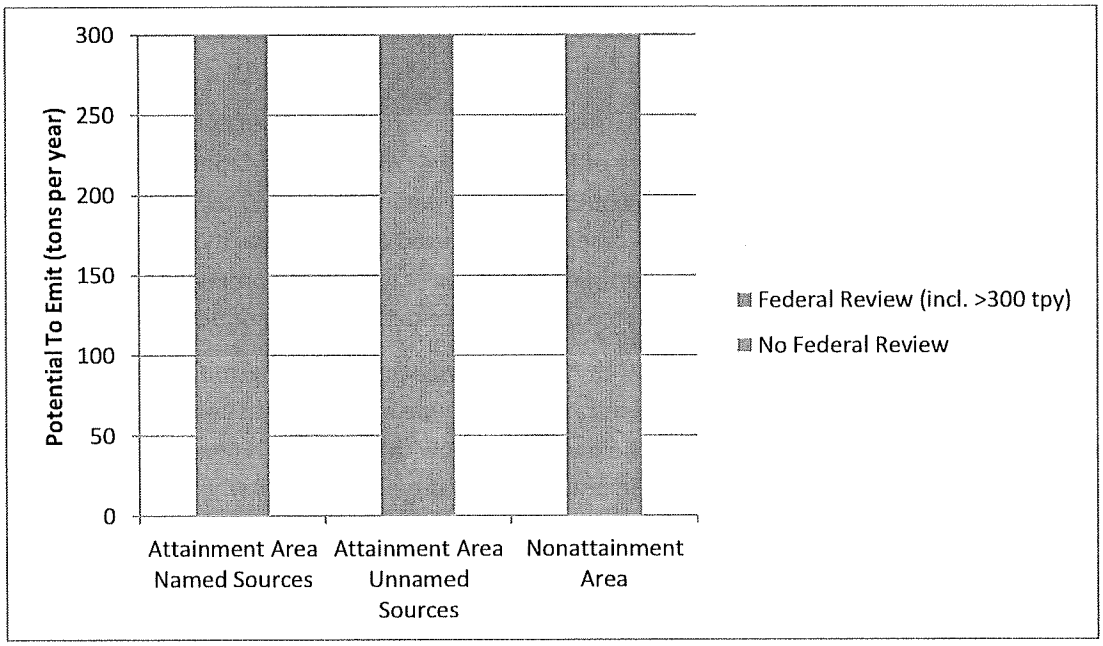
The requirement to demonstrate LAER means that the company applying for the permit must show that the proposed source will meet the lowest emissions rate for that type of source that has been incorporated into any SIP in the country (unless the owner can show that the rate is unachievable) or the lowest emission rate that has been achieved in practice for that type of source, whichever is lower, regardless of cost. The requirement for LAER creates an added cost for an expansion or new source within a nonattainment area to the extent that the cost of the pollution abatement equipment or practices required to meet that standard exceeded the costs of pollution abatement equipment or practices that would be required if the source was proposed for an attainment or unclassifiable area.

Offsets are required for any project having an emission increase over the "major source" threshold of greater than or equal to 100 tpy at a greenfield site or existing minor source, or a project which results in a net significant emission increase of greater than or equal to 40 tpy at an existing major source for Marginal and Moderate ozone nonattainment areas. VOC and NO_X emissions are considered independently of one another to evaluate if the emissions increase of either precursor equals or exceeds the "major source" threshold, or if the net emissions increase at an existing major source equals or exceeds the thresholds for "significant modification." For a Marginal nonattainment area, the offset ratio is 110%, and for a Moderate nonattainment area, the offset ratio is 115%. These are essentially capital costs that are required to be paid pre-construction and impose added start-up costs for a new facility beyond what would be required if the facility were built in an attainment or unclassifiable area.

In some cases, a new source review permit that did not require federal review in an attainment or unclassifiable area would require federal review in a nonattainment area, which can add 9-12 months to the approval process. While there is no federal review period for "minor source" NSR, there is a federal review period for NNSR permits in nonattainment areas and Prevention of Significant Deterioration (PSD) permits in attainment and unclassifiable areas. Whereas NNSR permitting applies to sources with a PTE of 100 tpy or more, PSD permitting applies to "named" sources with a PTE of 100 tpy and "unnamed" sources with a PTE of 250 tpy or more. Therefore, any NSR permit for an "unnamed source" with a PTE of 100-249 tpy located in an attainment area would not require a federal review. However,

the same source would be subject to NNSR permitting and the added federal review process if it was located in a nonattainment area. The figure below illustrates federal review "gap" between the 250 tpy or greater threshold for "unnamed" sources in an attainment area and the 100 tpy or greater threshold for sources in a nonattainment area.

Figure 1. Thresholds for federal review of new source review permits



Samsung, which falls into this "gap," would not require a PSD permit in order to expand its Austin Fabrication Facility up to complete build-out PTE of a 242 tpy if the Austin-Round Rock MSA an attainment or unclassifiable area, but would be require a NNSR permit if the area was designated nonattainment. According to Tim Jones of Samsung, a standard new source review permit for its facility, would be 9-12 months, while either a PSD or NNSR permit would require 18-24 months due to the federal review period required for such permits.[8] This 9-12 month delay in construction in a nonattainment area compared to the time it would take for the facility to be built in an attainment or unclassifiable area creates costs for the company in terms of lost revenue and increases in construction costs. This could in turn also cause a company to choose to expand elsewhere.

While these aspects of NNSR permitting would increase the financial cost of building and operating a new facility within the region if the company decided to proceed with the project, it can also cause the company to simply choose to build elsewhere or not build/expand at all. To the extent that NNSR permitting causes this to happen, there is an economic cost to the region of both the lost capital investment and the longer-term loss of earnings, property income, and taxes that would have been generated by the facility if it had been built over the course of its useful life.

[8] Tim Jones, Samsung. Personal communication. July 24, 2015.

2.3 Conformity

"Conformity" refers to the requirement under §176 of the CAA that federal actions "conform" to SIPs: "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 implementation plan after it has been approved and promulgated under section 7410 of this title."

Under this provision of the CAA, conformity to the SIP means:

- Conforming to the SIP's purpose of eliminating or reducing the severity and number of violations of a NAAQS and achieving expeditious attainment of the NAAQS; and
- That activities approved by the Federal government not:
    - Cause or contribute to any new violation of any standard in any area;
    - Increase the frequency or severity of any existing violation of any standard in any area; or
    - Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

Each federal agency is therefore required to determine that its actions within a nonattainment or maintenance area will conform to the SIP prior to proceeding with the action. Such "conformity determinations" must be made on the most recent emissions estimates, which must be based on the most recent population, employment, travel, and congestion estimates as determined by the MPO or another agency to make such estimates.

Conformity requirements apply only to nonattainment areas and to maintenance areas. No other set of requirements that applies to nonattainment areas also applies to the area once it is redesignated to attainment.

Conformity requirements are grouped into two categories:

1. Transportation conformity, which refers to federal approval of transportation plans, transportation improvement plans (TIPs), and on-road transportation funding; and
2. General conformity, which refers to any other federal approvals.

The regulations for conformity can be found in 40 CFR Part 93: Determining Conformity of Federal Actions to State or Federal Implementation Plans. Transportation conformity requirements are described in Subpart A, and general conformity requirements are found in Subpart B. For ozone nonattainment and maintenance areas, the pollutants subject to conformity are NO_X and VOC.

2.3.1 Transportation Conformity

Transportation conformity is a special set of conformity requirements that applies to approvals of transportation plans, transportation improvement programs (TIPs), and federally funded on-road transportation projects. If the Austin-Round Rock MSA were to be designated nonattainment for the new ozone NAAQS, the Capital Area Metropolitan Planning Organization (CAMPO) would need to work with the Texas Department of Transportation (TxDOT), Capital Metropolitan Transit Authority (CapMetro), the Federal Highway Administration (FHWA), the Texas Commission on Environmental

Quality (TCEQ), and the U.S. Environmental Protection Agency (EPA) in order to ensure that the region's transportation plan, TIP, and federally funded projects conformed to the SIP.

In general, any projects that would expand capacity in the transportation network are subject to transportation conformity requirements. Several types of highway and transit projects are exempt from transportation conformity requirements, including safety improvement projects, road maintenance projects, certain mass transit projects, bicycle and pedestrian projects, carpool and vanpool projects, and planning activities.

For such areas that are newly designated nonattainment, there are two interim tests that can used to make a conformity determination:

1. A "less than baseline" test, and
2. A "build/no build" test.

The "less than baseline" test involves modeling the on-road emissions for the nonattainment area in a baseline year and in relevant future years to ensure that future on-road emissions are less than emissions in the baseline year.

The more complicated and more stringent "build/no build" test involves comparing a "build" scenario to a "no build" scenario. For this test, the MPO would need to model both a "no build" scenario and a "build" scenario for each analysis year and demonstrate that the "build" scenario did not increase emissions compared to the "no build" scenario. If the transportation plan or TIP did not pass these tests, the MPO would need to modify the plan and re-model the emissions until it was able to demonstrate that implementation of the plan would not increase emissions relative to the "no build" scenarios. Given the complex nature of how certain projects could affect the travel demand model and roadway performance, passing this test can be significantly more difficult than a "less than baseline" test in a context in which on-road emissions are projected to decrease as significantly as current estimates suggest.

For areas initially designated as "Marginal" for ozone, the MPO only needs to use one of these tests to demonstrate conformity. For areas initially designated as "Moderate" for ozone, or for an area that was reclassified to "Moderate," the MPO would to use both tests in order to demonstrate conformity.

Once the state adopted a "control strategy plan" for the area – an attainment demonstration, reasonable further progress demonstration, or a maintenance plan – that plan's "Motor Vehicle Emissions Budget" (MVEB), would become the main mechanism for demonstrating conformity. If the EPA deemed the MVEB "adequate," the MPO would then be required to demonstrate conformity using a "budget test," in which it would need to show that projected on-road emissions fit within the MVEB for the region.

While an area is subject to both an attainment demonstration and RFP SIP, the tightest restrictions on emissions will apply. The TCEQ recently adopted new attainment demonstration[9] and RFP SIP revisions

[9] https://www.tceq.texas.gov/assets/public/implementation/air/sip/dfw/dfw_ad_sip_2015/AD/Adoption/DFWAD_13015SIP_ado_all.pdf

for the DFW area, both of which contained new MVEBs for the region. The table below shows the baseline emissions.

Table 3: MVEBs for the DFW 2008 Ozone Nonattainment Area

Budget Type	Year	NOX (tons per day)	VOC (tons per day)
RFP Six Years from Baseline	2017	148.36	77.18
RFP Contingency Year	2018	133.03	72.70
Attainment Demonstration	2018	119.69	62.20

In this case, the MPO would need to demonstrate that total on-road emissions in 2017 were less than or equal to 148.36 tpd of NO_X and 77.18 tpd of VOC, and that emissions in 2018 were less than or equal to 119.69 tpd of NO_X and 62.20 tpd of VOC.

Transportation conformity determinations are required:

- Within one year of an area being designated nonattainment or reclassification;
- Within two years of EPA approving motor vehicle emissions budget (MVEB) for the area;
- Prior to an MPO approving or DOT accepting a new transportation plan or TIP;
- Prior to an MPO approving or DOT accepting transportation plan amendments or TIP; and
- At least once every four years for an existing transportation plan or TIP, with a 12-month grace period.

A transportation conformity "lapse" can occur for a transportation plan or a transportation improvement program if a conformity determination is not made by an applicable deadline and is not corrected within a 12-month grace period after a deadline. This can occur due to a number of reasons, including higher growth in 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 a grace period ends, the conformity determination is considered to have expired. Once a lapse occurs, federal funding for transportation projects in the TIP or transportation plan is suspended until the federal government can determine that the TIP or transportation plan conforms to the SIP. If an area that is in a lapse can receive a conformity determination prior to the end of the fiscal year in which it occurs, it is possible that the area can still receive its allocation of federal funding for that fiscal year. However, since such funding will be lost if not used by the end of the fiscal year, TxDOT will instead reallocate funding for an area in a lapse to other areas of the state. While it is possible to try to make up for such lost funding by over-allocating funding to an area that experienced a lapse after it comes back into conformity, there is no guarantee that this would in fact occur.

At one point, prolonged transportation conformity lapses were a frequent occurrence. Examples of significant conformity lapses that occurred included:[10]

- Atlanta: January 1998 – July 2000 (2.5 years);

[10] http://www.epa.gov/otaq/stateresources/transconf/generalinfo/fullrpt.pdf

- Charlotte: lapsed for 20 months starting January 1997 (1.7 years);
- Denver: lapsed for 18 months starting in 1993 (1.5 years) and another 10 months 1994-1995 (0.8 years);
- Portland: lapsed for 1 year in 1994;
- Los Angeles: lapsed from 1998-2001 (3 years); and
- Salt Lake: lapsed 1994-1995 (~1 year).

Due to changes in the law, lapses have been less frequent and tend to be less prolonged. Nevertheless, the recent experience for the Beaumont-Port Arthur maintenance area for the 1997 eight-hour ozone standard, which experienced an 18-20 month lapse due to 0.4 tpd in VOC emissions, demonstrates that the risk of a lapse occurring is still present. CAPCOG considers the possibility of an extended lapse occurring within the Austin-Round Rock MSA over the time frame covered by this study as somewhere between low to moderate.

2.3.2 General Conformity

General conformity applies to any federal actions other than those covered by the transportation conformity regulations. For federal actions that would affect a nonattainment or maintenance area, the relevant agency would review the action to determine whether it conformed to the SIP using the following sequence:

1. Determine if the activity is exempted from general conformity requirements (see 40 CFR §93.153(c));
2. Determine if the activity is "presumed to conform" (see 40 CFR §93.153(g))
3. Determine whether the total direct and indirect emissions are above or below the de minimis level for the relevant pollutants (100 tons per year of NO_X or VOC for a Marginal and Moderate nonattainment area and for maintenance areas);
4. Determine whether the affected facility's emissions meet an emissions budget approved by the state as part of the SIP (if applicable);
5. Determine whether the action meets all state control requirements;
6. Determine whether the action would cause a new violation of the standard or interfere with timely attainment, maintenance, or reasonable further progress;
7. Demonstrate that the total and indirect emissions are specifically identified and accounted for in the SIP;
8. Obtain a written statement from the state that the emissions will not exceed the SIP emissions budget; and
9. If necessary, obtaining offsetting emissions from the same nonattainment or maintenance area if the emissions are not already accounted for in the SIP.

Offsets are required to occur during the same calendar year as the emissions increase, unless the offsets exceed a 1.15 to 1 ratio for Moderate areas or exceed a 1.1 to 1 ratio for Marginal and maintenance

areas. It is possible to set up an emission reduction credit system for meeting general conformity requirements.

Direct emissions means those 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 means those emissions of a criteria pollutant or its precursors:

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.

For the purposes of this definition, even if a Federal licensing, rulemaking or other approving action is a required initial step for a subsequent activity that causes emissions, such initial steps do not mean that a Federal agency can practically control any resulting emissions.

2.4 Reasonably Available Control Technology

Ozone nonattainment areas classified as Moderate or higher are required to demonstrate that sources within the nonattainment area have implemented "Reasonably Available Control Technology" (RACT). This requires existing sources to retrofit their facilities with pollution abatement devices. Under 40 CFR §51.100(o) RACT is defined as "devices, systems, process modifications, or other apparatus or techniques that are reasonably available taking into account: (1) the necessity of imposing such controls in order to attain and maintain a national ambient air quality standard; (2) the social, environmental, and economic costs of such controls; and (3) alternative means of providing for attainment and maintenance of such standard." EPA's guidance on RACT has specified that RACT is the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available, considering technological and economic feasibility.[11]

Under §182(b)(2), states are required to submit RACT SIPs no later than 24 months after a designation for the 8-hour ozone NAAQS and are required to implement RACT no later than the first ozone season or portion thereof which occurs 30 months after the RACT SIP is due.

For ozone nonattainment areas, there are three categories of RACT:

- VOC RACT for sources covered by an EPA Control Technique Guideline (CTG) document;
- Non-CTG major source VOC RACT, including emission sources covered in an EPA Alternative Control Technology (ACT) document; and
- Major source NO_X RACT.

A state's RACT SIP requirement involves demonstrating that each major source of NOX or VOC within the nonattainment area is subject to RACT emissions limits, and that the state has either adopted rules

[11] 44 FR 53761, September 17, 1979.

for each category of sources covered by a CTG document, demonstrated that the CTG emission limits do not constitute RACT for the particular sources within the nonattainment area, or that there are no sources to which the rule would apply. There are 44 such CTGs.

2.5 Reasonable Further Progress

Ozone nonattainment areas classified as Moderate or higher are required to demonstrate that the nonattainment area is achieving overall target reductions in emissions from within a specified period of time. Under 40 CFR §51.1110, states must submit such reasonable further progress (RFP) demonstrations no later than 36 months after the effective date of a nonattainment designation. For areas that are newly designated as "Moderate," the requirement is for a 15% in VOC reductions from baseline levels within 6 years of the most recent National Emissions Inventory (NEI) year.

2.6 I-M Program

Moderate ozone nonattainment areas are required to implement "basic" I-M programs. Under 40 CFR §51.350(a)(4), "any area classified as a moderate ozone nonattainment area, and not required to implement enhanced I/M under paragraph (a)(1) of this section, shall implement basic I/M in any 1990 Census-defined urbanized area with a population of 200,000 or more." Additionally, §51.350(b)(4) specifies that, "outside of ozone transport regions, programs shall 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 MSA containing the subject urbanized area are included to compensate for the exclusion." In practice, what this means is that not every county in an area designated nonattainment for ozone under a Moderate classification or higher are required to have an I-M program. If an ozone nonattainment area is classified higher than Moderate, other I-M regulations in 40 CFR §51.350 could apply and require implementation of an I-M in other parts of the nonattainment area besides the 1990 Census-defined urbanized area where it would be required for a Moderate area.

2.7 Attainment Demonstration

For ozone nonattainment areas with a Moderate or higher classification, the state is required to submit a demonstration that the area will be able to attain the standard by its attainment date. This demonstration requires photochemical modeling for the "attainment year" (the last complete ozone season prior to an area's attainment date), a demonstration that the state has implemented all "reasonably available control measures" (RACM) for the area, and contingency measures that would be automatically implemented if the region did not attain the standard by its attainment date. Under §172 of the Clean Air Act, this attainment demonstration must show that all measures necessary to reach attainment are going to be implemented. RACM is described under 40 CFR §51.1010 as a set of measures that collectively could advance an area's attainment date by one year. Additional criteria for RACM are described in the EPA's proposed approval of the New Jersey RACM analysis published in the January 16, 2009 issue of the Federal Register. In this proposed rulemaking, EPA defined RACM as any potential control measure for application to point, area, on-road, and non-road emission source categories that meet the following criteria:

- The control measure is technologically feasible;
- The control measure is economically feasible;

- The control measure does not cause "substantial widespread and long-term adverse impacts;
- The control measure is not "absurd, unenforceable, or impractical;" and
- The control measure can advance the attainment date by at least one year.

The requirement that a control measure can advance the attainment date by at least one year does not necessarily mean that the measure must be implemented prior to the last ozone season that occurs ahead of a nonattainment area's attainment date, however. For example, the East Texas combustion rule (30 TAC Chapter 117, Subchapter E, Division 4) that TCEQ adopted in 2007 (and EPA subsequently approved in 2009) as RACM for the Dallas-Fort Worth area's attainment demonstration for the 1997 ozone NAAQS had a compliance date of March 2010, even though the area's 2009 ozone design value was used as the basis for determining if the area had met its attainment date.

This SIP revision is due within 36 months of an initial nonattainment designation for newly designated Moderate ozone nonattainment areas.

2.8 Restrictions on Backsliding

Once an area is designated nonattainment, any existing emission reduction rules that have been incorporated into that area's SIP are not allowed to be relaxed until the area is redesignated to attainment for the standard unless the state can substitute the rules with other rules that achieve equal or greater emission reductions. This requirement is known as "anti-backsliding," and addresses the restriction in §172(e) in the Clean Air Act specifying that the EPA may not relax requirements for a nonattainment area even if it relaxes the standard, and the requirement, as well as the requirement in §110(l) that restricts the EPA from approving a revision to the SIP that would interfere with attainment, reasonable further progress, or any other applicable requirement. After the area is redesignated to attainment, the state must still demonstrate that removal of an existing control measure that is part of the SIP would not interfere with maintenance of the standard.

2.9 Sanctions

Though rarely used, there is a risk that sanctions under §179 of the CAA could be applied to the Austin-Round Rock MSA if the area was designated nonattainment if one of the following things occurred and was not remedied within 18 months prescribed period of time:

- If the EPA finds that the state failed to submit any of the SIP requirements for the area;
- If the EPA disapproves one or more elements of a SIP revision for the area; or
- If the EPA finds that one or more elements of the SIP is not being implemented within the area.

Sanctions may include: 1) a prohibition on approval of highway construction projects and awarding federal funding for highway construction projects (other than safety or air quality improvement projects); or 2) 200% offset requirements. If, after 6 months of applying one of these two sanctions, or if the EPA determines that the state is not acting in good faith to remedy the problem, both sets of sanctions may apply. The probability of sanctions being applied to the Austin-Round Rock MSA stemming from a nonattainment designation are low, but the analyses describing the economic

consequences of transportation conformity and NNSR permitting also can be used to understand the economic impacts of sanctions.

2.10 Other Requirements

There are also other requirements beyond those discussed in this section that apply to nonattainment areas that are not analyzed in this report. These include the requirements for emissions inventories, emissions statements, and the requirements for Serious, Severe, and Extreme areas. The requirements for emissions inventories and emissions statements do not impose any real costs or regulatory requirements on a nonattainment area at this point beyond what is already required. This section does not include detailed descriptions of the Serious, Severe, and Extreme area requirements because CAPCOG is assuming that the worst case scenario for the area would involve a classification only as high as Moderate.

3 Regulatory Assumptions

This section discusses the key assumptions regarding the regulatory environment and the particular requirements associated with an ozone nonattainment designation for EPA's proposed ozone standards as they might be applied in the Austin-Round Rock MSA.

3.1 Ozone NAAQS Set at 65 ppb in September 2015

For this report, CAPCOG is assuming that EPA sets the standard at 65 ppb using the same statistical form of the standard that is currently in place to assess compliance. While there has been considerable speculation about exactly where EPA might set the standard within the 65-70 ppb range it has proposed, CAPCOG is using the 65 ppb level as the basis for this analysis because it provides a "worst case scenario" for the amount of time that might be needed to bring the area into attainment of the standard if it was above it at the time EPA finalizes designations. If EPA were to set the standard at the highest level it proposed, the area's current design value is already in compliance with it, and would expected to remain in compliance for the 2014-2016 averaging period that will likely be the basis for EPA's designation decisions. The area's design value is likely to be approximately 66-68 ppb for this period, so the area's status will be very dependent on where exactly EPA sets the level of the standard.

While CAPCOG is not privy to any special information that would lead us to believe that 65 ppb is the most likely level for the standard, there are reasons to believe that this is the most likely level that EPA would set the standard at based on existing information that is publicly available. First, EPA was prepared to go ahead with a 70 ppb standard in September 2011 in its reconsideration of the 2008 ozone NAAQS based on the scientific record available through 2006, and has added studies to this review that it has indicated that it believes provides further support for protecting against exposures to 8-hour ozone concentrations at 70 ppb.

Second, whereas the Clean Air Act Scientific Advisory Committee (CASAC) recommended that the primary standard be set at a level *below* 70 ppb down to 60 ppb, EPA's proposal covered a range of 65 ppb up to *and including* 70 ppb. Given the current administration's stated desire to follow the advice of their scientific advisors, CAPCOG believes that it would be very unlikely that EPA would choose a 70 ppb

standard since it would higher than what was recommended by CASAC. While it is possible that EPA could go higher than 65 ppb within that range, CAPCOG believes that EPA is not likely to risk litigation from environmental groups claiming that EPA disregarded CASAC's recommendation to set the standard below 70 ppb.

Finally, in the preamble to EPA's proposal for the standard, there are repeated references to 8-hour concentrations of 70 ppb being a "level of concern," and the administrator being particularly concerned with populations being exposed to twice or more per ozone season to such "levels of concern." While there is considerable discussion of 72 ppb being the average concentration for the clinical study referenced as being associated with the >=70 ppb analysis, the preamble also references the CASAC discussion of this, saying, "The 70 ppb-8hr benchmark level reflects the fact that in healthy subjects, decreases in lung function and respiratory symptoms occur at concentrations as low as 72 ppb and that these effects almost certainly occur in some people, including asthmatics and others with low lung function who are less tolerant of such effects, at levels of 70 ppb and below." Based on the current form of the standard, which would allow, on average, three exposures per season above 70 ppb if the standard was set at that level, it seems unlikely that the Administrator would consider a 70 ppb requisite to protect human health with an adequate margin of safety, as is required by statute. The data presented in Table 1 in the preamble shows a confidence interval for the average % of children exposed to one or more concentrations of 70 ppb or more per year to include 0 for 65 ppb, and shows a reduction in the % of children exposed in the worst year in the worst area from 3.2% to 0.5%. Similarly, Table 1 shows that a standard set at 70 ppb would still allow an average of 46,000 children per year to be exposed to two or more concentrations of 70 ppb more, but only 5,400 if the standard were set at 65 ppb. Based on the way EPA presented and discussed these data in the preamble, CAPCOG believes that EPA is significantly more likely to set the standard at 65 ppb than it is to set the standard at 70 ppb.

CAPCOG also believes that this standard will be set in September 2015, consistent with EPA's court-ordered October 1, 2015, deadline. While litigation may take place after the rulemaking is published in the Federal Register that could delay implementation of the standard, CAPCOG believes that there is virtually no chance that the standard does not actually get finalized by October 1, 2015, and subsequently published in the Federal Register, making it effective at some point in the fall of 2015.

3.2 Austin-Round Rock MSA Designated Nonattainment in Fall 2017

This study assumes that EPA would designate all five counties in the Austin-Round Rock MSA as a nonattainment area in September 2017 based on the area's 2014-2016 design value. While CAPCOG believes that region or individual jurisdictions in the region may have a strong case to try to persuade the EPA not to designate the area or individual counties within the area as nonattainment, even if the regulatory monitors in Travis County are measuring above the standard, this report uses the default approach EPA used for the 2008 ozone NAAQS as the basis for this assumption in order to illustrate the implications of EPA implementing the standard using the same basic approach it took for the 2008 ozone NAAQS.

Under §107 of the CAA, the EPA is required to designate areas as "attainment," "nonattainment," or "unclassifiable" for any new or revised NAAQS within two years of the promulgation of the standard. A nonattainment area is defined as "any area that does not meet (or contributes to ambient air quality in

a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant."[12] Assuming that EPA finalizes the standard in September 2015, this would mean that EPA would need to finalize its designations by September 2017, based on the 2014-2016 ozone design values across the country. Since modeling projections indicate that the Austin-Round Rock MSA's 2014-2016 ozone design value is likely to be 66-68 ppb at that time, the area would be at risk for being designated nonattainment for a standard set at 65 ppb.

EPA's guidance to regional offices for designating areas as nonattainment for any new ozone NAAQS is likely to be very similar to the designation guidance EPA issued for the 2008 ozone NAAQS. [13] The first step in the process for the 2008 ozone NAAQS was to compare each monitor's design value to the 75 ppb standard, and – if it showed a three-year average of 76 ppb or higher, the monitor was considered to be violating the NAAQS. The presumptive boundaries for a nonattainment area associated with a violating monitor was the Core-Based Statistical Area (CBSA) in which the monitor was located, or – if the monitor was located in a Consolidated Statistical Area (CSA) consisting of more than one CBSA, the presumptive boundaries of the nonattainment area was the CSA.

EPA's nonattainment designation guidance also provides nine factors that should be considered by regional offices in making nonattainment designations:

1. Air quality data;
2. Emissions data (location of sources and contribution to ozone concentrations);
3. Population density and degree of urbanization (including commercial development);
4. Traffic and commuting patterns;
5. Growth rates and patterns;
6. Meteorology (weather/transport patterns);
7. Geography/topography (mountain ranges or other air basin boundaries);
8. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Reservations, metropolitan planning organizations (MPOs)); and
9. Level of control of emission sources.

After receiving recommendations from each state and tribe, the EPA then made adjustments in some cases, and then issued designations of either "nonattainment," "attainment/unclassifiable," and "unclassifiable."[14]

Based on the information available at this time, CAPCOG is assuming that the following schedule will be what EPA will follow for the designation process:

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[12] The EPA is allowed to extend the designation period to up to three years after a NAAQS is promulgated "in the event the Administrator has insufficient information to promulgate the designations."

[13] Memorandum from Robert J. Meyers, Principal Deputy Assistant Administrator of the U.S. Environmental Protection Agency, Office of Air and Radiation to Regional Administrators, Regions I-X. "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards." December 4, 2008. Available online at http://www.epa.gov/airquality/ozonepollution/designations/2008standards/documents/Area_Designations_for_the_2008_Revised_Ozone_NAAQS.pdf.

[14] The only areas of the country that were designated "unclassifiable" for the 2008 ozone NAAQS were portions of Utah that only had non-regulatory ozone monitoring data showing violations.

- January/February 2016: updated guidance on nonattainment designations issued
- September 2016: recommendations from Governors on area designations will be due to the EPA;
- June 2017: EPA proposes nonattainment designations;
- August 2017: State comments on proposed nonattainment designations due to EPA; and
- September 2017: EPA finalizes nonattainment designations.

If, as projected, the design values at the two regulatory ozone monitors in Travis County are at 66-68 ppb, it is very likely that at least Travis County would be designated nonattainment for the 2015 ozone NAAQS if it was at 65 ppb. CAPCOG is using all five counties in the Austin-Round Rock MSA – Bastrop, Caldwell, Hays, Travis, and Williamson Counties – as the basis for this analysis, since the entire MSA (defined according to the Office of Management and Budget's (OMB's) most recent definitions[15]) would constitute the presumptive boundaries for any nonattainment area associated with the two monitors in Travis County if one or both of their 2014-2016 ozone design values were violating the 2015 ozone NAAQS.

3.3 Initial Ozone Nonattainment Classification of Marginal

CAPCOG assumes that the EPA would implement the proposed ozone NAAQS under Subpart 2 of Title I, Part D of the Clean Air Act, which includes five levels of classification for ozone nonattainment areas. Based on the area's projected 2014-2016 ozone design value and the EPA's approach to implementing the 2008 ozone NAAQS, CAPCOG assumes that the Austin-Round Rock MSA would be classified as a "Marginal" area if designated nonattainment.

Under the 1990 CAA Amendments, Congress created a tiered system of ozone nonattainment area classifications based on each area's ozone levels. In implementing the 1997 and 2008 ozone NAAQS, the EPA has applied the ratios between the thresholds separating different classifications in the 1990 CAA Amendments based on the 1979 one-hour standard to the levels of the new 8-hour standards. The following table shows the thresholds that were used for each situation.

Table 4: Classification Thresholds for 1979, 1997, and 2008 Ozone NAAQS

Classification	Ozone Levels % of Standard	1990 CAA Amendments 1-Hour O_3 NAAQS (ppm)	1997 Eight-Hour O_3 NAAQS (ppm)	2008 Eight-Hour O_3 NAAQS (ppm)
Marginal	101 – 114%	0.121 – 0.137	0.085 – 0.091	0.076 – 0.085
Moderate	115 – 132%	0.138 – 0.159	0.092 – 0.107	0.086 – 0.099
Serious	133 – 149%	0.160 – 0.179	0.107 – 0.120	0.100 – 0.112
Severe – 15	150 – 232%	0.180 – 0.279	0.120 – 0.127	0.113 – 0.118
Severe – 17	150 – 232%	0.180 – 0.279	0.127 – 0.187	0.119 – 0.174
Extreme	233+%	0.280 +	0.187 +	0.175+

[15] U.S. Office of Management and Budget. Bulletin No. 13-01. "Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas." February 28, 2013. Accessible online at https://www.whitehouse.gov/sites/default/files/omb/bulletins/2013/b-13-01.pdf.

Based on these thresholds and the EPA's proposed range of 65-70 ppb, the following table shows what the likely ranges of 8-hour ozone design values would be for each classification at each standard level within the range proposed by EPA.

Table 5: Likely Nonattainment Classifications for 2014-2016 Ozone Design Values by Possible NAAQS Level (ppb)

Classification	65 ppb	66 ppb	67 ppb	68 ppb	69 ppb	70 ppb
Marginal	66-74	67-75	68-76	69-77	70-78	71-80
Moderate	75-86	76-87	77-88	78-90	79-91	81-92
Serious	87-97	88-98	89-100	91-101	92-103	93-104
Severe-15	98-102	99-104	101-105	102-107	104-109	105-110
Severe-17	103-151	105-153	106-155	108-158	110-160	111-162
Extreme	152+	154+	156+	159+	161+	163+

Since the area's 2012-2014 design value is already below the level that would trigger an initial "Moderate" classification for all of these possible standard levels and is projected to continue to decline through 2014-2016, the Austin-Round Rock MSA would be classified as Marginal if EPA followed this same approach for the new 2015 ozone NAAQS.

3.4 Failure to Attain by 2020 and Reclassification to Moderate

CAPCOG assumes that there is a risk that the area's 2017-2019 ozone design value may not yet be low enough for the area to monitor attainment of the standard for that period, which would mean it would miss its attainment deadline and be reclassified to Moderate. If this were to happen, the state would then need to submit a SIP revision fulfilling all of the Moderate area requirements within one year of receiving its reclassification notice.

Under §179(c) and (d) and under §181(b)(2) of the CAA, if a nonattainment area fails to attain an ozone NAAQS by its attainment date, the EPA is required to issue a notice no later than 6 months after the attainment date, and the state where the nonattainment area is located is required to submit an "attainment demonstration" SIP revision and SIP revisions fulfilling all of the other requirements for the next highest ozone nonattainment classification. For an area classified as "Marginal," this would mean that the EPA could issue such a "failure to attain" notice as early as May 1, 2020 (the date states are required to certify the prior year's monitoring data) or as late as March 31, 2021, if the 2017-2019 ozone design value is still above the 2015 ozone NAAQS. The state would then be required to submit a SIP revision fulfilling all of the requirements for a "Moderate" area within a year of that date (May 1, 2021 – March 31, 2022). Recent modeling that EPA conducted in support of the 2015 ozone NAAQS and the 2008 NAAQS indicated that the projected 2025 ozone design value for the Austin-Round Rock MSA without implementation of the new, lower ozone NAAQS would be 64.3 ppb, which would mean that the area's 2017-2019 design value would likely still be out of attainment of a 65 ppb standard.

Based on timelines in the CAA and recent court rulings, the timeline for various milestones associated with the nonattainment designation would start from the date the designations are published in the

Federal Register. The following table shows some of the likely milestones for newly designated nonattainment areas.

Table 6: Likely Milestones for 2015 Ozone NAAQS Nonattainment Areas

Date	Classification	Ozone Seasons Used to Assess Attainment
Fall 2020	Marginal	2017-2019
Fall 2023	Moderate	2020-2022
Fall 2026	Serious	2023-2025
Fall 2032	Severe (15)	2029-2031
Fall 2034	Severe (17)	2031-2033
Fall 2037	Extreme	2034-2036

If all of the monitors in the region have a 4th highest 8-hour ozone average at or below the level of the standard in the year prior to the attainment deadline (2019, 2022, 2025, 2031, 2033, and 2036, depending on classification) but the three-year average does not meet the NAAQS, the EPA can extend the deadline by 1 year. If the average of the 4th highest values in the attainment year and the subsequent year is at or below the level of the standardat each of the monitoring stations, the EPA can grant another one-year extension. For example, if the standard is at 65 ppb, and an area's 2017-2019 ozone design value is 66 ppb based on 4th highest averages of 67 ppb in 2017, 68 ppb in 2018, and 64 ppb in 2019, the EPA could extend the region's attainment date from September 2020 to September 2021. If the region's 4th highest value in 2020 was 66 ppb, the average for 2019 and 2020 would be 65 ppb, and the region could get another year for its design value to reach 65 ppb. If the area's 2019-2021 ozone design value reached 65 ppb, it would then be in attainment of the ozone standard and it would avoid being "bumped up" to a "Moderate" classification.

Once an area attains the standard, the EPA can suspend any new planning requirements for the area as long as its ozone levels stay at or below the standard. For example, an area classified as "Moderate" that is able to attain the standard by the end of the 2019 ozone season could theoretically receive a "Clean Data Determination" from EPA as early as May or June 2020 after the 2019 data.

This study assumes that the area would remain designated nonattainment for a period of three to nine years, depending on how soon after it was designated nonattainment it was able to monitor attainment of the standard. At the latest, CAPCOG is assuming that the area would monitor attainment of the standard in 2023 based on the area's 2020-2022 design value.

3.5 Redesignation to Attainment and Maintenance Plans

CAPCOG assumes that there would continue to be consequences for a nonattainment designation in 2017 out to 2041-2046 based on the two, 10-year maintenance periods that are required to follow a redesignation to attainment. While an area's planning requirements may be suspended once it reaches attainment through an EPA "Clean Data Determination," it will remain formally designated "nonattainment" until the EPA approves a "maintenance plan" for the region and formally redesignates the area to "attainment." Under §175A of the CAA, a maintenance plan must show that the area will continue to attain the standard for at least 10 years after it is redesignated to attainment. Since EPA has

up to two years to review and approve a redesignation request and maintenance plan, the state would need to project the maintenance period out 12 years from the date the plan and request were submitted. Eight years after an area is redesignated to "attainment," the state must submit a second maintenance plan covering the next 10-year period. Such "attainment" areas are still subject to transportation conformity while the area remains subject to a maintenance plan. Since SIPs require some time for states to develop, propose, and approve before submission to the EPA, it is unlikely that a "Marginal" area that was able to attain the 2015 ozone standard by the end of the 2019 ozone season would be able to be redesignated to attainment any sooner than May 2023. Similarly, a "Moderate" area that was able to attain the NAAQS by the end of the 2022 ozone season would not be able to be redesignated to attainment until at least May 2026.

One relatively recent example that illustrates these time frames was the redesignation process for the Beaumont-Port Arthur (BPA) area for the 1997 ozone NAAQS.

- 2005-2007: monitoring data shows attainment of the 1997 ozone NAAQS;
- July 9, 2008: TCEQ proposes maintenance plan and attainment redesignation request;
- December 10, 2008: TCEQ approves maintenance plan and attainment redesignation request; [16]
- October 20, 2010: EPA approves maintenance plan and attainment redesignation request; [17]
- 2021: last year in first 10-year maintenance period; and
- 2031: last in year in 2nd 10-year maintenance period.

According to TCEQ staff, this represents the fastest timeframe practical for such a request, so additional time may be required. CAPCOG believes that it would be reasonable to assume that if a "Marginal" area were to attain the standard by the end of the 2019 ozone season, thereby meeting its attainment deadline, it is likely that the TCEQ would be able to propose a maintenance plan and redesignation request by the end of 2020 and adopt it by mid-2021. The maintenance plan would therefore need to demonstrate maintenance of the ozone NAAQS out to 2033, with EPA approving the plan and the redesignation to attainment in mid-2023. The second maintenance plan would be due in mid-2031 and would need to demonstrate continued maintenance out to 2043. These dates would be pushed back accordingly for areas with higher classifications or pushed up if the area was able to attain the standard sooner than its attainment deadline. CAPCOG assumes that the soonest that the area would be able to be redesignated to attainment if the region's 2015-2017 design value is in attainment of the standard, and that May 2026 would be the latest that the area would be redesignated to attainment if the area took until 2022 to have a design value measuring attainment of the standard.

One interesting consequence of EPA's recent decision to revoke that 1997 eight-hour ozone NAAQS when it issued its implementation rule for the 2008 ozone NAAQS was that it effectively converted any area that was maintenance for the 1997 standard but had not been designated nonattainment for the 2008 standard into simply an "attainment/unclassifiable" area with no ongoing maintenance requirements. If EPA were to again lower the standard in 2020 or thereafter and were to similarly revoke the 2015 standard, it is theoretically possible that the any area that was in the midst of a

[16] http://www.tceq.state.tx.us/assets/public/implementation/air/sip/bpa/BPA_MP_Dec2008.pdf
[17] http://www.gpo.gov/fdsys/pkg/FR-2010-10-20/pdf/2010-26261.pdf

maintenance period could similarly have those maintenance requirements due to EPA implementing the newer, more stringent standard. Since that situation would be highly dependent on the area's ozone design values, the exact nature of the new standard, and a decision by EPA to revoke the 2015 standard (which it would not necessarily need to do if it adopted a new standard), CAPCOG did not analyze the possibility that this situation would occur for the Austin-Round Rock MSA.

3.6 Assumed Time Frame

Based on EPA's court-ordered deadline for issuing the final ozone NAAQS by October 1, 2015, CAPCOG has projected the most relevant milestones for the scenarios contemplated in this analysis. Many of the milestones are based on mandatory intervals of time between certain events based on the initial date that an area was designated nonattainment. While the "effective date" of the designation may not be exactly two years after the standard is set, whether it is September, October, November, or December, it wouldn't change the basic timing of the years in which certain important milestones would occur. The assumed timeframes for a request for redesignation to attainment area based on TCEQ approving a maintenance plan and redesignation request one year after certifying an area's ozone monitoring data such that it would show attainment of the standard.

The most optimistic scenario if EPA set the standard at 65 ppb and the EPA designated the area nonattainment based on its 2014-2016 design value would involve the area being able to measure attainment of the standard by the end of the 2017 ozone season.

Table 7. Milestones if the area attains the standard by end of the 2017 ozone season

Date	Milestone
Sep. 2015	EPA sets new Ozone Standard at 65 ppb
Sep. 2017	EPA designates the Austin-Round Rock MSA as a Marginal nonattainment area
May 2018	Certification of 2017 monitoring data
Sep. 2018	Initial transportation conformity determination due
May 2019	TCEQ adopts a maintenance plan and submits redesignation request to EPA
May 2021	EPA approves redesignation to attainment and maintenance plan
2029	TCEQ adopts 2nd maintenance plan
2031	EPA approves 2nd maintenance plan
2041	End of 2nd maintenance period

If the area were to reach attainment instead by the end of 2019 such that it could be in attainment by a September 2020 deadline, these milestones would be pushed back 2 years.

Table 8. Milestones if the area attains the standard by end of the 2019 ozone season

Date	Milestone
Sep. 2015	EPA sets new Ozone Standard at 65 ppb
Sep. 2017	EPA designates the Austin-Round Rock MSA as a Marginal nonattainment area
Sep. 2018	Initial transportation conformity determination due
Mar. – Nov. 2019	Final ozone season prior to Marginal area attainment date
May 2020	Certification of 2019 monitoring data
Sep. 2020	Marginal area attainment date; Austin-Round Rock MSA attains standard
May 2021	TCEQ adopts a maintenance plan and submits redesignation request to EPA
May 2023	EPA approves redesignation to attainment and maintenance plan
2031	TCEQ adopts 2nd maintenance plan
2033	EPA approves 2nd maintenance plan
2043	End of 2nd maintenance period

If the area missed its attainment deadline for a Marginal area, the EPA would be required to issue a reclassification notice for the area within 6 months. While this could potentially be done earlier than 6 months after the attainment date (February 2021) if the EPA based its notice issuance date on 6 months after the monitoring data was certified, but this would not make a major difference in these time frames. Within one year of the notice reclassifying the area to Moderate, the state would need to submit a SIP revision fulfilling all of the requirements for a Moderate area.

Table 9. Milestones if the area fails to attain the standard by end of the 2019 ozone season

Date	Milestone
Sep. 2015	EPA sets new Ozone Standard at 65 ppb
Sep. 2017	EPA designates the Austin-Round Rock MSA as a Marginal nonattainment area
Sep. 2018	Initial transportation conformity determination due
Mar. – Nov. 2019	Final ozone season prior to Marginal area attainment date
May 2020	Certification of 2019 monitoring data
Sep. 2020	Marginal area attainment date; Austin-Round Rock MSA fails to attain standard

Date	Milestone
Feb. 2021	EPA publishes reclassifies Austin-Round Rock MSA from Marginal to Moderate
Feb. 2022	Reclassified Moderate area SIP revisions due to EPA
Mar. – Nov. 2022	Final ozone season prior to Moderate area attainment date
May 2023	Certification of 2022 monitoring data
Sep. 2023	Moderate area attainment date; Austin-Round Rock MSA attains the standard
May 2024	TCEQ adopts a maintenance plan and submits redesignation request to EPA
May 2026	EPA approves redesignation to attainment and maintenance plan
2034	TCEQ adopts 2nd maintenance plan
2036	EPA approves 2nd maintenance plan
2046	End of 2nd maintenance period

3.7 Emission Reductions Anticipated by EPA's NAAQS RIA

EPA's Regulatory Impact Analysis for the proposed ozone NAAQS includes modeling data based on emission reductions it expects would occur as a result of the implementation of this NAAQS. EPA's supporting files for the modeling platform include county-level summaries of the emissions reductions it expects would occur in each county by source category. The following tables show the emission reductions expected for NO_X and VOC.

Figure 2: EPA Ozone NAAQS Modeling - NO_X and VOC Emissions in the Austin-Round Rock MSA in 2011 and 2025 (tpy)

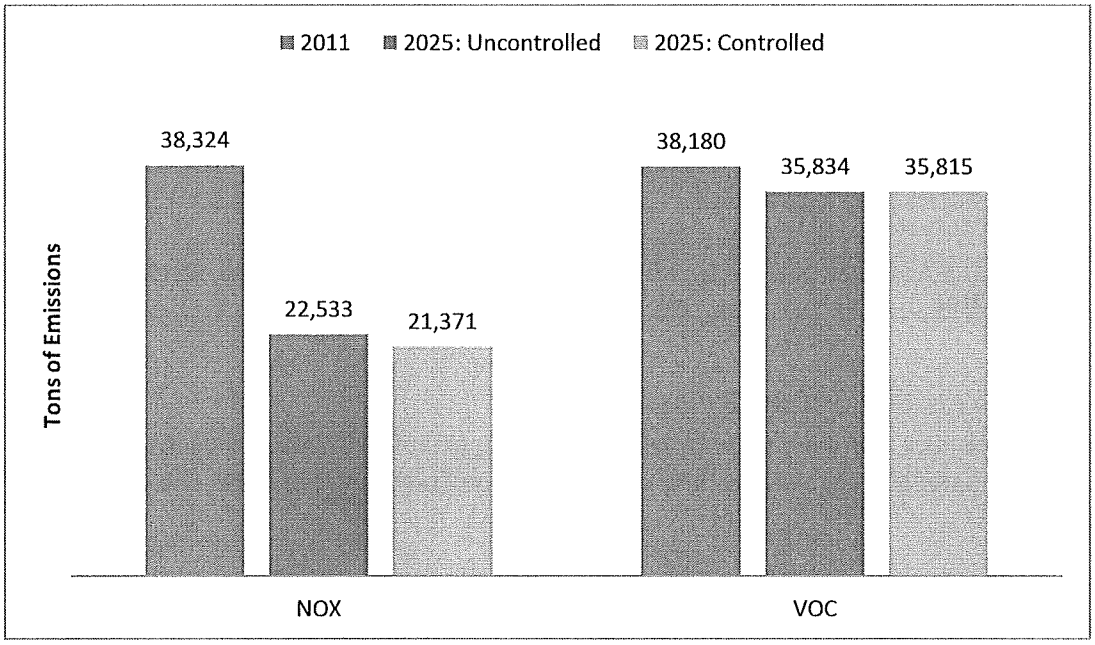

Table 10: NO_X Emission Reductions in 2025 "Control" Scenario Compared to "Uncontrolled" Scenario in O3 NAAQS RIA

Source	Bastrop	Caldwell	Hays	Travis	Williamson	Total
On-Road	0	0	0	0	0	0
Non-Road: Rail	0	0	0	0	0	0
Non-Road: Other	-8	-5	-6	-37	-29	-86
Area-Oil and Gas	0	0	0	0	0	0
Area-Residential Wood Combustion	0	0	0	0	0	0
Area-Other	0	0	0	-457	-169	-626
Point-Oil and Gas	0	0	0	0	0	0
Point-EGU	0	0	0	0	0	0
Point-EGU Peaker	0	0	0	0	0	0
Point-Non-EGU	0	-50	0	-40	0	-450
TOTAL	-8	-55	-6	-534	-198	-1,162

Table 11: VOC Emission Reductions in 2025 "Control" Scenario Compared to "Uncontrolled" Scenario in O3 NAAQS RIA

Source	Bastrop	Caldwell	Hays	Travis	Williamson	Total
On-Road-Evap. And Exhaust	0	0	0	0	0	0
On-Road-Refueling	0	0	0	0	0	0
Non-Road: Rail	0	0	0	0	0	0
Non-Road: Other	-1	-1	-1	-10	-6	-19
Area-Oil and Gas	0	0	0	0	0	0
Area-Residential Wood Combustion	0	0	0	0	0	0
Area-Other	0	0	0	0	0	0
Point-Oil and Gas	0	0	0	0	0	0
Point-EGU	0	0	0	0	0	0
Point-EGU Peaker	0	0	0	0	0	0
Point-Non-EGU	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0

3.8 Transportation Conformity Assumptions

If the Austin-Round Rock MSA were to be designated nonattainment for the 2015 ozone NAAQS in September 2017, CAMPO would need to complete an initial conformity analysis within one year (by September 2018).

For a newly designated nonattainment area for the proposed ozone NAAQS, the baseline year would likely be 2014, since this will be the most recent triennial emissions inventory year at the time that the initial conformity determinations will need to be made and it will be one of the three years that will be used for the 2014-2016 design values that will likely be the basis of the initial nonattainment designations. In order to pass the "less than baseline" test, CAMPO would need to demonstrate that the on-road emissions in the "horizon years" in the recently adopted 2040 transportation plan, which include 2020, 2030, and 2040, were less than the on-road emissions in 2014. If the emissions in the

future years were not less than the baseline emissions, transportation control measures (TCMs) would need to be adopted in order to reduce the future year emissions. CAMPO prepared emissions assessments for 2020 and 2040 as part of the development of its recent 2040 plan. These assessments indicated that the transportation plan would very likely be able to pass a "less than baseline test." The following table shows the summertime (May-September) NO_X and VOC on-road emissions estimates EPA used for the ozone NAAQS photochemical modeling.[18]

Table 12: May-September On-Road Emissions, 2011-2025

Pollutant	2011 (tons)	2025 (tons)	Change (tons)	% Change
NO_X	8,718.9	2,155.6	-6,563.3	-75%
VOC	3,856.7	1,696.0	-2,160.7	-56%

If a lapse were to occur in the Austin-Round Rock MSA, it would mean that any added capacity projects in the region's TIP or transportation plan that had not yet been let at the time the lapse occurred would not be able to proceed until the TIP or transportation plan was again able to demonstrate conformity. This might require a revision to the SIP to revise the MVEB, enactment of Transportation Control Measures (TCMs), or revision to the TIP or transportation plan. Given the time frame required to implement such changes, a lapse under such circumstances would not likely be resolved until at least a year after it occurred.

The practical effects of a lapse are that construction on added capacity projects would not be able to begin while an area was in a lapse. In practice, if a lapse were to occur, TxDOT would likely move up any projects that were exempt from conformity requirements (such as safety improvements), and – if the lapse could not be resolved within the same fiscal year, TxDOT would likely reallocate additional funding that had been designated for that area to other areas of the state so as not to lose those federal funds. When an area came back into conformity, TxDOT could attempt to mitigate the lost revenue that the region experienced while in the lapse by adding additional funds immediately following a lapse. However, there is no guarantee that this would occur, and – especially if many areas of the state wind up designated nonattainment for the 2015 ozone NAAQS, it may be more difficult for TxDOT to move money around in that way.

For this project, CAPCOG assumed that the Austin-Round Rock MSA would have proportionately similar number and duration of project delays associated with transportation conformity relative to the Houston-Galveston-Brazoria and Dallas-Fort Worth areas on an ongoing basis throughout this period, and could face a 1-2 year transportation conformity lapse at least once during the 28-year time frame contemplated in this study. CAPCOG considers the risk of project delays regularly occurring as moderate

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18 ftp://ftp.epa.gov/EmisInventory/2011v6/ozone_naaqs/reports/2011ef_2025ef_county_sector_comparison_NOX.xlsx and ftp://ftp.epa.gov/EmisInventory/2011v6/ozone_naaqs/reports/2011ef_2025ef_county_sector_comparison_VOC.xlsx.

to high, and the risk of at least one lapse of this nature occurring while the area was designated nonattainment or subject to a maintenance plan as low to moderate.

3.9 General Conformity Assumptions

There are two types of activities that appear to be the most likely to face any kind of challenges as a result of the general conformity requirements based on possible increases in emissions:

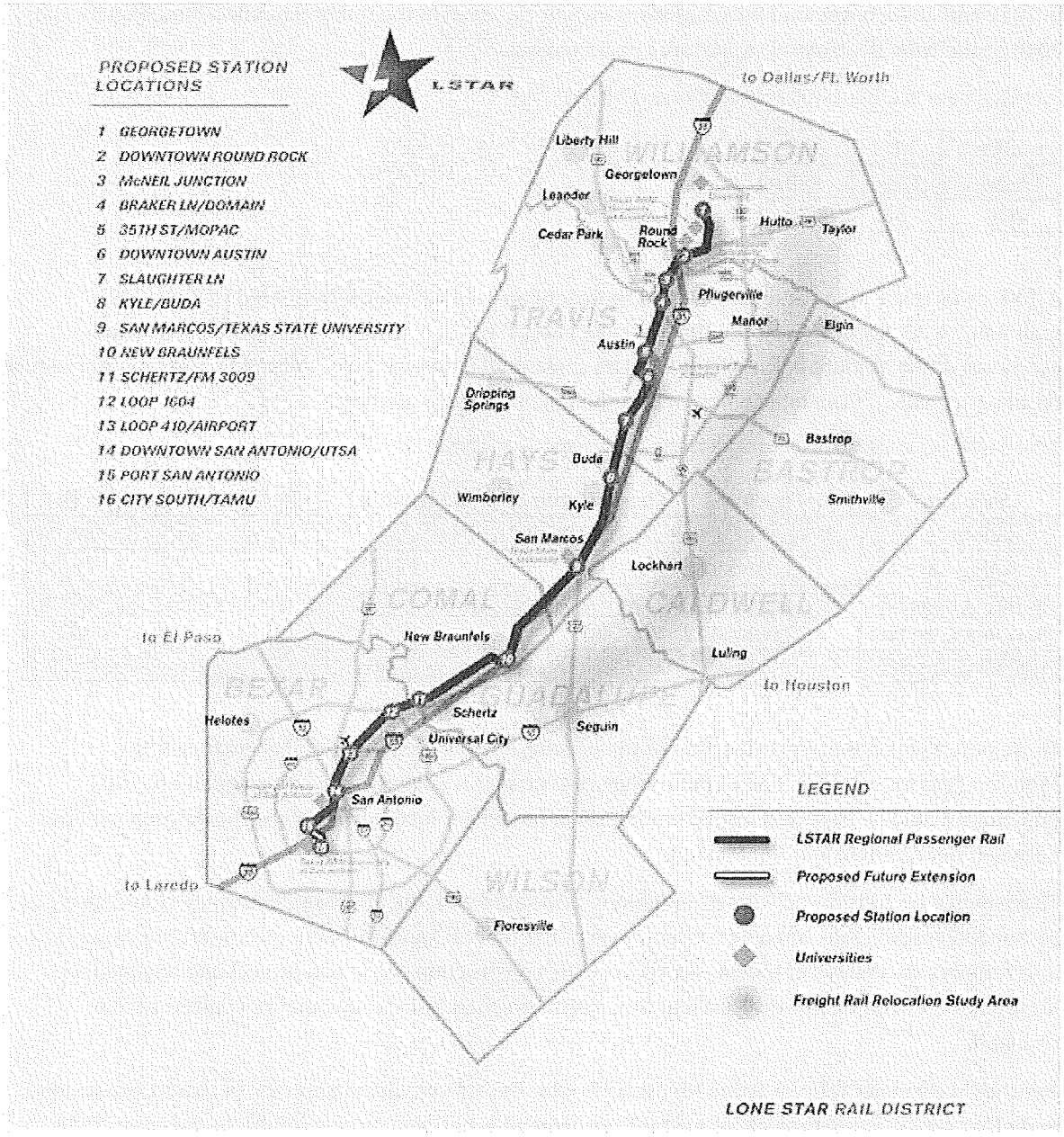
1. Rail expansions; and
2. Airport expansions.

As the region grows, the transportation needs also grow, but are limited by the available infrastructure. To the extent that certain economic activity and growth would be limited by delays in infrastructure investments due to the need to undergo federal general conformity determinations, there could be real economic consequences associated with these requirements.

One project that would most immediately be affected by this requirement would be the Lone Star Commuter Rail District. The Lone Star Rail District is an agency established by the state to establish passenger rail service between the San Antonio and Austin metro areas. The agency's current proposal involves using an existing Union Pacific rail line (the Missouri-Pacific line) between Georgetown and San Antonio to run up to 32 passenger trains a day along this route, while building a new rail line between Taylor and Seguin in order and relocating the existing freight rail traffic there. The following map shows the proposed passenger rail route and the freight rail relocation area.[19]

[19] http://lonestarrail.com/index.php/freight-rail-relocation/map/

Figure 3: Lone Star Rail District Proposes Passenger Rail Route and Freight Rail Relocation Study Area



In order for this project to proceed under a nonattainment designation, the district would require a number of federal approvals that would be subject to the general conformity requirements.

The table below shows the estimated NO_X emissions for locomotives within the Austin-Round Rock MSA in 2011 and 2025, based on EPA's emissions inventories used in their photochemical modeling for the 2014 ozone NAAQS proposal regulatory impact analysis.[20]

Table 13: Estimated 2011 and 2025 Rail Emissions (tons per year)

Pollutant	2011	2025
NO_X	1,280	890
VOC	66	35

A 100 tpy increase in rail emissions would represent an 8-11% increase compared to 2011-2025 emissions. A 2008 study on a potential rail relocation in the San Antonio and Austin areas included estimates of the amount of fuel that would be consumed under various "build" scenarios compared to a baseline scenario. [21] The table below shows the results of these analysis.

Table 14: Fuel Consumption Estimates for Rail Relocation Based on 2008 Study

Scenario	Fuel (gallons)	Change from Baseline (gallons)	Change from Baseline (%)
Baseline	2,956,784	0	0.00%
Planning Case A	3,016,397	173,296	5.86%
Planning Case B1	2,956,571	-213	-0.01%
Planning Case B2	2,955,889	-895	-0.03%
Planning Case C	3,016,397	59,613	2.02%

These data suggest that the relocation of the existing locomotives would not likely trigger the requirements for offsets in and of themselves, although it is unknown how much additional NO_X emissions would be expected from the addition of passenger locomotives along the existing rail lines between Georgetown and San Marcos.

These would be considered "direct" emissions associated with the approval, since they would be a reasonably foreseeable, ongoing consequence of the federal approval. General conformity, however, also requires an analysis of the emissions from the construction phase of a project and any indirect impacts of the federal approval, such as impacts on on-road activity now that rail patterns have changed.

Another likely major federal action that would occur by 2046 would be approval of airport expansions and other construction projects at Austin-Bergstrom International Airport (ABIA). In the early 2000s, an expansion of the Dallas-Fort Worth (DFW) international airport required emissions offsets as a result of increases in NO_X emissions of 0.32 tpd (117 tpy) in 2007 and 1.17 tpd (427 tpy) in 2015. An MOA

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20 ftp://ftp.epa.gov/EmisInventory/2011v6/ozone_naaqs/reports/2011ef_2025ef_county_sector_comparison_NOX.xlsx

21 ftp://ftp.dot.state.tx.us/pub/txdot-info/tpp/ctr_rail_study.pdf See tables 4-6, 4-13, 4-19

between the TCEQ and NCTCOG codified the emission reduction offsets that enabled the project to proceed.[22] This MOA was adopted in January 2004 and approved by the EPA in April 2005.

Currently, ABIA has 25 gates for commercial aircraft. Within the next few years, ABIA has indicated that an additional parking garage will be built and a 7-gate expansion (a 28% increase in capacity) will also be built, although both of these projects are likely to secure federal approval and commence construction prior to September 2017 when nonattainment designations are expected. In general, the airport has experienced 2% annual growth (geometric) in landings and take-offs (LTOs) over the past few years and expects this same rate of growth to continue. Based on present growth, over the next ten years after 2017, the airport could see:

- A 10-gate expansion with an estimated cost of $500 million - $1 billion;
- Roadway/curbside expansion with an estimated cost of $50 million; and
- A third, 5000-space parking garage with an estimated cost of $150 million.

Each of these projects would likely take longer to secure approval and cost more to build if the area was subject to general conformity requirements.

A recent emissions inventory for ABIA indicates that the 100 tpy threshold would be equivalent to an increase in activity of about 16% of the airport's emissions – including aviation sources, ground support equipment, and auxiliary power units.[23] This would be roughly equivalent to a 4-gate expansion relative to ABIA's current configuration and emissions. At current growth rates, even with fleet turnover, it is possible that ABIA would need to secure offsets in order to secure approval for gate expansions that would enable increases in LTOs every 8-10 years in order to accommodate growth.

Table 15: 2012 and 2018 ABIA NO_X and VOC Emissions

Pollutant	2012 (tpy)	2018 (tpy)
NO_X	608	640
VOC	117	105

In considering indirect emissions, an action subject to general conformity that induced an increase in on-road emissions would need to use the latest version of MOVES in order to assess the action's indirect emissions. The following table shows the approximate emissions rates for NO_X and VOC for on-road sources in 2012 and 2018 for the region, calculated by dividing total NO_X and VOC by total VMT.[24] At these emissions rates, it would require approximately 199,800,200 VMT. This would represent a 1.6% increase in VMT for the region, based on TxDOT's estimate of 33,835,827 average daily VMT for the region for Fiscal Year 2014.[25]

[22] http://www.tceq.state.tx.us/assets/public/implementation/air/sip/agreements/NCTCOG_MOA_011404.pdf
[23] http://www.capcog.org/documents/airquality/reports/2013/Task_3.3-ABIA_Doc_v3_4_RC2_RSB.pdf
[24] ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/mvs/ under "2012" and "2018" folders.
[25] http://www.txdot.gov/inside-txdot/division/finance/discos.html?CFC__target=http%3A%2F%2Fwww.dot.state.tx.us%2Fapps-cg%2Fdiscos%2Fdefault.htm%3Fdist%3DAUS%26amp%3Bstat%3Dvm

Table 16: Approximate NO_X and VOC Emissions per VMT for 2012 and 2018 (lbs/VMT) for Travis and Williamson Counties

Year	NO_X	VOC
2012	0.002372	0.001117
2018	0.001001	0.000630

Likewise, construction activities are considered part of a conformity analysis. Based on a default TexN 1.7.1 run for a 2014 ozone season day for the Austin-Round Rock MSA, non-road diesel engines emit about 0.098 pounds of NO_X per gallon of diesel. This is based on 13.74033 tons per day of NO_X from diesel equipment, and daily fuel consumption of 280,141 gallons. For context, the Central Texas Regional Mobility Authority reported using 52,332.70 gallons of fuel for the MoPac improvement project construction activities in 2014.

Given the scale of direct and indirect emissions that would be required to get to 100 tpy, CAPCOG believes that it is unlikely that a single rail or airport expansion approved by the federal government for either a rail expansion or ABIA would be likely to trigger the requirements for offsets. However, it is possible to estimate the approximate costs for such offsets if they were required. In general, using EPA's $15,000 per ton estimate for "unknown" NO_X emissions in its RIA for the 2014 ozone NAAQS proposal, a 100 tpy offset would cost approximately $1,500,000.

In addition to airport expansion or rail relocation, other federal actions could theoretically trigger offset requirements, although it would be much less likely. Other such activities could include:

1. Actions by the U.S. Army Corps of Engineers to approve the construction of dams, etc.;
2. Actions by the U.S. Army at Camp Swift;
3. U.S Army funding for construction projects at Camp Mabry; and
4. Actions by the U.S. DOT to approve gas transmission pipelines within the region.

What a general conformity analysis would do is delay a project that would have required less time for approval if it was located in an attainment area. As a general rule of thumb, CAPCOG assumed that general conformity would delay approval of rail and airport expansions by at least a year compared to the length of time required for an attainment area. CAPCOG assumed that there would be at least two rail expansions and two airport expansions that will take place between 2018 and 2046 that would trigger the general conformity requirements. While there are a number of other federal approvals that could also trigger conformity analyses, CAPCOG analyzed these two scenarios based on the high likelihood that such approvals would be needed within this time frame.

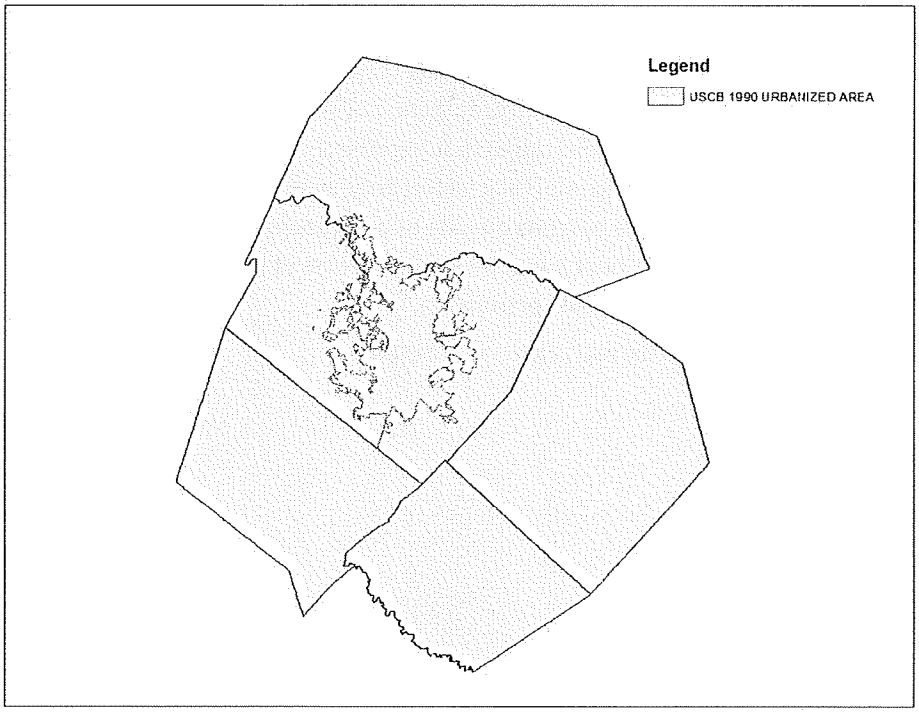
3.10 Inspection and Maintenance Program Assumptions

Since the requirement for I-M programs is only limited to the geographic areas covered by the 1990 Census-defined urbanized areas with populations of 200,000 or more in the 1990 Census, it would not be required for every county in the MSA, or for all areas of Travis and Williamson Counties, where it is currently being implemented. Therefore, Travis and Williamson County's implementation of this

program throughout the entire geographic extent of their counties actually goes beyond what would be required for the counties if designated nonattainment under a Moderate classification. Moreover, since the state could swap parts of urbanized areas in one county with non-urbanized areas in another county, it would be possible to have the I-M program apply only to Travis County without Williamson County needing to be included at all. While it is legally permissible under the Clean Air Act to have an I-M program apply only to a portion of a county, it would not be practical to do so. Factors that would make it impractical to implement in part of a county without it applying to other parts of the county include cost, complaints about equity, motorist education and/or confusion, and effectiveness.

The figure below shows the geographic extent of the 1990 Austin urbanized area.[26]

Figure 4: Geographic Extent of 1990 Austin Urbanized Area



As the figure shows, the urbanized area covered much of Travis County and a portion of Williamson County. Overall, the 1990 Austin urbanized area had a total population of 562,008.[27] CAPCOG estimates that the share of the Austin urban area living in Williamson County was 36,521.

The table below shows the 1990 urban, rural, and total population in each county in the MSA.

[26] U.S. Census Bureau. 1990 Census Urban Areas Boundary File. http://www2.census.gov/geo/tiger/PREVGENZ/ua/ua99_d90_shp.zip.
[27] http://www.demographia.com/db-ua90list.htm

Table 17: Urban and Rural Populations by County, 1990

County	1990 Urbanized Population	1990 Rural Population	1990 Total Population
Bastrop	14,767	23,496	38,263
Caldwell	13,866	12,526	26,392
Hays	28,743	36,871	65,614
Travis	524,469	51,938	576,407
Williamson	107,895	31,656	139,551
TOTAL	**689,740**	**156,487**	**846,227**

As the table above indicates, even though there are not any 1990 Census-defined "urban areas" other than the Austin urbanized area within the current five-county MSA, there were about 127,732 people classified as "urban" population beyond the population of the Austin urbanized area. This is because there was a distinction between a specific "urbanized area" and the number of people considered living in "urban" areas. The Census Bureau defined an urbanized area as one or more places (urban place) and adjacent densely settled surrounding territory (urban fringe) that together had a minimum of 50,000 persons. The Census Bureau defined "urban" as: "comprising all territory, population, and housing units in urbanized areas and in places of 2,500 or more persons outside of urbanized areas."[28] The table below shows the populations of places in Williamson County with 1990 populations of 2,500 or more that would be counted part of Williamson County's "urban" population.[29]

Table 18: Williamson County Places with More than 2,500 Population in the 1990 Census

Place	1990 Population
Cedar Park	18,253
Georgetown	16,251
Leander	5,728
Round Rock	31,559
Taylor	11,437
Total	**71,374**

Using Williamson County's 1990 urban population of 107,895, and the combined 1990 population of 71,374 for Cedar Park, Georgetown, Leander, Round Rock, and Taylor, the Williamson County portion of the 1990 Austin urbanized area should have had a total population of 36,521. Since this population is less than the 51,938 people living in "rural" areas of Travis County in 1990, an I-M program that covered all of Travis County but did not cover any of Williamson County would meet the requirements for a moderate ozone nonattainment area.

[28] http://www2.census.gov/geo/docs/reference/ua/urdef.txt
[29] https://www.census.gov/popest/data/cities/totals/1990s/tables/SU-99-05.txt

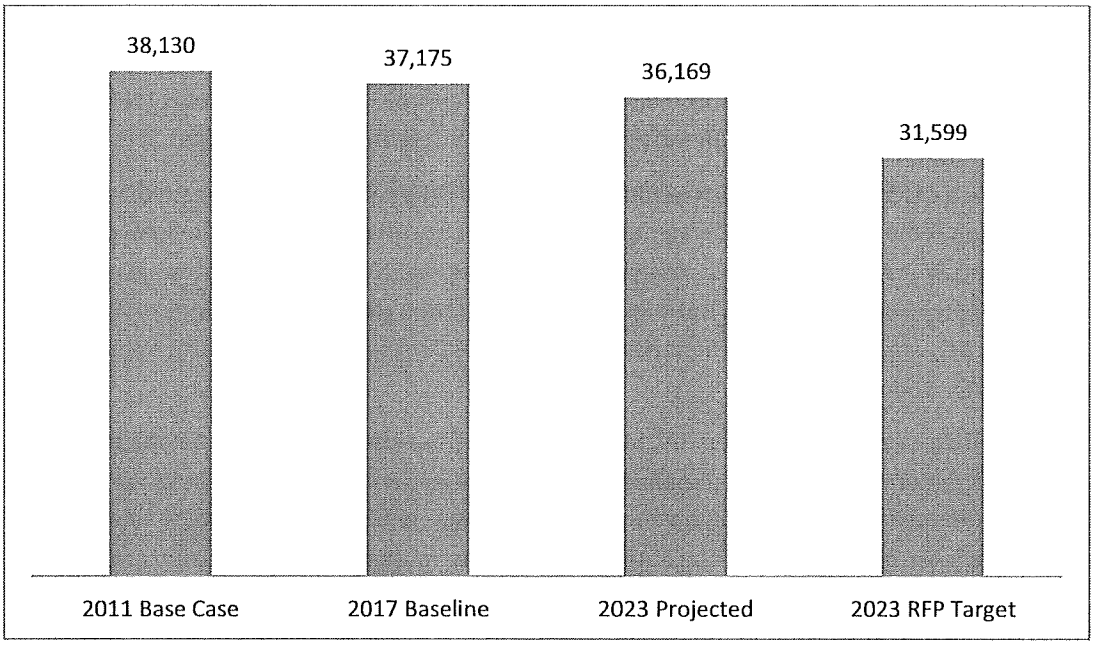
3.11 RFP Assumptions

CAPCOG assumes that, if the MSA were to be reclassified from Marginal to Moderate, the state would need to reduce 15% of its 2017-level VOC emissions by 2023, which would translate into a reduction of approximately 4,571 tons per year of VOC.

The emissions inputs EPA used for the ozone NAAQS proposal RIA show 38,180 tons per year of VOC emissions in 2011 and 35,834 tons per year in 2025 in the "uncontrolled" scenario, and 35,815 tons per year in the "controlled" scenario (the difference is attributable to nonroad equipment retrofits in the "controlled" scenario needed to bring the Houston area into attainment of the 75 ppb standard by 2025).[30] Between 2011 and the 2025 uncontrolled scenario, there is an average annual reduction in VOC emissions of 168 tons per year. This would put the region's emissions at 37,175 tons per year in 2017, which would likely be the baseline used for RFP calculations. Based on a requirement to reduce that emissions level by 15%, the area would need to achieve a total of 5,576 tpy in reductions by 2023 in order to reach a target level of 31,599 tpy.

Based on the 168 tpy annual reduction calculated for 2011-2025, the 2023 emissions level would be 36,169 tpy VOC. This is 1,005 tpy lower than 2017 levels, but an additional 4,571 tpy VOC reductions would be needed in order to fulfill the RFP requirement.

Figure 5. Projected annual anthropogenic VOC emission in 2017 and 2023 (tons per year)



30 ftp://ftp.epa.gov/EmisInventory/2011v6/ozone_naaqs/reports/2011ef_2025ef_county_sector_comparison_VOC.xlsx

3.12 RACT and RACM Assumptions

As a starting point, CAPCOG assumes that any regulation in the TCEQ's recently adopted Dallas-Fort Worth (DFW) SIP that the TCEQ has identified as fulfilling RACT would also be considered RACT for the Austin-Round Rock MSA. TCEQ considers some of these rules to actually go beyond what would be considered the minimal requirements for RACT for the 1997 eight-hour ozone standard, so the levels of control may not be exactly representative of the level of control that would be needed to fulfill RACT requirements only. For example, TCEQ's rules for cement kilns in the DFW area are based on application of Selective Non-Catalytic Reduction (SNCR) technology to reduce NO_X emissions, but it is possible that EPA would have accepted a less stringent standard consistent with other technologies (such as low-NO_X burners) as RACT. Nevertheless, given the similarity of the types of sources in the two areas and the much more stringent ozone standard that any new RACT rules would be adopted for, the existing DFW NO_X rules provide a good starting point for trying to understand what might be adopted (or required by EPA to be adopted) for the Austin-Round Rock MSA if it reached a Moderate classification. Any RACT analysis conducted by the state would be based on the specific sources within the Austin-Round Rock MSA. Considering the scale of the emission reductions that would be required to implement the 15% reduction in VOC emissions required under the RFP rules, CAPCOG did not include separate analyses of each of the 44 VOC source categories covered by a CTG.

The RACT requirements are independent of other requirements for a nonattainment area, and would be required whether or not they were necessary for attainment or RFP. In this case, however, CAPCOG assumes that the emission reductions from VOC RACT would contribute to RFP and – to a much lower degree – contribute to attainment, CAPCOG did not itemize the cost of RACT requirements for VOC sources, assuming that they were less than the total amount of VOC emissions needed for RFP.

NO_X emission reductions from certain sources may also be required beyond the level needed to fulfill RACT if the emission reductions from implementing RACT were not sufficient to bring an area into attainment by its attainment date. CAPCOG assumed that a "maximal NO_X reduction" strategy would be required for the Austin-Round Rock MSA's attainment demonstration that would require existing sources to reduce NO_X emissions further than what the current DFW rules require if those rules were applied to the Austin-Round Rock MSA.

Whether or not a measure was considered RACM, EPA may require such a measure to be adopted as being necessary for attainment, which is a separate requirement under the Clean Air Act. Under §172(c)(6), the state must adopt "enforceable emission limitations, and such other control measures, means or techniques (including economic incentives such as fees, marketable permits, and auctions for emission 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 requirement is independent from the requirement in §172(c)(1) for the SIP to include implementation of RACM and the term "as may be necessary" indicates that the SIP would need to include emission limits that were necessary to bring the area into attainment of the standard even if the state did not consider the measure to meet the definition of RACM.

While an itemized accounting of the potential costs of NO_X RACT is possible, it was not performed here. This study assumes that the costs for achieving maximum NO_X reductions from point sources would

exceed the costs for NO_X RACT rules since the stringency of the emission limits adopted under a "maximal control" scenario would, by definition, be tighter than the emission limits that would be necessary for RACT.

3.13 Assumptions about Other Emission Reduction Requirements

CAPCOG assumed that the following technologies would be required by EPA for existing sources as part of an attainment demonstration SIP for the area if it were to be required to submit a Moderate area SIP:

- Cement kilns: Selective Catalytic Reduction: SCR (80% from uncontrolled);
  - Texas Lehigh Cement Company;
- Lime kilns: Low-NO_X burners (30% from uncontrolled);
  - Austin White Lime;
- Electric Generating Unit (EGU) Boilers: SCR (80% from uncontrolled);
  - Decker Creek Power Plant;
  - Sim Gideon Power Plant;
- EGU gas-fired turbines: SCR and steam injection (95% from uncontrolled);
  - U.T. Hal Weaver Power Plant;
  - Bastrop Clean Energy Center;
- 4-cycle rich-burn engines: non-specific catalytic reduction (NSCR) (90% from uncontrolled);
  - Luling Gas Plant.

While SCR-level control for cement kilns is currently not required in any part of the state, it would constitute the maximum level of control for this source type based on EPA's list of control measures for cement kilns, and EPA identified SCR for cement kilns as one of the plausible pathways for states to implement the new ozone NAAQS in the RIA for EPA's 2014 ozone NAAQS proposal. While it is not necessarily true that TCEQ would consider this technology to be RACM for cement kilns or power plants in the Austin-Round Rock MSA, it is possible that EPA would withhold approval of an attainment demonstration for the region that did not include that level of control.

Based on each facility's 2013 emissions inventory, CAPCOG estimates that these controls would reduce NO_X emissions by 3,037 tons per year relative to current levels.

3.14 Anti-Backsliding Assumptions

For this analysis, CAPCOG was analyzing the incremental economic costs to the region of new requirements associated with a nonattainment designation. This means that the cost of a nonattainment designation would not include the ongoing costs associated with continuing to implement emission reduction measures within the region that would be subject to the Clean Air Act's anti-backsliding restrictions. These rules include:

- Vehicle emissions inspection and maintenance (I-M) program in Travis and Williamson Counties;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 114, Subchapter C, Division 3;
- Stage I vapor recovery 25,000 gallon per month throughput exemption level in all five counties;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 115, Subchapter C, Division 2;
- Degreasing restrictions in all five counties;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 115, Subchapter E, Division 1;

- Cutback asphalt restrictions in all five counties;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 115, Subchapter F, Division 1;
- Bulk gasoline plant VOC controls for loading and unloading in Travis County;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 115, Subchapter C, Division 1;
- Storage of VOC in Travis County;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 115, Subchapter B, Division 1;
- Vent Gas Control in Travis County;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 115, Subchapter B, Division 2;
- Water Separation Control in Travis County;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 115, Subchapter B, Division 3;
- Utility Electric Generation in Bastrop and Travis Counties;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 117, Subchapter E, Division 1; and
- Cement Kilns in Hays County;
  - Title 30 of the Texas Administrative Code, Part 1, Chapter 117, Subchapter E, Division 2.

To the extent that any of these emission reduction requirements could theoretically be removed from the SIP without coming up with substitute emission reductions through another regulation if the area was designated attainment, but would be locked into these measures for the duration of the nonattainment and maintenance periods if designated nonattainment, there could be a cost that would be associated with the anti-backsliding restrictions. This would be particularly true for a rule that involved significant ongoing program costs, such as the I-M program.

While it is possible to conduct this analysis – and CAPCOG does include an analysis for the costs of the I-M program in the "Context" section of this report, it would not accurately represent the incremental cost of a nonattainment designation compared to a "business as usual" scenario as it would represent the cost associated with a nonattainment designation associated with an "uncontrolled" scenario. Understanding the context for the costs of a nonattainment designation by examining the existing costs helps put the costs estimated for a nonattainment designation in perspective, but adding costs that the region is already incurring to the bottom line estimate would make an explanation of the costs more complex. Therefore, for this analysis, CAPCOG assumed that all of these measures continued to apply to the region during this period under a "business as usual" situation in which the region remained designated attainment.

3.15 Other Possible Regulatory Requirements for the Region

While this report focuses on the cost of associated with a nonattainment designation for the EPA's proposed ozone NAAQS, there are other costs that the region could face due to EPA's implementation of the proposed NAAQS beyond those specifically associated with the Austin-Round Rock MSA being designated a nonattainment area.

These situations include:

1. The EPA requiring emission reductions from within the MSA in order to abate interstate ozone impacts;
2. The TCEQ or EPA requiring emission reductions from within the MSA in order to reduce the area's contribution to a downwind nonattainment area;

3. All or part of the MSA being included in a larger nonattainment area associated with a monitor outside of the MSA (such as in San Antonio); and
4. Emission reductions required to bring the MSA into attainment of the standard by the attainment date for a Marginal area.

EPA's recent modeling of interstate contributions to peak 8-hour ozone concentrations for the 2008 ozone NAAQS shows that Texas contributes 0.65 ppb or more at 214 monitoring stations with projected 2017 ozone design values of 66 ppb or more in 26 states and 174 counties, with contributions in adjacent states as high as 16.71 ppb in Arkansas, 14.70 ppb in Louisiana, 11.65 ppb in Oklahoma, and 11.36 ppb in New Mexico.[31] The scale of these ozone contributions would clearly be above the level that EPA specified for its initial screen for air quality impacts (1% or more of a standard), but they don't mean that the EPA would necessarily require Texas to adopt additional controls to further control NO_X emissions, although the EPA's analysis of a range of $500 - $5000 per ton cost threshold for the Cross-State Air Pollution Rule (CSAPR) for the 1997 eight-hour ozone NAAQS and decision to use a $500 per ton threshold suggests that EPA likely would target the state for additional controls on stationary sources that were able to reduce emissions at an average cost up to $5,000 per ton. [32]Therefore, to the extent that EPA considers existing NO_X sources within the Austin-Round Rock MSA to be able to reduce emissions cost-effectively below their cost-per-ton threshold, these sources may be required to install pollution abatement devices in order to meet the state's interstate ozone transport obligations.

Similarly, the TCEQ or EPA may require emission reductions from within the Austin-Round Rock MSA in order to help achieve attainment in another area, even if the Austin-Round Rock MSA remained designated "attainment." Based on the San Antonio area's current ozone levels, it is very unlikely that it will be able to avoid a nonattainment designation for a more stringent standard, and it may even have a design value that would require it to be classified as "Moderate" if EPA sets the standard at the lower end of its proposed range. If that were to occur, the proximity of the Austin-Round Rock area and its contribution to ozone levels in San Antonio could cause the EPA or TCEQ to require emission reductions from nearby counties, including the Austin-Round Rock MSA, in order to reduce ozone levels within the San Antonio area.

Even if the Austin-Round Rock MSA were not added to a possible San Antonio nonattainment area, though, the EPA or TCEQ might determine that it would be necessary to reduce emissions within the MSA in order for another area in the state to reach attainment of the standard by their attainment deadlines. The EPA's Regulatory Impact Analysis for the proposed 2015 ozone NAAQS showed emission reductions from the Austin-Round Rock MSA being needed to support attainment in the Dallas-Fort Worth and Houston-Galveston-Brazoria areas by 2025.[33]

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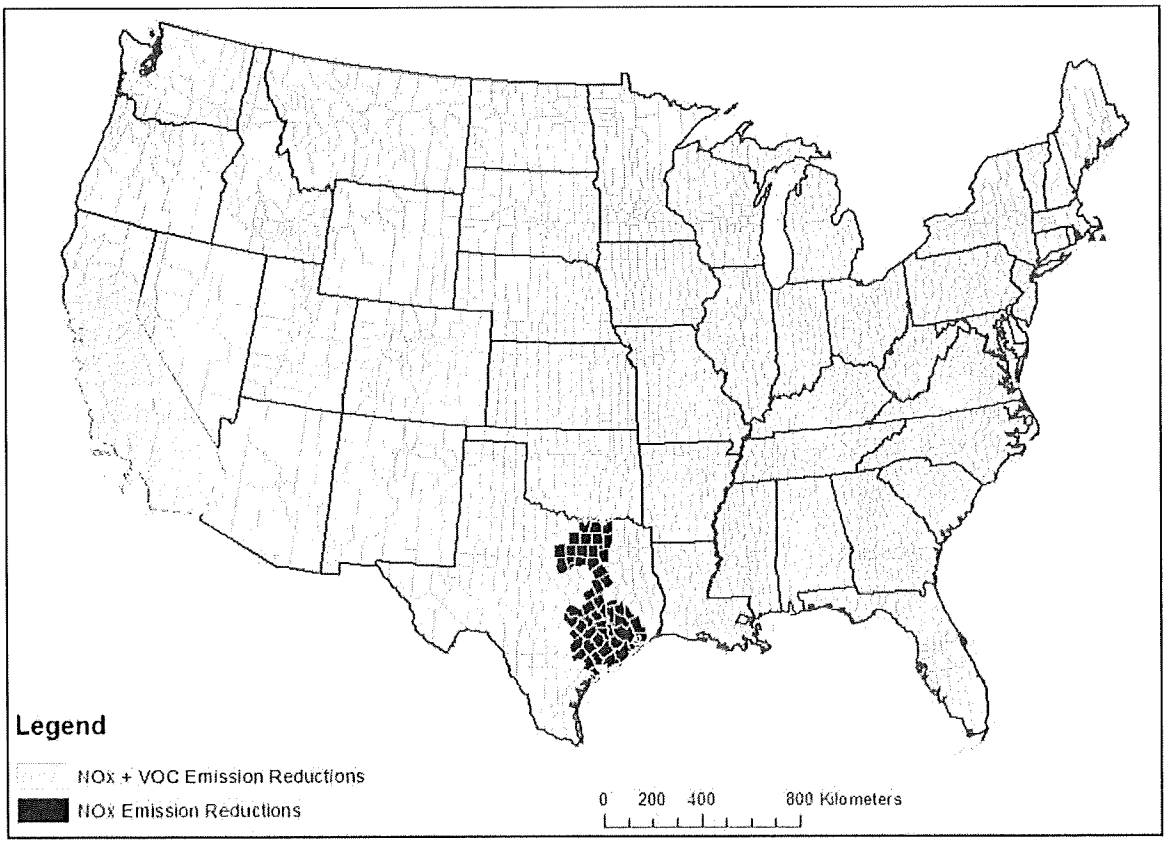
[31] http://www.epa.gov/airtransport/pdfs/2017%20Ozone%20Contributions_Transport%20NODA.xlsx

[32] http://www.epa.gov/airtransport/CSAPR/pdfs/SigContStateEmBudget.pdf

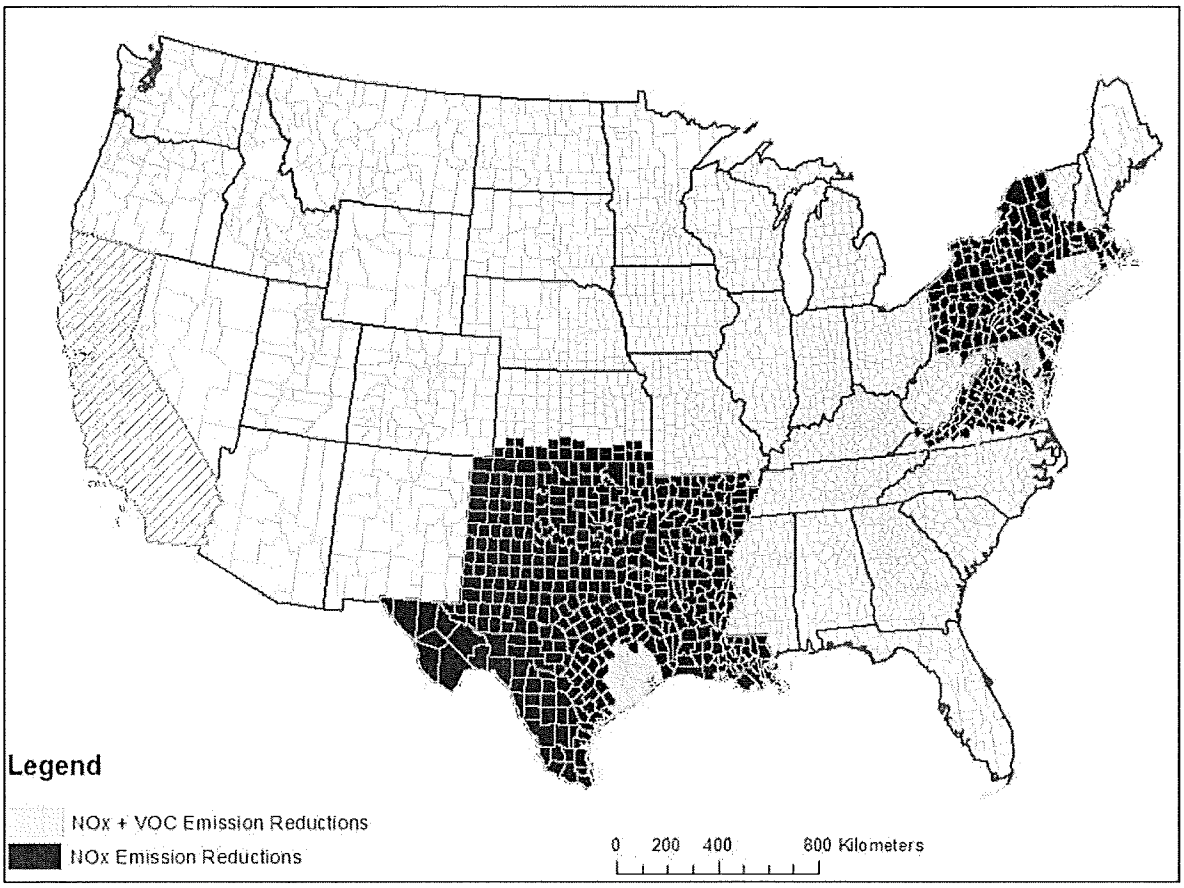
[33] U.S. Environmental Protection Agency Office of Air and Radiation, Office of Air Quality Planning and Standards. *Regulatory Impact Analysis of the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone*. November 2014. EPA-452/P-14-006. Available Online at http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf. Accessed June 14, 2015.

Figure 6: Counties Where Emissions Reductions Were Applied to Demonstrate Attainment of the 75 ppb Standard by 2025[34]



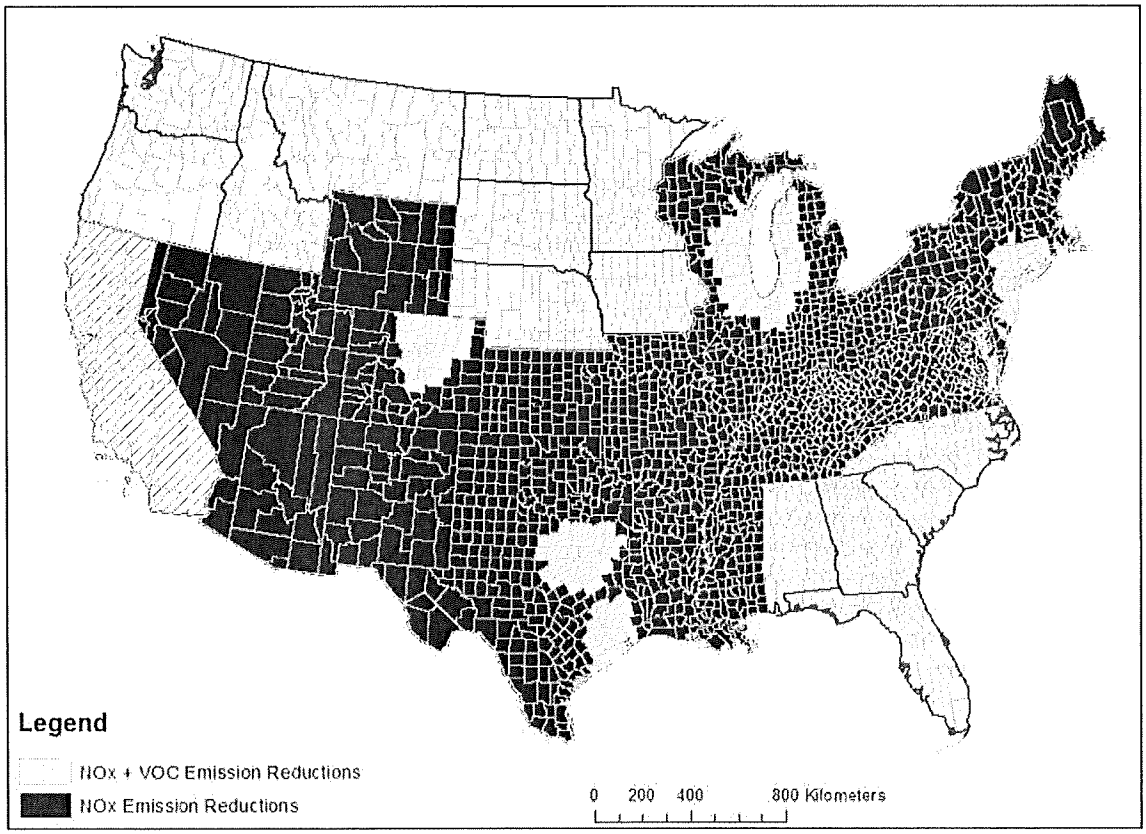
[34] http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf , Figure 4-2

Figure 7: Counties Where Emissions Reductions Were Applied to Demonstrate Attainment of a 70 ppb Standard by 2025[35]



[35] http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf, Figure 4-5

Figure 8: Counties Where Emissions Reductions Were Applied to Demonstrate Attainment of a 65 ppb Standard by 2025[36]



While this study uses the guidance EPA issued for issuing designations for the 2008 ozone NAAQS, it is likely that EPA will issue updated guidance for designations for the 2015 ozone NAAQS. It is not yet clear what changes, if any, they might make relative to the 2008 guidance. However, given the proximity and size of the Austin-Round Rock and San Antonio-New Braunfels MSA, some or all of the counties in the Austin-Round Rock MSA could actually be added to a San Antonio-based nonattainment area. This possibility is just speculation at this point, however, and – regardless of whether other counties were added to a possible Central Texas ozone nonattainment area beyond the five in the Austin-Round Rock MSA – the analysis in this report of the implications for the MSA itself would still be largely valid, except that it would make it less likely that the area would be able to measure attainment of the standard by the 2023 attainment date for moderate areas.

For areas designated as Marginal, there is not a requirement that existing sources within the region install new pollution control devices. Such requirements do not begin to apply until an area is classified as Moderate. Therefore, there may be costs associated with bringing a Marginal area into attainment of the standard by its applicable attainment deadline that are not directly required by virtue of the area's nonattainment designation. These costs are not considered specifically as part of this analysis, and those

[36] http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf, Figure 4-6

costs would likely overlap almost exactly with the emission reductions that would be required by virtue of a Moderate classification if the area was reclassified from Marginal. It is also true that if the area remained designated attainment for the proposed ozone standard and subsequently violated the standard, it is still the state's obligation to bring the area's ozone levels into attainment

The focus of this study are costs that are directly associated with the area being designated nonattainment that the area would not necessarily face if it remained designated attainment. Costs associated with actual attainment of the standard within the Austin-Round Rock MSA are only analyzed to the extent that the area would be required to adopt new emission reductions as the result of a nonattainment classification of Moderate or higher. Costs associated with reducing the area's contribution to ozone levels in other parts of the state or other states are not specifically analyzed, since EPA and TCEQ have much more discretion in determining what emission reductions are needed and what areas they should come from to fulfill these requirements.

4 Economic Assumptions

This report uses many of the same methods and tools that would be used in an economic impact assessment used for economic development analysis. In a typical economic development analysis, a proposed economic development project might be analyzed to estimate the impact throughout the region's economy of a company's plans to expand within the region. The impacts would include the value added to the region's gross regional product through the increased sales in that sector of the economy, as well as the "knock-on" effects (direct and indirect) of increased sales in the company's supply chain and the induced wealth effects in the economy of increased disposable income. This report uses those same kind of analyses to estimate the economic consequences of certain investments that might not occur or businesses that might close as the result of a nonattainment designation. This report also analyzes the impact of increases in the costs (and revenues in certain cases) for businesses that would be impacted by a nonattainment designation but would remain in business.

4.1 Measuring Impacts on Gross Regional Product

To the extent possible, this report describes the economic impacts of a nonattainment designation in terms of impacts on the Gross Regional Product (GRP). The GRP refers to the value of all the final goods and services produced in a region in a given year. The distinction between GRP and total sales is that the GRP subtracts the costs of inputs from sales.

To use an example, a local beverage manufacturer sells each beverage for $1. Of that $1:

- 10 cents is allocated to profits (property income);
- 40 cents is allocated to wages (earnings);
- 10 cents is allocated to taxes;
- 15 cents is allocated to the cost of cans; and
- 25 cents is allocated to other costs.

A measure of the revenue (or sales) would show $1 as the value of a transaction to purchase one beverage. GRP, on the other hand, subtracts the input costs associated with production (cans and other,

in our example above) and would only show $0.60 as the economic value added from the sale of one beverage, which would include the value of profits, wages, and taxes paid. If the supplier of cans was also located within the region, the $0.15 sale that the can manufacturing made to the beverage manufacturer would also contribute to the local GRP, after subtracting the can manufacturer's costs. These subtractions ensure that economic activity is not double-counted in the overall measure of economic production for a region.

In this report, something is considered an economic cost to the region if it results in a lower GRP from 2018-2046 as a result of an ozone nonattainment designation in 2017 than the GRP would have been if the region remained designated attainment. Conversely, something is considered an economic benefit to the region if it results in a higher GRP over the same period as the result of a nonattainment designation relative to the GRP if the area remained designated nonattainment.

For this analysis, GRP is considered the sum of all earnings (profits and wages in the example above), property income (which would include appreciation on capital), and taxes, minus any subsidies, for all industries within a defined geographic area – in this case, the Austin-Round Rock MSA.

$$GRP = \sum_{i=111000}^{n} (Earnings_i + Property\ Income_i + Taxes\ Paid_i - Subsidies\ Received_i)$$

Where "i" is the NAICS code.

There are some possible economic impacts of a non-attainment designation which are not specifically quantified in this study, such as damage to the "Austin brand," which are discussed at the end of this section. There are also possible economic impacts that are not quantified due to uncertainty as to the particular situations that might arise over the 23-28 year period analyzed.

4.2 EMSI Input-Output Model

For this report, CAPCOG relied on data and assumptions in the Economic Modeling Specialists International (EMSI) Input-Output model for 2013, the last year for which data were available.

For a new investment, CAPCOG translated the estimated sales for a new investment into its impact on the GRP through the following equation:

$$\begin{aligned}\Delta GRP\ from\ a\ Change\ in\ Sales &= \Delta Sales \\ &\times \left(\frac{Earnings + Profits + Taxes - Subsidies}{Total\ Sales} + Direct\ Value\ Added\ Per\ Sale \right. \\ &\left. + Indirect\ Value\ Added\ Per\ Sale + Induced\ Value\ Added\ Per\ Sale\right)\end{aligned}$$

Where CAPCOG only had information on the number of jobs that would change, CAPCOG calculated the sales by using the ratio of sales to jobs for that industry.

For example, an expansion at Samsung that would double its size would result in an increase in employment of 2,500. Based on $3,828,997,967 in sales and 10,610 in the "Semiconductor and Related Device Manufacturing" sector (NAICS Code 334413), there is an average sales-to-employee ratio of $360,876. Therefore, an increase in 2,500 employees would translate into $902,190,867 in increased

sales in this sector. Based on this sector's sales and its $1,473,199,869 in earnings, $1,456,628,872 in property income, and $80,670,859 in sales, this sector's GRP-to-sales ratio would be $78.62 in GRP per $100.00 in sales. Once the direct, indirect, and induced value added per sale ($0.0603 in direct value added per $1 in sales, $0.0122 in indirect value added per $1 in sales, and $0.4515 in induced value added per sales) are also considered, the total impact on the local economy of a 2,500-employee expansion at Samsung would be $1,182,058,775 per year. Over a 23-28 year timeframe, this would equate to $27 - $33 billion.

The above example only includes the ongoing activity from the expansion – it does not include the initial $13.6 billion investment that plant officials estimate for the project. Assuming that this investment was spent entirely in the Industrial Building Construction sector (NAICS Code 236210), this investment would increase GRP due to increased wages paid, profits received, and taxes paid in this sector, as well as in its supply chain in direct and indirect value added per sale. Since the economic activity associated with the construction is temporary, induced effects are not included, since these would be expected to be more tied to permanent changes in economic conditions. The change in GRP associated with the construction phase of this expansion would be considered the following.

$$\Delta GRP\ from\ a\ Capital\ Investment = \Delta Sales\ in\ Construction\ or\ Equipment \times \left(\frac{Earnings + Profits + Taxes - Subsidies}{Total\ Sales\ in\ Construction\ or\ Equipment} + Direct\ Value\ Added\ Per\ Sale + Indirect\ Value\ Added\ Per\ Sale\right)$$

In this case, a capital investment of $13.6 billion, if it was spent all on construction, would increase the region's GRP by $9,995,108,324 during the period construction was underway.

4.3 Background on the Austin-Round Rock MSA Regional Economy

The U.S. Bureau of Economic Analysis (BEA) estimates that the Austin-Round Rock MSA's Gross Regional Product (GRP) for 2013 was $103.892 billion. This number closely matches the GRP estimated by EMSI: over $107 billion. Leading sectors in the economy were Government ($12.9 billion); Manufacturing ($11.1 billion); Real Estate ($11.0 billion); and Professional, Scientific, and Technical Services ($10.8 billion). The following table presents the GRP for the Austin-Round Rock MSA by sector.

For the Austin-Round Rock MSA, EMSI estimates that the total 2013 GRP was $107,933,069,981, which includes $64,644,531,702 in earnings, $35,867,003,756 in property income, and $7,691,403,481 in taxes, with $269,868,958 in subsidies subtracted.

Table 19 - Austin MSA GRP by Sector (2013)[37]

Industry	Gross Regional Product
Crop and Animal Production	$425,241,141
Mining	$2,595,444,019
Utilities	$618,872,718
Construction	$4,290,623,284
Manufacturing	$11,103,145,952
Wholesale Trade	$9,337,507,447
Retail Trade	$5,470,127,441
Transportation & Warehousing	$1,232,079,551
Information	$6,819,489,643
Finance & Insurance	$7,450,741,977
Real Estate	$10,989,617,356
Professional, Scientific & Technical Services	$10,782,313,762
Management of Companies & Enterprises	$495,605,367
Administrative, Support, Waste Management, and Remediation Services	$3,516,923,158
Educational Services	$849,658,893
Health Care and Social Assistance	$6,005,972,281
Arts, Entertainment & Recreation	$980,479,919
Accommodation & Food Services	$3,078,708,303
Other Services (Except Public Administration)	$2,368,118,036
Government	$12,867,650,201
Unclassified Industry	$5,848,565,234
Total	$107,126,885,683

4.4 Description of Types of Impacts

There are five types of economic impacts analyzed in this study:

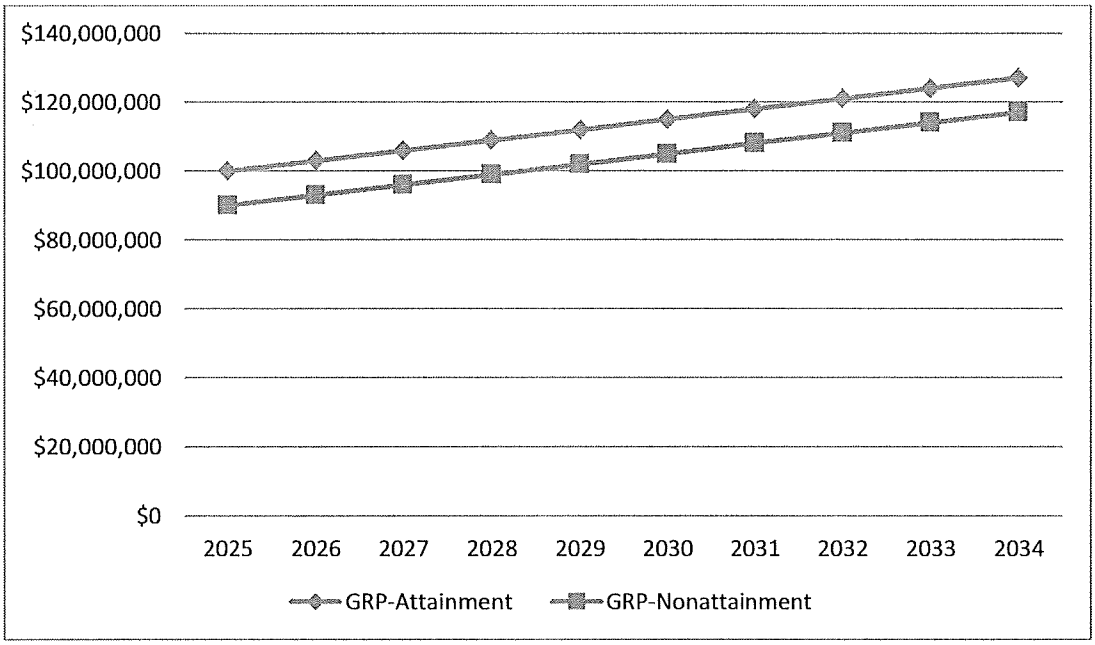
1. The impact of a permanent pollution abatement expense on an industry's GRP;
2. The impact of a delay in transportation infrastructure growth on the region's GRP;
3. The impact of a one-time loss of a likely capital investment on regional GRP;
4. The impact of a permanent loss sales in a given industry on regional GRP; and
5. The impact of a shift in sales from one industry to another on regional GRP.

For pollution control devices, the costs are treated as a 1-to-1 reduction in an industry's GRP, without direct, indirect, or induced effects on the local economy. Such a cost effectively increases the inputs required to produce the same amount of goods. Without knowing the price elasticity for the sales of those goods, it would not be possible with the tools CAPCOG has available for this project to analyze how an increase in input costs would affect the price and overall sales level for a given industry. The affected firms would be expected to partially shift some of those increased costs to consumers in the form of higher prices, to its workers in the form of decreased wages or layoffs, to its suppliers in terms

[37] EMSI Input-Output Model

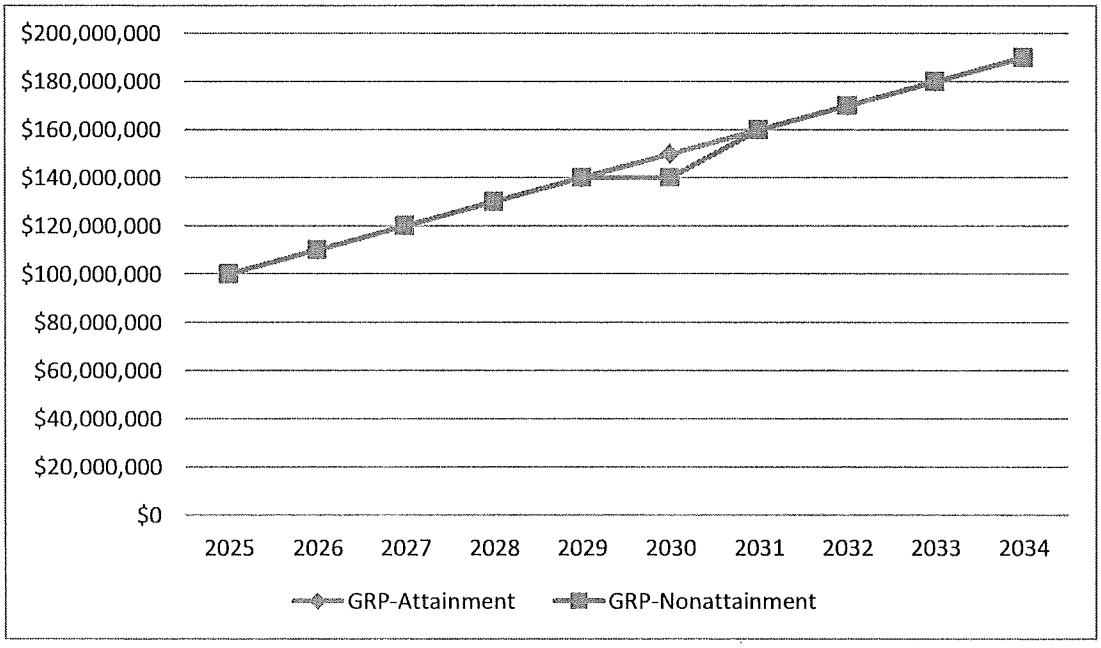
of decreased quantities purchased or decreased prices the firm would be willing to pay, and to its owners in the form of reduced corporate profits. Given the complexity of the situation, CAPCOG assumed that the financial cost of the pollution control equipment equaled the economic cost. This also assumes that these costs would be paid to out-of-region firms, although it would be expected that there would be some increase in revenues for local firms involved in the construction and/or operation of the pollution control equipment. Without additional data, CAPCOG was not able to provide that level of analysis for these type of costs. CAPCOG also treated the financial costs of government agencies fulfilling new planning requirements such as conformity and SIP planning as equivalent to the economic cost.

Figure 9. Example of the impact on an industry's GRP of a $10 million per year pollution abatement cost



For the general conformity analysis, CAPCOG analyzed the impact of a one-time loss in growth in key sectors that would be affected by delays in infrastructure development due to the need to obtain federal conformity determinations for such projects. The assumption in this situation is that the industries that would be directly impacted by a delay in infrastructure growth would be able to continue to experience sales growth within the existing infrastructure only up to a certain point after which the physical capacity of the existing infrastructure network would not allow any more growth in the given industry. If there was a delay in expanding the infrastructure network beyond the time frame it would take under an attainment designation, there would presumably be a loss in the aggregate GRP for the region from 2018 – 2046 that could be attributed to general conformity requirements relative to the aggregate GRP over this same period under an attainment designation.

Figure 10. Example of the impact of a delay in infrastructure expansion on GRP growth

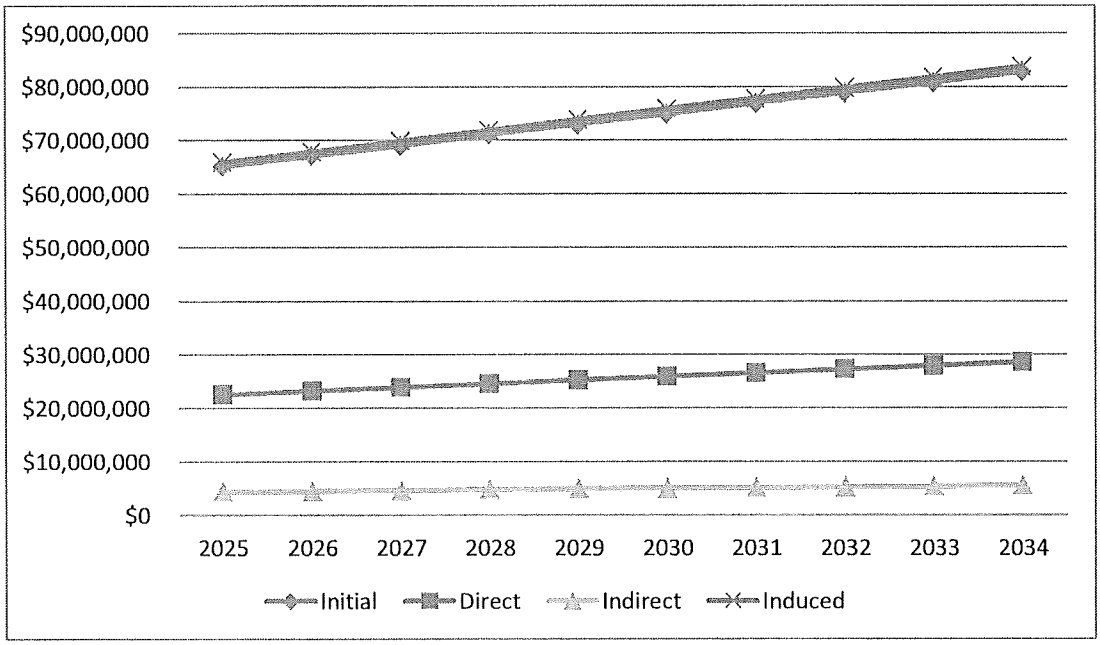


For impacts involving construction that would have occurred while the area was designated attainment that would be expected not to occur under a nonattainment designation, CAPCOG used EMSI's data to calculate what the direct and indirect economic impacts of that level of sales in the pertinent construction industry would be, but excluded induced impacts, since these would be one-time construction projects that would not be expected to increase the overall levels of employment within the region permanently. This type of analysis was used to model the loss of capital investment due to NNSR permitting and transportation conformity.

Figure 11. Example of a one-time loss in capital investment on initial, direct, indirect, and induced value added to GRP

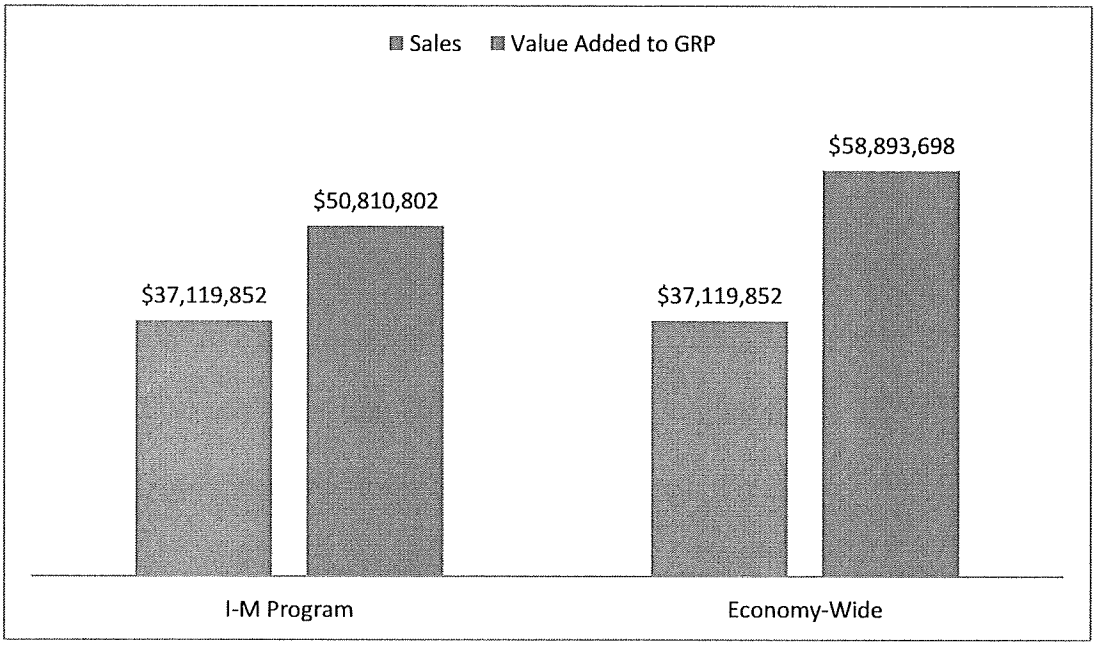
For the longer-term economic impacts that would be enabled through these construction activities, CAPCOG included the initial, direct, indirect, and induced economic impacts of the affected industry. For example, an expansion of Samsung would have an economic impact in the construction phase that would involve the industrial building construction sector, along with its direct and indirect suppliers, but would not include induced economic impacts, whereas the newly expanded semiconductor manufacturing sector would have initial, direct, indirect, and induced impacts due to a permanent increase in sales in this sector. The figure below shows an example of these impacts.

Figure 12. Example of a permanent loss in sales on initial, direct, indirect, and induced value added to GRP



The final type of analysis included in this report is a comparison of GRP when sales shift from one sector to another. This analysis is used to compare GRP associated with the region's existing I-M program to a "no I-M" scenario in which the dollars spent on the I-M program were spent elsewhere within the economy. This analysis depends heavily on the assumptions regarding where those dollars would shift to. Essentially, if the sum of all of the "value added" multipliers for a given industry is larger than the sum for the industries affected by the I-M program (automotive repair and maintenance primarily), then there would an economic cost associated with having sales in the auto repair industry rather than another industry. The figure below shows an illustration of the estimated GRP impacts from the local sales generated from I-M program compared to the estimated GRP impacts from the same amount of sales if they were distributed economy-wide proportionate to current sales levels. In this case, the $8 million difference between these two scenarios represents an opportunity cost associated with the I-M program, since the region could produce a higher total GRP if those same dollars were spent elsewhere within the economy.

Figure 13. Comparison of value added to sales in the I-M program to value added to sales economy-wide



4.5 Multipliers Used for Key Sectors

The following table shows the multipliers used for some key analyses in this report.

Table 20. Value multipliers for key sectors

NAICS Code	Description	Initial Value Added Per Sale	Direct Value Added Per Sale	Indirect Value Added Per Sale	Induced Value Added Per Sale	Total Value Added Per Sale
236210	Industrial Building Construction	0.5605	0.1554	0.0434	0	0.7593
237310	Highway, Street, and Bridge Construction	0.5606	0.148	0.041	0	0.7496
327310	Cement Manufacturing	0.4848	0.1672	0.0326	0.4908	1.1754
334413	Semiconductor and Related Device Manufacturing	0.7862	0.0603	0.0122	0.4515	1.3102
481111	Scheduled Passenger Air Transportation	0.4586	0.1732	0.0407	0.4747	1.1472

NAICS Code	Description	Initial Value Added Per Sale	Direct Value Added Per Sale	Indirect Value Added Per Sale	Induced Value Added Per Sale	Total Value Added Per Sale
481112	Scheduled Freight Air Transportation	0.4487	0.1654	0.0389	0.462	1.115
481211	Nonscheduled Chartered Passenger Air Transportation	0.4548	0.107	0.025	0.4366	1.0234
481212	Nonscheduled Chartered Freight Air Transportation	0.4419	0.1729	0.0408	0.4733	1.1289
481219	Other Nonscheduled Air Transportation	0.4309	0.1476	0.0346	0.4552	1.0683
482110	Rail transportation	0.5075	0.1847	0.055	0.5023	1.2495

4.6 Cost of Offsets

In order to estimate the potential costs of emission reduction credit (ERC) offsets, CAPCOG reviewed TCEQ's data on ERCs traded from December 2012 – December 2014 in the Dallas-Fort Worth (DFW) and Houston-Galveston-Brazoria (HGB) ozone nonattainment areas.[38] Table 21 shows a summary of the emission reduction trades from December 7, 2012, through December 3, 2014, excluding trades for $0.

Table 21: NO_X and VOC Emission Reduction Credit Trade Data for DFW and HGB Areas, Dec. 2012 - Dec. 2014

Data Point	DFW Area	HGB Area	Combined
NO_X Trades	1	9	10
NO_X TPY Traded	49.8	151.5	201.3
NO_X Trade Costs	$961,140	$28,326,900	$29,288,040
NO_X Trade Cost Per TPY	$19,300	$186,976	$145,494
VOC Trades	5	26	31
VOC TPY Traded	152.3	248.8	401.1
VOC Trade Costs	$206,740	$55,436,526	$55,643,266
VOC Trade Cost Per TPY	$1,357	$222,816	$138,727
TOTAL TRADE COSTS	$1,167,880	$83,763,426	$84,931,306

[38] TCEQ. Trade Report, Emission Reduction Credit Program. December 3, 2014. Available online at: https://www.tceq.texas.gov/assets/public/implementation/air/banking/reports/ectradereport.pdf.

As the table above shows, the cost of obtaining emission reduction offsets varies substantially by pollutant and by area. The cost of obtaining offsets is primarily influenced by a) the degree to which emissions within a nonattainment area are already controlled and b) the cost of obtaining additional emission reductions. One of the reasons that it costs so much to obtain a NO_X or VOC ERC in the HGB area is that the area's existing sources are already required to strictly limit emissions, so obtaining additional emission reductions becomes very expensive. The relatively lower cost of offsets in the DFW area indicates that there are existing facilities in the area that are able to reduce emissions at a significantly lower cost per ton of emission reductions than the facilities in the HGB area.

It is uncertain what the costs of NO_X or VOC ERCs might be for the Austin-Round Rock MSA if it is designated nonattainment for ozone. The DFW and HGB areas have been designated nonattainment for over 35 years, and the costs for obtaining ERCs in these two areas for these two years do not necessarily reflect the costs that the Austin-Round Rock MSA would face from 2017 to 2022 or 2025 while under a nonattainment designation. Offsets might be easier and cheaper to obtain earlier on during the area's time spent designated nonattainment due to potential retirements of older EGUs such as the steam boilers at the Decker Creek Power Plant (owned and operated by Austin Energy) and the Sim Gideon (owned and operated by LCRA). These units are nearly 40 years old and are much less efficient than newer plants. Table 22 shows the NO_X emissions and electricity generated for each of these units in 2014 as reported in EPA's Clean Air Markets Data.[39]

Table 22: NO_X Emissions and Electricity Generated at from Decker Creek and Sim Gideon Power Plants in 2014

Facility	Unit	NO_X Emissions (tons)	NO_X Emissions Rate (lbs/MMBtu input)	Electricity Generated (MW-hr)
Decker Creek	1	105.604	0.150	132,169
Decker Creek	2	105.808	0.088	224,896
Sim Gideon	1	11.838	0.147	14,748
Sim Gideon	2	7.169	0.135	10,034
Sim Gideon	3	134.565	0.198	126,541
TOTAL	**n/a**	**364.984**	**0.134**	**508,389**

By comparison, two new facilities in nearby Llano County (T.C. Ferguson) and Bell County (Panda Temple Power Station) only emitted 71 tons of NO_X but generated over 2.5 million MW-hrs at an average emissions rate of only 0.00646 pounds per MMBtu of heat input. If these plants were operated at full capacity, they would have emitted approximately 200 tpy, combined.

There is a high probability that the Decker Creek plant would be replaced within this timeframe and a moderate probability that Sim Gideon would be replaced. Replacing these existing units with units similar to those being used at T.C. Ferguson and Panda Temple Power Station would require approximately 220 – 230 tpy in offset credits – 200 tpy to directly offset the 200 tpy PTE for the new facilities and the extra 20 tpy needed to meet the 110% offset requirement for a Marginal area or 30 tpy to meet the 115% requirement if the area was classified as Moderate.

[39] EPA. Air Markets Program Data. http://ampd.epa.gov/ampd/

The most likely project that would be subject to NNSR permitting would be Austin Energy's planned replacement of the two boilers at the Decker Creek Power Plant with a new, 500 MW combined cycle power plant after 2018, as described in its December 2014 update to its generation plan[40]. Using the new T.C. Ferguson plant's 2014 emissions rates as a reference point, CAPCOG assumes that any new plant would have an emissions rate of approximately 0.07 lbs of NO_X/MW-hr of electricity generated. For a 500 MW plant, this would translate into a PTE of approximately 150 tpy of NO_X. The combined NO_X emissions for these two units in 2014 were approximately 210 tpy. Assuming that the five-year lookback period for NNSR permitting used to establish a baseline, the 24-month period establishing the baseline would likely include 2014, due to the plant's declining usage each year. At this level of a baseline, AE could generate approximately 210 tpy in NO_X ERCs by closing Decker's boilers at the end of 2018. In order to build the new facility, it would need to obtain approximately 165 tpy of NO_X offsets, (150 tpy PTE times 110% offset ratio). AE could use the approximately 210 tpy in offsets generated by closing Decker and have about 45 tpy of offsets remaining to sell through TCEQ's EBT system. A similar situation presents itself for the Sim Gideon plant.

The table below reflects the range of costs that would be associated with a major modification or major new source of NO_X or VOC emissions at the lowest threshold that would trigger offset costs, based on the DFW and HGB offset costs.

Table 23. Low and high cost estimates for modification and new source offsets

NNSR Permitting Scenario	Increase in Emissions (tpy)	Pollutant	Low	High
Modification	40	NOX	$772,000	$7,479,050
Modification	40	VOC	$54,298	$8,912,625
New Source	100	NOX	$1,930,000	$18,697,624
New Source	100	VOC	$135,745	$22,281,562

4.7 Assumptions for Growth and Inflation

CAPCOG expresses all impacts on GRP in terms of 2013 dollars in order to maintain consistency with the 2013 economic modeling data in EMSI's input-output model. For any historical costs identified in source material used for this project, CAPCOG converted the costs from whatever analysis year was used to 2013 dollars using the Bureau of Labor Statistics' Inflation Calculator.[41] The table below shows the data CAPCOG used for 1990-2015, retrieved in July 2015.

[40] Austin Energy Resource, Generation, and Climate Protection Plan to 2020. http://www.austinenergy.com/wps/wcm/connect/df11d713-1907-42bc-8bdd-f302fa5e187e/2010-AE-resourceGenClimProtTo2020-opt.pdf?MOD=AJPERES&projectid=e5408e57-e314-4f71-817d-a7a5a0564835&projectid=e5408e57-e314-4f71-817d-a7a5a0564835&projectid=e5408e57-e314-4f71-817d-a7a5a0564835&projectid=e5408e57-e314-4f71-817d-a7a5a0564835&projectid=e5408e57-e314-4f71-817d-a7a5a0564835&projectid=e5408e57-e314-4f71-817d-a7a5a0564835

[41] http://www.bls.gov/data/inflation_calculator.htm.

Table 24. 2015 values of $1 million for 1990-2014

Year	2015 value of $1M in historical year	Ratio to 2013
1990	$1,825,845.45	1.7824
1991	$1,752,114.54	1.7104
1992	$1,700,912.33	1.6604
1993	$1,651,474.05	1.6122
1994	$1,610,242.91	1.5719
1995	$1,565,866.14	1.5286
1996	$1,520,956.02	1.4847
1997	$1,486,841.12	1.4514
1998	$1,464,036.81	1.4292
1999	$1,432,400.96	1.3983
2000	$1,385,818.82	1.3528
2001	$1,347,476.00	1.3154
2002	$1,326,503.61	1.2949
2003	$1,296,945.65	1.2661
2004	$1,263,303.34	1.2332
2005	$1,221,904.76	1.1928
2006	$1,183,720.24	1.1555
2007	$1,150,939.03	1.1235
2008	$1,108,382.14	1.0820
2009	$1,112,339.60	1.0859
2010	$1,094,388.60	1.0683
2011	$1,060,900.96	1.0356
2012	$1,039,391.27	1.0146
2013	$1,024,386.47	1.0000
2014	$1,008,034.27	0.9840
2015	$1,000,000.00	0.9762

For future years, CAPCOG assumes that ratios between sales, employment, initial value added, direct value added, indirect value added, and induced value added for each industry are constant at 2013 levels. CAPCOG also assumes that the discount rate is equal to inflation at 3% annually, meaning that the real cost of a one-time regulatory impact that occurred in 2022 would be the same as the real cost of that same one-time regulatory impact if it occurred in 2018. For analyses of the impact of transportation conformity on GRP associated with highway construction, CAPCOG used the Highway Cost Index to calculate the increased input costs for a road construction project from one year to the next, subtracting 3% to account for overall inflation within the economy.[42]

[42] http://ftp.dot.state.tx.us/pub/txdot-info/cst/hci-binder.pdf

For the general conformity analyses in this report, the expected growth in the rail and air transportation sectors is used as the basis for calculating the cost of a nonattainment designation. CAPCOG calculated each sector's annual growth according to the following formula.

$$Growth_i = \frac{Growth_{MSA}}{2013\ GRP_{MSA}} \times 2013\ GRP_i$$

CAPCOG calculated the MSA's overall annual growth at $5.537 billion per year, based on annual increases from 2009-2013. The MSA's 2013 GRP was $103.892 billion. Therefore, annual growth in affected industries is assumed to be 5.33% of the industry's 2013 GRP (linear).

5 Analysis of Potential Economic Costs of a Nonattainment Designation

5.1 Impact on Expansion at Samsung

Samsung Austin Semiconductor is a semiconductor manufacturing facility in Travis County. Samsung's facility represents approximately $13.6 billion in capital investment. An official from Samsung has indicated that it expects to expand by an additional $8.5 – 13.6 billion between now and 2025, but this investment would very likely not occur if the region is designated nonattainment, since Samsung has about 20 other plants worldwide that it would be able to divert the expansion to.[43] Based on CAPCOG's review of online data sources, CAPCOG believed that the current employment of Samsung Austin Semiconductor is about 2,500.[44] Therefore, Samsung's planned expansion would add the equivalent of 1,500 – 2,500 jobs to the facility. Samsung officials estimate that this expansion would entail increasing NO_X emissions from its current level of about 142 tpy to about 242 tpy, an increase of 100 tpy.

A nonattainment designation could have two potential impacts on this possible expansion:

1. It could cause company officials choose to instead expand another one of its 20 plants worldwide;
2. If the expansion went forward, it would require Samsung to purchase emission reduction offsets.

The main factor that that would likely cause Samsung to expand elsewhere would be the difference in the federal review period required for an NNSR permit, which would extend time required from 9-12 months to 18-24 months. It is doubtful that the requirement for LAER or offsets would, by themselves change a semiconductor manufacturer's decision to locate or expand within the region. Samsung's primary sources of NO_X emissions are actually air pollution control devices that incinerate various chemical compounds. While there are lower-NO_X burners available, and they do cost more than uncontrolled NO_X burners, Samsung's decision to voluntarily purchase and install these burners in their existing facility indicates that this investment is not cost-prohibitive and would not likely change a company's decision to invest in the region or not.

If, due to a nonattainment designation, Samsung did not expand in Austin as planned, it would cause a one-time loss economic activity associated with building the expansion and the permanent loss of

[43] Tim Jones, Samsung. Personal communication. July 24, 2015.
[44] http://www.bizjournals.com/austin/subscriber-only/2014/02/28/semiconductor-companies.html

annual sales and associated value added to the local economy that would have been enabled by the expansion.

In order to model the economic impact of the loss of the initial $8.5 - $13.6 billion in capital improvements, CAPCOG assigned $8.5- $13.6 billion in sales into the "Industrial Building Construction" sector and calculated the initial, direct, and indirect value added to the local economy from this investment. This totaled a one-time $6.5 - $10.3 billion impact on GRP.

In order to model the economic impact of the loss of the sales that could be generated by the expansion, CAPCOG calculated the number of total sales equivalent to the approximately 2,500 jobs in the "Semiconductor and Related Device Manufacturing" sector, yielding $902 million in annual sales. Multiplying this by the initial, direct, indirect, and induced value-added multipliers, CAPCOG calculated an annual impact on GRP of $1.2 billion at the $13.6 billion investment level. At the lower $8.5 billion investment level, the annual impact on GRP would be $744 million. If we assume a useful life of 20 years, this translates into a total impact of $14.9 - $23.6 billion in lost GRP through 2046.

Table 25. Estimated total economic impact 2018 – 2046 of loss of Samsung expansion

Description of Impact	Low	High
Loss of Capital Investment	-$6,454,957,881	-$10,251,991,928
Loss of Ongoing Revenue	-$14,885,184,568	-$23,641,175,490
Combined Impact on GRP	**-$21,340,142,448**	**-$33,893,167,418**

5.2 Impact on Possible Texas Lehigh Expansion or New Cement Plant

Based on input from the Texas Cement Council and the Texas Lehigh Cement Company and CAPCOG's analysis of the costs of emission control technologies, CAPCOG believes that the requirement for LAER would likely preclude the construction of a new cement plant within the region if it was designated nonattainment.

There is a high likelihood that Hays, Travis, or Williamson Counties would be a prime candidate for a new cement plant between 2017 and 2025 if the EPA designates the area as attainment or unclassifiable for the new ozone NAAQS. All of the cement plants in Texas are located along the I-35 corridor from Bexar County up to Ellis County since this is where the raw material needed for cement production is located and five metropolitan areas are located. Of the five metro areas located along this corridor (the Dallas-Fort Worth, San Antonio, Austin-Round Rock, Killeen-Temple, and Waco MSAs), the Austin-Round Rock MSA has the lowest ozone design value and would be in the best position to avoid being designated nonattainment and is also the fastest growing MSA in the state, leading to a higher demand for cement products than slower-growing parts of the state. The Texas Cement Council estimates that demand for cement will outstrip the production capacity of Texas plants, with a 26% growth in demand expected between 2014 and 2019. Given the growth in demand in this sector in Texas generally and in the Austin-Round Rock MSA particularly, there is a very good chance that a cement company will seek to build a new cement plant along the I-35 corridor within the next 5-10 years and the most likely location for such a plant would be the Austin-Round Rock MSA.

On January 21, 2010, the EPA reached a Clean Air Act settlement with Lafarge North America, Inc. that required the installation of Selective Catalytic Reduction (SCR) at its cement plant in Joppa, Illinois, and SNCR on 17 of their 23 kilns.[45] A 2014 sustainability report for the company indicates that the SCR system has been installed and is achieving up to an 80% reduction in NO_X emissions relative to uncontrolled emissions at the facility.[46] The existence of this control technology being used in practice at a cement kiln in the United States makes it highly likely that an emissions rate consistent with SCR would be considered LAER if a company applied for a permit to build a new cement plant in an ozone nonattainment area. If an emissions rate consistent with SCR was considered LAER for a new cement plant, it could be costly enough to preclude a new investment in a cement plant entirely. An analysis by EPA in 2000[47] indicated that the annualized costs for SCR for a plant with a 1 million ton of clinker per year production capacity would cost $19 million-$25 million to install in 1992 dollars ($33 million - $42 million in 2015 dollars) and would add an additional $5 million to $7 million in operating costs each year. TCEQ's Stationary Source team in the Air Quality Division indicates that it is possible that a new cement plant using economically-efficient production processes could achieve the same NO_X emission rate per ton of cement clinker with SNCR as the Joppa plant does with SCR. If the LaFarge plant was the only facility with SCR at the time that an expansion at Texas Lehigh was proposed, it is possible that the plant could be designed in such a way that it wouldn't require SCR and have the same emissions rate in terms of pounds of NO_X per ton of clinker as LaFarge. However, if any other state adopted rules for cement kilns that stipulated a lower emissions rate that could only be achieved through use of SCR, that rate would become LAER and any new cement kilns would effectively be required to use SCR. In any case, this report's assumption of SCR control being required to fulfill NNSR requirements is a worst case scenario.

CAPCOG's discussions with the Texas Cement Council and Texas Lehigh Cement company lead CAPCOG to believe that a nonattainment designation would almost certainly preclude the construction of a new cement plant within the region. Based on information provided by the Texas Cement Council on recent and planned cement plant expansions in Texas and the estimated cost per ton of added capacity, CAPCOG estimated that the capital investment for a new cement plant within the region would be $305,777,464 - $713,480,750 for a 1 – 2 million ton of clinker per year expansion in production within the region. CAPCOG translated these into GRP effects by multiplying the sales by EMSI's value added to sales multipliers for the cement industry, including initial, direct, and indirect impacts, but excluding induced impacts. The impact on the local economy of the construction phase would be $232,209,489 - $541,822,140.

CAPCOG then estimated the impact of the lost revenue over 20 years from the expansion failing to be built. Using operational data from Texas Lehigh, CAPCOG estimated that a 1 million ton expansion would translate into $67,186,549 in annual sales. Using the initial, direct, indirect, and induced multipliers from EMSI, CAPCOG calculated that this translates into $78,968,846 in local GRP. Over a 20-year period, this

[45] http://www2.epa.gov/enforcement/lafarge-north-america-inc-clean-air-act-settlement.
[46] http://www.lafarge.com/sites/default/files/atoms/files/04302015-publication_sustainable_development-sustainable_report_2014-uk.pdf
[47] Battye, Rebecca; Stephanie Walsh; and Judy Lee-Greco. "NOx Control Technologies for the Cement Industries: Final Report." Prepared by EC/R Incorporated for EPA. EPA-457/R-00-002. September 19, 2000.

would mean that a 1 million ton expansion would contribute $1,579,376,910 to the local economy attributable to new sales in the cement manufacturing sector, and $3,158,753,820 for a 2 million ton expansion.

Table 26. Estimated total economic impact 2018 – 2046 of loss of Samsung expansion

Description of Impact	Low	High
Loss of Capital Investment	$232,209,489	$541,822,140
Loss of Ongoing Revenue	$1,579,376,910	$3,158,753,820
Combined Impact on GRP	**$1,811,586,399**	**$3,700,575,961**

5.3 Impact on Replacement of Boilers at Decker and Sim Gideon Power Plants

It is unlikely that the requirements for NNSR would prevent or increase the costs for the replacement of the boilers at Decker and Sim Gideon. For Electric Generating Units (EGUs), the same stringent emission rates that the new T.C. Ferguson Plant in Llano County or the Panda Temple Power Station in Bell County would also be expected to constitute LAER, meaning that there would be no meaningful difference between BACT and LAER for any new power plant that was built within the region. Since the new units at these plants would have significantly lower emissions than the existing plants, it is also very unlikely that such projects would require emission offsets. Therefore, CAPCOG assumes that a nonattainment designation would be unlikely to create new costs associated with these projects that Austin Energy and LCRA would not already face if the area remained designated attainment.

5.4 Transportation Conformity Costs

There are four types potential costs associated with transportation conformity requirements:

1. The costs to the MPO and other government agencies to perform conformity analyses and make conformity determinations;
2. The increased costs of building new roads associated with project delays that could routinely occur due to transportation conformity requirements;
3. The increased costs of building new roads associated with project delays attributable to a transportation conformity lapse; and
4. The lost federal revenue that a nonattainment or maintenance area could experience if it was in a prolonged transportation conformity lapse.

5.4.1 Costs of Performing Transportation Conformity Analysis

Based on a recent analysis of the unified planning work programs (UPWPs) for the MPOs in the Austin-Round Rock MSA and the DFW, HGB, and BPA areas, TxDOT estimated that conformity analysis would cost CAMPO approximately $100,000 -$250,000 per year.[48] Over a 23- to 29-year timeframe, this would cost approximately $2.3 million - $7.3 million.

In CAMPO's current UPWP for FY 2014-2015, they budgeted $141,330 to conduct emissions analyses for the development of the 2040 long-range plan, amendments to the CAMPO 2035 long-range plan, and

[48] Jackie Ploch, TxDOT. Personal Communication.

regional voluntary emissions reduction plans.[49] On an annual basis, this translates into $70,665 per year. These types of analyses are similar to the types of analyses that would be required for conformity determinations, but it is likely that the amount of such analyses that would need to be completed for conformity determinations would be significantly higher. By comparison, the annual budgets for conformity analyses in the UPWPs for H-GAC, NCTCOG, and JHORTS were $794,079, $394,000, and $38,043, respectively. [50]Given the relative scale of the Austin-Round Rock MSA relative to these other areas, CAPCOG believes that the $100,000 - $250,000 per year is a reasonable guess. Using the combined budgets and combined populations of the other three areas, as a point of reference. The costs are approximately $0.06 - $0.13 cents per person, for an average of $0.10 cents per person. At a 2014 population of 1.9 million, that would translate into costs of $110,000 - $250,000 annually.

5.4.2 Costs Associated with Routine Project Delays

At times, approval for a change in a project can be delayed for several months for areas that are designated nonattainment due to the need to conduct an updated conformity determination. In 2011, TTI developed a methodology for estimating the costs associated with road construction delays.[51] Examples calculations shown for the monthly cost of project delays are shown in the table below.

Table 27: Example Data and Assumptions Used to Calculate Costs of Project Delays

Data Point	Small Project	Medium Project	Large Project
Project Cost	$11.4 million	$46.9 million	$82.2 million
Total Months Delayed	33.5	58.8	11.1
Change in Highway Cost Index During Delay	11%	29%	3%
Length of Project	2.7 mi.	2.6 mi.	1.5 mi.
Avg. Daily Traffic Before Improvement	21,000	91,000	158,000
Avg. Daily Traffic After Improvement	26,000	99,000	196,000
Avg. Travel Speed – Before Improvement	46 mph	58 mph	59 mph
Avg. Travel Speed – After Improvement	50 mph	60 mph	61 mph
Pct. Trucks – Before Improvement	4.5%	10.0%	3.9%
Pct. Trucks – After Improvement	4.5%	10.5%	3.9%
Persons Per Vehicle	1.25	1.25	1.25
Return on Investment Associated with Economic Impacts	8.0%	8.0%	8.0%
Wasted Time from Project Delay	$26,363	$31,248	$63,902
Wasted Fuel from Project Delay	$19,260	$8,510	$7,421
Wasted Time from Project Delay – Commercial	$6,557	$18,410	$13,689
Wasted Fuel From Project Delay – Commercial	$1,094	$3,334	$1,413
Construction Cost Increase Per Month (based on Highway Cost Index)	$32,957	$191,956	$283,624
Economic Impact of Project Delay	$10,841	$47,170	$78,172

[49] http://www.campotexas.org/wp-content/uploads/2015/06/UPWP-FYs-2014-and-2015_amendment-6_approved-04132015.pdf

[50] ASHTO review of UPWP conformity costs, supplied by Jackie Ploch.

[51] Texas Transportation Institute. Assessing the Costs Attributed to Project Delay. http://tti.tamu.edu/conferences/tsc11/program/presentations/construction-2/ellis.pdf.

Data Point	Small Project	Medium Project	Large Project
Total Cost of Project Delay Per Month	$95,978	$297,293	$446,808

CAPCOG assumes that there is a moderate-to-high risk of similar project delays in the Austin-Round Rock MSA while the area is subject to transportation conformity requirements. By applying this method to projects in the DFW and HGB areas that were delayed due to transportation conformity requirements, TxDOT developed costs estimates associated with conformity-related project delays. A summary of this analysis is shown in Table 28. The complete list is included in an appendix to this report.

Table 28: Summary of Increased Costs for Roadway Projects Due to Transportation Conformity-Related Project Delays

Statistic	Dallas District	Houston District
Time Frame Covered	2002-2011	2012-2014
No. Projects Delayed	18	5
Avg. # Delays Per year	1.8	1.7
Avg. Delay	10.2 months	9.6 months
Range of Delays	3-22 months	6-12 months
Avg. Cost of a Project Delay	$3.1 million	$2.5 million
Range of Costs of Delay	$0.3 - $6.5 million	$0.9 - $4.0 million
Average Annual Costs of Delays	$5.6 million	$4.1 million

Given the population of the Austin-Round Rock MSA relative to populations of the DFW and HGB nonattainment areas, the estimated annual cost of these types of project delays in the Austin-Round Rock MSA could be expected to be $1,191,616 - $1,481,115 per year. Over a 23-29 year period, this would translate into $27,407,176 - $41,471,216.

5.4.3 Costs of Construction Delays Due to Transportation Conformity Lapse

CAPCOG assesses the probability of a the region experiencing at least one transportation conformity lapse lasting 1-2 years during the time frame covered by this study as low to moderate. If a one- to two-year transportation conformity lapse were to occur, one of the impacts would be that all regionally significant added capacity projects that had not already been let would not be able to proceed until the region was able to come back into conformity. While these projects could resume once the region was back in conformity, the costs for completing these projects would likely have increased higher than the rate of inflation, causing these projects' contributions to the GRP to be reduced.

EMSI estimates that there was $359,861,912 in sales in the highway, street, and bridge construction sector (NAICS code 237310) in 2013. Based on the difference between the July 2015 highway cost index (HCI) and the July 2014 index, the annual change in highway construction costs was 8.1 – 15.9%, depending on the averaging time used.[52] Since CAPCOG is assuming an economy-wide inflation rate of 3%, the net increase would be 5.1 – 12.9%. This would translate into $18,298,801 - $93,012,795 in increased costs for the same set of projects.

[52] http://ftp.dot.state.tx.us/pub/txdot-info/cst/hci-binder.pdf

5.4.4 Possible Loss in Federal Highway Construction Funding

Finally, a transportation conformity lapse that went beyond a single fiscal year would result in at least temporary loss of federal funding for construction projects. While the most likely outcome in such a situation would be that TxDOT would simply temporary shift federal funding to other areas while the lapsed area attempted to come back into conformity and then "compensate" the area for the lost federal funding during the lapse by increasing federal funding to the area in years following a lapse, there is no guarantee that this would happen.

CAMPO's 2015-2018 TIP includes $911,669,840 in roadway projects averaging $228 million per year.[53].Federal funding accounts for $151,714,000 of the total, and averages $37,928,500. Using the ratio of 2014 to 2013 CPI, this translates into $37,323,050 per year in 2013 dollars. If a two-year lapse were to occur, that would equal $74,646,101.

Looking back over the past 11 years, federal funding to the MPO for "Category 7" and "Category 9" averaged $20,997,690 in 2013 dollars. CAPCOG used the actual spending 2013 as the basis for its "low" estimate - $23,746,747.

5.5 General Conformity Costs

CAPCOG estimated the cost of general conformity by modeling the effect of 1-year delays in expansions of airport and rail infrastructure. This assumed that these industries' sales would be constrained by infrastructure for an additional year compared to what would occur under an attainment designation. The growth that these industries would have experienced in that year would have been forfeited. CAPCOG used initial, direct, indirect, and induced multipliers for each rail and air transportation sector and assumed 5.33% linear growth from 2013 consistent with the overall economy's growth from 2009-2013. In order to establish a range of possible costs, CAPCOG assumed that these infrastructure bottlenecks caused by general conformity-related delays would occur 1-2 times from 2018-2046. The table below shows the estimate of these costs by industry.

Table 29. Estimated economic costs of infrastructure expansion delays associated with General Conformity, 2018-2046

NAICS	Industry	1 occurrence	2 occurrences
481111	Scheduled Passenger Air Transportation	$14,507,145	$29,014,291
481112	Scheduled Freight Air Transportation	$108,091	$216,181
481211	Nonscheduled Chartered Passenger Air Transportation	$4,697,253	$9,394,506
481212	Nonscheduled Chartered Freight Air Transportation	$2,561,417	$5,122,833
481219	Other Nonscheduled Air Transportation	$575,214	$1,150,428
482110	Rail transportation	$7,182,369	$14,364,738
Combined	**Combined**	**$29,631,489**	**$59,262,978**

[53] http://www.campotexas.org/wp-content/uploads/2014/05/CAMPO-15.18-TIP.05162014Web.pdf, amended: http://www.campotexas.org/wp-content/uploads/2015/01/Amendment-1-STIP-Report-FY-2015-2018.pdf.

Constraints on airport growth and the development of the Lonestar rail district could have economic consequences not only for the rail companies, airlines, support companies, and employees of these firms, but also for industries like the food service and accommodation sector that benefits from the increased tourism that the region would likely experience as a result of these infrastructure projects. CAPCOG did not seek to capture these potential economic costs in this study.

5.6 Costs for Local Point Source NO_X Reductions

CAPCOG calculated the cost of point source NO_X reductions at 7 large point sources within the Austin-Round Rock MSA that did not already have the maximum emission reduction technology installed. Although this maximum level NO_X control may not be required, this report assumes these maximum reductions would be needed to demonstrate attainment by the attainment date. Since EPA's RIA for the ozone standard proposal anticipated significant NO_X emission reductions from some types of point sources that are located in the Austin-Round Rock MSA, CAPCOG used the EPA's RIA as the basis for this analysis.[54]

Specifically, EPA anticipated:

- Low-NO_X burners for lime kilns;
- SCR for cement kilns;
- SCR for utility boilers;
- NSCR for 4-Cycle Rich Burn internal combustion engines; and
- Low-NO_X burners for natural gas-fired turbines.

Since application of SCR and steam injection to a natural gas turbine that was already equipped with low-NO_X burners would still be expected to achieve a 15% reduction in NO_X emissions relative to uncontrolled emissions and has an overall cost-per-ton effectiveness lower than many other NO_X controls, CAPCOG assumed that SCR and steam injection would be needed for the large turbines at U.T.'s Hal Weaver Power Plant (gas turbine 8), and the Bastrop Clean Energy Center. CAPCOG used the EPA's Controlnet documentation[55] and "menu of control measures"[56] to calculate the estimated costs. For EGUs, CAPCOG used EPA's CAMD data on electrical generation to estimate and the Controlnet documentation for boiler SCR costs. Since the calculations for boilers include capital costs, annual operation and maintenance costs, and annual variable costs separately, CAPCOG calculated the cost for the entire 24-year period between 2022, when such measures would be required to be implemented for a "Moderate" area, and 2046, which would be the end of the 2nd maintenance period. CAPCOG also calculated the costs for all of the other point source NO_X controls based on those controls being required for the full 24-year period between these two milestones.

[54] See table 4A-9 from EPA's 2014 Ozone Standard Proposal RIA, http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf.
[55] http://www.epa.gov/ttn/ecas/models/DocumentationReport.pdf
[56] http://www.epa.gov/air/pdfs/MenuOfControlMeasures.xlsx

Table 30. Summary of calculated costs for maximal point source NO_X emission controls 2022-2046

Facility	Unit	NO_X Control Technology Required	% NO_X Reduction from Uncontrolled	Total Cost 2022-2046 ($2013)	Annual NO_X Reduction from 2013 Controlled (tpy)
Texas Lehigh	Kiln	SCR (worst case scenario)	80%	$272,679,080	1,892
Austin White Lime	Kilns 1, 2, and 3	Low-NO_X Burners	30%	$3,902,019	163
Hal Weaver Power Plant	Turbine 8	SCR + Steam Injection	95%	$11,045,118	295
Bastrop Clean Energy Center	Turbines 1A and 1B	SCR + Steam Injection	95%	$81,442,875	252
Decker	Boiler 1	SCR	80%	$21,635,476	84
Decker	Boiler 2	SCR	80%	$26,382,439	78
Sim Gideon	Boiler 1	SCR	80%	$10,703,436	9
Sim Gideon	Boiler 2	SCR	80%	$10,687,305	6
Sim Gideon	Boiler 3	SCR	80%	$22,418,577	108
Luling Gas Plant	4-Cycle Rich-Burn Engines 1-10	NSCR	90%	$2,119,136	150
TOTAL	**n/a**	**n/a**	**n/a**	**$463,015,461**	**3,037**

As is mentioned earlier, there is a good chance that the boilers at Decker Creek Power Plant and Sim Gideon Power Plant will be decommissioned by 2022 in any case, so it is somewhat unlikely that Austin Energy and LCRA would invest the resources needed for additional NO_X controls instead of simply moving up the retirement date. In 2014, Decker's two boiler units generated 357,066 MW-hrs of electricity, and Sim Gideon's three boiler units generated 151,323 MW-hrs, for a combined 508,389 MW-hrs. At an average wholesale electricity cost price of $42.37 per MW-hr from April 15, 2014 – December 15, 2014,[57] this would translate into only $15.1 million in revenue for Decker and $6.4 million in revenue for Sim Gideon for a total of $21.5 million between the two plants. It is unlikely that Austin Energy and LCRA would invest the $24 million in capital costs or be willing to incur the approximately $1 million in annual operating costs for SCR systems for each of these plants given that level of revenue generation. Therefore, if these plants were still open in 2022, this requirement would likely accelerate replacement plans.

Similarly, the costs for an SCR system at Texas Lehigh would likely be cost-prohibitive and would force the plant to shut down earlier than what would otherwise be the case. However, unlike Decker and Sim Gideon, it is not likely that a newer cement plant would be built to replace Texas Lehigh within the region if it went out of business because the costs for SCR would likely make any new cement plant cost-prohibitive as well. If Texas Lehigh were to shut down, it would mean an approximately $1.9 billion

[57] http://www.eia.gov/electricity/wholesale/xls/ice_electric-2014final.xls

reduction in GRP over a 20-year period, using the same methods used to estimate the value of an expansion of Texas Lehigh described earlier. If Texas Lehigh were not required to install SCR, and instead were simply required to operate its SNCR at full capacity year-round, it would reduce the 24-year cost estimate to $42,985,389 million. Based on its current employment levels and the ratio of sales to employees in the EMSI data, CAPCOG estimates that the plant's 2014 revenues were approximately $81 million, which is $1.949 billion over a 24-year timeframe. While the estimated $273 million required for SCR over this period would likely be cost-prohibitive, it is unlikely that the SNCR option would be.

Therefore, the true economic cost of a maximal point source NO_X control strategy such as one described above would subtract the costs of SCR for Decker, Sim Gideon, and Texas Lehigh, but would add the cost of a likely plant closure of Texas Lehigh since it is unlikely that a new plant would be built to replace it under those circumstances. A less aggressive point source NOX reduction strategy would require SNCR for Texas Lehigh rather than SCR. Under this scenario, the costs for Sim Gideon and Decker would still be excluded, but the costs for Austin White Lime, Hal Weaver, Bastrop Clean Energy Center, and Luling Gas Plant would remain the same.

- Economic cost of maximal point source NO_X control strategy: $2,047,800,546
- Economic cost of less aggressive point source NO_X control strategy: $ 141,494,537

5.7 Costs for VOC Reductions

Specific types of VOC emission reductions are required for "Moderate" areas, as described above. These include:

- RACT for sources of VOC emissions covered by a CTG document;
- Non-CTG major source RACT, including emission sources covered by an EPA Alternative Control Technology (ACT) document; and
- A 15% VOC reduction RFP requirement.

CAPCOG used the EPA's RIA cost estimates for VOC emission reductions for the 70 ppb and 65 ppb scenarios in order to calculate an average cost per ton of VOC reduced.[58] Tables 4A-8 and 4A-10 in the report show the estimated emission reductions for the 70 ppb and 65 ppb standard scenarios, respectively, and tables 7A-2 and 7A-4 show the estimated costs in millions of 2011 dollars.

Table 31: Average Cost Per Ton of VOC Emission Reductions from Ozone NAAQS RIA

Standard Level	VOC Reductions (tpy)	Cost (2011$)	Cost Per Ton (2011$)
70 ppb	55,298	$438,642,000	$7,932
65 ppb	105,551	$842,244,000	$7,983
Combined	**160,809**	**$1,280,886,000**	**$7,965**

[58] U.S. Environmental Protection Agency Office of Air and Radiation, Office of Air Quality Planning and Standards. *Regulatory Impact Analysis of the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone*. November 2014. EPA-452/P-14-006. Available Online at http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf. Accessed June 14, 2015.

Using the average cost per ton of VOC reductions from the RIA and the estimated 4,571 in additional emission reductions that would be needed to reach the 2023 target described in section 2.5, CAPCOG calculates that the cost of meeting the 15% VOC reduction requirement would be $36,408,015 per year in 2011 dollars. Based on inflation from 2011-2013, this translates into $37,703,648 in 2013 dollars.[59] At a minimum, these costs would be expected to apply in 2022 – 2026 until the area was redesignated to attainment. However, in light of the dearth of VOC emission reductions that would be expected to occur beyond then, and the need to use a Section 110(l) demonstration that removal of an emission reduction measure from the SIP would not interfere with maintenance of the standard, it is unlikely that the TCEQ could remove these requirements from the SIP due to the need to keep future emission levels below "attainment" levels in maintenance plans. Therefore, these expenses would be expected to apply to each year from 2022-2046, and would cost a total of $904,938,889.

At the highest end of the cost-per-ton estimates in the RIA, it would cost an average of $14,860.92 per ton of VOC for surface coating incineration. Since this number represents an average cost per ton for this control measure, there would presumably be some sources or areas where the actual cost per ton would be higher than this. There are other types of coating controls with average costs per ton of over $10,000. If the marginal cost of obtaining VOC reductions within this region averaged $14,860.92 per ton, the total cost for VOC reductions from 2022-2046 would be $1,630,209,506. This would represent the very highest end of the potential annual costs for the region. There are also control options that should cost less than these options, including some controls that have an average cost per ton of less than $100. Given the wide range of average costs per ton for each VOC measure included in the RIA, CAPCOG believes that the weighted average across all of the measures included in the RIA is the best approximation of the likely cost per ton of VOC emissions within the MSA if it was designated nonattainment.

5.8 Summary of Costs

The following table shows a summary of the range of estimated economic impacts for each scenario discussed above.

[59] Bureau of Labor Statistics. Inflation Calculator. Accessible online at http://www.bls.gov/data/inflation_calculator.htm.

Table 32. Summary of estimated impacts of a nonattainment designation on aggregate GRP 2018-2046

Scenario	Low	High
Loss of Samsung Expansion	($21,340,142,448)	($33,893,167,418)
Loss of Texas Lehigh Expansion	($1,811,586,399)	($3,700,575,961)
Decker and Sim Gideon Boiler Replacement	$0	$0
Transportation Conformity-Routine Analysis	($2,300,000)	($7,000,000)
Transportation Conformity-Routine Project Delays	($27,407,176)	($41,471,216)
Transportation Conformity-Lapse Project Delays	($18,298,801)	($93,012,795)
Transportation Conformity-Loss of Federal Funds	($23,746,747)	($74,646,101)
General Conformity-Rail Expansion Delays	($7,182,369)	($14,364,738)
General Conformity-Aviation Expansion Delays	($22,449,120)	($44,898,240)
NO_X Point Source Emission Reductions	($141,494,537)	($2,047,800,546)
VOC Reductions	($904,917,445)	($1,630,209,506)
TOTAL COST	**($24,299,525,042)**	**($41,547,146,520)**

6 Potential Costs of Nonattainment in Context

While having estimates of the economic costs of a nonattainment designation is useful, it is also important to put these costs into context. This includes accounting for compensating economic benefits that might occur due to CMAQ funding and decreased ozone levels that the region might experience attributable to the restrictions in place for a nonattainment area. It is also useful to understand how these costs compare to and are affected by existing emission control programs currently in place in the region, particularly the vehicle emissions inspection and maintenance program.

6.1 Estimated CMAQ Revenue if Designated Nonattainment

The Congestion Mitigation and Air Quality Improvement (CMAQ) program was established in 1991 to provide a funding source to state and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality that are designated nonattainment or maintenance areas for ozone, carbon monoxide, or particulate matter. CMAQ can be found in 23, U.S.C. §104. New guidance for the program took effect on October 1, 2012, specifying the apportionment and use of the funds.

- Eligible activities include:
  - Acquisition of diesel retrofits and provision of diesel-related outreach activities;
  - Intermodal equipment and facility projects that target diesel freight emissions through direct exhaust control from vehicles or indirect emissions reductions through improvements in freight network logistics;
  - Alternative fuel projects including participation in vehicle acquisitions, engine conversions, and refueling facilities;
  - Establishment or operation of traffic monitoring, management, and control facility, including the installation of advanced truck stop electrification systems;
  - Projects that improve traffic flow, including:

  - efforts to provide signal systematization;
  - construct HOV lanes;
  - streamline intersections;
  - add turning lanes;
  - improve transportation systems management and operations that mitigate congestion and improve air quality;
  - implement intelligent transportation systems (ITS) and other CMAQ-eligible projects, including efforts to improve incident and emergency response or improve mobility, such as through real time traffic, transit, and multimodal traveler information.;
- Projects that shift travel demand to nonpeak hours or other transportation modes, increase vehicle occupancy rates, or otherwise reduce demand through initiatives, such as teleworking, ridesharing, pricing, and others;
- Transit investments, including transit vehicle acquisitions and construction of new facilities or improvements to facilities that increase transit capacity;
- Non-recreational bicycle transportation and pedestrian improvements that provide a reduction in single-occupant vehicle travel; and
- Vehicle inspection and maintenance programs.

Generally, the federal share for CMAQ projects is 80%, meaning that state or local governments would need to come up with the additional 20% needed for a project. Certain safety projects that include an air quality or congestion relief component may have a federal share of 100%, but this provision is limited to 10% of the total funds apportioned to the state. Texas's CMAQ apportionment for FY 2015 was $104,702,735. Based on its method of apportioning funding based on population and a classification-based weighting, CAPCOG estimated the CMAQ funding for each area if they were designated based on 2014 design values.[60]

[60] http://www.fhwa.dot.gov/environment/air_quality/cmaq/policy_and_guidance/2013_guidance/index.cfm

Table 33. Estimated apportionment of CMAQ funding based on 2014 population, ozone levels, and FY 2015 state funding

Name	Type	Population, 2014	Design Value, 2014	Likely Designation if Standard @ 65 ppb	Pop*Multiplier	%	Amount
Abilene, TX	MSA	168,592	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
Amarillo-Borger, TX	CSA	281,658	n/a	Marginal	281,658	1.20%	$1,259,930.66
Austin-Round Rock, TX	MSA	1,943,299	69	Marginal	1,943,299	8.30%	$8,692,889.91
Beaumont-Port Arthur, TX	MSA	405,427	70	Marginal	405,427	1.73%	$1,813,582.10
Brewster County, TX	County	9,173	n/a	Marginal	9,173	0.04%	$41,033.25
Brownsville-Harlingen-Raymondville, TX	CSA	442,295	58	Attainment/Unclassifiable	0	0.00%	$0.00
College Station-Bryan, TX	MSA	242,905	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
Corpus Christi-Kingsville-Alice, TX	CSA	522,051	66	Marginal	522,051	2.23%	$2,335,272.07
Dallas-Fort Worth, TX-OK	CSA	7,308,127	80	Moderate	8,038,940	34.35%	$35,960,301.41
El Paso-Las Cruces, TX-NM	CSA	836,698	72	Marginal	1,003,395	4.29%	$4,488,452.75
Houston-The Woodlands, TX	CSA	6,686,318	80	Moderate	7,354,950	31.42%	$32,900,633.86
Killeen-Temple, TX	MSA	424,858	72	Marginal	424,858	1.82%	$1,900,502.09
Laredo, TX	MSA	266,673	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
Longview-Marshall, TX	CSA	284,817	71	Marginal	284,817	1.22%	$1,274,061.70
Lubbock-Levelland, TX	CSA	329,221	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
McAllen-Edinburg, TX	CSA	894,028	57	Attainment/Unclassifiable	0	0.00%	$0.00
Midland-Odessa, TX	CSA	315,194	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
Polk County, TX	County	46,079	n/a	Marginal	46,079	0.20%	$206,123.54
San Angelo, TX	MSA	118,182	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
San Antonio-New Braunfels, TX	MSA	2,328,652	80	Moderate	2,561,517	10.94%	$11,458,343.27
Texarkana, TX-AR	MSA	93,275	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
Tyler-Jacksonville, TX	CSA	269,744	71	Marginal	269,744	1.15%	$1,206,636.19
Victoria-Port Lavaca, TX	CSA	120,427	63	Attainment	0	0.00%	$0.00
Waco, TX	MSA	260,430	69	Marginal	260,430	1.11%	$1,164,972.20
Wichita Falls, TX	MSA	151,536	n/a	Attainment/Unclassifiable	0	0.00%	$0.00
TOTAL	**n/a**	**24,749,659**	**n/a**	**n/a**	**23,406,338**	**100%**	**$104,702,735**

From 2017-2046, the relative funding level would change as areas with higher classifications reached attainment and their multipliers reverted to 1.0. If there were no population multipliers, the Austin-Round Rock MSA would receive $9,416,652 based on 2014 population.

CAPCOG used the initial, direct, indirect, and induced multipliers for the highway construction sector in order to calculate the total economic impact of these revenues for 2018 – 2046, assuming that the period of nonattainment and maintenance would last until 2041-2046.

Table 34. Estimated CMAQ funding and economic impact of funding, 2018-2046

Total	Minimum	Maximum
Annual Revenue	$8,692,890	$9,416,652
Total Economic Impact, 2018-2046	$228,862,817	$330,356,965

This would represent the maximum economic impact possible due to CMAQ funding if it was fully used and led to permanent increases in sales in the highway construction sector. This economic benefit offsets the economic costs discussed in the previous section.

6.2 Net Impact of Nonattainment Designation Compared to total GRP

One useful point of reference is to compare the total net economic impact (after considering the economic benefits of CMAQ funding) to total aggregate GRP from 2014-2046. Overall, the estimated range of net economic impacts of a nonattainment represents a 0.37% - 0.70% reduction in GRP relative to GRP that would be expected if the region remained in attainment.

Table 35. Net economic impact of nonattainment designation compared to aggregate GRP for 2012-2046

Statistic	Low Estimate	High Estimate
Net Economic Impact of Nonattainment	-$24,070,662,225)	-$41,216,589,555)
Aggregate GRP 2014-2046	$5,893,811,498,691	$6,534,833,250,000
% of Aggregate GRP	-0.37%	-0.70%

6.3 Potential Offsetting Health and Benefits from a Nonattainment Designation

EPA's RIA includes a number of coefficients that describe the increase in incidence of both short-term and long-term mortality associated with changes in in ozone exposure. The table below summarizes the coefficients that EPA used on their core analysis for short-term mortality.[61]

[61] EPA. *Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone*, Table 5-7. Health Endpoints and Epidemiological Studies Used to Quantify Ozone-Related Health Impacts in the Core Analysis. EPA-452/P-14-006. November 2014. Accessible online at http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf

Table 36: Short-Term Ozone-Related Mortality Coefficients Used in EPA's Core RIA Model

Endpoint	Study	Study Population	Coefficient
Premature Mortality – Short-Term	Smith et al. (2009)	All Ages	0.00032
Premature Mortality – Short Term	Zanobetti and Schwartz (2008)	All Ages	0.00051

EPA provides the equation that can be used to apply these coefficients to a given population in order to calculate the number of deaths associated with a change in ozone exposure in the Health and Risk Exposure Assessment (HREA).[62] The following equation shows how to calculate the impact of a change in ozone levels:

Equation 1: $\Delta y = (y_0 - y_1) = y_0[1 - e^{-\beta \Delta x}]$

Where:

- y_0= the incidence of the health endpoint for a baseline period;
- Δx = the change in the ozone level; and
- β = the effect coefficient.

For a given population of people aged 29 or higher, there would be expected to be a 0.398% decrease in the number of premature deaths associated with long-term exposure to ozone and 0.032-0.051% decrease in the number of premature deaths associated with a 1 ppb reduction in ozone levels.

For the long-term O_3-attributable mortality, the relevant ozone levels are a seasonal average of peak 1-hour ozone measurements (see page 7-22 of the HREA). For the short-term coefficients from the Smith and Zanobetti studies referenced by EPA, the HREA indicates that the relevant ozone level

In order to estimate the absolute number of estimated number of premature deaths avoided, it is necessary to have the absolute number of deaths that would be expected to occur in a given population for a given year. The EPA used county-level data on mortality from the Center for Disease Control (CDC). The CDC's Wide-ranging OnLine Data for Epidemiologic Research (WONDER) system provides statistics on mortality at the county-level that can be grouped by age groups to match the groupings used in EPA's model (all ages and >29). [63] CAPCOG queries this system to obtain the population and number of deaths for the >29 age grouping and all deaths for 2011-2013 from March to October, which is the region's ozone monitoring season. The table below shows the number of deaths per 100,000 in population for these two age groupings.

[62] EPA. Health and Risk Exposure Assessment for Ozone Final Report. EPA-452/R-14-004a. August 2014. http://www.epa.gov/ttn/naaqs/standards/ozone/data/20140829healthrea.pdf. Section 7, equation 3.

[63] Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2013 on CDC WONDER Online Database, released 2015. Data are from the Multiple Cause of Death Files, 1999-2013, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on June 13, 2015.

Table 37: Death Rates Per 100,000 in the Austin-Round Rock MSA, March-October, 2011-2013

Year	Total Population	Total Deaths Mar-October	Deaths Per 100,000	Total Population Age 30+	Total Deaths for Age 30+ Mar-October	Ratio per 100,000 for Age 30+
2011	1,783,519	5,415	303.6	979,791	5,227	533.5
2012	1,834,303	5,888	321.0	1,019,001	5,694	558.8
2013	1,883,051	5,851	310.7	1,060,950	5,661	533.6
2011-2013	5,500,873	17,154	311.8	3,059,742	16,582	541.9

CAPCOG used population projections from the Texas State Data Center (TSDC) in order to obtain population estimates for 2010-2025, including both the total population and the 30+ age population.[64] CAPCOG used growth scenario 1, which is based on population growth rates from 2000-2010, for the projection. CAPCOG then applied the relevant death rates to each year's population in order to obtain an estimated number of deaths that would occur in that year. CAPCOG then calculated the number of deaths that would be avoided with a 1 ppb decrease in ozone using each model.

Table 38: Estimated Change in Number of Deaths Due to a 1 ppb Reduction in Ozone Levels, 2010-2025

Year	Zanobetti Coefficient	Smith Coefficient
2010	-3	-2
2011	-3	-2
2012	-3	-2
2013	-3	-2
2014	-3	-2
2015	-3	-2
2016	-3	-2
2017	-3	-2
2018	-3	-2
2019	-4	-2
2020	-4	-2
2021	-4	-2
2022	-4	-2
2023	-4	-3
2024	-4	-3
2025	-4	-3

[64] Texas State Data Center. Texas Population Projections Program. Population Projections for Individual Texas Counties by Single Years of Age for 2010-2050 in 1 year increments. Accessed at http://txsdc.utsa.edu/Data/TPEPP/Projections/Index.aspx on June 13, 2015.

In the RIA for the ozone NAAQS proposal, EPA used the following values for the economic value of premature mortality, otherwise referred to as the "value of a statistical life:[65]

- $4,800,000 for 1990 income levels, in 1990 dollars,
- $8,300,000 for 1990 income levels, in 2011 dollars, and
- $10,000,000 for 2024 income levels, in 2011 dollars.

Using these data, CAPCOG interpolated the 1990-2024 values in 2011 dollars, and then calculated the 2013 cost in 2013 dollars.[66] This translated into $9,786,847. Using linear growth from 2010-2024, CAPCOG projected the number of estimated deaths avoided from a 1 ppb reduction in ozone for each year, and calculated the monetized value of the avoided deaths. In 2013, a 1 ppb reduction in ozone would have had $18,323,047 - $29,205,174 in monetized economic benefits for avoided short-term deaths attributable to ozone exposure according to this methodology.

6.4 Estimated Cost of Achieving a 1 ppb Reduction in Ozone

Sensitivity modeling performed by the University of Texas at Austin (UT) for CAPCOG on the June 2006 modeling episode showed the extent to which broad reductions in anthropogenic NO_X and VOC emissions from the MSA would reduce ozone levels within the region. Using the ratio of emission reductions to ozone reductions between the 25% reduction scenarios and the 50% reduction scenarios, CAPCOG calculated the following ratios of local NO_X and VOC emission reductions required to reduce ozone levels by 1 ppb, based on the values reported by UT in Table 5 in their report. [67]

Table 39: Emission Reductions Required to Achieve a 1 ppb Reduction in Ozone (ppb)

Location	NO_X	VOC
Audubon (C38)	14.7	1,082.9
Murchison (C3)	13.1	541.4
Travis County	16.9	1,895.0

Translating the NO_X emissions daily totals into annual rates, it would require 4,776 – 6,176 tons per year of local NO_X reductions in order to achieve a 1 ppb reduction in ozone. Assuming that the cost of achieving these emission reductions could range from $5,000 to $15,000, it would require $24 million -

[65] EPA. *Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone*, Table 5-10. Unit Values for Economic Valuation of Health Endpoints. EPA-452/P-14-006. November 2014. Accessible online at http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf

[66] Bureau of Labor Statistics. Inflation Calculator. Accessible online at http://www.bls.gov/data/inflation_calculator.htm.

[67] .McGaughey, Gary; Ling Huang, Yosuke Kimura, Cyril Durrenberger, and Elena McDonald-Buller. *Analysis of the Impact of Reductions in Anthropogenic NOX and VOC Emissions on Ozone Concentrations in the Austin Area using the Rider 8 Photochemical Modeling Episode for May 31 – July 2, 2006.* Prepared for the Capital Area Council of Governments and Texas Commission on Environmental Quality by The University of Texas at Austin. September 2012.

$93 million per year would be needed to achieve a 1 ppb reduction in peak ozone levels within the region.

6.5 Inspection and Maintenance Program Costs

One of the most significant financial costs that the region voluntarily incurs already is the I-M programs in Travis and Williamson Counties. CAPCOG estimates that the costs to motorists for the I-M program in 2014 ranged from $17 million - $37 million, depending on assumptions used to calculate the total repair costs. This is based on the following assumptions:

The maximum amount of total fees collected for the initial tests is equal to the total number of initial tests times $16.00.

$$Initial\ Test\ Fees\ Collected = 900{,}475\ initial\ tests\ \times \$16.00\ per\ tests = \$14{,}407{,}600$$

A recent analysis of I-M program fees conducted by ERG indicated that a significant percentage of respondents to a survey of local stations reported that they offered free initial tests at least once.[68] Out of the 22 respondents that were test-only facilities, 10 (45.5%) indicated that they had offered a free initial emissions test at least once, while 14 out of 41 test-and-repair facilities (34.1%) reported offering a free initial test at some point. Only one test-only and one test-and-repair facility reported offering fees for less than $16.00. Overall, the survey for the Austin-Round Rock area included a total of 63 responses, including 22 test-only facilities (out of 85 in TCEQ's database as of April 2014) and 41 test-and-repair facilities (out of 320 in TCEQ's database as of April 2014). These data suggest that the actual amount of fees that was collected in 2014 would likely be somewhat lower than $14,407,600. However, in light of ERG's conclusion that, in general, the fees are not covering the inspection stations' costs, it also seems likely that the number of motorists who are able to get a free test is likely very small and shrinking year-by-year. Since this report is mainly concerned with generally characterizing risk associated with a nonattainment designation, rather than developing a precise estimate of the fees collected from the I-M program, CAPCOG used the $14,407,600 mark above as the basis for this comparison, since it represents the maximum financial cost that might be associated with the fees.

If a motorist fails an initial test and the owner repairs the vehicle and retests within 15 days, that initial retest is free. According to ERG's fee analysis,[69] these free retests represent 7% of the tests in the Austin-Round Rock MSA. The fees associated with the initial retests was calculated by multiplying the total number of retests by 93% (100% minus the 7% free) in order to estimate the number of initial retests that required payment of the fee, and then multiplying that number by the $16.00 fee.

$$Initial\ Retest\ Fees\ Collected = 76{,}071\ initial\ retests \times 97\%\ \times \$16.00\ per\ test = \$1{,}131{,}936$$

For subsequent retests, there is no option for a fee waiver, so the calculation would be the same as for the initial test.

$$Other\ Retest\ Fees\ Collected = 9{,}038\ other\ retests \times \$16.00 = \$144{,}608$$

[68] http://www.tceq.state.tx.us/assets/public/implementation/air/ms/IM/IM_FEE_Analysis_2014.pdf
[69] ibid. see page 88 of the report.

Table 40 summarizes the estimated emissions inspection fees that were collected in 2014 using the methods described above.

Table 40: Estimated Emissions Inspection Fees Paid in 2014

Test Type	Fees Paid
Initial Test	$14,407,600
Initial Retest	$1,131,936
Other Retest	$144,608
All Tests	**$15,648,144**

A much more detailed and complex analysis would be required, and additional data on the number of motorists who received free tests or reduced-fee tests (rather than just the percentage of stations who have ever offered them) in order to develop a more precise estimate that what is shown in the table above. The $15.6 million figure cited above represents the maximum that motorists might have paid in fees in 2014, in light of the data available, but does not account for any free or reduced fee tests other than the 7% of initial retests cited in ERG's study. CAPCOG does not represent this figure to be a precise estimate, but rather, an approximation of the maximum amount of financial costs to motorists associated with I-M fees.

Vehicles that fail an emissions test are required to repair their vehicle in order for the vehicle to subsequently pass an emissions test. Using the test data for 2014, ERG's fee analysis,[70] ERG's I-M program performance evaluation for the Austin area,[71] and data from internet research on the costs of "check engine" repairs,[72] CAPCOG developed a range of estimated emissions-related repair costs for the region. At the lower end of the range, CAPCOG used the data form ERG's performance evaluation to calculate the average annual costs of repairs based on the actual repair expenses reported for 2012 and 2013 in the Texas Information Management System (TIMS), a database that includes I-M program data. Since this field is an optional field for repair stations, it is not likely to be a complete dataset, but it would represent a minimum number of repairs and repair costs that could be used for this analysis.

Table 41: Repair Costs Reported in TIMS for 2012 and 2013

Year	All Repairs (Number)	All Repairs (Calculated Expenses)	Repairs with Costs Between $0 and $2000 (Number)	Repairs with Costs Between $0 and $2000 (Calculated Expenses)
2012	14,004	$1,204,445	5,787	$1,001,054
2013	12,362	$897,119	4,620	$816,888
Combined	26,366	$2,101,564	10,407	$1,817,942
Annual Avg.	13,183	$1,050,782	5,204	$908,971

[70] Ibid
[71] http://www.tceq.state.tx.us/assets/public/implementation/air/ms/IM/IMProgEval2015-ARR.pdf
[72] https://www.carmd.com/wp/vehicle-health-index-introduction/2015-carmd-state-index/

Given that there were 53,315 motorists who failed an initial test, CAPCOG believes that it is unlikely that only 10-25% of these motorists received repairs as would be indicated by these data. In order to calculate an "upper bound" estimate of the number of repairs performed, CAPCOG used the 53,315 vehicles that failed their initial test and estimated the number of vehicles that eventually passed in subsequent retesting. Since the actual number of initial retests was higher than the number of initial failures (76,071 compared to 53,315), and more "other retests" than there the number of initial retest failures (9,038 compared to 7,009), CAPCOG instead used the "pass" percentages for the initial retests and other retests in order to calculate the total number of estimated repairs.

$$\begin{aligned} Total\ Repairs = (53{,}315\ initial\ failures\ \times 90.79\%\ pass\ rate\ for\ initial\ retests) \\ + (53{,}315\ initial\ failures\ \times 9.21\%\ failure\ rate\ for\ initial\ retests \\ \times 70.58\%\ pass\ rate\ for\ other\ retests) = 51{,}870\ repairs \end{aligned}$$

This would imply that 97% of vehicles that fail an emissions test would pay repair costs. In order to calculate the estimated total expenses for these tests, CAPCOG used three different cost estimates:

1. The average cost of repairs between $0 and $2000 reported in ERG's performance evaluation report
2. The average cost of repairs reported for the Austin area in ERG's fee analysis report; and
3. The average cost of "check engine" repairs for Texas.

Table 42 shows the "upper bound" estimated expenses for emissions-related repairs in 2014, based on these three estimates.

Table 42: Estimated Emissions-Related Repairs assuming high number of repairs, 2014

Source	Avg. Cost of Repair	Total Expenses for Repairs, 2014
ERG I-M Program Performance Evaluation for the ARR Area	$174.68	$9.06 million
ERG Fee Analysis – ARR Area	$219	$11.36 million
CarMD Estimate	$413.26	$21.44 million

Combining the lower bound and upper bound estimates, this produces a range of about $900,000 to $21.4 million. Within this range, CAPCOG feels that a reasonable estimate would be $5 million - $8 million, as this would represent about 50-90% of the test failures getting repaired, with the balance either scrapping their vehicle, selling their vehicle outside of the area, or continuing to drive the vehicle out of compliance with the program (a population that represents about 14% of the vehicles on the road), and which reflects the average cost of repairs in ERG's I-M program Performance Evaluation cost analysis for repairs that were logged as being between $0 and $2000. Due to program changes that are likely to increase compliance, CAPCOG believes that the repair costs would be towards the higher end of that $5-9 million per year in the future.

Since the costs paid by motorists only reflects one side of the economic transactions that would occur when a motorist paid an emissions fee or paid for an emissions-related repair, in order to estimate the

cost to the economy of this program, a comparison of the economic activity that is generated due to this program to the economic activity that could be generated by using that same money elsewhere in the local economy is needed. For the purposes of this analysis, CAPCOG is assuming that 100% of the dollars spent by motorists on the I-M program stay within the local economy, since the fees and repair costs are paid to establishments within the local economy.

CAPCOG first estimated the amounts of these fees that went to the testing or test/repair businesses, the amount that went to TCEQ/DPS administration of the program, and the amount that went towards the LIRAP/DACM program, based on what percentage of the total $16.00 fee each of these components represents ($11.50, $2.50, and $2.00, respectively).

Table 43: I-M Emissions Fee Revenue Disposition, 2014

Revenue Disposition	Portion of Fee	Total Estimated Revenue
Test and Repair Establishments	71.88%	$11,272,979
TCEQ/DPS	15.63%	$2,450,648
LIRAP Program	12.50%	$1,960,518
TOTAL	**100.00%**	**$15,684,144**

The $11 million in the inspection fee revenue retained by the inspection stations would represent a portion of the GRP of three types of establishments: general automotive repair (NAICS Code 811111), automotive exhaust system repair (NAICS Code 811112), and "all other automotive repair and maintenance," which includes test-only facilities (NAICS Code 811198). The 2013 GRPs for these NAICS codes are shown in Table 44. The GRP for all automotive repair and maintenance establishments (NAICS Code 8111) was $345 million in 2013. At the $11 million mark, these fees represent approximately 9% of the GRP for the three NAICS codes that would be directly involved in the testing and 3% of total GRP for the automotive repair and maintenance sector.

Table 44: 2013 Gross Regional Product for Establishments Involved in I-M Testing

NAICS Code	Description	GRP, 2013
811111	General Automotive Repair	$120,171,523
811112	Automotive Exhaust System Repair	$2,475,418
811198	All Other Automotive Repair and Maintenance	$5,496,589
Combined	**n/a**	**$128,143,531**

The $2,450,648 in emissions test fees that would be used to pay for TCEQ/DPS administration of the program is revenue to state government (NAICS Code 902999). Since Austin is the state Capital, these revenues would be expected to constitute revenue for the region within this sector.

While $1,960,518 was collected for the LIRAP program, the region is receiving less than that amount in LIRAP funding. For FY 2016, the region will be receiving $1,482,953 in DACM funding, of which 10% can

be used for administration ($148,295). Another $196,955 goes back to the counties for Local Initiative Projects (LIP), although in 2014, this amount was much less. This amount constitutes revenue to local governments (NAICS Code 903999). For 2014, $259,975 in repair vouchers and $730,100 in replacement vouchers were redeemed in 2014 under the LIRAP/DACM program. The revenue for repairs is considered elsewhere in this analysis, but the $730,010 would constitute revenue to new car dealers and used car dealers (NAICS Codes 441110 and 441120).

Using economic modeling data for the NAICS Codes that would receive these revenue streams, CAPCOG estimated that the range total economic activity associated with each of these revenue streams.

Table 45: Estimated Economic Activity Associated with the I-M Program Fees and Repair Costs

NAICS Group	Description	Revenue	Total Associated Economic Activity
8111	Auto Repair and Maintenance	$12.3 - $32.7 million	$20.1 - $53.8 million
902999 and 903999	State and Local Government	$2.6 million	$4.2 million
441110 and 441120	New and Used Car Dealers	$0.7 - $1.4 million	$1.3 - $2.5 million
Combined Total	**n/a**	**$15.6 - $36.8 million**	**$25.6 - $60.5 million**

In order to understand the economic impact of the I-M program, it is necessary to not look at the program's total economic activity on its own, but rather – compare the amount of economic activity associated with the revenue generated from the fees and repair costs paid by motorists to the economic activity that would be generated by those motorists if they could spend that money elsewhere within the local economy.

CAPCOG compared the economic activity associated with the I-M program to the economic activity that would occur if the same amount of revenue was instead spent by motorists in the retail sector (NAICS Code 44-45), the Arts, Entertainment, and Recreation sector (NAICS Code 71), the Accommodation and Food Services sector (NAICS Code 72), and economy-wide. These comparisons enable an analysis of what the economic output for the region would be if the sales associated with the I-M program were redirected to other parts of the economy. The three sectors CAPCOG chose to analyze seemed to be the most likely place where a consumer would spend the savings that would be associated with not being subject to the I-M program. As the table below shows, the estimated economic impact ranged from an economic cost of $8.1 million to an economic benefit of over $1.8 million per year. Given the uncertainty regarding the economic impacts of the I-M program, it would be difficult to characterize the anti-backsliding restrictions as a "cost" to the region, since it is not clear that the economy would perform better if people redirected their dollars away from auto repair shops and towards other categories of consumer spending.

Table 46: Estimated economic impacts of the I-M program relative to other sectors

Sales Reference Case	Low	Medium	High
Economy-Wide	$1,750,736	$4,238,899	$8,082,896
Retail	-$1,040,073	$112,287	$1,892,584
Arts, Entertainment, and Recreation	$1,247,092	$3,494,190	$6,965,761
Accommodation and Food Services	-$1,859,536	-$1,099,407	$74,927
Retail, Arts, Entertainment, Recreation, Accommodation Services, and Food Services	-$1,350,964	-$347,410	$1,202,994

6.6 VOC Reduction RFP Penalty

Any new VOC reductions that would be required as a result of the VOC RACT for CTG sources would be creditable towards any required RFP reductions, but existing VOC emission reductions not only would not be creditable, but would actually increase the total costs for reducing VOC emissions compared to an uncontrolled scenario, since they would already be factored into the baseline.

To use the I-M program example along with the same 2011 and 2025 emissions data used above to calculate the VOC emission reduction requirement, CAPCOG calculated the 2017 and 2023 emissions without the I-M program by dividing the on-road VOC emissions in Travis and Williamson Counties by 88% to reflect the 12% reduction in on-road VOC emissions that the program is estimated to achieve.

Table 47. Estimation of I-M program RFP VOC "penalty" (tpy)

Scenario	2017	2023	Change	Change Required	Additional Needed
Controlled	37,175	36,169	-1,005	-5,576	-4,571
Uncontrolled	37,911	36,662	-1,249	-5,687	-4,437
Difference	736	493	-244	-110	133

The extra 133 tpy of VOC reductions required in the "controlled" scenario compared to the "uncontrolled" scenario translates into an extra $1 million a year in added VOC emission reduction costs the region would need to pay in order to fulfill this requirement as a result of this RFP "penalty." The same would apply to the other VOC control measures incorporated into the SIP that would reduce the 2017 baseline, including the lower applicability level for Stage I Vapor Recovery, the degreasing rules, and the cutback asphalt restrictions.

7 Conclusion

This report is CAPCOG's attempt to address the question that is often asked about an ozone nonattainment designation – what could it cost? Being able to answer that question with a defensible set of estimates based on the best information we have available helps members of the public, local elected officials, local businesses, and state and federal environmental agencies understand the economic risks the area would face if designated nonattainment and understand the economic benefits

and risks of taking voluntary action to reduce ozone-forming emissions ahead of a nonattainment designation. CAPCOG also hopes that this report can help highlight to the EPA the potentially very high costs of a nonattainment designation to a region that has been on the forefront of attempting to voluntarily reduce ozone-forming emissions, particularly if EPA takes the same approach to implementing this new standard as the 2008 ozone NAAQS. While there are also risks with not designating an area nonattainment if its ozone levels are measuring above the level of the new ozone standard over 2014-2016, this report shows that the estimated costs to the region over the 28-year period that the area could face regulatory consequences for a nonattainment designation appear to significantly outweigh the benefits that the designation might provide in accelerating the reduction in ozone levels within the region. Even if the two expansions analyzed in this report were not included in this analysis, the net cost of a nonattainment designation to the local economy would likely be $33-$129 million per year. This exceeds the estimated $18 - $29 million per year benefit in reduced ozone-related short-term mortality that EPA estimates could be achieved through a 1 ppb reduction in peak ozone, a mark which all of the controls adopted under a nonattainment designation would be unlikely to achieve in any case.

There are a number of factors that could impact these cost estimates. While this report analyzes a scenario in which EPA sets the standard at 65 ppb, if the EPA set the standard at a higher level, such as 66 ppb or 67 ppb, and the area was designated nonattainment, the area would be able to attain the standard more quickly with fewer emission reductions and would therefore face less economic risk associated with some of the regulatory requirements for a nonattainment area. Similarly, if EPA were to not designate all of the counties in the MSA as nonattainment, such as limiting the geographic boundary of the area to Travis County for instance, it would also reduce the economic loss to the region, although the largest cost – the loss of a Samsung expansion – would still likely occur in such a situation. It is also possible that the EPA could add counties to the nonattainment area, which might cause economic losses in those counties but might reduce the costs of emission reduction offsets within the Austin-Round Rock MSA. And EPA could choose to implement the new standard differently than it is implementing the 2008 standard in ways that would reduce or eliminate some of the costs described in this report. For example, if EPA chose to implement the new standard under Subpart 1 of Title 1, Part D of the Clean Air Act, rather than Subpart 2, the region would likely not have to face the costs associated with VOC reductions that would be required under a Moderate classification. It is also true that some of the costs – particularly those associated with the point source NO_X reductions – could wind up being required regardless of the region's attainment status if the EPA determined that such reductions were necessary to support attainment or maintenance of the standard in another part of the state or to reduce Texas's ozone contributions to other states. If such emission reductions are required by virtue of one of these other requirements, the costs associated with those reductions should not be attributed to a nonattainment designation.

There are also situations that could increase the costs of a nonattainment designation. For example, if the EPA decided to group the Austin-Round Rock MSA and the San Antonio-New Braunfels MSA into a single nonattainment area, the counties in the Austin-Round Rock MSA would remain designated nonattainment until ozone levels in Bexar County were able to reach the new standard. Another

example might be the increased costs of residential and commercial construction due to cement shortages if domestic production and port capacity cannot expand to accommodate imports. There are any number of business decisions that might be affected by a nonattainment designation, and this report does not seek to cover all of them. Some of those decisions may not even be foreseeable at this point. It would not be possible for this report to analyze every possible cost that the area might face as a result of a nonattainment designation. Instead, this report seeks to provide an estimate of the general magnitude of the economic impacts of some of the foreseeable types of costs that could be associated with a nonattainment designation.

While there are many alternative ways to attempt to estimate these costs, CAPCOG believes that this report serves the general purpose of highlighting the economic benefits of taking voluntary action to reduce ozone-forming emissions and the economic risks that the region faces if it is designated nonattainment for EPA's proposed ozone standard. In analyzing these risks, it is important to distinguish financial costs from economic costs, and to distinguish costs associated with a nonattainment designation from other costs the region might face as a result of implementation of EPA's proposed ozone NAAQS. Regardless of where EPA sets the new standard, this report also provides a framework for understanding the potential economic consequences of a nonattainment designation for this or any other ozone standard. If the region is able to narrowly avoid a nonattainment designation, and the region's emission reduction measures made the difference, there is a substantial economic benefit that can be attributed to those efforts. Likewise, if the region's ozone levels are just barely above the level of the standard when EPA finalizes designations, there may be substantial economic consequences to the region if it is not able to convince EPA to exercise discretion in the designation and implementation phases for the new ozone NAAQS. **If the area's ozone levels at the end of 2015 are close to the level of the new standard, additional efforts to reduce emissions within the region in 2016 and efforts to persuade EPA to exercise discretion in designation and implementation of the new NAAQS could be very economically valuable to the region.**

As new information becomes available, CAPCOG plans to update this study with new data and analysis.