4. Environmental Considerations: Air Quality

Introduction

The negative impacts of poor air quality on health are of great concern in North Central Texas. Air quality is vital to a community's overall quality of life, but the negative impacts of polluted air can more adversely affect sensitive populations such as children and the elderly. For example, a 2018 update from the Center for Children's Health found 14 percent of children aged 0 to 14 in the six-county area of Denton, Hood, Johnson, Parker, Tarrant, and Wise were reported to have an asthma diagnosis at some point in their lifetime.[2]

While regional air quality has improved in recent years, continued progress is necessary to further benefit both people who have asthma or respiratory problems and those who could also experience health effects when exposed to air pollution.

Beyond health effects, air pollution can have negative economic impacts. North Central Texas is a leader in global and domestic trade (for further discussion, see the **Freight** section of the **Mobility Options** appendix). This trade, while creating approximately 20 percent of the region's employment, has serious implications for regional air quality. Generally, the trucks and trains employed in goods movement are fueled by diesel and, therefore, are major contributors to air pollution. Medium- and heavy-duty on-road vehicles together comprise approximately 59 percent of the total on-road mobile source nitrogen oxide emissions in the region, with locomotives accounting for 38 percent of the total off-road mobile source nitrogen oxide emissions, as illustrated in the **Air Quality** section of the **Environmental Considerations** appendix. Failure to meet federal air quality standards could result in additional emission control requirements negatively impacting local businesses. It may also result in a freeze on all federally funded transportation projects, costing the region millions of dollars in federal transportation funding and ultimately affecting jobs in the region.

Because the transportation sector is a significant source of air pollutants, NCTCOG (North Central Texas Council of Governments) monitors air quality impacts attributable to transportation and administers a variety of programs to improve air quality in the region. Efforts that monitor and target pollutants result in reductions to regulated and nonregulated pollutants alike. Further descriptions of regulated pollutants and required technical analyses is found in the *Required Technical Analysis* section of this chapter, while the *Vehicle Air Quality Strategies and Voluntary Initiatives* section discusses NCTCOG's efforts to go above and beyond required air quality activities, as well as the numerous projects and programs administered in the North Central Texas region.

Mobility 2045 Update Supported Goals

Support travel efficiency measures and system enhancements targeted at congestion reduction and management.

Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.

Air Quality Policies and Programs

AQ3-001: Pursue successful transportation conformity determinations of the Metropolitan Transportation Plan and Transportation Improvement Program consistent with federal and state guidelines.

[2] The Center for Children's Health, https://centerforchildrenshealth.org/data/chna/pages/default.aspx

AQ3-002: Provide technical assistance and analysis to attain and maintain National Ambient Air Quality Standards and reduce negative impacts of other air pollutants.

AQ3-003: Support and implement educational, operational, technological, and other innovative strategies that improve air quality in North Central Texas, including participation in collaborative efforts with local, regional, state, federal, and private sector stakeholders.

AQ3-004: Support and implement strategies that promote energy conservation, address public health concerns, reduce demand for energy needs, reduce petroleum consumption, and/or decrease greenhouse gas emissions.

AQ3-005: Required for clean fleet funding as contained in Regional Transportation Council Resolution R14-10. Establish a framework for reducing fleet emissions, reducing fuel consumption, partnering with the North Central Texas Council of Governments/Dallas-Fort Worth Clean Cities, and training staff.

AQ3-006: Adopt and implement an idling restriction ordinance, or any other idling restriction measure, to reduce idling within local government jurisdictions as consistent with Regional Transportation Council Resolution R21-06.

AQ3-007: Promote adoption and implementation of an ordinance or guidelines similar to an ordinance that promote sustainable tire disposal practices, including recycling.

AQ3-008: Adopt and implement a comprehensive air quality action plan or various strategies provided in the North Central Texas Council of Governments Comprehensive Air Quality Action toolkit.

F3-002: Incorporate sustainability and livability options during the project selection process. Include additional weighting or emphasis as appropriate and consistent with Regional Transportation Council policy objectives, including, but not limited to, demand management, air quality, natural environment preservation, social equity, or consideration of transportation options and accessibility to other modes (such as freight, aviation, bicycle, and pedestrian). *(While this is listed as a financial policy, it has specific implications for the air quality portion of the plan.)*

The Mobility 2045 Update supports the following air quality programs:

AQ2-001: Air Quality Initiatives: Fleets

AQ2-002: Air Quality Initiatives: Consumers

AQ2-003: Air Quality Initiatives: Communities

AQ2-004: Air Quality Technical Planning and Analysis

Required Technical Analysis

National Ambient Air Quality Standards and Ozone Nonattainment Status

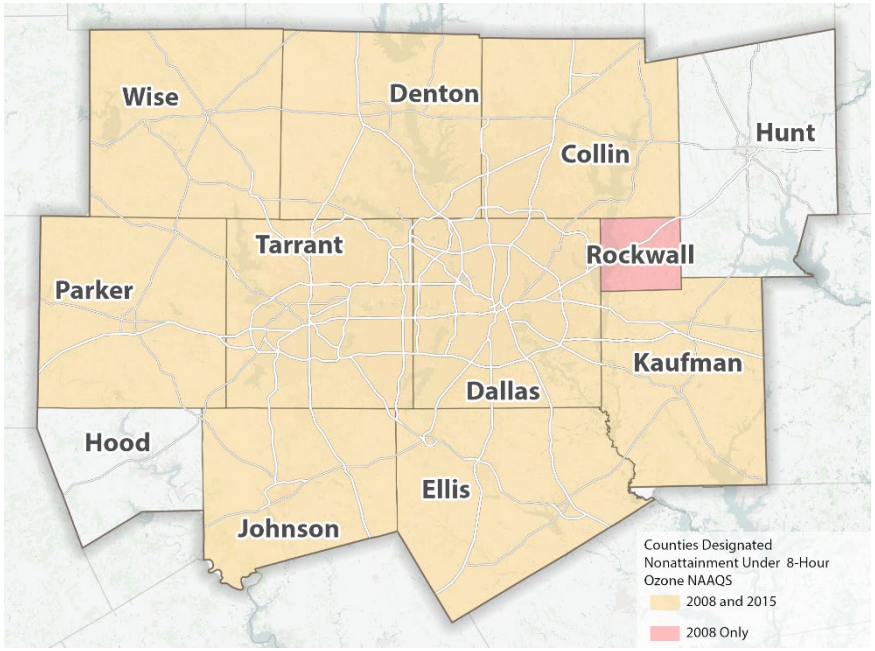
The federal Clean Air Act requires the United States EPA (Environmental Protection Agency) to set NAAQS (National Ambient Air Quality Standards) for outdoor air pollutants considered harmful to public health and the environment. The EPA refers to these pollutants as criteria pollutants, which include carbon monoxide, nitrogen dioxides, ground-level ozone, sulfur dioxide, particulate matter, and lead. Each county in the nation is assessed according to the standards for each criteria pollutant. An area with attainment status has pollutant concentrations within the limits established by the EPA as being protective of human health and the environment. An area with nonattainment status has pollutant concentrations exceeding those limits. Based on the magnitude of a pollutant in a given area, the EPA classifies counties into one of the following categories, listed in order of increasing severity: attainment/unclassifiable, marginal, moderate, serious, severe 15, severe 17, and extreme.

Since the NCTCOG 10-county region is designated nonattainment for ozone, most of the air quality efforts focus on reducing ozone precursor pollutants from the transportation sector, the largest contributor to ozone formation. Ground-level ozone pollution is caused by a photochemical reaction of volatile organic compounds and nitrogen oxides, which are known as ozone precursors, in the presence of sunlight and heat. In 1991, the region's first designation classified four counties in the region as nonattainment under the 1-hour ozone NAAQS. The Clean Air Act requires the EPA to reevaluate criteria pollutant standards periodically, resulting in a change in the ozone NAAQS, the number of counties designated as nonattainment, and the region's classification status.

Since 1991, the standards have become more stringent, and six additional counties were added to the region's nonattainment area. The "Environmental Protection Agency Historical Ozone Standard Timeline," in the **Air Quality** section of the **Environmental Considerations** appendix, presents the timeline of changes to the EPA's ozone standard and the implications for the North Central Texas region.

The timeline illustrates how, as the ozone standard gets lower, more counties in the region are impacted. Under the 2008 8-hour ozone standard, the 10 counties shown in **Exhibit 4-2** are classified as serious nonattainment and had an attainment of July 20, 2021. The region did not meet this deadline and will be reclassified to the severe category. Nine of these 10 Dallas-Fort Worth nonattainment counties (excluding Rockwall County) are classified as marginal nonattainment under the 2015 8-hour ozone NAAQS and had an attainment of August 03, 2021. The 9 counties did not meet this deadline and will be reclassified to the moderate category.

Exhibit 4-2: 8-Hour Ozone NAAQS Nonattainment Area



Despite making significant strides toward improving air quality, the region faces challenges in meeting increasingly stringent air quality standards, especially in consideration of the region's rapid population growth, which is forecasted to grow to 11.4 million residents by 2045. As population grows, vehicle miles traveled also increase, resulting in more vehicle emissions. **Exhibit 4-3** illustrates progress made in reducing ambient ozone concentrations despite population growth. **Exhibit 4-4** provides additional detail on the region's success in reducing ambient ozone concentration since 1998 in efforts to meet the 1997, 2008, and 2015 ozone NAAQS.

Exhibit 4-3: Demographic and Design Value Historical Trends in the Dallas-Fort Worth 10-County Ozone Nonattainment Area

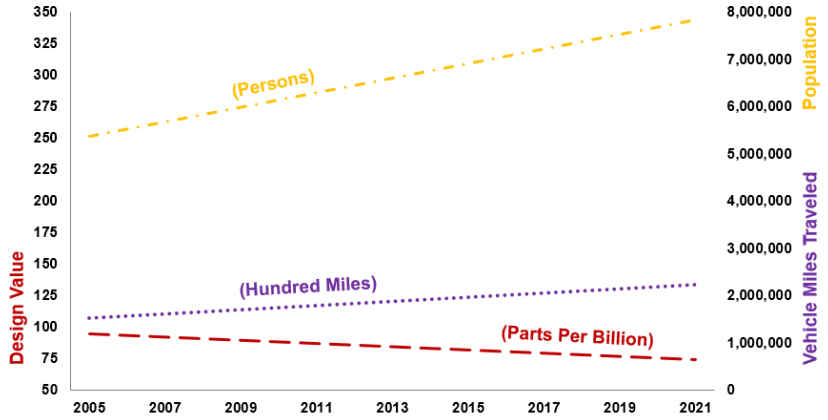
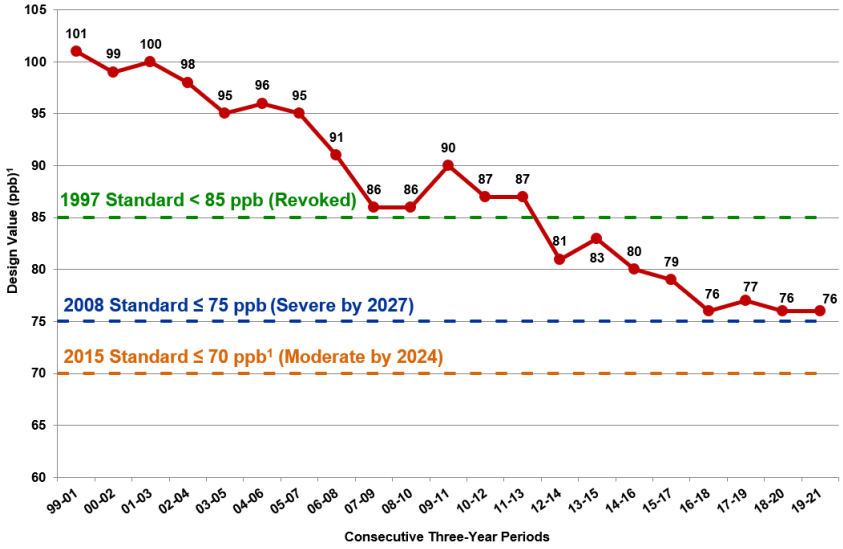


Exhibit 4-4: 8-Hour Ozone NAAQS Trend Line, 1998 to 2017



[1] Attainment goal – According to the US EPA National Ambient Air Quality Standards, attainment is reached when, at each monitor, the *Design Value* (three-year average of the annual fourth-highest day maximum 8-hour average ozone concentration) is equal to or less than 70 parts per billion.

Source: NCTCOG

Air Quality Conformity

NCTCOG participates in a cooperative, collaborative process with local, state, and federal agencies to improve air quality across the region. This partnership includes close coordination as TCEQ (Texas Commission on Environmental Quality) develops the SIP (State Implementation Plan). The SIP, a regional air quality plan required by the Clean Air Act, outlines how ozone concentrations will be reduced in the nonattainment area to a level that complies with the federal standard.

> **The goal** of the North Central Texas Council of Governments air quality programs is to achieve healthy air quality for North Central Texas residents and the environment by meeting and maintaining federally mandated standards for all criteria air pollutants.

In North Central Texas, the Regional Transportation Council has taken a proactive role in helping TCEQ revise the SIP for the region. NCTCOG assists with air quality technical planning and implements emission reduction control strategies at the local level to enhance federal and state efforts. Numerous other stakeholders throughout the region, including local governments and business coalitions, also support this process and facilitate local implementation.

The federal government requires projects and programs in nonattainment areas, including the 10 counties in North Central Texas, to be analyzed for Transportation Conformity to be approved and implemented. Transportation Conformity air quality analysis must be conducted on federally funded projects; projects requiring federal approval; transportation improvement programs; or projects,

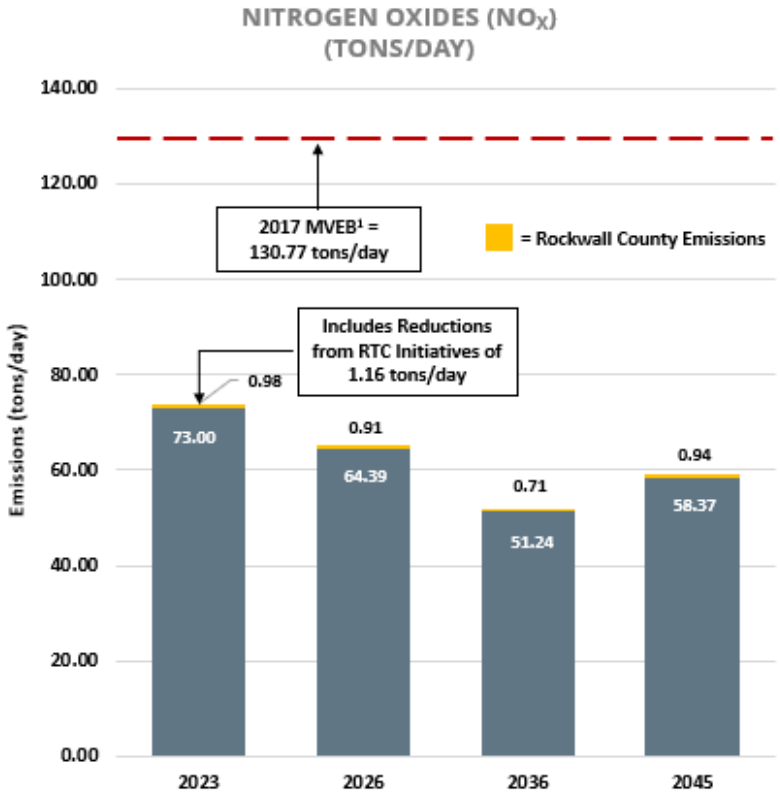
programs, and policies identified in transportation plans. The conformity analysis does not measure ozone directly, but instead measures ozone precursors: VOC (volatile organic compounds) and NO_X (nitrogen oxides). MVEB (Motor Vehicle Emissions Budgets) for NO_X and VOC are established in the regional SIP. Under the MVEB test, vehicle emissions for each analysis year must be less than the applicable air quality budgets.

A conformity determination is a two-step process in metropolitan areas. First, the RTC (Regional Transportation Council), as the policy body of the region's Metropolitan Planning Organization, is responsible for conducting the local-level transportation conformity determination for the North Central Texas counties designated as nonattainment. Second, the Federal Highway Administration and Federal Transit Administration make a federal-level transportation conformity determination. Only after receiving this federal determination can the region's long-range transportation plan and Transportation Improvement Program be implemented.

Vehicle emission results documented below demonstrate the 10-county Dallas-Fort Worth ozone nonattainment area meets the regional air quality conformity requirements of the budget test. Conformity analysis results are shown in **Exhibit 4-5** and **Exhibit 4-6.**

RTC initiatives, such as bicycle and pedestrian facilities, traffic signal improvements, high-occupancy vehicle/managed lanes, and park-and-ride facilities, are important to ensuring a successful conformity determination and assist with the region reaching or maintaining attainment for the EPA's criteria pollutants.

Exhibit 4-5: Emissions of Nitrogen Oxides
Dallas-Fort Worth Ozone Nonattainment Area
Air Quality Conformity Analysis Results

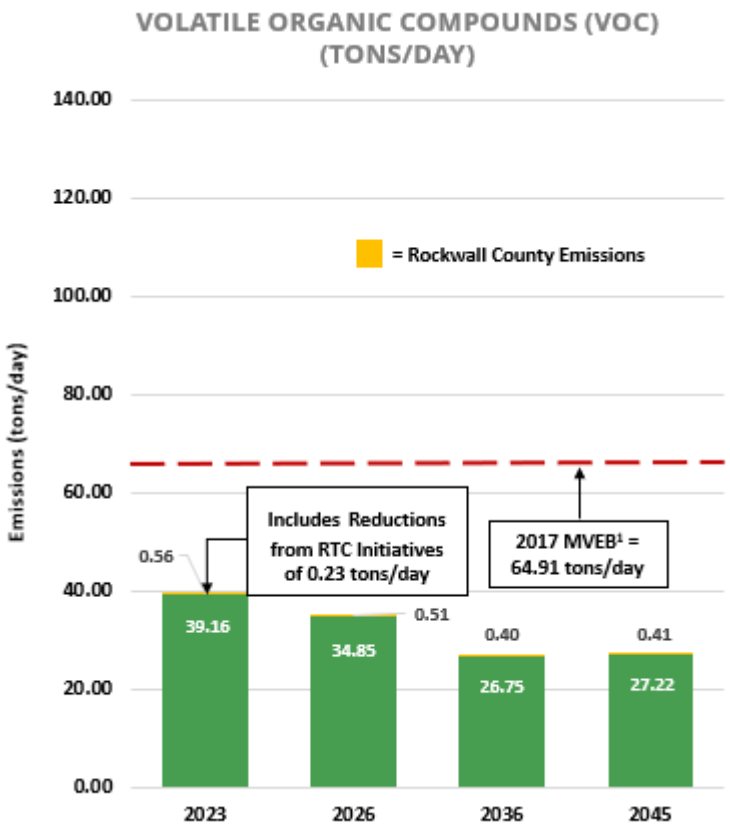


The results of the conformity determination demonstrate the Mobility 2045 Update meets the specific transportation air quality conformity requirements of the Clean Air Act (42 USC 7504, 7506(c) and (d)) and amendments, the applicable revision to the air quality plan (2017 Attainment Demonstration SIP, including the approved 2017 MVEBs[3]), and the Transportation Conformity rule (40 CFR Parts 51 and 93). This conformity determination was approved by the RTC,

[3] *Adequacy Status of the Dallas-Fort Worth, Texas Attainment Demonstration 8-Hour Ozone Motor Vehicle Emission Budgets for Transportation Conformity Purposes*, 81 FR 78591

along with the Mobility 2045 Update, in June 2022. For additional Transportation Conformity information, refer to the 2022 Transportation Conformity document.[4]

Exhibit 4-6: Emissions of Volatile Organic Compounds
Dallas-Fort Worth Ozone Nonattainment Area
Air Quality Conformity Analysis Results



Mobile Source Air Toxics

In addition to the criteria air pollutants under NAAQS, the EPA also regulates MSAT (Mobile Source Air Toxics). MSAT account for 7 of the 187 air toxics defined by the Clean Air Act Amendments of 1990. All refineries or importers of gasoline for passenger vehicles must meet specific compliance baselines, established by the EPA, for conventional and reformulated gasoline. The remaining air toxics come from point and area sources.

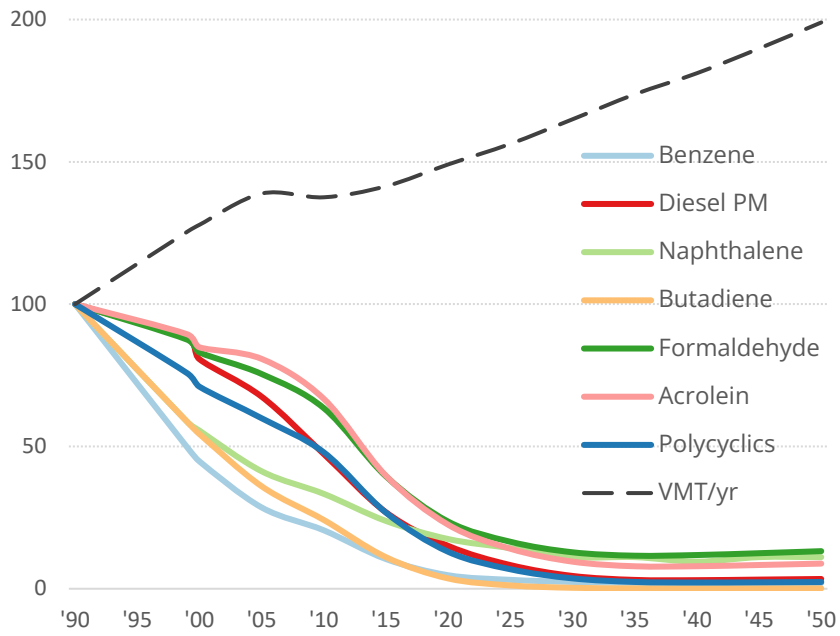
Of the seven MSAT, some toxic compounds are present in fuel and are emitted into the air when fuel evaporates or passes through an engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. MSAT also result from engine wear or from impurities in oil or gasoline. **Exhibit 4-7** shows that national MSAT emissions are expected to decline drastically over time, despite vehicle miles traveled dramatically increasing. Reductions in MSAT emissions can be attributed to the use of cleaner fuels and more efficient engines.

Vehicle Air Quality Strategies and Voluntary Initiatives

The programs and policies supported by the Mobility 2045 Update not only seek to improve the efficiency of the transportation system, which in turn improves air quality by reducing regulated pollutants, but also serve to reduce non-regulated pollutants (e.g., greenhouse gases) and fuel consumption.

[4] North Central Texas Council of Governments, 2022, Transportation Conformity, http://www.nctcog.org/trans/air/conformity/. The Transportation Conformity document will be updated at this website upon completion.

Exhibit 4-7: Index of National MSAT Emission Trends and Vehicle Miles Traveled, 2010 to 2050, for Vehicles Operating on Roadways[5]



Non-Regulated Pollutants

GHGs (greenhouse gases) trap heat in the atmosphere and create a naturally occurring warming phenomenon called the greenhouse effect. This warming may affect the built and natural environment in ways that are potentially broad reaching and unpredictable at a regional level. The North Central Texas region could experience changes in precipitation levels, impacts to human health, and impacts to natural ecosystems.

Some GHGs occur naturally in the atmosphere, while others result from human activities. Naturally occurring GHGs include water vapor, CO_2 (carbon dioxide), CH_4 (methane), N_2O (nitrous oxide), and ozone. Certain human activities associated with transportation, however, add to the levels of most of these gases:

DFWCC (Dallas-Fort Worth Clean Cities Coalition**)**, which was established in 1995, works with vehicle fleets, fuel providers, community leaders, and other stakeholders to reduce transportation energy use and improve air quality. DFWCC collaborates with both the public and private sector to increase the use of alternative fuels, advanced technology vehicles, improve fuel economy and the use of technologies that reduce idling, and reduce vehicle miles traveled.

Staff accomplishes this work through support, education, and training of fleet staff, education and awareness-building for consumers, and planning support and sharing of best practices among the cities and other organizations that have a role to play in creating regulations and policies that can help or hinder alternative fuel and electric vehicle adoption.

DFWCC has a target of increasing reductions in petroleum consumption among local fleets by 16 percent more than the previous year, each year. Progress is documented in the DFWCC Annual Report, available at https://www.dfwcleancities.org/annualreport.

See the **Air Quality** section in the **Environment Considerations** appendix for an overview of DFWCC impacts summarized from the 2020 Annual Survey of local fleet activities.

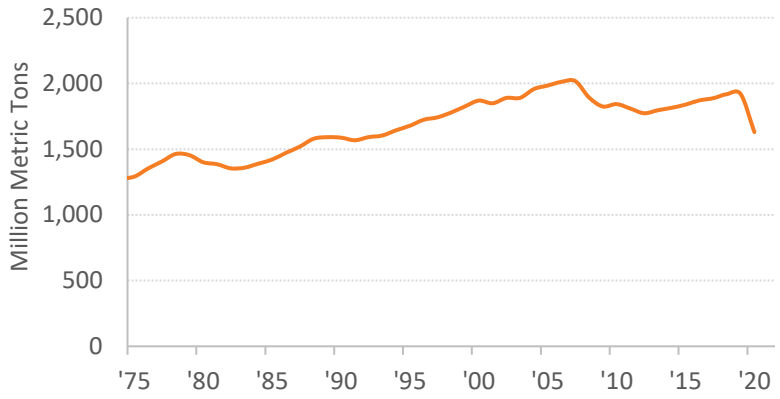
[5] Federal Highway Administration, 2016, https://www.fhwa.dot.gov/ENVIRonment/air_quality/air_toxics/policy_and_guidance/msat/nmsatetrends.cfm

- CO_2 is released to the atmosphere when fossil fuels (oil, natural gas, and coal) are burned.
- CH_4 is emitted during the production and transportation of coal, natural gas, and oil.
- N_2O is emitted during combustion of fossil fuels.

GHGs that are not naturally occurring include chlorofluorocarbons and hydrofluorocarbons, which are by-products of foam production, refrigeration, and air conditioning; and perfluorocarbons, which are generated by industrial processes. In the United States, the transportation sector is the lead source of GHG emissions, accounting for 29 percent of national GHG emissions in 2019, according to the EPA.[6] As **Exhibit 4-8** shows, CO_2 emissions from the transportation sector peaked in 2006 and remained relatively stable from 2008 to 2019. However, in 2020, CO_2 emissions dropped to levels seen in 1994. This drop in emissions is likely largely due to the decline in transportation activity during the COVID-19 pandemic, as passenger trips, transit, and air travel was substantially reduced. This suggests that substantial emissions reductions could be achieved if large-scale shifts toward telecommuting, virtual conferences, and other non-single-occupant vehicle modes of travel became permanent.

NCTCOG is working on the first regional GHG emissions inventory to determine the emissions from various sectors. This inventory will assist in the development of a GHG emissions reductions toolkit for local governments, private industries, and the general public to assist in the reduction of emissions.

Exhibit 4-8: Total US Transportation Sector Carbon Dioxide Emissions[7]



Technology and Air Quality

Aside from monitoring impacts, the RTC has taken a proactive stance in supporting implementation of projects and programs designed specifically to improve air quality rather than for transportation purposes.

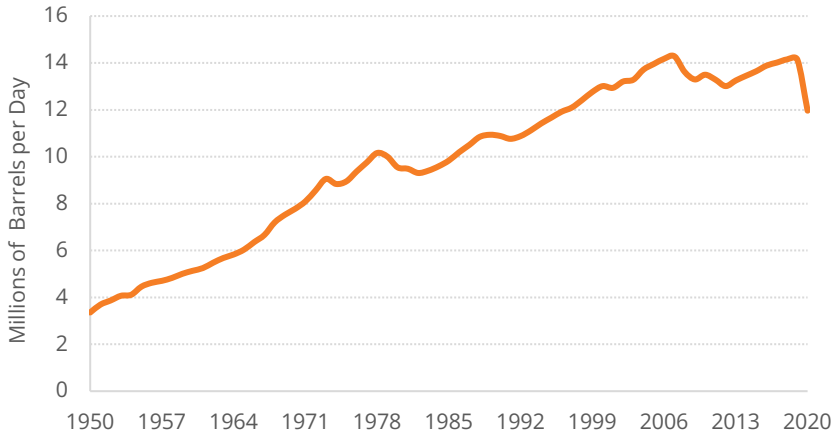
According to the US Energy Information Administration, in 2021, 68 percent of total US petroleum consumption was from the transportation sector.[8] **Exhibit 4-9** depicts the substantial increase in petroleum consumption for transportation since 1949, but also shows this consumption has leveled off somewhat in recent years. Additionally, the impact of COVID-19 can be realized with the drop in petroleum consumed by the transportation sector from 2019 to 2020. Some of the increase in consumption expected from higher vehicle miles traveled is offset by increases in fuel efficiency and use of electricity and other alternative fuels.

[6] US Environmental Protection Agency, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

[7] US Energy Information Administration, August 2021 Monthly Energy Review, Figure 3.7, https://www.eia.gov/totalenergy/data/monthly/

[8] US Energy Information Administration, August 2021 Monthly Energy Review, https://www.eia.gov/totalenergy/data/monthly/

Exhibit 4-9: Petroleum Consumed by the Transportation Sector in the US[9]



Vehicle technologies can help reduce petroleum, increase efficiency, and reduce pollutants in several ways. Technologies help keep vehicles operating properly, which helps keep emissions lower. Technologies are also available to increase fuel economy and reduce idling. Finally, advanced technology vehicles such as hybrids, electric vehicles, and other alternative fuels (e.g., propane Autogas, compressed natural gas, and biofuels) produce lower emissions than their conventional counterparts. This is true even when accounting for upstream emissions such as those associated with generating electricity at a power plant. One of the major programs housed at NCTCOG is the DFWCC (Dallas-Fort Worth Clean Cities) Program. NCTCOG is designated by the Department of Energy as the host agency for DFWCC. As part of the national Clean Cities network, DFWCC works to improve efficiency and reduce emissions from the transportation sector. Most of these impacts are realized through use of alternative fuel, hybrid, and electric vehicles.

Alternative Fuels

Use of alternative fuel vehicles is only possible if alternative fuel infrastructure exists to support their operation. Beginning in 2016, the Federal Highway Administration was required to designate Alternative Fuel Corridors as either "ready" or "pending" for electric vehicle charging, hydrogen, propane, and natural gas fueling. This designation indicates the degree to which refueling infrastructure for a particular fuel is available along highway corridors. NCTCOG has participated in this initiative since 2016, in collaboration with the Texas Department of Transportation. After the first five years of nominations, Texas boasts a robust network of designations, including 16 Interstate Highways, 1 US Highway, and 1 State Highway, covering 13,000 miles of National Highway System (all fuels combined). A map of the currently designated Alternative Fuel Corrdiors can be found in the **Air Quality** section of the **Environmental Considerations** appendix. These corridor designations have become critically important with the passage of the Bipartisan Infrastructure Law, as they open the door to funding eligibility for development of additional fueling stations along these highways.

NCTCOG is doing more extensive corridor work through a planning project along Interstate Highway (IH) 45, which connects the Dallas-Fort Worth area to Houston. Through a planning grant from the Federal Highway Administration, NCTCOG is developing a Zero-Emission Vehicle Corridor Deployment Plan, which will outline how best to build out infrastructure along IH 45 to support both battery electric and fuel cell electric vehicle travel with a focus on supporting medium- and heavy-duty zero-emmissions vehicle travel. This corridor is key to advancing air quality efforts in both the Dallas-Fort Worth and Houston areas, as both face ozone nonattainment challenges that are heavily impacted by heavy-duty diesel vehicles. NCTCOG is working with the Houston-Galveston Area Council and a

[9] *Ibid*

variety of stakeholders, including original equipment manufacturers, station providers, and utilites to advance this project and leverage IH 45 Infrastructure Deployment Plan work with other planning efforts led by organizations statewide.

Autonomous Vehicles

The emergence of AVs (autonomous vehicles) could have a positive impact on transportation sector emissions. Most AVs will be built on electric or hybrid powertrains and are likely to be first deployed in large numbers through fleets managed by shared mobility providers. The intensive use of electrified fleet vehicles to handle a substantial portion of trips in the region would mean the share of trips handled by zero-tailpipe-emission AVs may be significantly higher than the percentage of AVs in the overall vehicle fleet.

The air quality benefits of AVs will be much higher if shared-ride and micro-transit forms of shared mobility gain a significant market share. There is a real possibility that automated surface transportation may result in an increase in vehicle miles traveled due to 1) greater convenience, 2) lower cost, 3) the ability to work and consume media while traveling instead of driving, and 4) use by persons unable to drive a conventional car. Increasing average vehicle occupancy levels will be key to counteracting this possibility. For further discussion on AVs, see the *Vehicle Automation and Related Developments* section of the **Transportation Technology** chapter.

Technology and Air Quality Programs

Regional planning goals such as increasing mobility, supporting economic vitality, enhancing the environment, promoting energy conservation, and improving the quality of life also influence air quality impacts. Many programs, policies, and projects described in other chapters of this document improve air quality by increasing efficiency in the transportation system. The following efforts are among those that reduce transportation-related emissions:

- Mitigating congestion
- Reducing the number of vehicles driven by individual commuters through the use of alternative transportation options or technology advancements (e.g., remote work or virtual meetings enabled by stable broadband connection and access)
- Improving roadway design to facilitate traffic flow

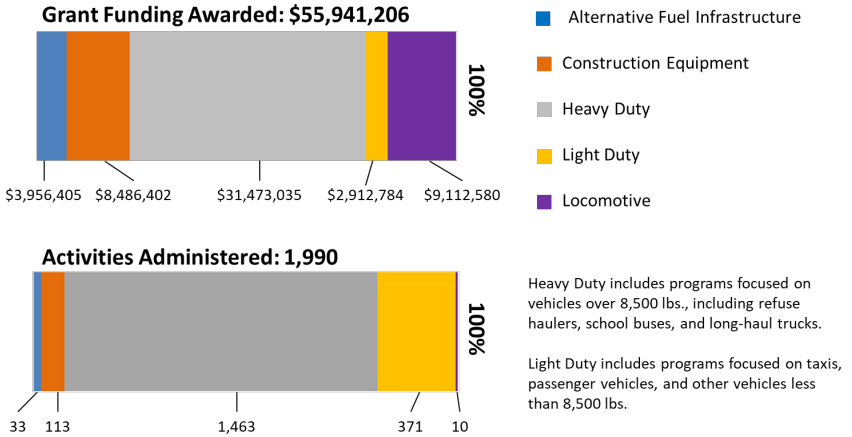
These strategies are discussed in the **Operational Efficiency** chapter. Many of these programs and projects are included as voluntary control strategies in the region's SIP. These strategies improve how the transportation system operates and have a secondary benefit of improving air quality.

Air quality programs are designed to target three major audiences: fleets (both public and private), consumers, and communities. Many projects within these programs seek to facilitate the use of the cleanest available technologies either directly (e.g., providing incentives to scrap and replace high-polluting vehicles, or to purchase zero-emission vehicles) or indirectly (e.g., deploying infrastructure for these vehicles or providing education on features and benefits of cleaner transportation technologies to encourage adoption).

As an example, **Exhibit 4-10** illustrates the total number of activities and total funding awarded to local fleets through competitive funding programs for the 2006 to 2021 period.

Numerous communication strategies help explain the importance of these measures to stakeholders and the public, including Air North Texas, education campaigns, newsletters, and social media. This comprehensive approach to reducing emissions will become increasingly important as the region balances population and economic growth with the need to continue to improve air quality.

Exhibit 4-10: Total Vehicle/Equipment/Technology Grant Funding Awarded and Activities Administered by Activity Type (2006 to 2021)



Electrification

Electric drive vehicles, which include BEVs (battery electric vehicles), PHEVs (plug-in hybrid electric vehicles), and hydrogen fuel cell vehicles, have the potential to gain great market share and help reduce concentrations of criteria pollutants, and also continue trends in both petroleum and CO_2 reductions. Within its work as the DFWCC Coalition, NCTCOG oversees an initiative called Electric Vehicles North Texas, which began around 2011, as a way to pull stakeholders together to plan for and support adoption of BEVs and PHEVs. Beyond education and information sharing, key activities include outreach and consumer-facing events such as National Drive Electric Week. Current forecasts predict BEVs and PHEVs could comprise 30 percent of all vehicles on the road by 2040, based on policy and technology assumptions, but the rate of adoption may be substantially impacted by state and local measures.[10] Additionally, the Biden Administration announced a national goal for 50 percent of all passenger vehicle sales in the United States to be electric by 2030. According to the 2021 Environmental Protection Agency Automotive Trends Report, 5 percent of new car sales in 2021 were electric vehicles (EVs) and by 2025, it is estimated that 30 percent of new car sales could be EVs.[11] North Texas observed a 32.5 percent average annual growth for EV registration from 2015 to 2020, showing that EV adoption is growing quickly within the region. As of January 2022, BEVs and PHEVs constitute approximately 0.62 percent of the overall passenger vehicle fleet in the NCTCOG region, comprising over 40,000 vehicles.

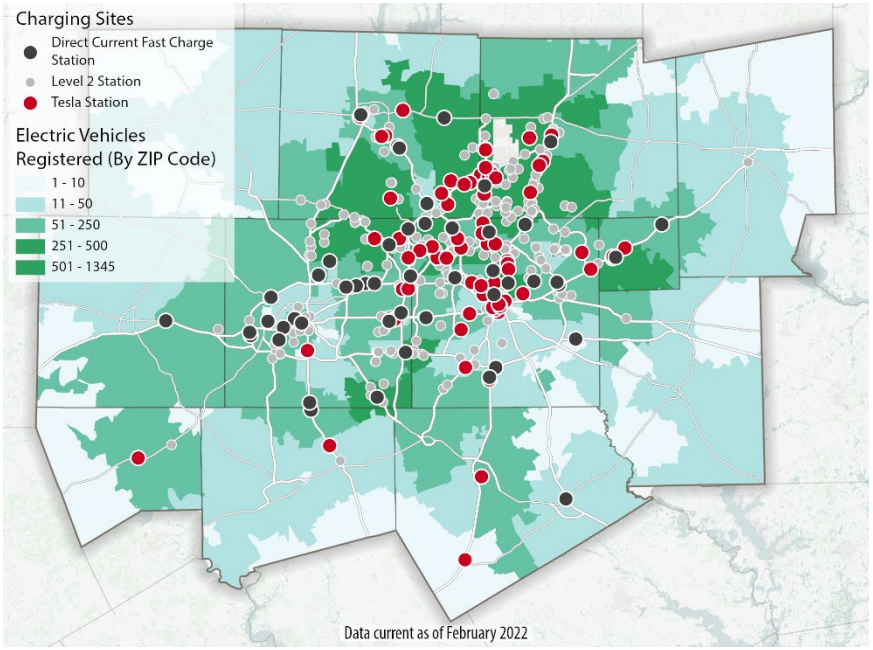
NCTCOG seeks to support strong EV adoption through local planning and resources, especially regarding how local governments can support EV readiness in their communities to reduce EV barriers and increase EV charging accessibility to all populations. **Exhibit 4-11** shows the geographic distribution of EV registration by zip code, publicly available Level 2 and Direct Current Fast Charge charging infrastructure, and Tesla charging infrastructure, as of January 2022. Note that Tesla charging stations are classified separately because the charging equipment at Tesla sites is proprietary and can only be used by Tesla drivers. Thus, those sites are not considered 'publicly accessible.'

As depicted in the map, most EV infrastructure locations mimic areas of higher EV registration rates, clustering EV infrastructure accessibility most densely toward the areas where Dallas, Denton, and Collin counties meet. This pattern has left many areas across the region with limited availability of publicly accessible charging infrastructure.

[10] Bloomberg New Energy Finance, Electric Vehicle Outlook 2020, https://about.bnef.com/electric-vehicle-outlook/

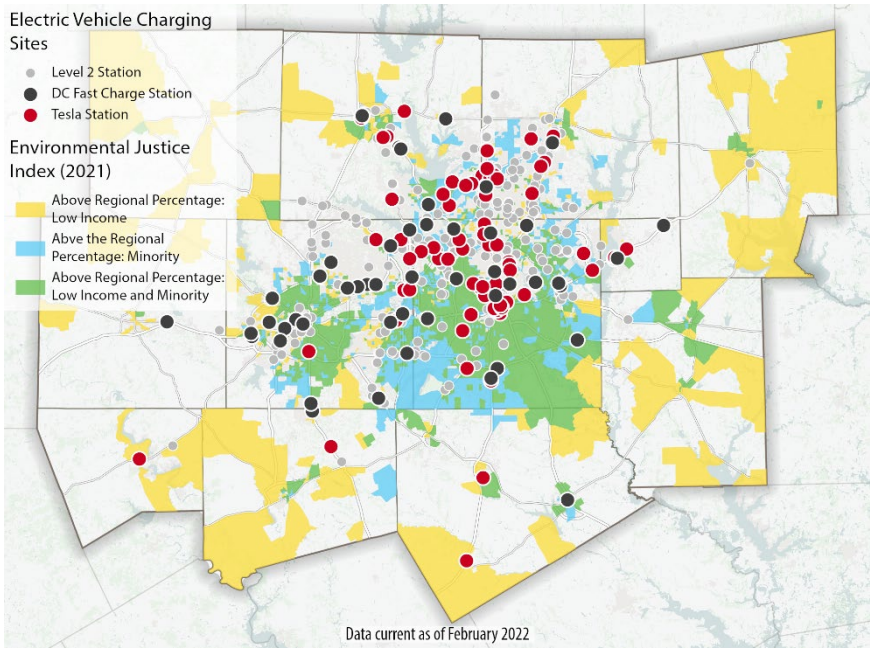
[11] US Environmental Protection Agency 2021 Automotive Trends Report, https://www.epa.gov/automotive-trends/download-automotive-trends-report

Exhibit 4-11: EV Registration by Zip Code and Publicly Accessible EV Charging Infrastructure in the 12-County North Texas Metropolitan Planning Area



A gap analysis, found in the **Air Quality** section of the **Environmental Considerations** appendix**,** highlights areas that fall within a five-mile radius of publicly available charging infrastructure across the 12-county Metropolitan Planning Area boundary. This further showcases gaps where there is minimal access to publicly available charging sites. Furthermore, as most registered electric vehicles and their corresponding charging infrastructure have trended greater in areas of higher income populations, the North Central Texas Council of Governments seeks to concordantly increase equitable accessibility of charging by ensuring geographic gaps within environmental justice areas are supported by needed infrastructure. **Exhibit 4-12** shows the existing public charging infrastructure in comparison to the 12-county Metropolitan Planning Area boundary environmental justice areas to highlight areas of greater equitable charging needs. There are over 1,400 publicly available EV charging plugs dispersed over 600 charging stations within North Texas as of January 2022. However, based on current technology, if EV growth forecasts predicting up to 30 percent market penetration of EVs by 2045 come to fruition, North Texas may need as much as 75 times[12] the amount of public access EV charging plugs currently available. This is based on ratios of infrastructure needed to support EV adoption developed by the National Renewable Energy Laboratory in 2017. As technology evolves, including advances in battery storage and EV range, this estimate is certain to change. It does provide a sense of the magnitude of planning and investment needed to develop this infrastructure.

Exhibit 4-12: Publicly Accessible EV Charging Infrastructure and Environmental Justice Areas in the 12-County North Texas Metropolitan Planning Area



[12] National Renewable Energy Lab National Plug-In Electric Vehicle Infrastructure Analysis

With the passing of the Bipartisan Infrastructure Law, $7.5 billion was allocated for electric charging infrastructure across the country. Approximately $408 million will be allocated to the Texas Department of Transportation through the National Electric Vehicle Infrastructure Formula Program, which is designed to help build a nationwide network of charging stations along highways.[13] A portion of this funding will be used to support charging site development in the 12-county Metropolitan Planning Area boundary. Another $2.5 billion has been made available via competitive grants through the Charging and Fueling Infrastructure Discretionary Grant Program. NCTCOG successfully competed in the Charging and Fueling Infrastructure: Community Program for funding to build EV charging stations that fill gaps in charging access in the 16-county NCTCOG region. These dollars will provide critical investments needed to increase electric vehicle charging accessibility for equitably across the region and enable more seamless EV travel without range limitations.

Aside from the substantial funding authorized through the Bipartisan Infrastructure Law to these two electric vehicle infrastructure deployment programs, substantial funding for the electrification of transportation has been scoped into other programs across agencies, including the Department of Energy and the EPA. The EPA will administer $2.5 billion over five years for zero-emission buses, and another $2.5 bilion for "clean" school buses, which may include electric, along with other alternative fuels. Emphasis on electrification has also been built into programs focused on ports and other freight-heavy sectors.

The extent to which EV adoption provides air quality benefits depends somewhat on when and how EVs will charge, especially as heavier vehicles electrify. EVs represent a new load on the electrical grid when charging. It will be important to add this additional load during off-peak times when there is latent grid capacity, rather than adding additional load during peak afternoon hours, which would result in a need for additional peak electricity generation, and could prolong the use of higher emitting electric generating units. Outreach and education about the "best" time to charge will be essential, along with "smart" charging and managed charging strategies that shift the EV load to optimum times. Policy measures, such as utility rates and incentives for off-peak charging, could also be powerful, and the extent to which these measures may be adopted in the deregulated portion of the Texas electrical grid remains to be seen. Technologies such as off-grid or solar-integrated EV charging and bi-directional vehicle to grid capabilities provide an opportunity for EVs to help increase resilience and efficiency of the electrical grid and provide power during emergencies. NCTCOG collaborates with a variety of stakeholders across the state to plan for integration of transportation with the electrical grid in a way that not only serves transportation needs, but also accounts for grid resource constraints. The Bipartisan Infrastructure Law directs funding to the Department of Energy, in particular, to study issues related to integration of transportation and electric grid infrastructure.

Hydrogen Fuel Cell Technology

Hydrogen fuel cell vehicles are another application of electric drive vehicles that can help reduce emissions in the transportation sector and offer a comparable driving range to conventional vehicles. As hydrogen fuel cells become feasible in transportation, especially in the heavy-duty truck sector, NCTCOG is working with a variety of stakeholders on planning and construction efforts to support hydrogen project deployments. The Interstate Highway 45 Zero-Emission Vehicle Corridor Deployment Plan described earlier is a key example of this work. Additionally, NCTCOG successfully competed for an award in the Charging and Fueling Infrastructure: Corridor Program and was awarded funding to build five publicly accessible

[13] TXDOT Texas Electric Vehicle Infrastructure Plan https://www.txdot.gov/projects/projects-studies/statewide/texas-electric-vehicle-planning-03-22-22.html

medium- and heavy-duty hydrogen refueling stations throughout the Texas Triangle. Two of these planned stations are in the 12-county Metropolitan Planning Area.

Summary

Air quality is vital to a community's overall quality of life. The federal Clean Air Act requires the United States to set NAAQS for outdoor air pollutants considered harmful to public health and the environment. NCTCOG participates in a cooperative, collaborative process with local, state, and federal agencies to improve air quality across the region.

By implementing air quality policies and programs and monitoring advancements in technology and related factors, NCTCOG takes a proactive stance in supporting regional efforts to improve air quality for North Texans.

All air quality policies, programs, projects, and maps are included in the **Air Quality** section of the **Environmental Considerations** appendix.