2021 Air Quality Report for the Austin-Round Rock-Georgetown Metropolitan Statistical Area

Prepared by the Capital Area Council of Governments

August 17, 2022

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EXECUTIVE SUMMARY

This is the annual air quality report for the Austin-Round Rock-Georgetown Metropolitan Statistical Area (MSA) prepared by the Capital Area Council of Governments (CAPCOG) for the members of the Central Texas Clean Air Coalition (CAC), the Texas Commission on Environmental Quality (TCEQ), and the U.S. Environmental Protection Agency (EPA). This report serves as the region's annual "check-in" with EPA as part of the CAC's participation in the Ozone (O_3) and fine particulate matter ($PM_{2.5}$) Advance Programs (OAP). The report covers January 1, 2021, through December 31, 2021. Under the most recent MSA definitions promulgated by the Office of Management and Budget (OMB) in March 2020, the Austin-Round Rock-Georgetown MSA consists of Bastrop, Caldwell, Hays, Travis, and Williamson Counties, which are the same five counties that have been participating in regional air quality planning efforts since 2002.

The report is intended to do the following:

- Provide an update to EPA, TCEQ, and local stakeholders on the status of air quality in the Austin-Round Rock-Georgetown MSA through the end of 2021 (Section 1);
- Provide an update on the latest understanding of the contribution of the region's emissions to high O_3 levels when they occur (Section 2);
- Summarize the status of emission reduction measures implemented in the region in 2021 (Section 3);
- Detail ongoing planning activities in the region (Section 4); and
- Identify new issues affecting air quality planning efforts in 2021 and beyond (Section 5).

Some of the highlights of the report are listed below:

- The region's 2021 air pollution levels continued to meet all federal air quality standards, and the region's primary O_3 monitor resumed data collection after being out of commission for most of 2020 ;
- There were a total of 3 days when monitored air pollution levels were considered "unhealthy for sensitive groups, and another 138 days when air pollution levels were considered "moderate," according to EPA's Air Quality Index (AQI);
- Overall emissions of nitrogen oxides (NO_X) continued to trend downward, and emissions from regional power plants were lower during the 2021 O_3 season than they were in 2020 largely due to the shutdown of 1 of the 2 steam units at the Decker Power Plant in late 2020;
- Emission reduction measures implemented by the state and local partners in 2021 continued to help control regional O_3 levels and $PM_{2.5}$; and
- The CAC approved an update to the Regional Air Quality Plan to include PM and to extend the plan's years to 2026.

This report includes information from twenty-seven different CAC member organizations. However, fifteen CAC member organizations did not provide reports this year. CAPCOG will provide an addendum to this report to CAC members, TCEQ, and EPA, if these organizations provide reports or CAPCOG receives any updates from any other organization after this report has been submitted.

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LIST OF ACRONYMS

- AFFP: Alternative Fueling Facilities Program
- AQI: Air Quality Index
- CAC: Clean Air Coalition
- CACAC: Clean Air Coalition Advisory Committee
- CAMPO: Capital Area Metropolitan Planning Organization
- CAPCOG: Capital Area Council of Governments
- CapMetro: Capital Metropolitan Transit Authority
- CAMS: Continuous Air Monitoring Station
- CAPP: Clean Air Partners Program
- CO: Carbon Monoxide
- CTRMA: Central Texas Regional Mobility Authority
- CTT: Clean Transportation Triangle
- DACM: Drive a Clean Machine
- DERI: Diesel Emission Reduction Incentive
- DTIP: Drayage Truck Incentive Program
- EAC: Early Action Compact
- EE/RE: Energy efficiency and renewable energy
- EPA: U.S. Environmental Protection Agency
- ERIG: Emission Reduction Incentive Grant Program
- FEM: Federal Equivalent Method
- FRM: Federal Reference Method
- I/M: Inspection and maintenance
- ILA: Inter-Local Agreement
- kWh: Kilowatt-Hour
- LCRA: Lower Colorado River Authority
- LDPLIP: Light Duty Motor Vehicle Purchase or Lease Incentive Program
- LIRAP: Low-Income Vehicle Repair, Retrofit, and Accelerated Vehicle Retirement Program
- LSCFA: Lone Star Clean Fuels Alliance
- MDA8: Maximum Daily 8-Hour Average
- µg/m_3: Micrograms per cubic meter
- MOVES: Motor Vehicle Emissions Simulator
- MSA: Metropolitan Statistical Area
- NAAQS: National Ambient Air Quality Standards
- NO_X: Nitrogen oxides
- NO_2: Nitrogen dioxide
- NTIG: New Technology Implementation Grant
- O_3: Ozone
- OAD: Ozone Action Day
- OAP: Ozone Advance Program
- PACE: Property-Assessed Clean Energy
- Pb: Lead
- PM: Particulate matter
- $PM_{2.5}$: Particulate matter with a diameter of 2.5 microns or less
- PM_{10}: Particulate matter with a diameter of 10 microns or less
- ppb: Parts per billion
- ppm: Parts per million
- SIP: State Implementation Plan
- SO_2: Sulfur dioxide
- SPRYP: Seaport and Rail Yard Areas Grant
- TCAWG: Texas Clean Air Working Group
- TCEQ: Texas Commission on Environmental Quality
- TCFP: Texas Clean Fleet Program
- TCSB: Texas Clean School Bus Program
- TDM: Travel Demand Management
- TERP: Texas Emission Reduction Plan
- TexN: Texas NONROAD Model
- TNGVGP: Texas Natural Gas Vehicle Grant Program
- tpd: tons per day
- TWG: Texas Working Group for Mobile Source Emissions
- TxDOT: Texas Department of Transportation
- TxVEMP: Texas Volkswagen Environmental Mitigation Program
- VOC: Volatile Organic Compound

1 AIR QUALITY STATUS

The following bullet points summarize the status of the Austin-Round Rock-Georgetown MSA's air quality status as of the end of 2021:

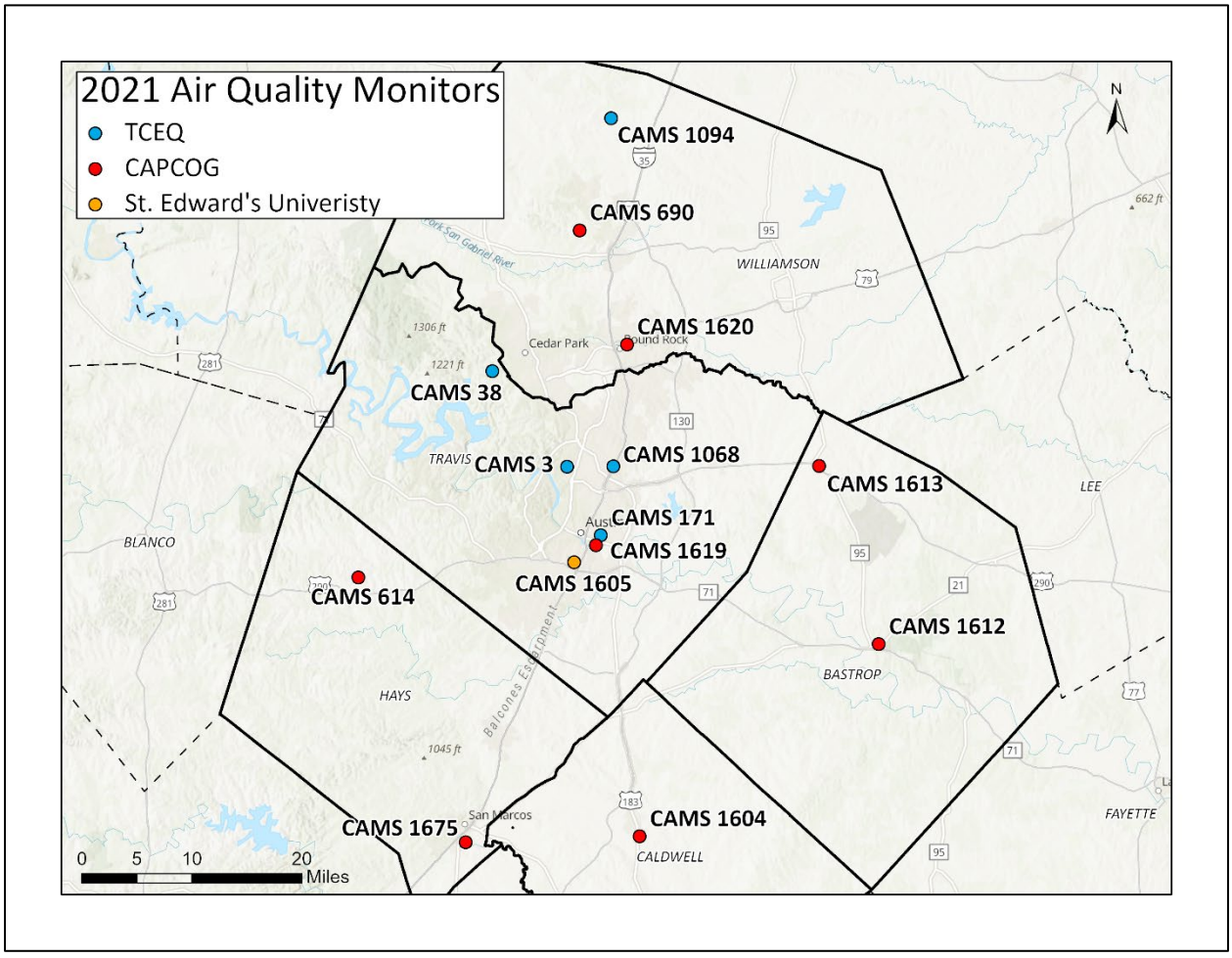
- Air pollution levels throughout the metro area remained in compliance with all current National Ambient Air Quality Standards (NAAQS) and all five of the counties in the Austin-Round Rock-Georgetown MSA remain designated as "attainment/unclassifiable" all NAAQS.
- Through the end of 2021, City of Austin is the 2nd-largest city in the U.S. with air pollution levels in compliance with all NAAQS, and it is the largest city in the U.S. designated "attainment/unclassifiable" for all NAAQS[1].
- The NAAQS that the region's air pollution levels are closest to violating are the O_3 NAAQS and the annual $PM_{2.5}$ NAAQS: the region's 2019-2021 8-hour O_3 "design value" of 63 parts per billion (ppb) was 10% below the 70 ppb 2015 O_3 NAAQS and region's 2019-2021 annual $PM_{2.5}$ design value level of 9.5 micrograms per cubic meter ($\mu g/m^3$) was 21% below the 2012 annual $PM_{2.5}$ NAAQS of 12.0 $\mu g/m^3$. The EPA's Clean Air Scientific Advisory Committee (CASAC) has recently recommended a more stringent annual $PM_{2.5}$ NAAQS of 8-10 $\mu g/m^3$, so current $PM_{2.5}$ levels are at risk of violating a more stringent NAAQS within that range.
- Relative to the rest of the country, Travis County's annual $PM_{2.5}$ design value exceeds the design value of 87% of all other counties with regulatory monitors across the country. Travis County's 24-hour $PM_{2.5}$ design is higher than 70% of the other counties and the region's O_3 design value is higher than 58% of other counties.
- The region recorded three days in 2021 when O_3 levels were considered "unhealthy for sensitive groups," as well as an additional 138 days when either O_3 or $PM_{2.5}$ levels were considered "moderate," based on EPA's AQI.
- The region's cumulative seasonal O_3 levels in 2021 were below the levels that EPA considers harmful to vegetation.
- TCEQ's most recent review of air toxics data collected at CAMS 171 found that all air toxics levels measured were below the levels that would be expected to cause adverse health or environmental impacts.
- Zero of the five TCEQ Ozone Action Day (OAD) forecasts correctly predicted O_3 levels > 70 ppb, although overall, TCEQ's daily AQI forecasts correctly predicted "moderate" or worse air quality 61% of the time, and TCEQ was able to predict 65% of all days when the AQI levels were "moderate" or worse within the region.

[1] San Jose has a larger population than Austin and also has air pollution levels attaining all NAAQS, but Santa Clara County, where San Jose located, is part of the San Francisco Bay O_3 nonattainment area

- There were a total of 171 odor complaints reported to the TCEQ from within the Austin-Round Rock-Georgetown MSA in 2021, up from 153 in 2020.

The following map shows the locations of all the Continuous Air Monitoring Stations (CAMS) that collected air pollution and meteorological data around the Austin-Round Rock-Georgetown MSA in 2021, including the monitors operated by TCEQ, CAPCOG, and St. Edward's University.

Figure 1-1. 2021 Air Quality Monitors in the Austin-Round Rock-Georgetown MSA and CAPCOG Counties Cited in the Report



1.1 Compliance with the NAAQS

The Austin-Round Rock-Georgetown MSA's 2021 design values for carbon monoxide (CO), nitrogen dioxide (NO_2), O_3, particulate matter with diameters of 2.5 micrometers or less ($PM_{2.5}$), particulate matter with diameters of 10 micrometers or less (PM_{10}), and sulfur dioxide (SO_2) were all in compliance with the applicable NAAQS. Lead (Pb) is not monitored within the region. Table 1-1 shows all of the NAAQS currently in effect.

Table 1-1. NAAQS Currently in Effect

Pollutant	Standard Type	Averaging Time	Level	Form	Impacts of Violating the NAAQS
CO	Primary	8 hours	9 parts per million (ppm)	Not to be exceeded more than once per year	Neurological and cardiovascular impacts, particularly for individuals who are exercising or under stress
	Primary	1 hour	35 ppm	Not to be exceeded more than once per year	
Pb	Primary and Secondary	Rolling 3-month average	0.15 micrograms per cubic meter ($\mu g/m^3$)	Not to be exceeded	Primarily neurological problems for children and cardiovascular problems for adults, but numerous other health impacts as well; ecological damage from deposition
NO_2	Primary	1 hour	100 parts per billion (ppb)	98^{th} percentile of 1-hour daily maximum concentrations, averaged over 3 years	Respiratory impacts to people with lung disease such as asthma, children and teens, older adults, and people who are active outdoors; contributes to acid rain, visibility impairment, and nutrient pollution in coastal waters
	Primary and Secondary	1 year	53 ppb	Annual mean	
O_3	Primary and Secondary	8 hours	0.070	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	Respiratory impacts to people with lung disease such as asthma, children and teens, older adults, and people who are active outdoors; impacts on plant growth
$PM_{2.5}$	Primary	1 year	12.0 $\mu g/m^3$	Annual mean, averaged over 3 years	Respiratory and cardiovascular impacts on people with lung or heart disease (respectively), older adults, children, and teenagers; visibility impairment
	Secondary	1 year	15.0 $\mu g/m^3$	Annual mean, averaged over 3 years	
	Primary and Secondary	24-hr	35.0 $\mu g/m^3$	98^{th} percentile, averaged over 3 years	
PM_{10}	Primary and Secondary	24 hours	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years	
SO_2	Primary	1 hour	75 ppb	99^{th} percentile of 1-hour daily maximum concentrations, averaged over 3 years	Respiratory impacts to people with lung disease such as asthma, children and teens, older adults, and people who are active outdoors; impacts plant growth and contributes to acid rain
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year	

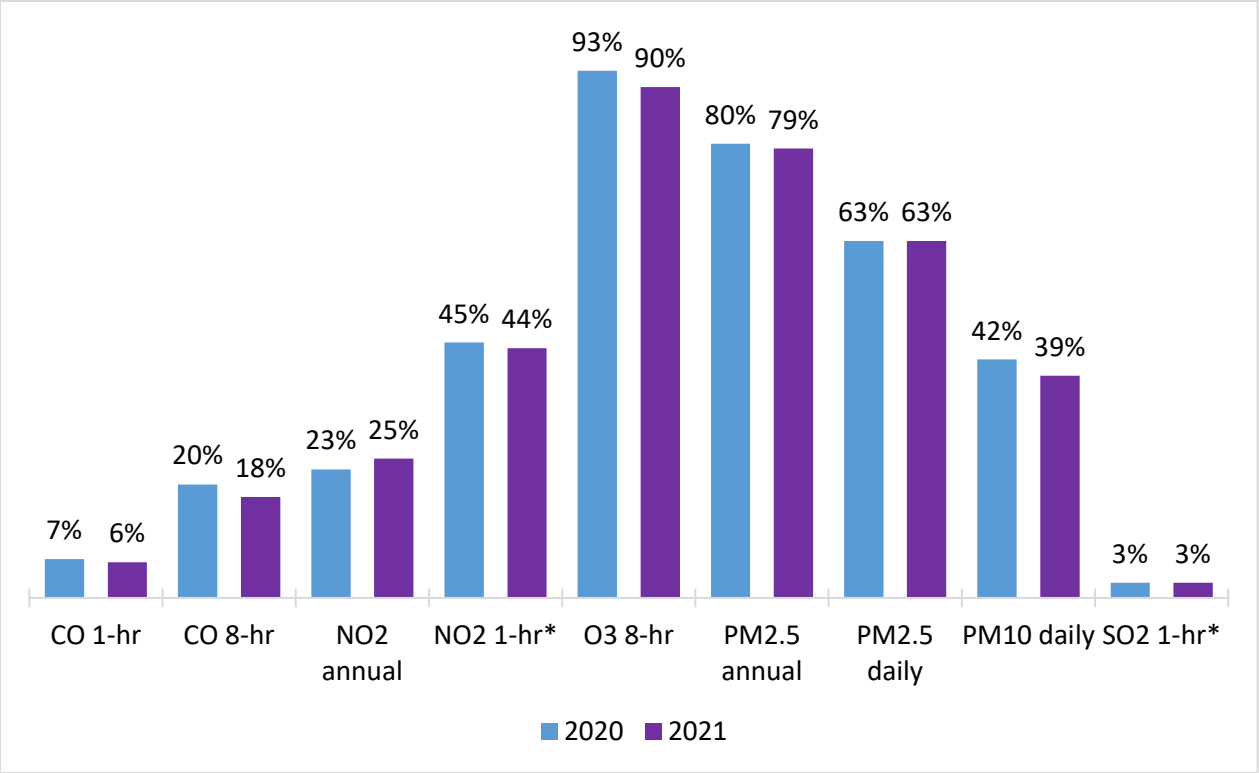
There are four "regulatory" monitoring stations in the Austin-Round Rock-Georgetown MSA, all located in Travis County, that reported data to EPA and were used for comparisons to the NAAQS. Table 1-2 summarizes the Federal Reference Method (FRM)/Federal Equivalent Method (FEM) monitors in the region and the years for which data are available from 2019-2021. CAMS 1068 is the region's designated "near-road" monitor.

Table 1-2. Summary of Criteria Pollutant Measurement Periods at Federal Reference Method (FRM) Monitors in the Austin-Round Rock-Georgetown MSA, 1/1/2019 – 12/31/2021

Pollutant	Sampler Type	CAMS 3 (AQS Site Number 484530014)	CAMS 38 (AQS Site Number 484530020)	CAMS 171 (AQS Site Number 484530021)	CAMS 1068 (AQS Site Number 484531068)
CO	Continuous, regulatory	n/a	n/a	n/a	1/1/2019 – 12/31/2021
NO_2	Continuous, regulatory	1/1/2019 – 2/17/2020; 10/22/2020 – 12/31/2021	n/a	n/a	1/1/2019– 12/31/2021
O_3	Continuous, regulatory	1/1/2019 – 2/17/2020; 10/22/2020 – 12/31/2021	1/1/2019 – 12/31/2021	n/a	n/a
$PM_{2.5}$	Continuous, regulatory	1/1/2019 – 2/17/2020; 10/16/2020 – 12/31/2021	n/a	1/1/2019 – 12/31/2021	1/1/2019 – 12/31/2021
$PM_{2.5}$	Non-continuous, regulatory	n/a	n/a	1/1/2019 – 12/31/2021	n/a
PM_{10}	Non-continuous, regulatory	n/a	1/1/2019 – 12/31/2021	1/1/2019 – 12/31/2021	n/a
SO_2	Continuous, regulatory	1/1/2019 – 2/17/2020; 10/22/2020 – 12/31/2021	n/a	n/a	n/a

Figure 1-2 shows the metro area's 2020 and 2021 design values compared to each primary NAAQS. The 2021 design value for 8-hour O_3 was lower than 2020. Additionally, the design values for $PM_{2.5}$ saw a decrease in 2021 compared to 2020.

Figure 1-2. Austin-Round Rock-Georgetown MSA Design Values as a Percentage of Primary NAAQS



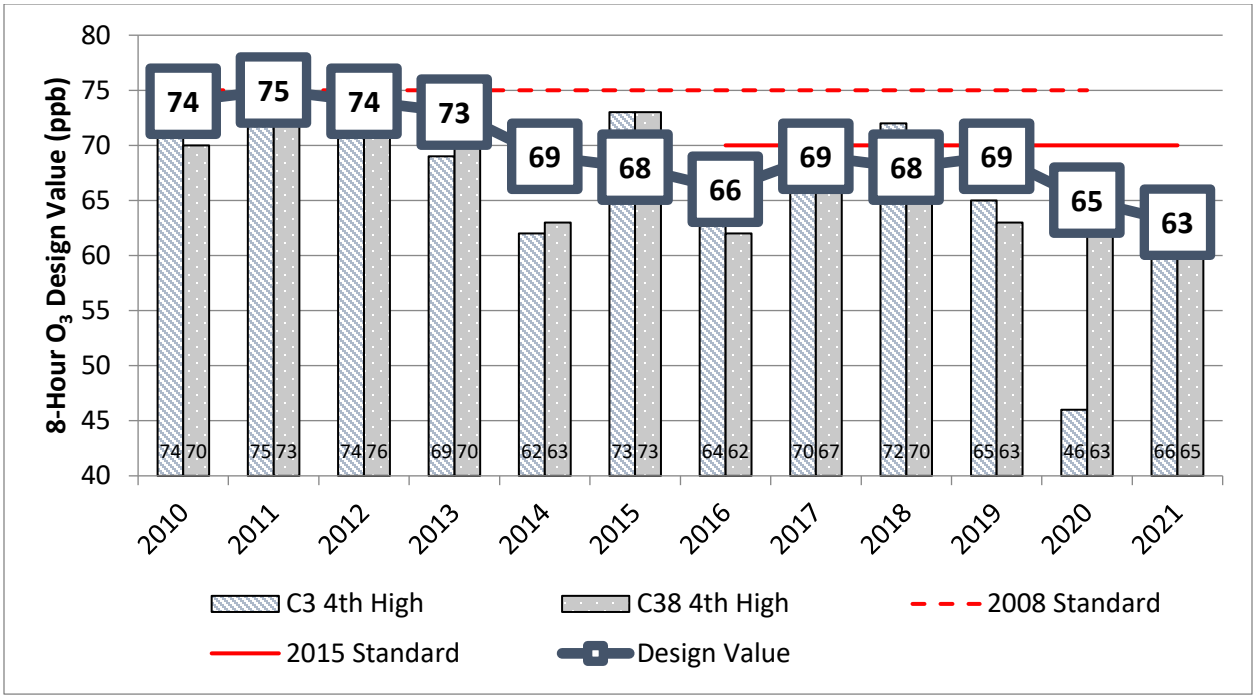
The asterisks next to the 1-hour NO_2 and SO_2 NAAQS signify the fact that the 2020 and 2021 design values for these NAAQS are considered invalid due to data completeness problems. CAMS 1068 had only 3 quarters of valid NO_2 data in 2019, CAMS 3 had only 1 quarter of valid NO2 and SO_2 data in 2020.

As part of its 2019-2023 Regional Air Quality Plan, the CAC defined "near-nonattainment" as having a design value of at least 85% of any NAAQS. Based on this criterion, O_3 remains the only pollutant for which the MSA is classified as "near-nonattainment." Although, the annual $PM_{2.5}$ levels are close to that range.

1.2 O_3 Design Value Trend

Figure 1-3 below shows the trend in the Austin-Round Rock-Georgetown MSA's 8-hour O_3 design values from 2010-2021 compared to the 2008 and 2015 8-hour O_3 NAAQS, along with the 4th-highest Maximum Daily 8-Hour Average (MDA8) O_3 at each regulatory O_3 station. MDA8 is the daily maximum 8-hour concentration for a given calendar day that is the highest of the twenty-four possible 8-hour average concentrations computed for that day.

Figure 1-3. Austin-Round Rock-Georgetown MSA 8-Hour O_3 Design Value and 4th-Highest MDA O_3 Trend 2010-2021



The O_3 design value decreased 2 ppb from 2020 to 2021, though the 4th highest 8-hour O_3 average at CAMS 38 was actually 65 ppb in 2021, whereas it was only 63 ppb in 2020. The improvement in the design value reflects the fact that the design value represents a 3-year average, and the significantly higher 4th-highest value at CAMS 38 in 2018 of 70 ppb was replaced with a 2021 value of 65 ppb.

In addition, both the 2020 and 2021 design values are likely about 1-2 ppb lower than what they would have been if CAMS 3 had been in operation in 2020.[2] Since it was not, the region's only valid design value for the 2018-2020 and 2019-2021 periods are from CAMS 38. This will also be the case for 2020-2022.

1.3 Maximum Daily 8-Hour O_3 Averages in the Region

While compliance with the O_3 NAAQS is based on readings recorded at "regulatory" Federal Reference Method (FRM) or Federal Equivalent Method (FEM) O_3 samplers, there are also several non-regulatory O_3 monitoring stations in the region that are used to understand regional O_3 levels.

In addition to the two regulatory O_3 monitors that TCEQ operates, CAPCOG collected O_3 data at eight monitoring stations. St. Edward's University collected data at one additional O_3 monitoring station between 2019 and 2021. These monitoring stations use EPA-approved O_3 sampling methods and data

[2] Due to construction at the area of the CAMS 3 monitoring site at Murchison Middle School, CAMS 3 was re-located to another location on the school property during 2020. CAMS 3 data collection was paused in February, and the data collection did not resume until October. As a result of the CAMS 3 re-location, the primary O_3 monitor for the region was offline for 89% of the region's ozone season in 2020.

collected during this period and followed a Quality Assurance Project Plan (QAPP) approved by TCEQ. However, these monitors were not operated as FRM or FEM monitors, and they are not reported to EPA's Air Quality System (AQS).

Table 1-3 summarizes the fourth highest MDA8 O_3 measurements collected at each monitoring station in the CAPCOG region in 2019, 2020, and 2021, as well as the three-year average for each station. CAMS 3 and 38 are the "regulatory" monitoring stations operated by TCEQ, while CAMS 614, 690, 1604, 1612, 1613, 1619, 1675, and 1620 are research monitoring stations operated by CAPCOG. CAMS 1619 and CAMS 1620 are new sites for CAPCOG in 2021. Reports documenting the quality-checks performed at CAPCOG's sites can be found on CAPCOG's website at http://www.capcog.org/divisions/regional-services/aq-reports.

Table 1-3. Fourth Highest MDA8 Measurements at All O_3 Monitoring Stations in the CAPCOG Region, 2019-2021 (ppb)

CAMS	AQS Site Number	County	2019	2020	2021	2019-2021 Average[3]	2019-2021 St. Dev.
3 – Austin NW[4]	484530014	Travis	65	46	66	59	11.3
38 – Audubon Society	484530020	Travis	63	63	65	63	1.2
614 – Dripping Springs	482090614	Hays	64	66	69	66	2.5
690 – Lake Georgetown	484910690	Williamson	67	64	65	65	1.5
1604 - Lockhart	480551604	Caldwell	61	59	63	61	2.0
1605 – St. Edwards	484531605	Travis	58	56	57	57	1.0
1612 - Bastrop	480211612	Bastrop	59	59	64	60	2.9
1613 - Elgin	480211613	Bastrop	60	61	63	61	1.5
1619[5] - East Austin	484531619	Travis	n/a	63	62	62	0.7
1675 – San Marcos	482091675	Hays	n/a	n/a	63	63	n/a
1620[6] - Round Rock	484916602	Williamson	63	62	63	62	0.6

These data show the 2019-2021 three-year average of the fourth-highest MDA8 values in the region ranged from 57 ppb – 66 ppb, with CAMS 614 recording the highest three-year average of 66 ppb. If CAMS 3 were not offline for the majority of 2020, CAMS 3 would have been expected to record the region's highest fourth-high MDA8 value in that year, and thus, the highest three-year average.

[3] Truncated, as is done in calculating O_3 design values

[4] Data for 2020 and averages including 2020 at CAMS 3 are considered "invalid" for comparison to the NAAQS despite being collected at a regulatory monitor due to low data completeness in 2020.

[5] CAMS 1619 began operations in 2020, thus 2019 values for the monitor are not available.

[6] CAMS 1620 began operations in 2021, thus 2019 and 2020 values for the monitor are not available.

1.4 Daily Pollution Levels Compared to EPA's AQI

While regulatory compliance is an important indicator of the region's air quality, it is possible for an area to experience numerous NAAQS exceedances multiple times in a given year and still have a compliant design value. A design value also does not directly indicate how frequently a region experienced high pollution levels. Another indicator that can be used to characterize a region's air quality is the number of days a region experiences air pollution levels that fall within each of the AQI categories established by EPA. Table 1-4 shows the concentrations of NO_2, O_3, and $PM_{2.5}$ that correspond to each AQI level.

Table 1-4. Summary of AQI for NO_2, O_3, $PM_{2.5}$, and PM_{10}

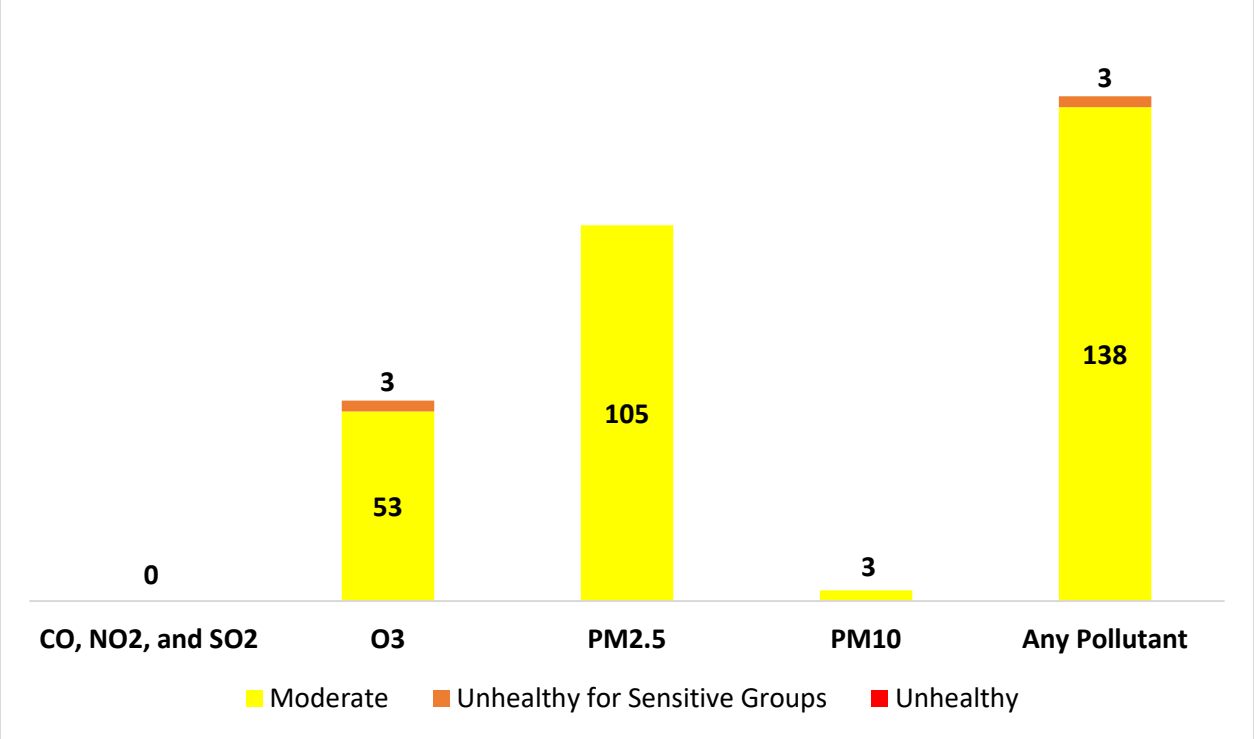
AQI Level	AQI Number	NO_2 (1-Hr., ppb)	O_3 (8-Hr., ppb)	$PM_{2.5}$ (24 hr., µg/m³)	PM_{10} (24 hr., µg/m³)
Good	0-50	0-53	0-54	0.0-12.0	0-54
Moderate	51-100	54-100	55-70	12.1-35.4	55-154
Unhealthy for Sensitive Groups	101-150	101-360	71-85	35.5-55.4	155-254
Unhealthy	151-200	361-649	86-105	55.5-150.4	255-354
Very Unhealthy	201-300	650-1249	106-200	150.5-250.4	355-424
Hazardous	301-500	1250-2049	201-600	250.5-500	425-604

This report includes data from all the air pollution monitoring stations in the region, not just the TCEQ regulatory monitors. Therefore, the number of days in the "moderate" and "unhealthy for sensitive groups" categories described below are higher than if only the TCEQ regulatory monitors were used.

1.4.1 High AQI Days by Pollutant

The following figures show the number of days in 2021 when $PM_{2.5}$, PM_{10}, or O_3 concentrations measured in the CAPCOG region were high enough to be considered "moderate" or "unhealthy for sensitive groups." Monitored pollution levels for CO, NO_2, and SO_2 all remained in the "good" range throughout the year. In total, the region experienced moderate or worse air quality on 39% of days in 2021, with three of those days reaching "unhealthy for sensitive groups" levels. It is important to note that PM_{10} sampling only occurs once every six days. While there were three recorded "moderate" PM_{10} days in 2021, there could have been more days that were "moderate" or "unhealthy for sensitive groups" that were not captured in the sampling window.

Figure 1-3. Number of "Moderate" or "Unhealthy for Sensitive Groups" Air Pollution Days in the MSA in 2021 by Pollutant

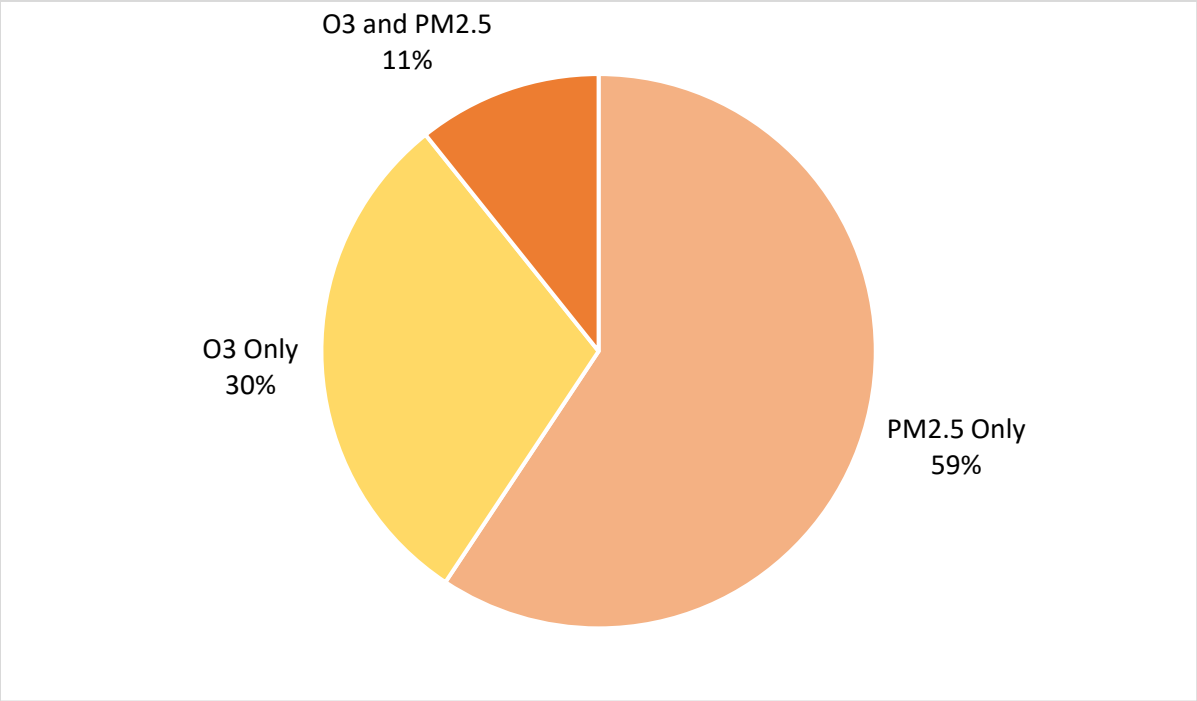


High levels of O_3 were responsible for all of days when the region experienced air pollution levels considered "unhealthy for sensitive groups". However, high levels of $PM_{2.5}$ were responsible for a majority of days when air pollution levels were considered "moderate." For two years in a row, "moderate" levels for PM_{10} were recorded. This is also notable because PM_{10} is only sampled every 6 days, so these three "moderate" days represented 5% of all samples collected in 2021, proportionate to 18 out of 365 days. The elevated PM_{10} on these three days was associated with dust picked up from the Panhandle and Far West Texas carried by winds from a cold front for one day[7], while the other elevated PM_{10} day was caused by dust as well as agricultural burning and gas flaring from carried on by a cold front.

Figure 1-4 shows the distribution of days when O_3 or $PM_{2.5}$ air pollution was considered at least "moderate" by pollutant.

[7] Austin air quality today: Texas dust causes hazy conditions Wed. | kvue.com

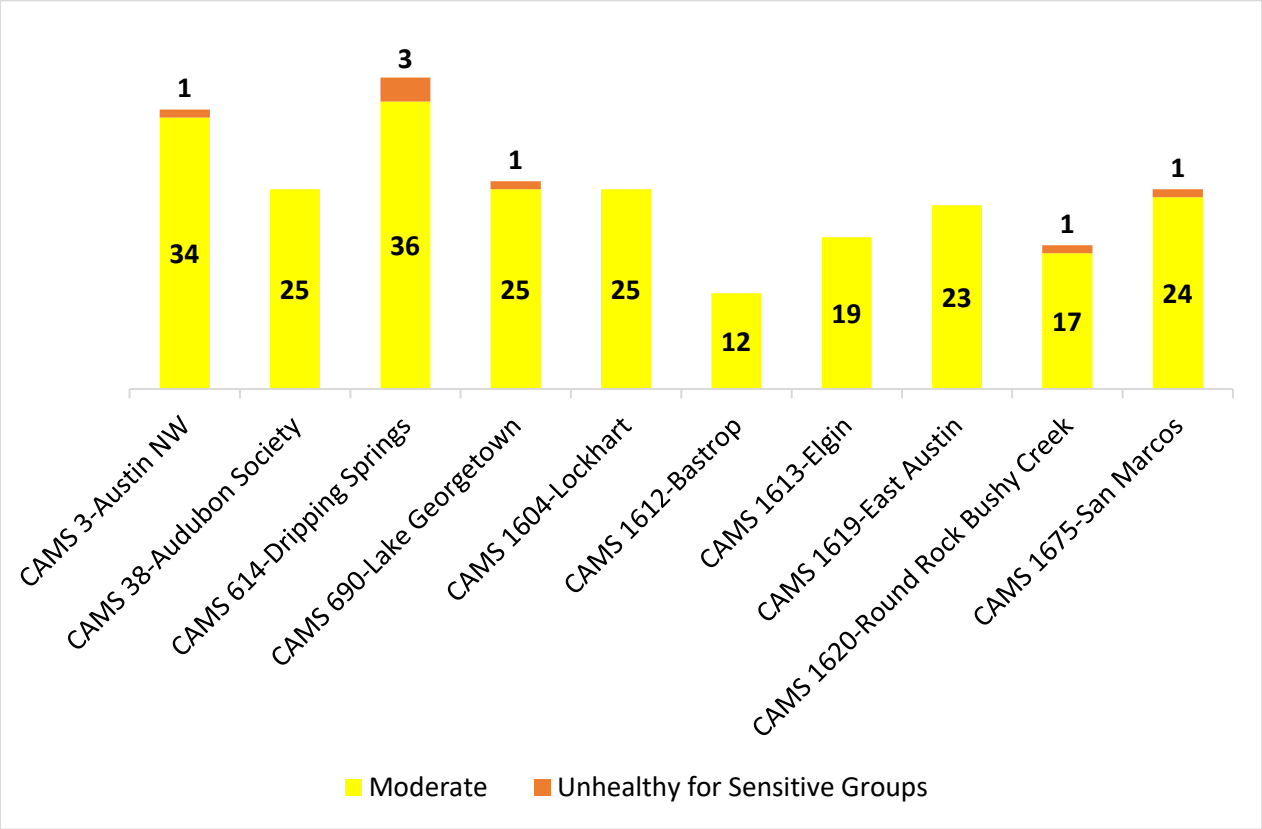
Figure 1-4. Days in 2021 When O_3 or $PM_{2.5}$ AQI Levels in the MSA Were "Moderate" or Worse



1.4.2 High O_3 AQI Days by Monitoring Station

The following figure shows the number of days when O_3 levels were considered “moderate” or “unhealthy for sensitive groups” at each O_3 monitoring station in the region in 2021. CAMS 3, CAMS 614, CAMS 690, CAMS 1620, and CAMS 1675 recorded ozone levels that were “unhealthy for sensitive groups” on three days in 2021.

Figure 1-5. Number of Days when MDA8 O_3 Pollution was "Moderate" or Worse by Monitoring Station, 2021

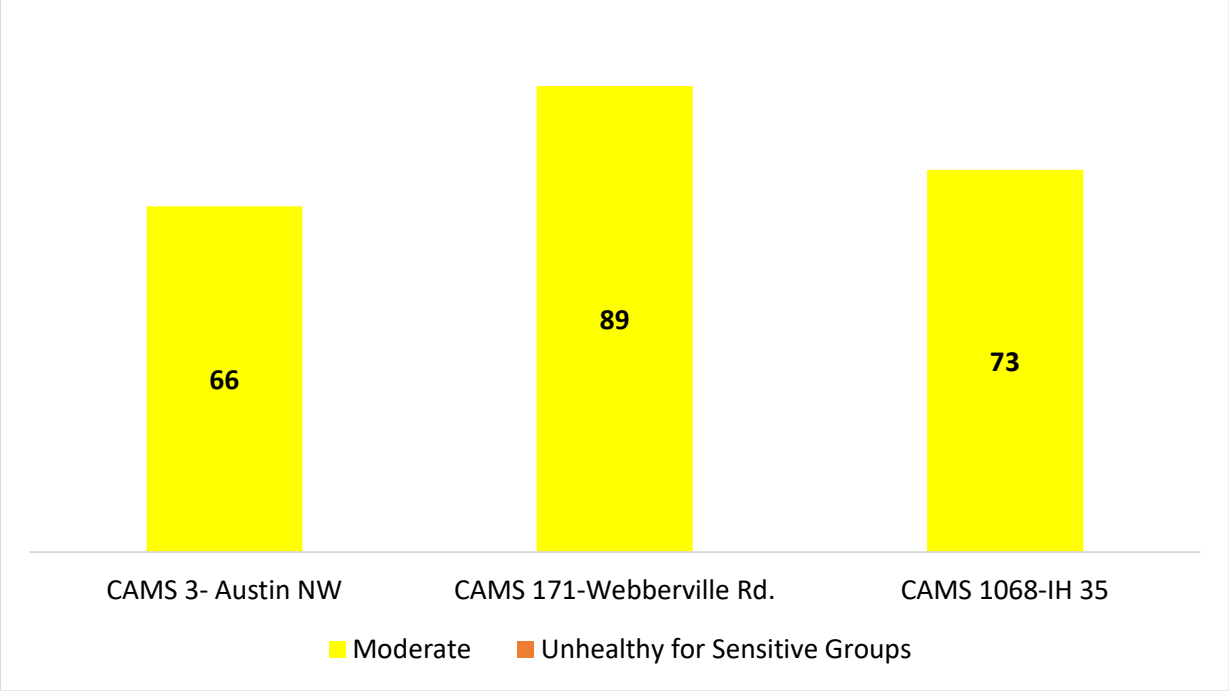


1.4.3 High PM AQI Days by Monitoring Station

1.4.3.1 $PM_{2.5}$ AQI Days

Figure 1-6 shows the number of days when $PM_{2.5}$ levels were considered “moderate” and “unhealthy for sensitive groups” at each $PM_{2.5}$ monitoring station in the region in 2021. Data is based on the daily average $PM_{2.5}$ levels collected from four continuous samplers. CAMS 3, CAMS 171, and CAMS 1068, are all located within the City of Austin, and CAMS 1094 is a temporary monitor that is located in the City of Jarrell in Williamson County. CAMS 1094 started data collection on July 23, 2020. According to the TCEQ from August 2020, “The continuous $PM_{2.5}$ monitor in Jarrell was deployed because the TCEQ is working on a complaint investigation. This is a temporary monitor that will be deployed for approximately 90 days. This monitor is a state-initiative monitor and is not part of TCEQ’s federal network of monitors.” However, CAMS 1094 collected data for the rest of the year, from July 23, 2020 – December 31, 2020, and it still is collecting data as of July 2021

Figure 1-6. Number of Days when $PM_{2.5}$ Pollution was "Moderate" or Worse by Monitoring Station, 2020

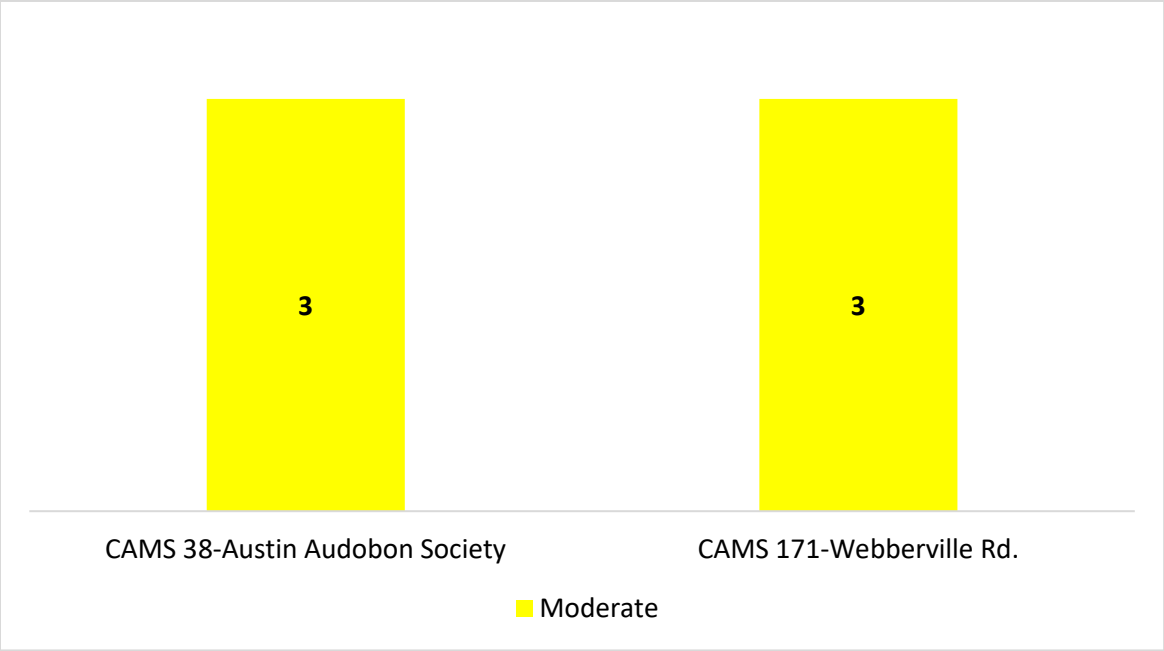


CAMS 171 continued to record the highest number of "moderate" days for $PM_{2.5}$ pollution. No monitors recorded "unhealthy" and "unhealthy for sensitive groups" $PM_{2.5}$ levels for 2021.

1.4.3.2 PM_{10} AQI Days

For the second time in a row, the PM_{10} monitors recorded three days that were "moderate." The elevated PM_{10} was associated with dust picked up from the Panhandle and Far West Texas carried by winds produce from a cold front on March 17, 2021.Another elevated PM_{10} day was caused by dust as well as agricultural burning and gas flaring from Mexico, Central America and in the Bay of Campeche carried by winds produced from the Pacific cold front on March 23, 2021. It is important to note that PM_{10}, sampling only occurs once every six days. While there were three recorded "moderate" PM_{10} days in 2021, there could have been more days that were "moderate" or "unhealthy for sensitive groups" that were not captured in the sampling window. The figure below displays the number of "moderate" days by monitor for PM_{10}.

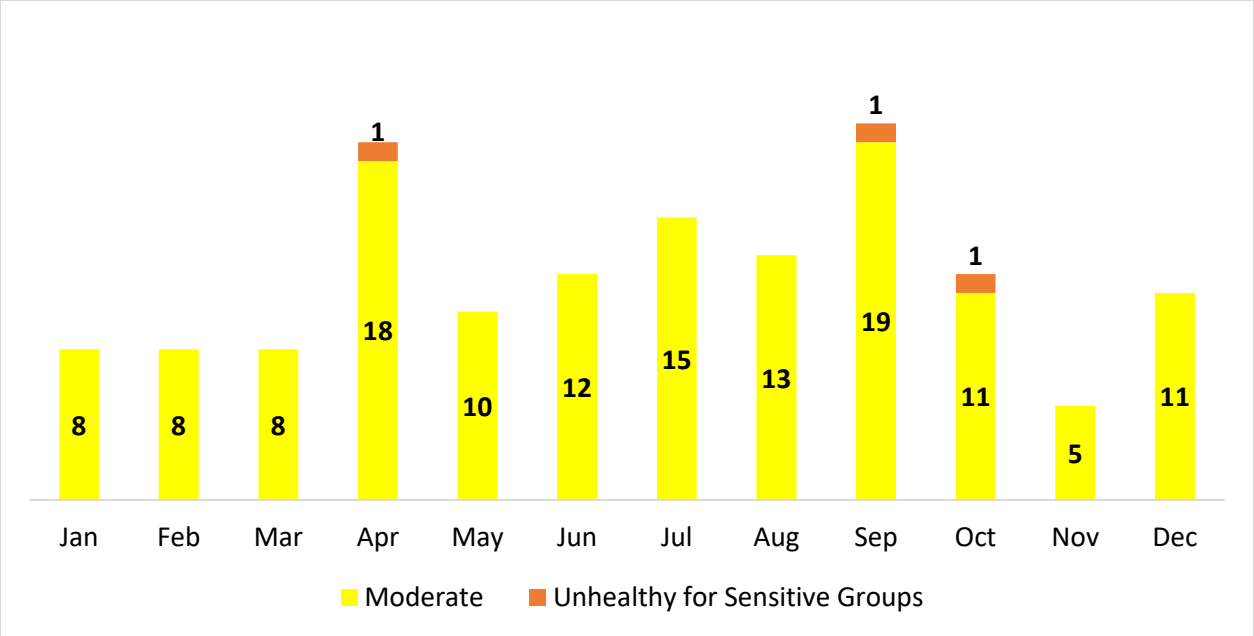
Figure 1-7. Number of Days when PM10 Pollution was "Moderate" by Monitoring Station, 2021



1.4.4 Distribution of "Moderate" or Worse AQI Days by Month

Air pollution levels vary significantly by month in the MSA. Figure 1-8 shows the number of days when air pollution levels were "moderate", "unhealthy for sensitive groups", or "unhealthy" within the MSA by month.

Figure 1-8. Number of Days when Air Pollution was "Moderate" or Worse in the Austin-Round Rock-Georgetown MSA by Month, 2021



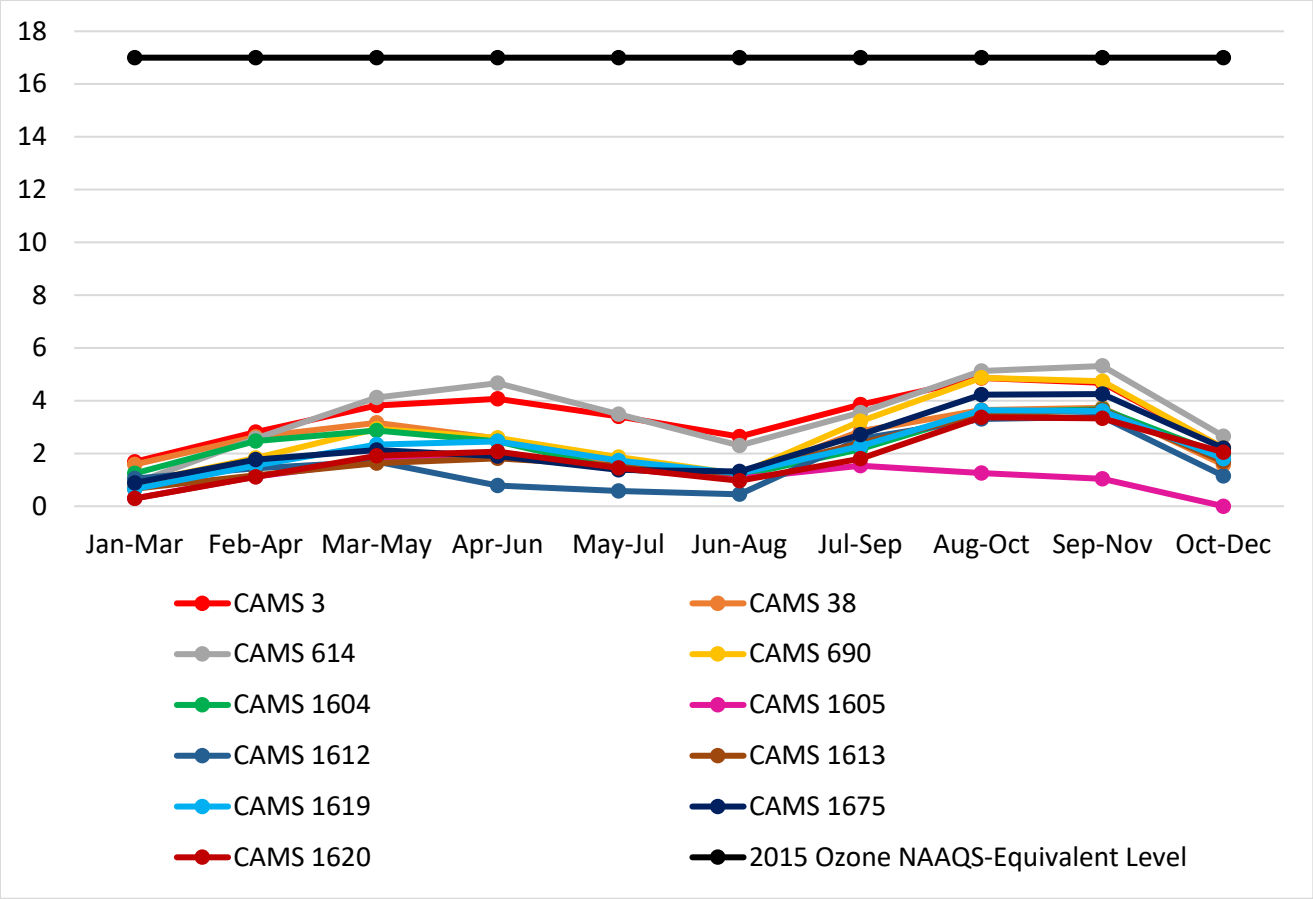
O_3 caused the "unhealthy for sensitive groups" days in April, September and October.

1.4.5 Seasonal O_3 Exposure

While EPA set the 2015 secondary O_3 standard identical to the 2015 primary O_3 standard, the preamble to the rulemaking states that, "the requisite protection will be provided by a standard that generally limits cumulative seasonal exposure to 17 ppm-hours (ppm-hrs.) or lower, in terms of a 3-year W126 index."[8] EPA did not set a separate secondary standard set to protect public welfare, as opposed to public health, because, "such control of cumulative seasonal exposure will be achieved with a standard set at a level of 0.070 ppm, and the same indicator, averaging time, and form as the current standard."[9]

The region's seasonal O_3 exposure levels were 31%-99% below the 17 ppm-hr. levels EPA referenced in the final 2015 O_3 NAAQS rulemaking. Figure 1-9 shows the 3-month seasonal exposure levels at each monitoring station.

Figure 1-9. Weighted Seasonal O3 Exposure by Monitoring Station and 3-Month Period, 2021 (W126 ppm-hrs.)



[8] 80 FR 65294

[9] Ibid.

1.5 Air Quality Forecasting

One of the factors that influences the risks associated with air pollution is the extent to which air pollution can be accurately and successfully predicted. For the MSA, there are two types of forecasting tools that can be used to help reduce the exposure of sensitive populations to high air pollution levels – Ozone Action Days (OADs) and daily Air Quality Forecasts.

1.5.1 Ozone Action Days

TCEQ issues OADs the afternoon before the next day when TCEQ believes that O_3 levels may exceed the level of the NAAQS.

There are two ways that CAPCOG measures the performance of OAD forecasting for the region:

1. Accuracy in correctly predicting an OAD; and
2. Success in predicting when actual monitored O_3 levels were high enough to be considered "unhealthy for sensitive groups."

Using the AQI for O_3, CAPCOG calculates these metrics as follows:

$$OAD\ Accuracy\ Rate = \frac{Days\ OAD\ Declared\ When\ Actual\ MDA8 > 70\ ppb}{Days\ OAD\ Declared}$$

$$OAD\ Success\ Rate = \frac{Days\ OAD\ Declared\ When\ Actual\ MDA8 > 70\ ppb}{Days\ When\ Actual\ MDA8 > 70\ ppb}$$

Using these formulas for accuracy and success, TCEQ's OAD forecasting efforts for the region were 0% accurate and 0% successful in 2021 This means that none of TCEQ's OAD alerts were followed by actual O_3 over 70 ppb, and none of the days when actual O_3 exceeded 70 ppb were predicted with an OAD alert. The days used to determine this rate are presented in Table 1-5. These 2021 metrics only account for days when TCEQ issued an OAD or actual O_3 measured >70 ppb. It does not account for the other days when TCEQ correctly did not issue an OAD and O_3 did not exceed 70 ppb.

From 2019-2021, TCEQ issued 18 OAD alerts for the MSA –five in 2019, two in 2020, and five in 2021. During this time frame, there were 7 days when O_3 levels exceeded the level of the relevant O_3 NAAQS: two in 2019, two in 2020, and three in 2021. Table 1-5 lists each of these dates.

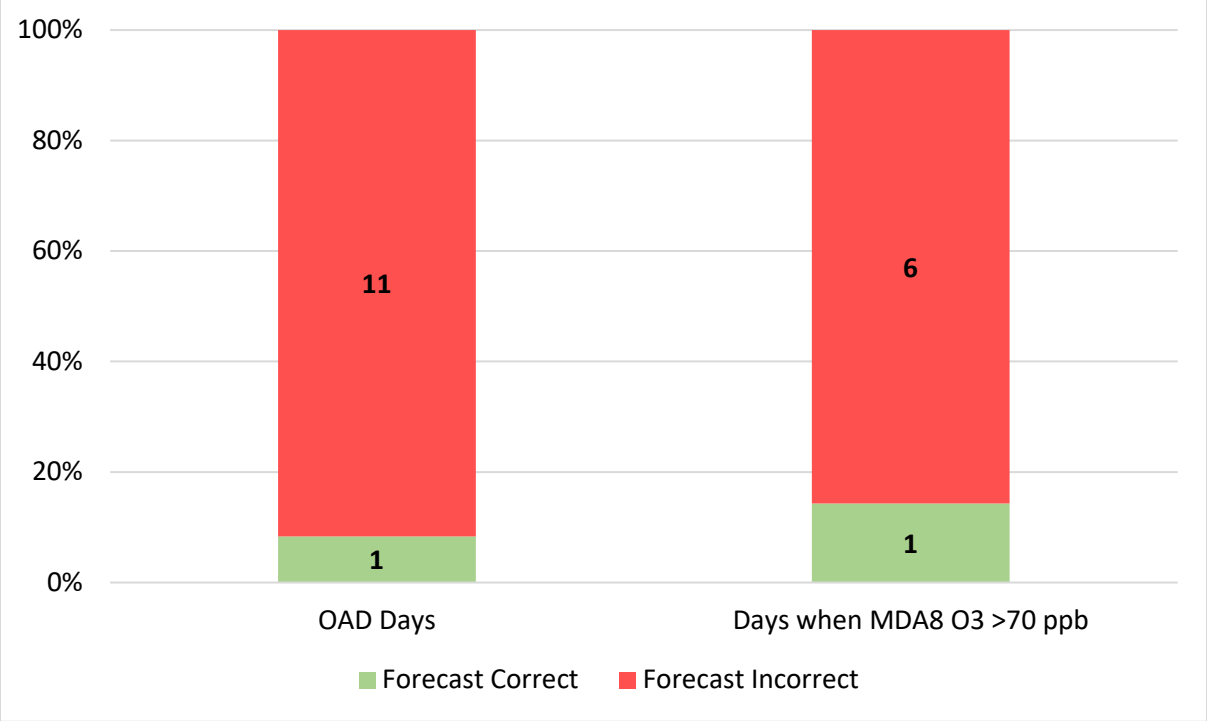
Table 1-5. OAD Dates and Dates when O_3 Exceeded Level of NAAQS, 2018-2020

Date	OAD Issued for this Date?	O_3 NAAQS Level in Effect	Highest O_3 MDA8 Value Recorded in MSA	Station where Highest O_3 MDA8 Value Recorded
4/9/2019	Yes	70 ppb	67 ppb	CAMS 614 & 690
6/8/2019	Yes	70 ppb	63 ppb	CAMS 1613
7/25/2019	Yes	70 ppb	67 ppb	CAMS 614
7/26/2019	Yes	70 ppb	74 ppb	CAMS 614
7/27/2019	Yes	70 ppb	57 ppb	CAMS 1675
9/6/2019	No	70 ppb	74 ppb	CAMS 38
5/18/2020	No	70 ppb	72 ppb	CAMS 614

Date	OAD Issued for this Date?	O_3 NAAQS Level in Effect	Highest O_3 MDA8 Value Recorded in MSA	Station where Highest O_3 MDA8 Value Recorded
8/18/2020	No	70 ppb	78 ppb	CAMS 1619 & 1675
8/20/2020	Yes	70 ppb	62 ppb	CAMS 614
9/30/2020	Yes	70 ppb	58 ppb	CAMS 614
4/11/2021	No	70 ppb	71 ppb	CAMS 614
6/16/2021	Yes	70 ppb	66 ppb	CAMS 614
6/18/2021	Yes	70 ppb	66 ppb	CAMS 614
6/19/2021	Yes	70 ppb	61 ppb	CAMS 614
9/10/2021	No	70 ppb	75 ppb	CAMS 614
9/25/2021	Yes	70 ppb	70 ppb	CAMS 1612
9/26/2021	Yes	70 ppb	63 ppb	CAMS 690
10/8/2021	No	70 ppb	76 ppb	CAMS 1620

Over the three-year period, one out of the twelve OAD forecasts correctly predicted O_3 levels over the applicable NAAQS – a 8% accuracy rate. Conversely, there was a 14% "success rate" in predicting actual MDA8 O_3 levels over the NAAQS from 2019-2021 (1 correctly predicted OAD out of 7 days with actual O_3 >70 ppb).

Figure 1-10. OAD Forecast Accuracy and Success, 2019-2021



1.5.2 Daily Air Quality Forecasts

TCEQ issues OADs when TCEQ believes that O_3 will reach levels considered "unhealthy for sensitive groups." However, the TCEQ issues daily AQI forecasts for O_3, $PM_{2.5}$ and, rarely, PM_{10}. The performance of these forecasts can be measured using the same type of metrics that were used for OADs – accuracy and success. In this case, CAPCOG evaluated the accuracy and success rate in terms of the number of

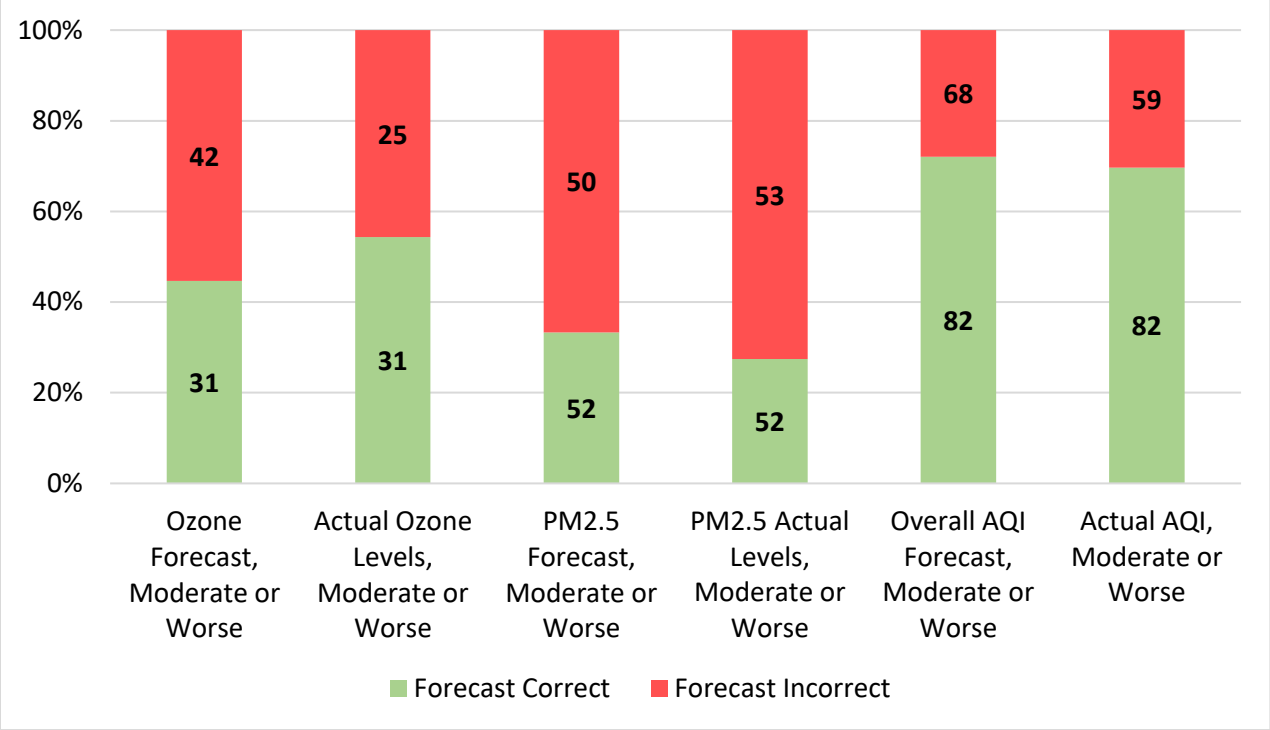
days when air quality was forecast to be "moderate" or worse. The equations below explain these terms in terms of the daily AQI forecast.

$$AQI\ Forecast\ Accuracy\ Rate = \frac{Days\ When\ AQI\ Forecast\ to\ be\ Moderate\ or\ Worse\ and\ was\ Actually\ Moderate\ or\ Worse}{Days\ Forecast\ to\ be\ Moderate\ or\ Worse}$$

$$AQI\ Forecast\ Success\ Rate = \frac{Days\ When\ AQI\ Forecast\ to\ be\ Moderate\ or\ Worse\ and\ was\ Actually\ Moderate\ or\ Worse}{Days\ When\ Actual\ AQI\ Was\ Moderate\ or\ Worse}$$

Since the daily AQI forecasts for the region included forecasts for both O_3 and $PM_{2.5}$, it is possible to analyze these accuracy and success rates by pollutant, as well as for the overall AQI. Figure 1-11 presents the results of this AQI forecast analysis for 2021.

Figure 1-11. Accuracy and Success of AQI Forecasts for 2021



In summary, TCEQ's forecasts for "moderate" or higher O_3 levels were 42% accurate and 55% successful. Whereas forecasts for "moderate" or higher $PM_{2.5}$ levels were 51% accurate and 50% successful. Overall AQI forecasts were 55% accurate and 42% successful.

1.6 Odor Complaints

The Regional Air Quality Plan is intended to be a comprehensive plan for air quality. Therefore, it includes a section on nuisance odors, and data on the number of odor complaints reported to TCEQ. This section of the annual report summarizes the odor compliant data from the region in 2021 county-by-county.

The table below summarizes the number of odor complaints filed from each county in 2021, along with each county's population, and the number of odor complaints per 10,000 residents.

Table 1-6. 2021 Odor Complaints and Number of Complaints Per 10,000 Residents by County

County	Odor Complaints[10]	Population[11]	Odor Complaints Per 10,000 Residents
Bastrop	15	102,058	1.47
Caldwell	1	46,791	0.21
Hays	25	255,397	0.98
Travis	127	1,305,154	0.97
Williamson	3	643,026	0.05
TOTAL	**171**	**2,352,426**	**0.73**

As evident in Table 1-6, Bastrop County had the highest number of odor complaints per 10,000 residents. This issue with odor is a recurring issue for Bastrop County.

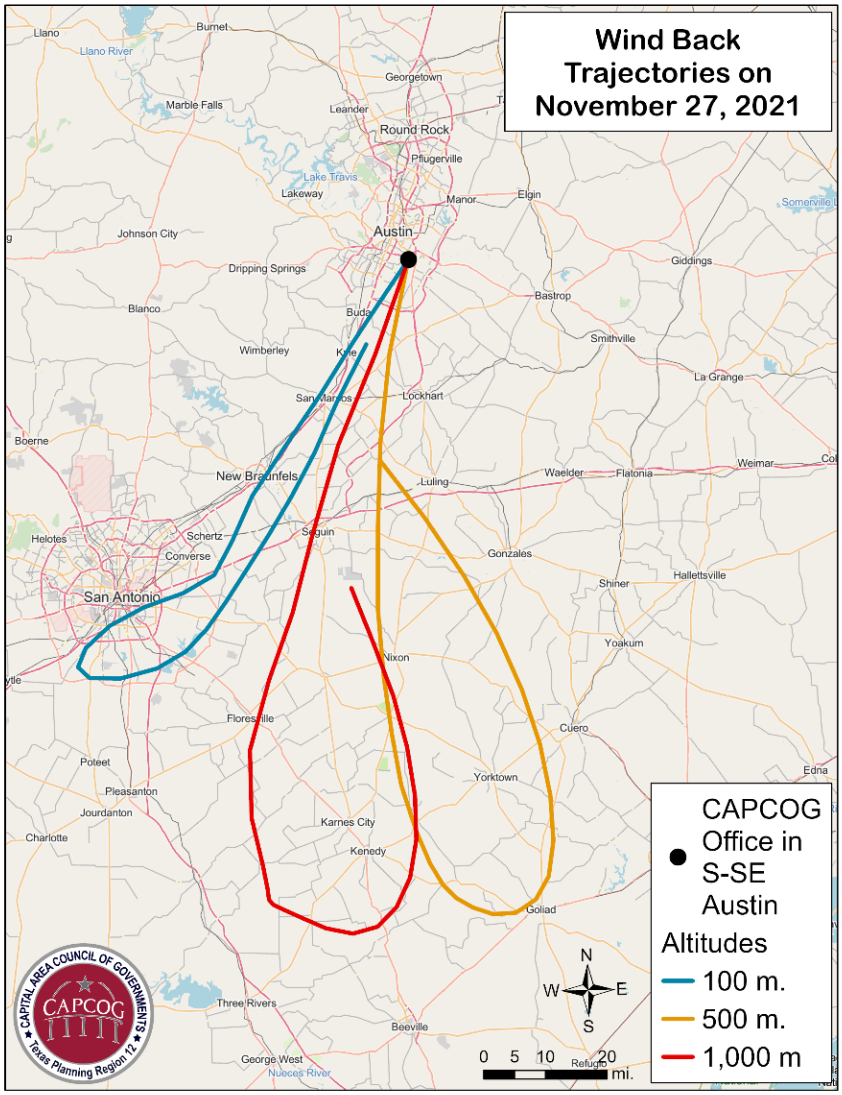
Additionally on November 27, 2021, multiple residents in southern Travis County noted an odor in the air that prompted media attention. KXAN reported on the issue stating that Austin Fire Department believes it was the "Luling Effect." According to the Austin Fire Department, "While not the typical time of day for the 'Luling Effect,' it seems a little push of southeast wind has brought in the oil field odor."[12] CAPCOG analyzed wind back-trajectories for this day, and the wind pattern indicates that wind blew into the region from the Luling area oil fields and the Eagle Ford Shale production area. As evident in the figure below, the wind not only originated from the oil production area, but the wind also circled around the oil production area before moving north into the region.

[10] Obtained by querying for "Air Quality High Level, Nature: Odor" on TCEQ's complaint tracking website at: https://www2.tceq.texas.gov/oce/waci/index.cfm

[11] U.S. Census Bureau, July 1, 2021, population estimates: https://www.census.gov/newsroom/press-kits/2022/pop-estimates-county-metro.html

[12] KXAN, Stinky air in Austin? The 'Luling Effect' returns, 11/28/2021, https://www.kxan.com/news/local/stinky-air-in-austin-the-luling-effect-returns/

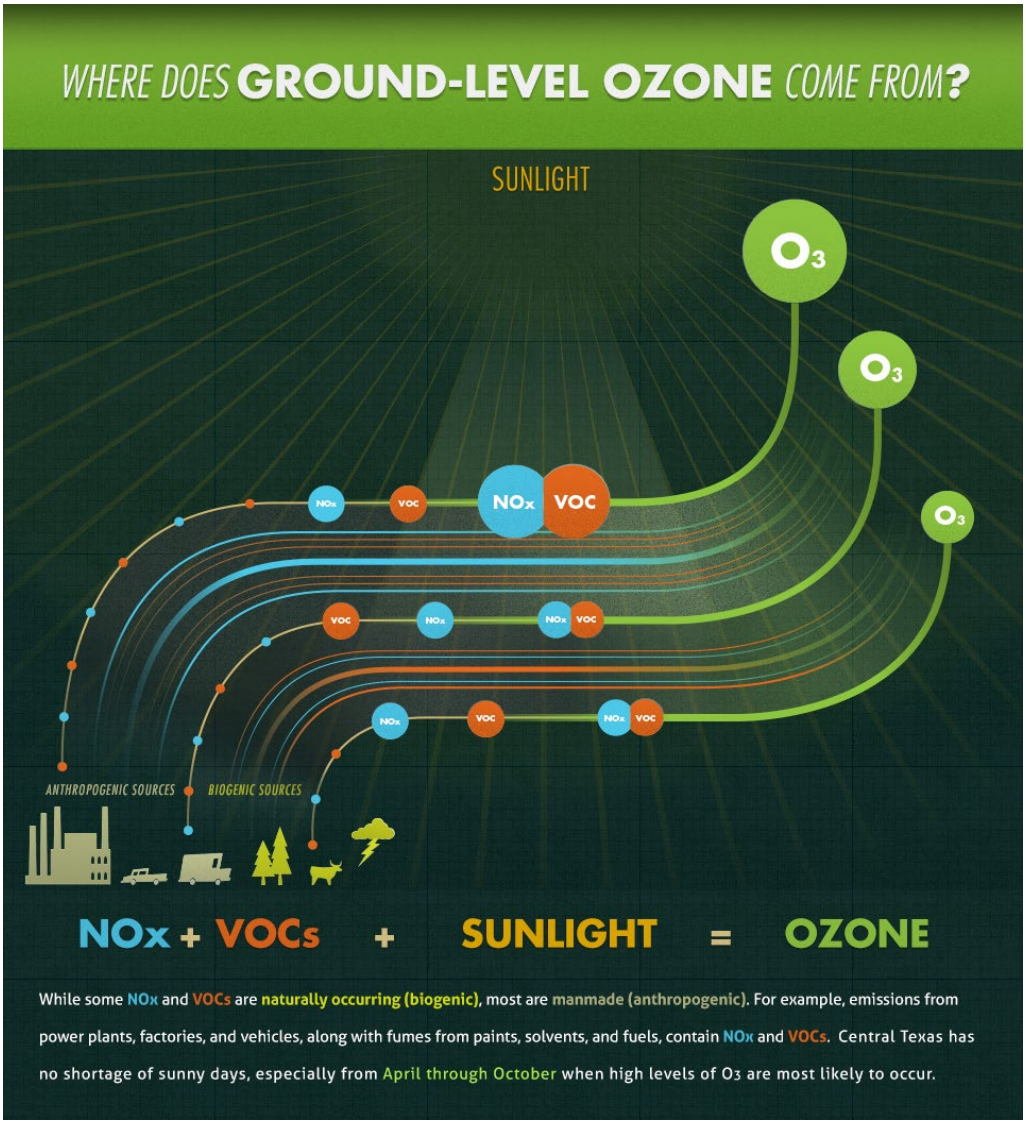
Figure 1-12. Wind Back Trajectory for "Luling Effect" on 11/27/22



2 2021 Regional Ozone Season Weekday NO_X Emissions Profile

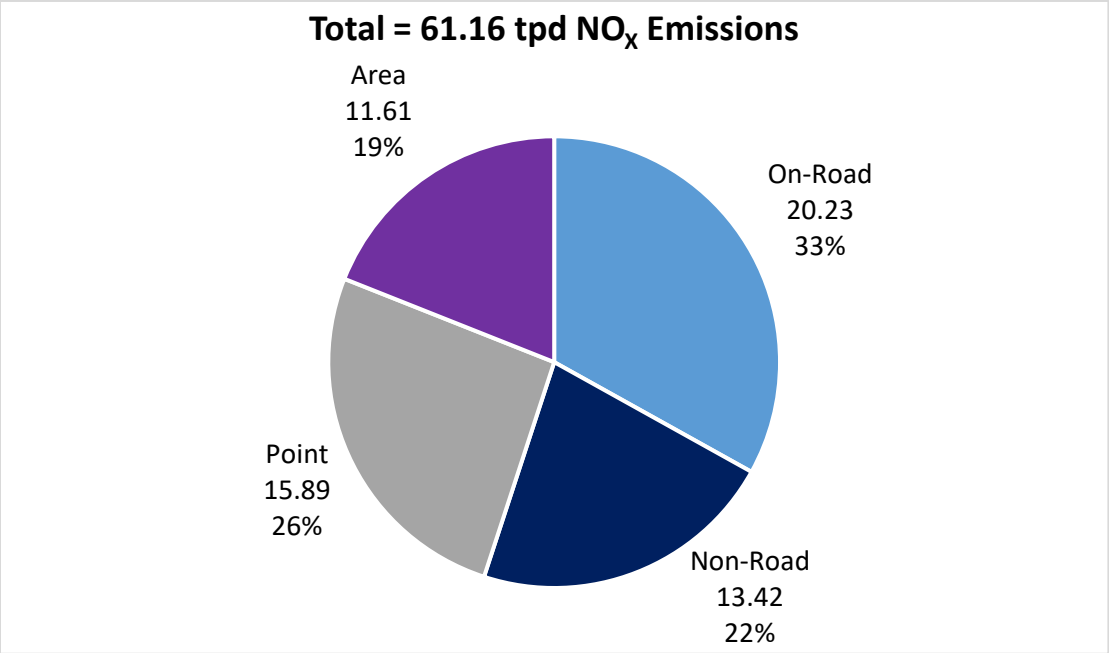
NO_X emissions react with volatile organic compounds (VOC) in the presence of sunlight to form ground-level O_3. Depending on local conditions, an area's O_3 problems can be influenced more by NO_X emissions or VOC emissions. In the MSA, NO_X emissions account for about 99% of all locally generated O_3. Therefore, an understanding of the contribution of different sources of NO_X emissions to the region's overall daily NO_X emissions during Ozone Season will elucidate the relative importance of these sources to O_3 formation.

Figure 2-1. Ozone Formation



The following pie chart shows the estimated average 2021 O_3 season weekday anthropogenic NO_X emissions in the region by major source type – on-road mobile, non-road mobile, point source, and area source emissions.

Figure 2-2. 2021 O_3 Season Weekday NO_X Emissions for the Austin-Round Rock-Georgetown MSA (tpd)



2.1 NO_X Emissions by Source Type by County

Table 2-1 shows the break-down of the region's ozone season day (OSD) weekday NO_X emissions by county and source type.

Table 2-1. 2021 OSD Weekday NO_X Emissions by Source Type and County (tons per day)

County	On-Road	Non-Road	Point	Area	Total
Bastrop	1.26	1.04	3.42	0.46	**6.18**
Caldwell	0.70	0.89	1.90	1.89	**5.39**
Hays	2.86	1.03	6.02	0.80	**10.71**
Travis	10.78	7.46	4.40	6.47	**29.12**
Williamson	4.62	3.00	0.15	1.99	**9.76**
Total	**20.23**	**13.42**	**15.89**	**11.61**	**61.16**

2.2 On-Road Sources

The on-road sector includes mobile sources that are registered to operate on public roads. On-road vehicles remain the largest source of NO_X emissions within the region, accounting for 20.23 tons per day (tpd) of NO_X emissions on a typical 2021 OSD weekday, based on TCEQ's most recent "trends" emissions inventories.[13] Table 2-2 shows the typical 2021 O_3 season weekday NO_X emissions for the region by source use type.

[13] Produced by TTI in August 2015. Available online at: ftp://amdaftp.tceq.texas.gov/pub/EI/onroad/mvs14_trends/.

Table 2-2. Regional 2021 OSD Weekday On-Road NO_X Emissions by Source Use Type (tpd)

Source Use Type	NO_X
Motorcycle	0.03
Passenger Car	5.94
Passenger Truck	4.08
Light Commercial Truck	1.20
Intercity Bus	0.12
Transit Bus	0.16
School Bus	0.34
Refuse Truck	0.27
Single-Unit Short-Haul Truck	1.30
Single-Unit Long-Haul Truck	0.14
Motor Home	0.14
Combination Short-Haul Truck	2.43
Combination Long-Haul Truck	4.09
Total	**20.23**

Passenger cars and passenger trucks combined to account for 10.02 tpd of NO_X emissions, while heavy-duty commercial trucking accounted for 7.95 tpd NO_X emissions. The remaining sources accounted for 2.25 tpd NO_X emissions, most of which come from light commercial trucks.

2.3 Non-Road Sources

The non-road sector consists of any mobile source that is not registered to be operated on a public road, including sources such as agricultural equipment, construction and mining equipment, locomotives, aircraft, and drill rigs. Non-road sources made up the 3rd-largest source of NO_X emissions within the region in 2021, accounting for 13.42 tpd of NO_X emissions on a typical O_3 season weekday. There are four different types of non-road data sets: equipment modeled in the MOVES2014b and TexNv2 models, locomotives/rail equipment, aircraft (including ground support equipment), and drill rigs.

Table 2-3. 2021 OSD Weekday Non-Road NO_X Emissions by County (tpd)

County	MOVES2014b	Rail	Aircraft	Drill Rigs	Total
Bastrop	0.63	0.41	0.00	0.00	1.04
Caldwell	0.40	0.42	0.05	0.02	0.89
Hays	0.64	0.39	0.00	0.00	1.03
Travis	4.43	0.41	2.63	0.00	7.46
Williamson	2.48	0.50	0.02	0.00	3.00
Total	**8.58**	**2.14**	**2.69**	**0.02**	**13.42**

- For MOVES2014b sources, CAPCOG used the 2017 OSD estimates prepared by TCEQ for the AERR,[14] then adjusted the totals for each SCC and county based on the ratios between the 2021 "Trends" inventory and the 2017 "Trends" inventory.[15]

[14] Available online here: ftp://amdaftp.tceq.texas.gov/pub/EI/nonroad/aerr/2017/for_EPA/
[15] Available online here: ftp://amdaftp.tceq.texas.gov/pub/EI/nonroad/trends/

- For aircraft, CAPCOG used ERG's estimated O_3 season daily 2021 NO_X emissions.[16]
- For rail and drill rigs, CAPCOG used TCEQ's existing 2021 trends inventories.[17]

2.4 Point Sources

The point source sector consists of any stationary source that reports its emissions to TCEQ. The most recent point source data that is publicly available from TCEQ is for 2020. In that year, there were 27 facilities in the Austin-Round Rock-Georgetown MSA that reported emissions to TCEQ.[18] Emissions data specific to 2021 are available for each electric generating unit (EGU) that reports to EPA. CAPCOG estimated an average of 15.90 tpd NO_X emissions from point sources in the MSA in 2021:

- Except for the turbines at Decker Creek Power Plant, CAPCOG used the average daily NO_X emissions reported to EPA for May 1, 2021 – September 30, 2021 for all EGUs that report emissions to EPA,[19] (5.17 tpd);
- For the eight turbine units at Decker Creek Power Plant, CAPCOG used the average daily NO_X emissions reported to EPA for May 1, 2021 – September 30, 2021, adjusted to reflect the ratio between the average OSD NO_X emissions reported in TCEQ's EIQ for 2020 to the average OSD (May 1 – September 30) NO_X emissions reported to EPA for 2021[20] (0.10 tpd);
- For all other sources of NO_X emissions, including sources at non-EGU facilities, CAPCOG used the OSD NO_X emissions reported in the facility's 2020 EIQ (9.42 tpd).

Table 2-4 shows the estimated OSD NO_X emissions by county for EGU and non-EGU sources.

Table 2-4. Estimated 2021 Point Source OSD NO_X Emissions by County (tpd)

County	EGU[21]	Non-EGU	Total
Bastrop	3.31	0.11	**3.42**
Caldwell	0.00	1.90	**1.90**
Hays	0.59	5.43	**6.02**
Travis	1.36	3.04	**4.40**
Williamson	0.00	0.15	**0.15**
Total	**5.27**	**10.63**	**15.89**

The table below shows the facility-level OSD NO_X emissions estimates.

[16] E-mail from Roger Chang, ERG, to CAPCOG, on June 3, 2021
[17] Available online here: ftp://amdaftp.tceq.texas.gov/pub/EI/offroad/locomotive/trends/ and ftp://amdaftp.tceq.texas.gov/pub/EI/oil_gas/drilling/.
[18] "State Summary" file available online here: https://www.tceq.texas.gov/downloads/air-quality/point-source/2014_2020statesum.xlsx
[19] Accessible online here: https://ampd.epa.gov/ampd/
[20] The adjustment for the Decker Turbines is due to a known issue with data substitution required for reporting data to EPA that does not apply to the annual EIQs.
[21] Includes all sources at these facilities, including sources that do not report to AMPD.

Table 2-5. Estimated Average 2021 OSD Point Source Emissions in the Austin-Round Rock-Georgetown MSA (tpd)

RN	Company	Site	County	NO_X
RN100225846	Acme Brick Company	Elgin Plant	Bastrop	0.04
RN100214337	Austin White Lime Company Ltd	McNeil Plant & Quarry	Travis	1.31
RN101056851	Bastrop Energy Partners LP	Bastrop Energy Center	Bastrop	0.76
RN100542752	BFI Waste Systems of North America Inc	BFI Sunset Farms Landfill	Travis	0.05
RN100219872	City of Austin Electric Utility Department DBA Austin Energy	Decker Creek Power Plant	Travis	1.09
RN100215052	City of Austin Electric Utility Department DBA Austin Energy	Sand Hill Energy Center	Travis	0.27
RN102611365	CPI Products Intl Inc	CPI Products Intl	Williamson	0.00
RN100728179	Durcon Laboratory Tops Incorporated	Durcon Laboratory Tops	Williamson	0.00
RN101059673	Flint Hills Resources Corpus Christi LLC	Austin Terminal	Travis	0.00
RN105366934	Flint Hills Resources Corpus Christi LLC	Mustang Ridge Terminal	Caldwell	0.00
RN100723915	Gentex Power Corporation	Lost Pines 1 Power Plant	Bastrop	0.43
RN100211689	Hays Energy LLC	Hays Energy Facility	Hays	0.59
RN102038486	Lower Colorado River Authority	Sim Gideon Power Plant	Bastrop	2.13
RN100212034	Meridian Brick LLC	Elgin Facility	Bastrop	0.07
RN100843747	NXP USA Inc	Ed Bluestein Site	Travis	0.03
RN102752763	NXP USA Inc	Integrated Circuit Mfg Oak Hill Fab	Travis	0.02
RN100220177	Oasis Pipeline Co Texas LP	Prairie Lea Compressor Station	Caldwell	1.90
RN100518026	Samsung Austin Semiconductor LLC	Austin Fabrication Facility	Travis	0.24
RN100725712	Seminole Pipeline Company LLC	Coupland Pump Station	Williamson	0.11
RN100723741	Spansion LLC	Spansion Austin Facility	Travis	0.02
RN102016698	Texas Disposal Systems Landfill Inc	Texas Disposal Systems Landfill	Travis	0.04
RN102597846	Texas Lehigh Cement Company LP	Texas Lehigh Cement	Hays	5.43
RN105074561	Texas Materials Group Inc	Austin Hot Mix	Travis	0.00
RN102533510	University of Texas at Austin	Hal C Weaver Power Plant	Travis	1.21
RN109992479	Valero Terminaling And Distribution Company	Truck Loading Terminal	Williamson	0.00
RN100215938	Waste Management of Texas Inc	Austin Community Landfill	Travis	0.11

RN	Company	Site	County	NO_X
RN100225754	Waste Management of Texas Inc	Williamson County Recycling and Disposal Facility	Williamson	0.04
Total				**15.90**

Decker Creek's NO_X emissions reduced significantly in 2021 compared to 2020. From 2020 to 2021, Decker Creek decreased from 4.05 tpd to 1.09 tpd of NO_X which is a 73% decrease. This decrease can be attributed to Decker Creek's retirement of steam unit 1 in October 2020. [22] Austin Energy expects to retire the other Decker Creek steam unit, unit 2, in 2022[23]. Therefore, NO_X emissions from regional EGUs should continue to decrease as older, "dirtier" units continue to be retired. Additionally, since 2021 was a milder summer in the region, it appears that the Decker Creek turbine units, which are "peaker units" used to supply load to the electrical grid when power demand is high or peak, were used less in 2021 than in 2020.

Since EPA data for EGUs are available at the daily level, CAPCOG analyzed the regional EGU NO_X emissions on the top four days at CAMS 3 and CAMS 38 with the highest 8-hour O_3 averages for 2021, since these days affect NAAQS compliance.

The top four days at CAMS 38, which is the current monitor used for the region's design value, were the following:

- 9/10/2021: 66 ppb
- 9/23/2021: 66 ppb
- 9/24/2021: 66 ppb
- 4/11/2021: 65 ppb

On these days, EGU NO_X emissions (except for Decker turbines, which were excluded from the analysis) averaged 2.67 tpd, which is 44% lower than the May 1st – September 30th daily average of 5.17 tpd, though NO_X emissions did reach 5.23 tpd on 4/11/2021.

For CAMS 3, 2021 data will be eligible for inclusion in a design value starting with the 2021-2023 period. The top 4 days at CAMS 3 were:

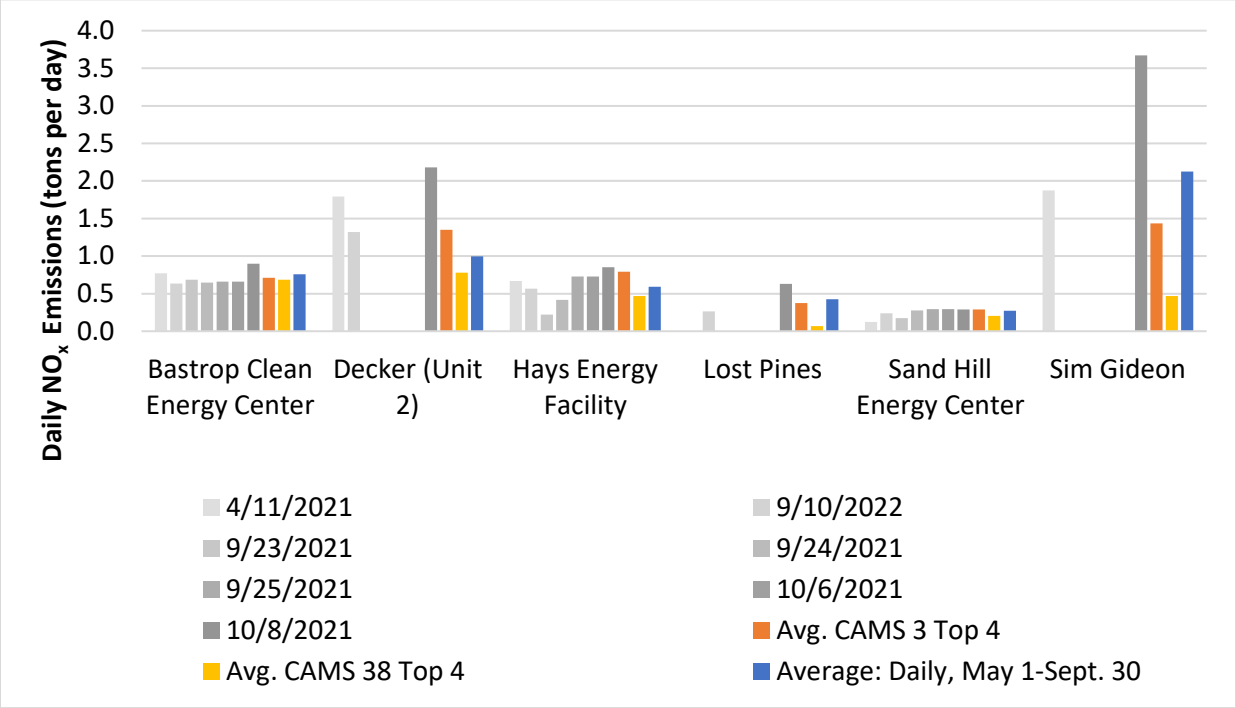
- 10/8/2021: 71 ppb
- 9/25/2021: 67 ppb
- 9/10/2021: 66 ppb
- 10/6/2021: 65 ppb

[22] Austin Monitor, *Decker Creek Power Station finally closing,* 6/2/2020, https://www.austinmonitor.com/stories/whispers/decker-creek-power-station-finally-closing/
[23] Austin Energy, *Austin Energy announces update to generation portfolio*, 11/1/2021, https://austinenergy.com/ae/about/news/news-releases/2021/austin-energy-announces-generation-portfolio-update/

On these days, EGU emissions averaged 4.95 tpd, 4% below the OSD average, and reaching as high as 8.52 tpd on 10/6/2021.

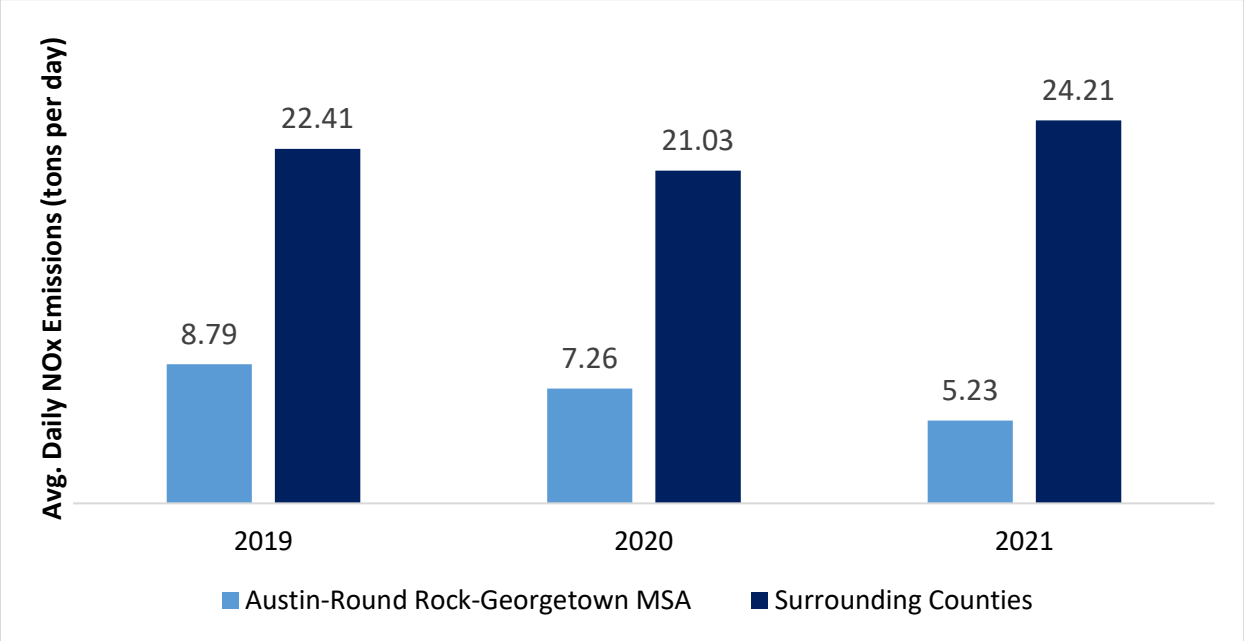
As the chart below shows, there was a high degree of variation in emissions among these days with some power plants not running on some days (which are displayed as gaps in the graph). These data suggest that the impact of EGU emissions on design values is highly sensitive to individual days when O_3 levels are elevated. Unlike in most prior years, the EGU emissions on the top 4 days don't stand out as being significantly higher than what is typical for May – September.

Figure 2-3. Comparison of EGU NO_X Emissions on Top 3 O_3 Days at CAMS 38 Compared to Average Daily NO_X Emissions May 1 – September 30, 2021



Looking at the 2021 data compared to previous years, average OSD emissions from EGUs were lower in 2021 to 2020. In 2021, it is the first time since 2016 when regional emissions from EGUs have decreased while emissions from EGUs in surrounding counties have increased. This regional decrease is most likely attributed to Decker Creek Power Plant retiring one of its steam units in October 2020. The figure below compares the OSD NO_x emissions from EGUs within the MSA and EGUs in surrounding counties. Note that the figure does not include the emissions from the Decker Creek turbine units.

Figure 2-4. Average Daily May – September NO_X Emissions from EGU Point Sources in Austin-Round Rock-Georgetown MSA and Surrounding Counties, 2019-2021



2.5 Area Sources

CAPCOG estimated the 2021 area sources using TCEQ's 2017 summer weekday NO_X emissions from its 2017 National Emissions Inventory submission.[24]

Table 2-6. Area Source OSD Weekday NO_X Emissions by County and Source Type (tpd)

County	Industrial Combustion	Commercial & Institutional Combustion	Residential Combustion	Oil & Gas	Other	Total
Bastrop	0.10	0.10	0.00	0.16	0.09	0.46
Caldwell	0.09	0.04	0.00	1.73	0.02	1.89
Hays	0.31	0.35	0.00	0.00	0.13	0.80
Travis	2.34	4.04	0.02	0.01	0.05	6.47
Williamson	0.89	1.03	0.01	0.03	0.03	1.99
Total	**3.74**	**5.57**	**0.04**	**1.94**	**0.33**	**11.61**

[24] E-mailed from Matthew Southard, TCEQ, to Andrew Hoekzema, CAPCOG, on July 26, 2019.

3 Implementation of 2019-2026 Regional Air Quality Plan and Other Measures

This section provides details on emission reduction measures implemented within the Austin-Round Rock-Georgetown MSA in 2021. This includes both measures that had been included in the 2019-2023 Regional Air Quality Plan and other measures that were not explicitly committed to in that plan.

3.1 Regional and State-Supported Measures

Regional and state-supported measures involve multi-jurisdictional programs or state involvement in an emission reduction measure within the region. These include:

- The Vehicle Emissions Inspection and Maintenance (I/M) Program
- Texas Emission Reduction Plan (TERP) grants
- Volkswagen Environmental Mitigation Trust Beneficiary Mitigation Plan for Texas
- The Clean Air Partners Program
- The Clean Cities Program
- Outreach and Education Measures
- Property-Assessed Clean Energy (PACE)
- The Commute Solutions Program

3.1.1 Vehicle Emissions Inspection and Maintenance Program

The Austin-Round Rock-Georgetown MSA is home to Travis and Williamson Counties – the two largest "attainment" counties in the country that have a vehicle emissions inspection and maintenance (I/M) program. The I/M program has been in place since September 1, 2005, and it was implemented as part of the region's participation in the Early Action Compact (EAC) program. The program's rules are found in Title 30, Part 1, Texas Administrative Code (TAC) Chapter 114, Subchapter C, Division 3: Early Action Compact Counties. Under the program, all gasoline-powered vehicles (including heavy-duty vehicles but excluding motorcycles) that are 2-24 years old are required to undergo an annual emissions inspection along with their annual safety inspection. Vehicles model year 1995 and older are required to pass a "two-speed idle" (TSI) test, and vehicles model year 1996 and newer are required to pass an "on-board diagnostic" (OBD) test. 2019 was the last year in which TSI tests will be conducted for the I/M program due to the model year coverage. Up until the end of state fiscal year 2021, the inspection cost $18.50 per test:

- The station may retain $11.50
- $4.50 is remitted to the state and deposited into the Clean Air Account (Fund 151):
    - $2.50 is for state administration of the I/M program

If a vehicle fails an emissions inspection, the owner is required to fix the vehicle as a condition of registration. As described in 37 TAC § 23.52(a), "an emissions testing waiver defers the need for full compliance with vehicle emissions standards of the vehicle emissions inspection and maintenance (I/M) program for a specified period of time after a vehicle fails an emissions test." The following waivers are available in certain circumstances:

- A "low-mileage" waiver if a motorist has paid at least $100 for emissions-related repairs and is driven less than 5,000 per year
- An "individual vehicle" waiver if a motorist has paid at least $600 in emissions-related repairs

Under 37 TAC § 23.53(a), time extensions are also available:

- A "low-income time extension" is available if the motorist has income at or below the federal poverty level and the motorist hadn't previously received a time extension in the same cycle
- A "parts-availability time extension" is available if an applicant can show problems in obtaining the needed parts for repair

Some of the key metrics for the I/M program year-to-year are the number of emissions inspections and the failure rates. Table 3-1 summarizes the number and disposition of emissions inspections in 2021:

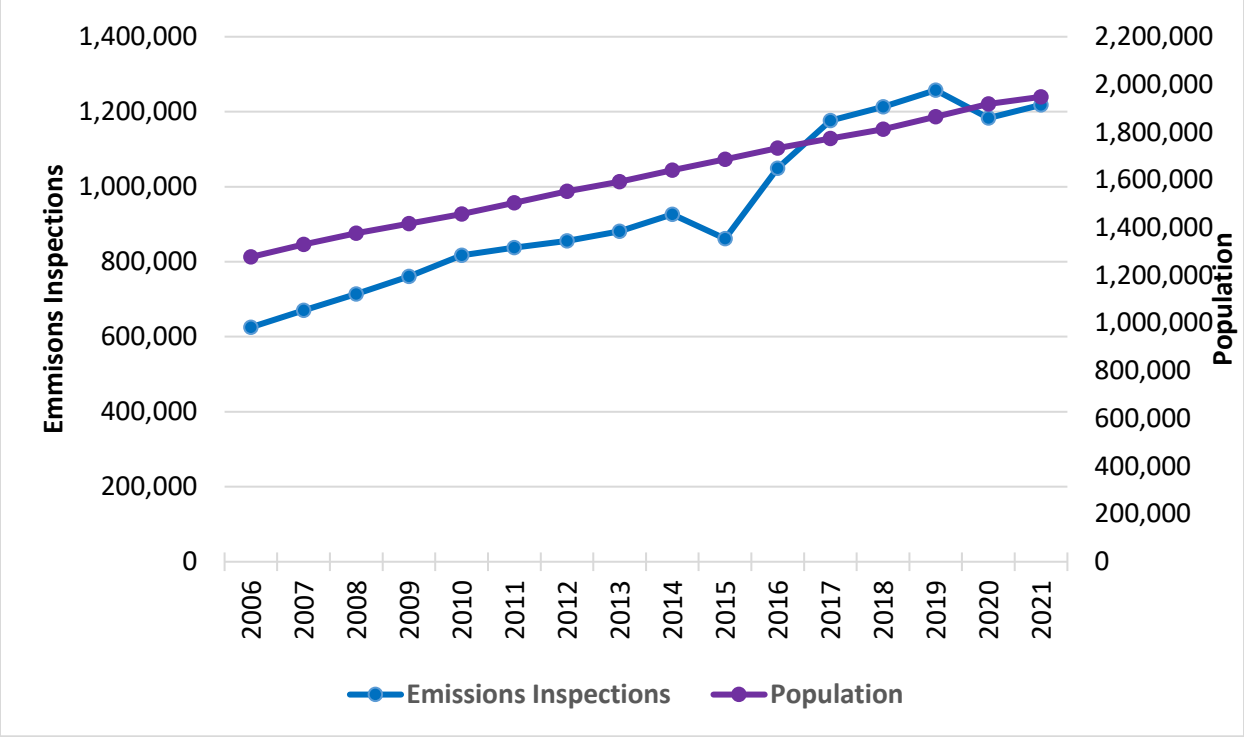
Table 3-1. I-M Program Statistics for 2021[25]

Metric	Travis County	Williamson County	Combined
Total Emission Tests	810,943	407,201	1,218,144
Initial Emission Tests	768,218	384,327	1,152,545
Initial Emission Test Failures	44,548	23,846	68,394
Initial Emission Test Failure Rate	5.8%	6.2%	5.9%
Initial Emission Retests	37,937	20,637	58,574
Initial Emission Retest Failures	4,291	1,993	6,284
Initial Emission Retest Failure Rate	11.3%	9.7%	10.7%
Other Emission Retests	4,788	2,237	7,025
Other Emission Retest Failures	1,303	561	1,864
Other Emission Retest Failure Rate	27.2%	25.1%	26.5%

In general, there have been year-over-year increases in the number of emissions inspections tracking with population increases, except for 2015 and 2020. The difference in 2015 was due to a transition period in the state's move from a two-sticker (registration and inspection) system to a one-sticker system, some vehicles were able to skip a cycle of inspections if they had a January 2015 or February 2015 registration renewal deadline. By March 1, 2016, however, all vehicles should have "caught up." However, due to the COVID-19 pandemic, there were less emissions inspections in 2020 and 2021 than in 2019. This decrease in inspections was most likely due to the statewide vehicle registration renewal waiver.[26] The waiver allowed vehicle owners to avoid penalties for failure to timely register a vehicle. The waiver began on March 16, 2020, and it was in place until April 14, 2021.[27] Overall, emissions inspections increased from 2020 to 2021. In 2021, there were approximately 0.64 emissions inspections per capita in Travis and Williamson Counties which is higher than the 0.62 emissions inspections per capita in 2020.

[25] Data e-mailed from David Serrins, TCEQ, to CAPCOG staff on 5/5/2022.
[26] https://gov.texas.gov/news/post/governor-abbott-waives-certain-vehicle-registration-titling-and-parking-placard-regulations-in-texas
[27] http://ftp.txdmv.gov/pub/txdmv-info/media/2021/02_12_21-End_of_Vehicle_Title_Registration_Waiver.pdf

Figure 3-1. Trend in Emissions Inspections Compared to Population in Travis and Williamson Counties 2006-2021



The initial failure rate for 2021 decreased from 2020. However, the 2021 rate still is higher than failure rates since 2009. This increase in the failure rate could be attributed to people's hesitancy to visit mechanics for vehicle repairs or maintenance because of the COVID-19 pandemic issues, either financial, medical, or other.

Figure 3-2. Initial Emissions Inspection Failure Rate Trend 2006-2021

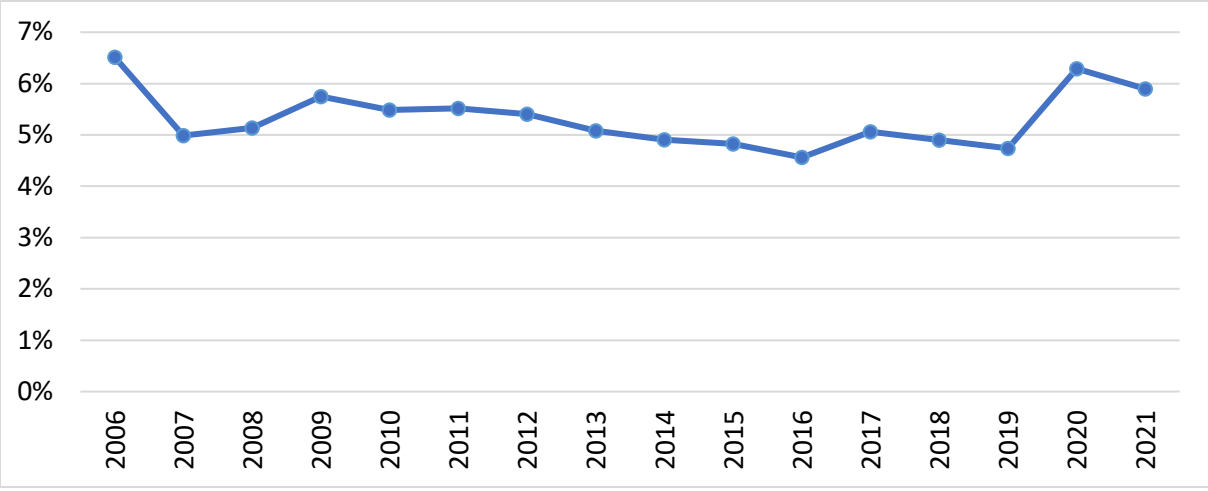
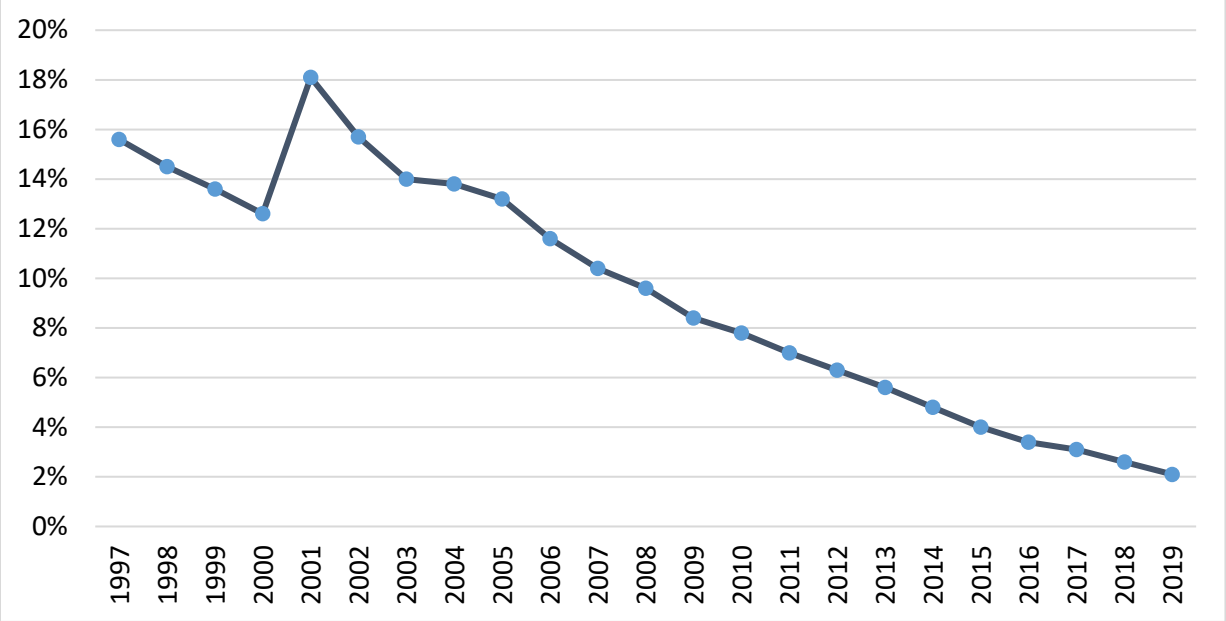


Figure 3-3 shows the emissions test failure rates of each model year based on tests conducted in 2021. As the figure below shows, the chances of older model year vehicles failing an emissions test are significantly higher than a newer model year vehicle failing a test. In 2021, model year 2019 vehicles had a failure rate of only about 2.1%, whereas the failure rate for model year 2001 vehicles was 18.1%.

Figure 3-3. 2021 Emission Test Failure Rate by Model Year



As described above, under certain circumstances, a vehicle subject to annual testing requirements is allowed to continue operating under an I/M program waiver. Table 3-2 summarizes the waivers issued in 2020 and 2021.

Table 3-2. 2020 and 2021 I-M Program Waivers

Waiver Type	2020	2021
Total Tests	1,114,305	1,152,576
Failing Vehicles	50,274	48,643
Total Waivers	31	74
Total Waiver Rate	0.06%	0.15%
Individual Waivers	11	30
Low Mileage Waivers	8	27
Low Income Time Extensions	12	17
Parts Availability Time Extensions	0	0
Other (Special Test)	0	0

3.1.2 Texas Emission Reduction Plan Grants

Texas Emission Reduction Plan (TERP) grants provide funding for a variety of types of projects designed to reduce emissions, particularly NO_X. These include:

- The Diesel Emissions Reduction Incentive (DERI) program, designed to achieve emission reductions by incentivizing the early replacement or repowering of older diesel-powered engines with newer engines:
    - The Emission Reduction Incentive Grant (ERIG) program is a competitive grant program based on the cost/ton of NO_X reduced;

    - The Rebate Grant program is a first-come, first-served grant program based on fixed rebate dollar amounts based on fixed cost/ton of NO_X reduced assumptions;
- The Texas Natural Gas Vehicle Grant Program (TNGVGP) incentivizes the replacement of diesel-powered trucks with natural gas vehicle-powered trucks, with the newer engine needing to achieve at least a 25% reduction in emissions compared to the diesel power it is replacing;
- The Texas Clean Fleet Program (TCFP) incentivizes owners of large fleets to replace a significant portion of their conventionally-fueled vehicles with alternative-fueled vehicles, achieving emission reductions by replacing the older, dirtier engines with newer, cleaner engines;
- The Texas Clean School Bus (TCSB) program provides funding for the retrofit and replacement of older school buses;
- The Light Duty Motor Vehicle Purchase or Lease Incentive Program (LDPLIP) provides rebate incentives statewide to purchase or lease an eligible new light-duty motor vehicle powered by natural gas, propane, hydrogen fuel cell, or electric drive;
- The New Technology Implementation Grants (NTIG) program provides funding for new/innovative technology to reduce emissions from stationary sources; and
- The Alternative Fueling Facilities Program (AFFP) provides funding for the construction of a variety of types of alternative fuel infrastructure in nonattainment areas;
- The Seaport and Rail Yard Areas Emission Reduction (SPRY) Program provides funding for the early replacement of drayage trucks and equipment at eligible in ports and class I railyards in nonattainment areas (this program was formerly known as the Drayage Truck Incentive Program or DTIP). The Austin area is not eligible for this program.
- The Governmental Alternative Fuel Fleet (GAFF) Program was a new TERP program in 2021. The GAFF Program assists state agencies or political subdivisions, that own or operate a fleet of >15 vehicles, in purchasing or leasing new alternative fuel or hybrid vehicles.

Notable program changes adopted by the 2021 Texas legislative session included:

- A 3% shift of TERP funding from the Texas Clean Fleet Program (TCFP) to the New Technology Implementation Grant (NTIG) program and expands the eligible activities of NTIG to include flare reduction and rental of equipment.
- A requirement that at least 35% of TERP revenue be sent to TxDOT for congestion mitigation and air quality projects rather than for direct provision of emission reduction grants. This is expected to result in at least $182 million in funds to be redirected from the new TERP trust fund. Although, the total amount available for TERP grants will still be substantially higher for 2022-2023 than for 2020-2021 due to the transition from these funds being subject to appropriation to being deposited into a new TERP trust fund.
- Both items above will need to be reconciled since they have conflicting percentages of funding for the TCFP and NTIG programs.

In May 2022, TCEQ posted a series of reports on their program website that summarizes the estimated OSD weekday NO_X emission reductions achieved by each program for 2021 – 2026, based on grants awarded through August 31, 2021. Table 3-3 summarizes these data for the Austin area.[28]

Table 3-3. Quantified OSD Weekday NO_X Emissions from TERP Grants by Program from Grants Awarded through August 31, 2021 (tpd).

Program	2021	2022	2023	2024	2025	2026
DERI[29]	2.28	2.02	1.84	1.70	1.23	0.78
TCFP[30]	0.02	0.01	0.01	0.02	0.02	0.02
TNGVGP[31]	0.04	0.03	0.03	0.01	0.01	0.00
TCSB[32]	0.01	0.01	0.01	0.01	0.01	0.01
TOTAL	**2.35**	**2.07**	**1.89**	**1.74**	**1.27**	**0.81**

Table 3-4 shows the TERP funding awarded to the Austin-Round Rock-Georgetown MSA in FY 2021, along with any quantified NO_X emissions reductions from those grants. TCEQ does not provide NO_X estimates for funding awarded for the NTIG, AFFP, or LDPLIP grant programs.

Table 3-4. TERP Grants Awarded in the Austin Area in FY 2021[33]

Grant Program	Total Funding Awarded[34]	Funding Awarded to the Austin Area	Percent of Funding Going to MSA	Austin Area NO_X Emissions Reductions (tons)	Cost Per Ton of NO_X Emissions Reductions in Austin Area
AFFP	$11,668,329.61	$2,357,555.46	20%	N/A	N/A
DERI-Rebate	$9,753,285.00	$2,659,105.00	27%	111.19	$23,914.97
DERI-ERIG	$44,366,008.21	$4,014,047.00	9%	375.40	$10,692.72
GAFF	$6,000,000.00	$0.00	0%	0.00	N/A
LDPLIP	$2,568,997.50	$828,205.00	32%	N/A	N/A

[28] TCEQ develops OSD weekday NO_X emission reduction estimates by dividing the annual NO_X reductions by 260, which corresponds roughly to the number of weekdays in a year.

[29] TCEQ. "Diesel Emission Reduction Incentive (DERI) Program Projects by Area 2001 through August 2021" Prepared by Air Grants Division, May 2022. Available online at: https://www.tceq.texas.gov/downloads/air-quality/terp/reports/reports-projects-by-area-deri.pdf, Accessed 8/11/2022.

[30] TCEQ. "Texas Clean Fleet Program Projects by Area 2010 through August 2021." Prepared by Air Grants Division, May 2022. Available online at: https://www.tceq.texas.gov/downloads/air-quality/terp/reports/reports-projects-by-area-tcfp.pdf. Accessed 8/11/2022.

[31] TCEQ. "Texas Natural Gas Vehicle Grant Program (TNGVGP) Projects by Area 2012 through August 2021." Prepared by Air Grants Division, May 2022. Available online at: https://www.tceq.texas.gov/downloads/air-quality/terp/reports/reports-projects-by-area-tngvgp.pdf. Accessed 8/11/2022.

[32] TCEQ. "Texas Clean School Bus (TCSB) Program Replacement Projects by Area 2018 through August 2021." Prepared by Air Grants Division, May 2022. Available online at: https://www.tceq.texas.gov/downloads/air-quality/terp/reports/reports-retrofits-projects-by-area-tcsb.pdf. Accessed May 2022.

[33] Based on information provided by Nate Hickman, TCEQ, on 5/13/2022, by e-mail to CAPCOG staff.

[34] For the purposes of this table, the fiscal year award is identified as the fiscal year in which a grant contract was executed, rather than the fiscal year in which an award announcement was made or the fiscal year in which funding was awarded.

Grant Program	Total Funding Awarded[34]	Funding Awarded to the Austin Area	Percent of Funding Going to MSA	Austin Area NO_X Emissions Reductions (tons)	Cost Per Ton of NO_X Emissions Reductions in Austin Area
NTIG	$4,642,192.00	$0.00	0%	N/A	N/A
SPRYP	$4,645,109.00	$0.00	0%	0.00	N/A
TCFP	$7,736,986.00	$2,101,187.22	27%	9.38	$224,007.17
TCSB[35]	$0.00	$0.00	0%	0.00	N/A
TNGVGP	$3,687,663.33	$0.00	0%	0.00	N/A
TOTAL	**$90,426,378.65**	**$11,960,099.68**	**13%**	**495.97**	**$24,114.56**

3.1.3 Texas Volkswagen Environmental Mitigation Program (TxVEMP)

In 2018, the TCEQ released the final version of their Beneficiary Mitigation Plan which identified the Austin metro area as a "priority" area and allocated $16,297,602 of the $169,548,522 total available funds to the Austin-Round Rock-Georgetown MSA. The funds are for the replacement or repower of diesel vehicles and equipment to new diesel, alternative fuel (compressed natural gas, propane, or hybrid electric), or all-electric vehicles and equipment. The Zero Emission Vehicle Supply Equipment Grants are available statewide, and they are a separate funding source from the priority area funds. In spring 2019, TCEQ began opening their grant rounds for the Texas Volkswagen Environmental Mitigation Program (TxVEMP). The table below shows the vehicle types for each grant found, the grant amount available for the MSA, and total grant amount requested as of 3/9/2022. At the time of this report, the NO_X reduction information was not available from TCEQ. The Beneficiary Mitigation Plan for Texas and information about the grants can be found at www.TexasVWFund.org.

Table 3-5. TxVEMP Grant Funding for Austin Area as of 3/9/2022[36]

Vehicle Grants	Grant Amount Available for Austin Area	Grant Amount Awarded in Austin Area as of 3/9/2022
School Buses, Shuttle Buses, and Transit Buses[37]	$5,704,161	$5,704,161
Refuse Vehicles including Garbage Trucks, Recycling Trucks, Dump Trucks, Chipper Trucks, Street Sweepers, and Roll-Off Trucks[38]	$4,074,401	$1,674,513
Local Class 4-8 Freight and Drayage Trucks[39]	$3,259,521	$1,247,876
Zero Emission Vehicle Supply Equipment Grants - Level 2 Charging (Available statewide)[40]	$10,465,958	$2,997,500
Zero Emission Vehicle Supply Equipment Grants - Direct Current Fast Charging (Available statewide)[41]	$20,934,042	$1,800,000

[35] The TCSB program was not open in FY 2021. All funds were awarded in FY 2020.
[36] Includes projects pending execution
[37] https://www.tceq.texas.gov/agency/trust/index/buses
[38] https://www.tceq.texas.gov/agency/trust/refuse
[39] https://www.tceq.texas.gov/agency/trust/freight
[40] https://www.tceq.texas.gov/agency/trust/levl2
[41] https://www.tceq.texas.gov/agency/trust/dcfch

Vehicle Grants	Grant Amount Available for Austin Area	Grant Amount Awarded in Austin Area as of 3/9/2022
Total	**$44,438,083**	**$13,424,050**

3.1.4 Lone Star Clean Fuels Alliance Clean Cities Program

CAPCOG worked closely with Lone Star Clean Fuels Alliance (LSCFA) in 2021. LSCFA is the region's Clean Cities Coalition hosted by the U.S. Department of Energy (DOE). As part of the DOE's national network of Clean Cities, LSCFA works with businesses and governments to increase their adoption of cleaner vehicle fuels and technologies.

In 2021, CAPCOG partnered with LSCFA to host virtual roundtables for electric utilities and fleets to prepare for electric vehicles (EVs). These roundtables focused on "readiness" for future EV growth. The topics of 2021 roundtables were EV supply equipment (EVSE) contracting, planning and costs for EVSE infrastructure in new construction, EV funding opportunities, and available no-cost DOE tools for EVs and EVSE. The EV Readiness Roundtables met on the following dates:

- Utility Roundtables:
  - August 12, 2021
  - November 2, 2021
- Fleet Roundtables:
  - August 19, 2021
  - November 9, 2021

LSCFA members include:

- Air Products
- eCab of North America
- Henna Chevrolet-Nissan
- Nat G CNG Solutions
- Opel Fuels
- Propane Council of Texas
- Texas Natural Gas Foundation
- University of Texas - Parking and Transportation Services
- XOS Electric Trucks

In addition, the LSCFA held a number of meetings and workshops throughout 2021.

- Board Meetings:
  - January 27, 2021
  - April 14, 2021
  - July 14, 2021
  - October 13, 2021
- Workshops:
  - Zero Motorcycle Ride and Drive – October 14, 2021
  - AYRO Site Visit – December 8, 2021

3.1.5 Clean Air Force of Central Texas and the Clean Air Partners Program

In 2021, CAPCOG worked closely with the Clean Air Force of Central Texas (CAF) to enhance outreach and education and technical knowledge of air quality in Central Texas. CAF, CAPCOG, and the City of Austin partnered to hold the 2021 CLEAN AIR Luncheon for Meteorologists in Central Texas on June 9, 2021. The luncheon gathered 16 local meteorologists and weather forecasters from Central Texas news outlets. The topic of the 2021 luncheon was PM and its importance in Central Texas.

Additionally in 2021, CAF reconvened their Air Quality Professional's Forum (AQPF). The AQPF brings together air quality practitioners from CAF's Clean Air Partners to network and learn. Quarterly lunch meetings with technical presentations by air quality experts provide training and interaction with other professionals from a variety of industries. CAPCOG presented a quarterly regional air quality update of monitoring and NAAQS updates and participated in the 2021 AQPF meetings. The 2021 AQPF meetings were held on July 20, 2021, and October 5, 2021.

CAPCOG sits on the CAF Board of Directors, which represents a broad spectrum of community, business, and government organizations. The CAF Board reviews and makes recommendations on air quality policy, public outreach, and technical issues. In 2021, the CAF Board met on November 15, 2021.

CAF's Clean Air Partners Program includes organizations outside of the CAC. The Clean Air Partners is a way to encourage businesses to act and make an impact on air quality. The CAF Clean Air Partners include:

1. Applied Materials, Inc.
2. Austin Community College
3. Austin Independent School District
4. Chemical Logic
5. Environmental Defense Fund
6. Emerson Automation Solutions
7. NXP Semiconductors
8. Power Engineers
9. St. David's Health Care Partnership
10. Tokyo Electron (TEL)
11. University of Texas at Austin

In addition, there are several CAC members who also participate in the Clean Air Partners Program:

1. CAPCOG
2. City of Austin
3. Central Texas Regional Mobility Authority (CTRMA)
4. Movability
5. Lone Star Clean Fuels Alliance (LSCFA)
6. Lower Colorado River Authority (LCRA)
7. Public Citizen – Texas
8. St. Edward's University
9. Travis County

3.1.6 Outreach and Education Measures

Continued outreach and education are essential to achieving CAC goals.

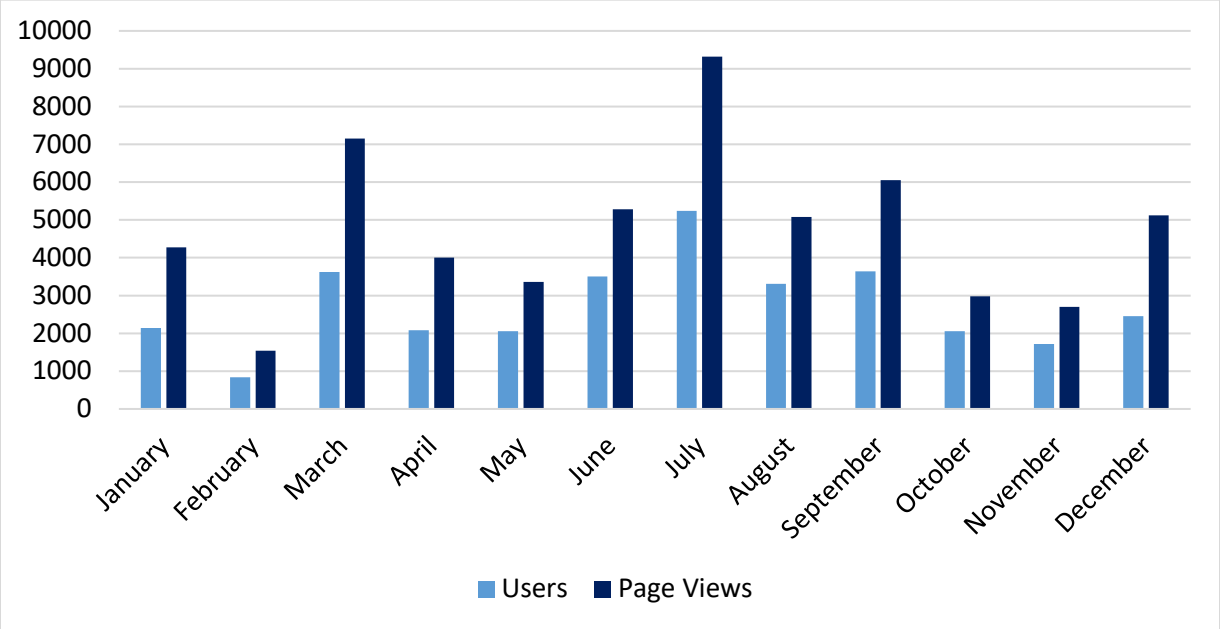
3.1.6.1 Electronic Outreach and Education

One of the primary ways CAPCOG staff accomplished outreach goals during this period was through electronic outreach. Electronic outreach allows the program to provide air quality information to a large audience with limited resources. Electronic outreach completed during this period was carried out through the Air Central Texas (ACT) website, social media accounts, digital advertising, and ACT newsletters.

3.1.6.1.1 Air Central Texas Website

The ACT website (www.aircentraltexas.org) provides the public with information about Central Texas air quality, supports existing air quality programs, and promotes activities to protect local air quality. The goal is to motivate everyone to make decisions that are "Air Aware." In 2021, CAPCOG continued to maintain and update the ACT website. Figure 3-4 shows the number of users and page views for each month.

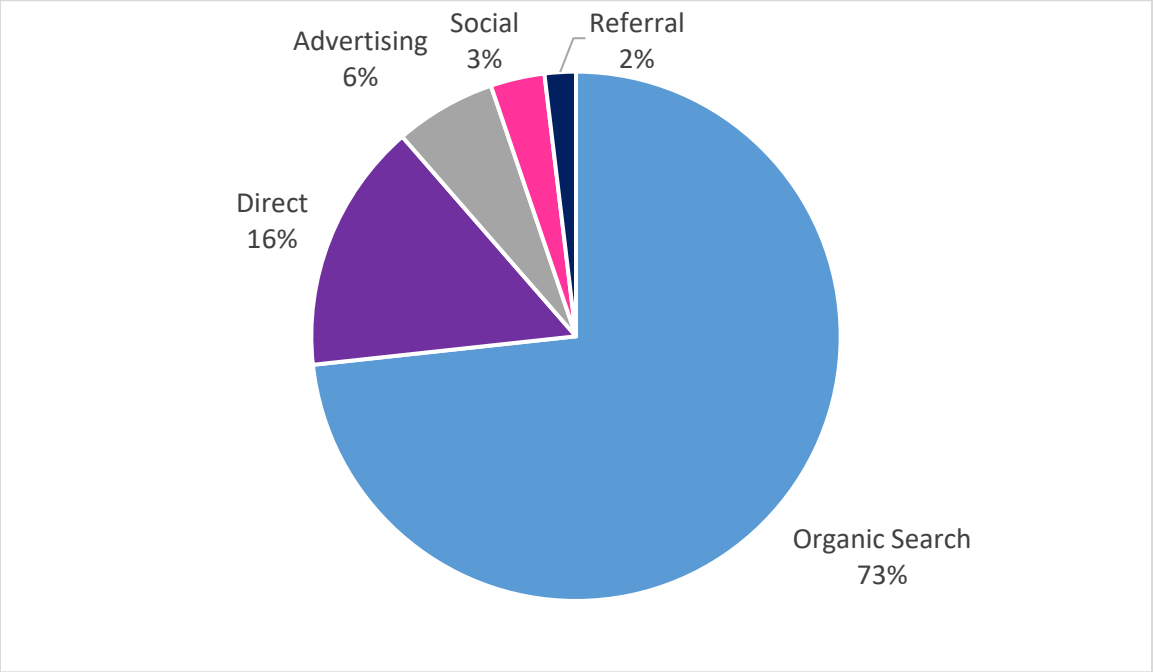
Figure 3-4. Air Central Texas Website Traffic, 2021



The increase in website visits during March coincides with the beginning of O_3 season. Paid advertising helped increased page views in the summer months. In July, users were interested in information on hazy days caused by Saharan Dust. This indicates that people want to understand why air quality is poor when it is noticeable. Therefore, it is important to maintain ACT updated with local information about upcoming air quality concerns.

Figure 3-5 shows how website visitors found the site. 73% of all visitors found the website from an organic search of air quality terms in a search engine (e.g., Google or Bing). 15% of visitors used a direct web search in which the users typed in an ACT URL or were directed from an email or newsletter. Also, visitors found the site through paid advertising, social media links, and referrals from other websites – mainly the City of Austin and CAPCOG websites.

Figure 3-5. Air Central Texas Website Acquisition Method, 2021



The top ACT Webpages viewed in 2021 are listed below. Besides the homepage, the most visited pages were those that detail ground-level ozone in English and Spanish. It is notable that three of the top pages, #3, 5, and 8, are in Spanish.

Table 3-6. Top Air Central Texas Website Pages by Page Views, 2021

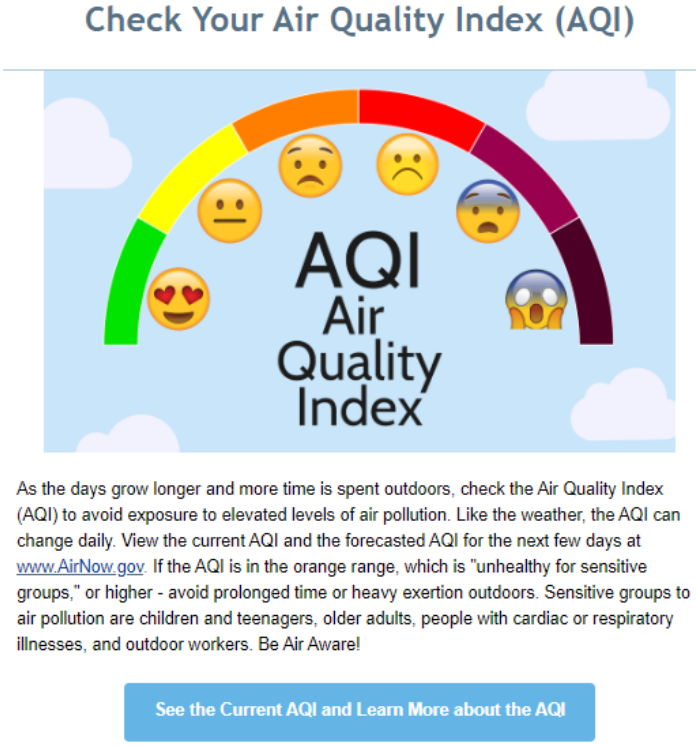
Page Rank	Page Title	Page Views
1	Home Page (English)	7,384
2	What is Ground-Level Ozone?	7,286
3	El Ozono Troposférico	3,147
4	Drive Cleaner	2,194
5	Home Page (Spanish)	1,468
6	How is the Air in Central Texas?	831
7	2021 Air Quality Awareness Week (link unavailable)	725
8	¿Quién está en Riesgo?	584
9	Wildfires and Smoke	578
10	Ozone Action Days	572
11	Air Quality Index (AQI)	514

The ACT newsletter is CAPCOG's public facing air quality newsletter. It provides the public with relevant air quality news, events, tips, and AQI data. Table 3-10 shows the data associated with each newsletter. Figure 3-6 displays an example of an ACT newsletter article.

Table 3-10. Air Central Texas Monthly Newsletters Campaign Summary, 2021

Campaign Name	Send Date	Recipients	Opens	Clicks
March 2021 Air Central Texas Newsletter	3/1/2021	163	26.1%	5.0%
April 2021 Air Central Texas Newsletter	4/1/2021	164	27.6%	4.9%
May 2021 Air Central Texas Newsletter	5/3/2021	166	27.3%	4.2%
June 2021 Air Central Texas Newsletter	6/1/2021	168	26.1%	7.9%
July 2021 Air Central Texas Newsletter	7/1/2021	171	22.2%	4.2%
August 2021 Air Central Texas Newsletter	8/2/2021	172	24.7%	2.4%
September 2021 Air Central Texas Newsletter	9/1/2021	170	30.5%	11.0%
October 2021 Air Central Texas Newsletter	10/1/2021	180	30.7%	8.5%
November 2021 Air Central Texas Newsletter	11/1/2021	183	27.5%	7.3%

Figure 3-6. Sample Newsletter Article from the June 2021 ACT Newsletter



3.1.6.1.2 Social Media

CAPCOG maintains an ACT Facebook account with 423 followers and an ACT Twitter account with 187 followers. Figure 3-7 shows an example of a social media post. For 2021, the total impressions – the number of times a user saw a post – was 299,807 for social media.

Figure 3-7. Air Central Texas Facebook Post Example

3.1.6.1.3 Advertising

Radio and digital ads were run in 2021 to promote ACT and air quality awareness. These ads are useful to reach people who are not active on social media or the internet. Radio ads were run on 4-5 radio stations per month, including one Spanish station (KLZT-FM). The ads were run from May through October, when air quality is expected to be the worst in the MSA. Table 3-7 displays the relevant ad data for the radio ads.

Table 3-7. 2021 ACT Radio Ad Results

Ad Theme	Radio Station	Commercials	Reach[42]	Frequency[43]	Impressions[44]
Air Quality Awareness Week	KLBJ-AM	20	65,200	2.1	136,000
	KBPA-FM	20	123,000	1.5	187,500
	KLZT-FM	20	47,200	1.8	76,500
	KUT-FM	5	50,800	1.4	71,000
Anti-Idling	KLBJ-AM	20	61,400	2.1	124,000
	KBPA-FM	20	130,000	1.5	197,500
	KLZT-FM	20	45,900	1.7	77,000
Vehicle Maintenance	KLBJ-AM	20	54,200	1.9	104,400
	KBPA-FM	20	138,700	1.5	209,500
	KLZT-FM	20	46,600	1.7	78,000
	KUT-FM	5	51,300	1.5	74,500
General Air Quality	KLBJ-AM	20	50,500	1.8	92,500
	KBPA-FM	20	142,000	1.5	144,000
	KLZT-FM	20	50,600	1.8	89,000
	KUT-FM	5	50,500	1.5	75,000

[42] Reach is the number of unique users that see or hear the ad.
[43] Frequency is the average number of times a user sees or hears the ad.
[44] Impressions are the total number of times a user saw or heard the ad.

Ad Theme	Radio Station	Commercials	Reach[42]	Frequency[43]	Impressions[44]
Festival Season - Alternative Transportation	KLBJ-AM	27	64,300	2.4	156,100
	KBPA-FM	28	164,400	1.7	274,500
	KLZT-FM	20	51,200	1.7	89,000
	KUT-FM	10	81,200	1.8	147,000
Total		**340**	**1,469,000**	**1.7**	**2,403,000**

Additionally, ACT ran digital ads, which are ads on websites and Spotify. Spotify is a music streaming service that contains advertisements between songs. Table 3-8 displays the relevant ad data for the digital ads. Figure 3-8 displays an example of a digital ad for ACT.

Table 3-8. 2021 ACT Digital Ad Results

Ad Theme	Ad Display	Impressions
Air Quality Awareness Week	Website	323,530
Anti-Idling	Website	202,989
Vehicle Maintenance	Website	202,307
General Air Quality	Website	203,615
Festival Season - Alternative Transportation	Website	201,671
Contest	Website	180,377
Air Quality Awareness Week	Spotify	25,080
Anti-Idling	Spotify	26,173
Vehicle Maintenance	Spotify	21,986
General Air Quality	Spotify	25,412
Festival Season - Alternative Transportation	Spotify	22,209
Total	**n/a**	**1,436,456**

Figure 3-8. 2021 ACT Digital Ad Example

3.1.6.2 In-Person Outreach and Education and ACT Awards

In addition to electronic outreach, CAPCOG staff usually engages the public in-person at community events. Apart from the Meteorologist's Luncheon described in Section 3.1.5, no in-person outreach occurred in 2021, due to the COVID-19 pandemic. In-person outreach is expected to resume in 2022.

Due to a recent lack of participation, CAPCOG decided not to hold the annual Air Central Texas Awards in 2021. Since the awards were not held in 2021, CAPCOG plans to resume them in 2022 with the hopes that it will get increased participation, especially since 2022 marks the 20th anniversary of the CAC.

3.1.7 PACE Program

The PACE program provides an innovative mechanism for financing renewable energy and energy-efficiency improvements to industrial, commercial, multi-family residential, and non-profit buildings in participating jurisdictions. In order to address pay-back periods for energy efficiency and renewable energy (EE/RE) projects that may not align properly with a private property owner, the PACE program enables jurisdictions to put a property tax lien on a piece of property where an EE/RE improvement is made using private financing until the loan for the project has been paid back. PACE is authorized under state law in Section 399 of the Texas Local Government Code Chapter 399.45 Projects include:

- HVAC modification or replacement;
- Light fixture modifications such as LED;
- Solar panels;
- High-efficiency windows or doors;
- Automated energy control systems;
- Insulation, caulking, weather-stripping or air sealing;
- Water-use efficiency improvements;
- Energy- or water-efficient manufacturing processes and/or equipment;
- Solar hot water;
- Gray water reuse; and
- Rainwater collection systems.

In 2021, Bastrop, Hays, Travis, and Williamson Counties participated in PACE. Travis County and Williamson County adopted PACE in 2016. Hays County adopted it in 2017. Lastly, Bastrop County adopted PACE on September 24, 2018. Therefore, Caldwell County is the only county in the MSA that does not participate in PACE.

As of May 9, 2022, 10 of the 57 completed PACE projects in the state were in Bastrop, Hays, Travis, and Williamson Counties. Table 3-12 summarizes key data from the projects for each county[46]. For more information on PACE, visit http://www.texaspaceauthority.org/.

[45] http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.399.htm
[46] https://pace.harcresearch.org/

Table 3-12. PACE Project Summary for Austin-Round Rock-Georgetown MSA as of May 9, 2022

County	Projects	Investments	Jobs Created	CO_2 Reduced (tons/yr.)	SO_2 Reduced (tons/yr.)	NO_X Reduced (tons/yr.)	Water Saved (gallons/yr.)	Energy Saved (kWh/yr.)
Bastrop	1	$120,000	2	49	0.08	0.03	n/a	94,081
Hays	1	$1,800,000	10	429	0.23	0.72	3,139,000	824,903
Travis	6	$5,311,960.29	41	1,219	1.12	1.44	658,000	2,314,740
Williamson	2	$1,767,982	14	1,018	0.54	0.96	1,780,000	1,956,657
TOTAL	**10**	**$8,999,942**	**67**	**2,715**	**1.97**	**3.15**	**5,577,000**	**5,190,381**

3.1.8 Commute Solutions Program

The Commute Solutions program is the region-wide Travel Demand Management (TDM) program that promotes activities to increase the efficiency and use of existing roadways. This goal encouraging shifts from less efficient travel behaviors like, single occupant vehicle use, vehicle use during peak congestion hours, and travel on high-congestion roadways, to more efficient behaviors like, the use of public transit, carpools, vanpools, walking, biking, teleworking, alterative work schedules, and travel on less congested roadways. Due to the importance of these types of activities as part of the region's air quality plan, CAPCOG supported this program with funding by the Capital Area Metropolitan Planning Organization (CAMPO) for part of 2021. The Commute Solutions website provides the public with information about Central Texas mobility options and encourages the public to shift from single occupant vehicle use to a more efficient mode. Apart from air quality, other benefits of the program and other TDM activities include:

- Improved regional mobility;
- Improved safety outcomes;
- Reduced fuel consumption;
- Reduced time wasted in traffic;
- Improved workforce and economic development outcomes;
- Improved public quality of life; and
- Reduced space needed to service the transportation system

In February 2020, CAPCOG and CAMPO entered into an agreement to transfer the Commute Solutions program to CAMPO. This followed the CAMPO board's decision to award approximately $500,000 in Surface Transportation Block Grant funding to CAMPO for a regional TDM program from 2020-2022, and to provide funding to CAPCOG to continue managing the Commute Solutions website and myCommuteSolutions.com platform until the transition. CAPCOG fully transitioned the Commute Solutions Program to CAMPO on August 1, 2021.

3.2 Organization-Specific Measures and Updates

This section provides updates on measures implemented by CAC members. Supplemental electronic files provide detailed, measure-by-measure, organization-by-organization details. These measures are based on reports collected from CAC members in May and June 2022.

Organizations that provided a report to CAPCOG included:

1. Austin White Lime Company;
2. Bastrop County;
3. Caldwell County;
4. CAPCOG;
5. City of Austin;
6. City of Buda;
7. City of Cedar Park;
8. City of Kyle;
9. City of Lago Vista;
10. City of Lakeway;
11. City of Pflugerville;

12. City of Round Rock;
13. CLEAN Air Force;
14. Movability;
15. Lone Star Clean Fuels Alliance (LSCFA);
16. Lower Colorado River Authority (LCRA);
17. St. Edward's University;
18. TCEQ;
19. Texas Department of Transportation (TxDOT);
20. Texas Lehigh Cement Company;
21. Texas Parks and Wildlife Department (TPWD);
22. Travis County; and
23. Williamson County.

Organizations that did not report as of the date of this report included:

1. CAMPO;
2. CapMetro;
3. Central Texas Regional Mobility Authority (CTRMA);
4. City of Bastrop;
5. City of Bee Cave;
6. City of Elgin;
7. City of Hutto;
8. City of Georgetown;
9. City of Leander;
10. City of Lockhart;
11. City of Luling;
12. City of San Marcos;
13. City of Sunset Valley;
14. City of Taylor;
15. Hays County;
16. Huston-Tillotson University;
17. Federal Highway Administration;
18. Lone Star Chapter of the Sierra Club; and
19. Public Citizen

3.2.1 Emission Reduction Measures

A total of 26 CAC members reported on their implementation of Tier 1 and 2 NO_X emissions reduction measures in 2021. Additionally, 2021 was the first year that CAC members committed to implement $PM_{2.5}$ emission reduction measures. A summary of the number of organizations that implemented each measure is listed below. Organization-specific information is available in the Appendix.

- Tier 1
    - Educating employees about regional air quality and encouraging them to sign up for daily air quality forecasts and Ozone Action Day alerts = **19 organizations**
    - Where feasible, encourage employees to telecommute at least once a week and on all Ozone Action Days = **15 organizations**
    - When employees are not telecommuting, encourage them to take low-emission modes of transportation, such as carpooling, vanpooling, transit, biking, and walking = **14 organizations**

  - Where flexible schedules are allowed, encourage employees to consider work schedules with start times earlier than 8 am rather than later in the morning due to the higher impact of emissions on O_3 levels later in the morning = **17 organizations**
  - Conserve energy, particularly on Ozone Action Days = **16 organizations**
  - Establish and enforce idling restriction policies for use of organization's vehicles, equipment, and property = **14 organizations**
  - Establish fleet management policies that prioritize the use of vehicles and equipment with low NO_X rates = **10 organizations**
  - Educate fleet users on driving and equipment operation practices that can reduce NO_X emissions = **10 organizations**
  - Reschedule discretionary emission-generating activities such as engine testing and refueling to late afternoon rather than the morning, particularly on Ozone Action Days = **10 organizations**
  - Seek funding to accelerate replacement of older, higher-emitting vehicles and equipment with newer, cleaner vehicles and equipment, such as Texas Emission Reduction Plan (TERP) grants = **13 organizations**
- Tier 2
  - Establish low-NO_X purchasing policies for new on-road vehicles, non-road equipment, and stationary equipment = **5 organizations**
  - Establish "green" contracting policies to encourage the use of low-NO_X vehicles and equipment and avoid the use of engines during the morning on Ozone Action Days = **2 organizations**
  - Purchase higher-grade gasoline with lower sulfur content in August and September = **1 organizations**
  - Provide incentives to employees to avoid single-occupancy vehicle commuting, particularly on Ozone Action Days = **3 organizations**
  - Optimize combustion and pollution controls for NO_X reductions, particularly on Ozone Action Days = **2 organizations**
  - Enforce vehicle idling restrictions within the community [either through an ordinance if a city or a memorandum of agreement with TCEQ if a county] = **5 organizations**
  - Educating the public about regional air quality and encouraging them to sign up for daily air quality forecasts and Ozone Action Day alerts = **15 organizations**
- PM2.5 Emission Reduction Measures
  - Reduce PM emissions from construction and demolition activities
    - Implement within own organization's operations = **7 organizations**
    - Encourage or require 3rd party organizations to implement = **6 organizations**
    - Educate and encourage the public at large to implement = **6 organizations**
  - Reduce PM emissions from commercial cooking/charbroiling
    - Implement within own organization's operations = **1 organizations**
    - Encourage or require 3rd party organizations to implement = **1 organizations**
    - Educate and encourage the public at large to implement = **4 organizations**

- Reduce PM emissions from road dust
  - Implement within own organization's operations = **7 organizations**
  - Encourage or require 3rd party organizations to implement = **6 organizations**
  - Educate and encourage the public at large to implement = **6 organizations**
- Reduce PM emissions from mining and quarrying activities
  - Implement within own organization's operations = **1 organizations**
  - Encourage or require 3rd party organizations to implement = **1 organizations**
  - Educate and encourage the public at large to implement = **5 organizations**
- Reducing PM emissions from open burning
  - Implement within own organization's operations = **4 organizations**
  - Encourage or require 3rd party organizations to implement = **3 organizations**
  - Educate and encourage the public at large to implement = **10 organizations**
- Reduce PM emissions or impact of PM emissions from prescribed burning on high PM days
  - Implement within own organization's operations = **3 organizations**
  - Encourage or require 3rd party organizations to implement = **4 organizations**
  - Educate and encourage the public at large to implement = **7 organizations**
- Reduce emissions from mobile sources year-round
  - Implement within own organization's operations = **6 organizations**
  - Encourage or require 3rd party organizations to implement = **3 organizations**
  - Educate and encourage the public at large to implement = **7 organizations**
- Reduce emissions from stationary combustion sources year-round
  - Implement within own organization's operations = **4 organizations**
  - Encourage or require 3rd party organizations to implement = **2 organizations**
  - Educate and encourage the public at large to implement = **5 organizations**
- Installation additional PM2.5 monitors/sensors within the region
  - Implement within own organization's operations = **6 organizations**
  - Encourage or require 3rd party organizations to implement = **4 organizations**
  - Educate and encourage the public at large to implement = **6 organizations**
- Promote awareness of health effects of PM air pollution
  - Implement within own organization's operations = **10 organizations**
  - Encourage or require 3rd party organizations to implement = **5 organizations**
  - Educate and encourage the public at large to implement = **11 organizations**

If these organizations provide data subsequent to this report, CAPCOG will provide an updated version of this report.

3.2.2 Idling Restrictions

The following jurisdictions implement idling restrictions, either with a local ordinance, through a memorandum of agreement (MOA) with TCEQ, or both.

Table 3-13. Jurisdictions Implementing Idling Restrictions in the Austin-Round Rock-Georgetown MSA, 2021

Jurisdiction	Local Ordinance	TCEQ MOA
City of Austin	☒	☐
City of Bastrop	☒	☐
City of Elgin	☒	☐
City of Georgetown	☒	☐
City of Hutto	☒	☐
City of Lockhart	☒	☐
City of Round Rock	☒	☐
City of San Marcos	☒	☐
Bastrop County	☐	☒
Travis County	☐	☒

These idling restrictions are "passive" controls in that the jurisdictions will respond to complaints when they are made, but they don't devote dedicated resources to idling restriction enforcement.

3.2.3 CapMetro Bus Electrification Initiative

As part of its long-term planning efforts, CapMetro has begun the process of converting significant portions of its fleet from diesel to electric. In 2021, the CapMetro board approved the purchase of nearly 200 electric buses, the largest procurement of electric vehicles in the country. Additionally, CapMetro is constructing a new bus yard in North Austin that will have the capacity to accommodate 214 buses and support charging for 187 battery electric buses. Moving forward, CapMetro exclusively will purchase electric buses for fleet replacement.[47]

3.2.4 2021 Update to Austin Energy's Generation Portfolio

In addition to Austin Energy updating its Resource, Generation, and Climate Protection Plan in 2020[48], Austin Energy announced updates to its generation portfolio in 2021[49]. Since Austin Energy both owns generating assets and serves as a retail provider of electricity, its generation plan and portfolio are a significant part of the region's efforts to control air pollution. Highlights of the 2021 update include the following:

- Continuation of Plan to Shut Down Decker Steam Unit 2 in 2022: This was pushed back from 2021, but Austin Energy shut down Decker Power Plant's gas-powered steam unit 2 on March 31, 2022. Austin Energy already met their goal of shutting down steam unit 1 in 2020. Due to its location and high NO_X emissions on high O_3 days (see Section 2.4), despite load-shifting that would be expected to occur that would result in higher output at other fossil-fuel plants in the Electric Reliability Council of Texas (ERCOT) grid, these actions would be expected to significantly reduce peak O_3 concentrations in the next few years.

[47] https://capmetro.org/electricbus
[48] https://austinenergy.com/wcm/connect/6dd1c1c7-77e4-43e4-8789-838eb9f0790d/gen-res-climate-prot-plan-2030.pdf?MOD=AJPERES&CVID=n85G1po
[49] https://austinenergy.com/ae/about/news/news-releases/2021/austin-energy-announces-generation-portfolio-update

- Negotiations Stall Over Shut Down of Austin Energy Share of Fayette Power Project: While Austin Energy had targeted to cease operation of Austin Energy's portion of the Fayette Power Project (FPP) coal plant by the end of 2022, negotiations between LCRA and Austin Energy stalled in 2021. According to Austin Energy, "the terms of the joint ownership arrangement with LCRA are set forth in a Participation Agreement that does not provide a clear path to unilateral shutdown for any of the units at FPP." Austin Energy owns a 50% stake in two of the three units at FPP. LCRA owns the other 50% stakes in those units and a 100% stake in the third unit. As a result of the stalled negotiations, Austin Energy will continue to run its portion of FPP, but it will minimize the scheduled output through use of the Reduce Emissions Affordably for Climate Health (REACH) Plan. REACH considers the cost of carbon in Austin Energy's offers to sell generation from FPP. Use of the REACH strategy will significantly lower carbon emissions from Austin Energy's share of FPP and takes a substantial step toward meeting the carbon reduction goals outlined in the 2030 Plan. Since the REACH strategy will be expected to have the effect of reducing the dispatch of Austin Energy's fossil fuel generating assets within the region, it should also reduce emissions of all other pollutants from these facilities as well. While FPP is outside of the Austin-Round Rock-Georgetown MSA, reduced operations would be expected to reduce background O_3 concentrations coming into the region when winds blow from that direction.

3.2.5 Other Notable Distinctions for Local Communities

This section identifies a number of other distinctions that local communities have received for air quality, climate change, and energy efficiency.

- American Council for an Energy-Efficient Economy (ACEEE) City Clean Energy Scorecard:
  - ACEEE scores 75 US cities on their efforts to achieve a clean energy future by improving energy efficiency and scaling up renewable energy.
  - In 2021, the City of Austin ranked 14th out of all the national cities that were evaluated: https://www.aceee.org/local-policy/city-scorecard
- Bloomberg American Cities Climate Challenge
  - The Bloomberg American Cities Climate Challenge is a $70 million-dollar program that accelerates 25 cities' efforts to tackle climate change and promote a sustainable future for residents.
  - In 2019, the City of Austin won the challenge. Over two years, Austin will be provided with powerful new resources and access to cutting-edge support to help meet or beat its near-term carbon reduction goals: https://www.bloomberg.org/program/environment/climatechallenge/#overview
- STAR Communities:
  - The STAR Community Rating System provides a comprehensive framework and certification program for evaluating local sustainability, encompassing economic, environmental, and social performance measures since its release in 2012.
  - City of Austin is a 4-Star Certified Community, the highest rating of any city in Texas, receiving this designation in 2014: https://reporting.starcommunities.org/communities/5-austin-texas
- SolSmart:

  - Recognizes cities, counties, and regional organizations for making it faster, easier, and more affordable to go solar.
  - The City of Austin is designated as a “Gold”-level designee and the City of Smithville (in Bastrop County) is designated as a “Bronze”-level designate: http://www.solsmart.org/our-communities/designee-map/
- Climate Mayors:
  - A bipartisan, peer-to-peer network of U.S. mayors working to demonstrate leadership on climate change through meaningful actions in their communities.
  - City of Austin, City of San Marcos, City of Manor, and City of Smithville are all members: http://climatemayors.org/about/members/
  - City of Austin also participates in a collaborative electric vehicle purchasing initiative through the Climate Mayors: https://driveevfleets.org/what-is-the-collaborative/

4 ONGOING PLANNING ACTIVITIES

This section documents notable air quality planning milestones and activities completed in 2021.

4.1 CLEAN AIR COALITION MEETINGS

During 2021, there were a total of three Clean Air Coalition meetings:

- February 10, 2021
- May 12, 2021
- November 11, 2021

Significant policy-related actions taken by the CAC in 2021 included:

- A comment letter to TCEQ regarding TCEQ's 2021 Monitoring Network Plan
- Approval of Addendum to 2019-2023 Austin-Round Rock-Georgetown Regional Air Quality Plan

The Clean Air Coalition Advisory Committee (CACAC) met four times:

- January 28, 2021
- April 29, 2021
- July 29, 2021
- October 28, 2021

4.2 PARTICIPATION IN EPA'S ADVANCE PROGRAM FOR PM

In 2020, the CAC voted to participate in EPA's Particulate Matter (PM) Advance Program. EPA's Advance Program promotes local actions in "attainment" areas to reduce O_3 and/or $PM_{2.5}$ to help these areas continue to maintain the NAAQS by encouraging and supporting states, tribes, and local governments that want to take proactive steps to keep their air clean.[50] While the CAC has participated in the O_3 Advance Program for years, the CAC decided also to participate in the PM Advance Program due to the region's PM levels. In 2021, CAPCOG worked on collecting PM emission reduction commitments from CAC members in winter 2021. As a result of the emission reduction measures and PM subcommittee work in 2020, CAPCOG developed the Addendum to 2019-2023 Austin-Round Rock-Georgetown Regional Air Quality Plan . The CAC approved this Addendum at their November 11, 2021 meeting.

The Addendum to 2019-2023 MSA Regional Air Quality Plan is intended to:

1. Include fine particulate matter ($PM_{2.5}$), as a focus of this plan in order to comply with the Plan's two objectives:
    a. Primary objective: maximize the probability of compliance with the NAAQS region-wide; and
    b. Secondary objective: otherwise minimizing the health and environmental impacts of regional air pollution.

[50] For more information, go to: https://www.epa.gov/advance/basic-information-about-advance

2. Update the Plan's end date from December 31, 2023, to December 31, 2026, to account for EPA's announced reconsideration of the 2020 review of the Particulate Matter (PM) National Ambient Air Quality Standards (NAAQS) and the results of the review of the ozone (O_3) NAAQS due in 2025; and

In order to support these objectives, this Plan calls for:

1. Implementation of controls on the direct emissions of $PM_{2.5}$;
2. Outreach, education, and technical support to enhance $PM_{2.5}$ emission reductions;
3. Outreach and education to reduce public exposure to PM when high enough to be considered "moderate" or worse based on the U.S. Environmental Protection Agency's (EPA's) Air Quality Index (AQI);
4. PM monitoring;
5. Other PM research and planning activities; and
6. Policy advocacy.

The Plan identifies regional particulate matter (PM) issues, defines objectives for addressing these issues, establishes strategies for achieving these objectives, and lays out actions that will advance these strategies.

This report is the first year where CAC members reported on their PM emission reduction commitments. Additionally, this report will satisfy the reporting requirements for the EPA Advance Program.

4.3 Statewide and Regional Collaborative Initiatives

CAPCOG participated in several statewide and regional air quality-related initiatives in 2021, which are listed below.

4.3.1 Air Quality, Equity, and EV Working Group

CAPCOG participated in a statewide "Air Quality, Equity, and EV Working Group" that is comprised of staff from other COGs, non-profits, universities, and other stakeholders. The group discusses air quality-related issues as it pertains to general air quality, EVs, and equity. The group met at least monthly in 2021. The exact meeting dates are unavailable due to calendar invitation issues.

4.3.2 SPEER's City Efficiency Leadership Council

CAPCOG participated in the South-central Partnership for Energy Efficiency as a Resource's (SPEER's) City Efficiency Leadership Council (CELC). The CELC is a collaborative network of Texas cities, school districts, and other government entities engaged in partnership and resource exchange in an effort to expand the adoption of energy management best practices in the public sector. CAPCOG participated in quarterly CELC meetings and participated in several CELC webinars.

4.3.3 Texas Clean Air Working Group

CAPCOG participated in Texas Clean Air Working Group (TCAWG) meetings in 2021, as well as a TCAWG Education Subcommittee.

- January 25, 2021 - General TCAWG Meeting
- March 19, 2021 - TCAWG Education Subcommittee Meeting

4.3.4 Technical Working Group for Mobile Source Emissions

CAPCOG participated in the Technical Working Group for Mobile Source Emissions (TWG) meetings in 2021. The TWG meets to discuss Texas transportation issues regarding on-road mobile source emission inventories and transportation policy. CAPCOG attended TWG meetings and trainings on the following dates:

- February 4, 2021 – Quarterly Meeting
- March 24, 2021 – SIP 101 Training
- May 6, 2021 – Quarterly Meeting
- July 8, 2021 – Introduction to MOSERS Training
- August 5, 2021 – Quarterly Meeting
- December 2, 2021 – Quarterly Meeting

4.3.5 Austin Area Sustainability Indicators (A2SI) Project

In 2021, CAPCOG worked in collaboration with the University of Texas at Austin and City of Austin to improve the Austin Area Sustainability Indicators (A2SI) data dashboard. A2SI is an initiative at the University of Texas at Austin that aims is to measure the quality of life and sustainability trends in order to serve as the foundation to address challenges in Central Texas. Indicators describe context, identify trends, and translate data into points that are easier to communicate. These indicators span air quality, population demographics, health, mobility, economy, and the environment. The final A2SI Dashboard is an interactive mapping tool that can be used for a variety of planning needs. The A2SI Dashboard can be viewed at this link, http://www.austinindicators.org/explore-data/.

4.4 Regional Air Quality Technical Research Activities

CAPCOG completed several air quality technical research activities in 2021 including:

- 2020 Austin-Round Rock-Georgetown MSA Air Quality Report
- Monitoring Projects:
  - Continued O_3 and meteorological data collection at eight CAPCOG-owned monitoring stations in the region to supplement the two TCEQ O_3 monitors in the region
  - Installation of PurpleAir PM sensors at all CAPCOG CAMS
  - 2021 Air Quality Monitoring Report
- Modeling and Data Analysis Projects:
  - 2020 Air Quality Monitoring Data Analysis
  - Analysis of Impact of COVID-19 Travel Behavior Change and Air Quality Impacts
- Emission Inventory Project:
  - On-Road Heavy-Duty Vehicle Emissions Inventory Research for the MSA

Reports and data from these projects can be found at https://www.capcog.org/documents/.

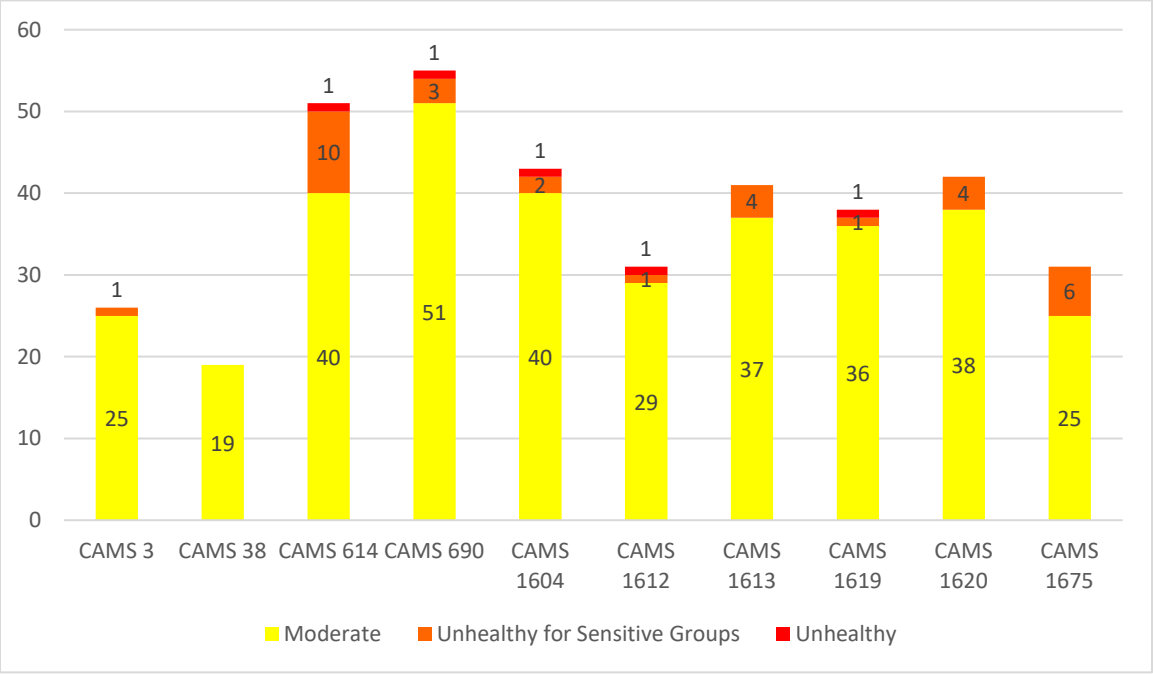
5 PLANNING FOR THE FUTURE

This section details some important issues to note for the region's air quality plan moving forward, including new issues that have arisen between the end of 2021 and the completion of this report.

5.1 A VERY BAD 2022 O_3 SEASON

Despite having relatively mild O_3 seasons the last few years, 2022 so far is shaping up to be a very bad O3 season for the Austin area, with the region experiencing 13 days with 8-hour O_3 levels over 70 ppb, and 2 days with 8-hour O_3 levels over 85 ppb, and we still have half of August and all of September and October to go before we can expect to be done with seeing O_3 over 70 ppb. The following figure shows the number of "moderate," "unhealthy for sensitive groups," and "unhealthy" days recorded at each monitoring station through the end of July 2022. The highest 8-hour O_3 value recorded in the region in a long time occurred on June 29, 2022, when the Lockhart monitor recorded an 8-hour average of 98 ppb, which would be uncommon enough anywhere in the region, but especially at that site, which tends to be an upwind site most of the time. The season started out particularly rough – with three "orange" O_3 days in March right at the beginning of the O_3 season and significantly earlier than the region is accustomed to seeing O_3 that high.

Figure 5-1. High O_3 Days by Monitor in 2022 through August 10



The only site to not record an 8-hour O_3 average over 70 ppb so far has been CAMS 38, which will remain the region's O_3 monitor of record for the 2020-2022 monitoring period due to CAMS 3 being out of commission most of 2020. The following table summarizes the 4th-highest 8-hour O3 averages at each monitoring station in the region for 2020-2022 through August 10, 2022. While CAPCOG's two regulatory monitors do not have fourth highest 8-hour O_3 values very different from 2021, three of

CAPCOG's eight sites show 4th-highest values over 70 ppb in 2022 already, with the three-year average for CAMS 614 right at 70 ppb.

Table 5-1. 2020-2022 Fourth Highest MDA8 O_3 at Austin Area Monitoring Stations to Date

Site	2020 (ppb)	2021 (ppb)	2022 to 8/10 (ppb)	2020-2022 Avg. to 8/10/22 (ppb)
CAMS 3	*46	66	66	*59
CAMS 38	63	65	63	63
CAMS 614	66	69	75	70
CAMS 690	64	65	71	66
CAMS 1604	59	63	69	63
CAMS 1605	56	57	51	54
CAMS 1612	59	64	67	63
CAMS 1613	61	63	69	64
CAMS 1619	63	62	67	64
CAMS 1620	n/a	59	70	**64
CAMS 1675	61	63	73	65
CAMS 6602	61	n/a	n/a	**61

*CAMS 3's 2020 value represents an artificially low value due to it not operating during almost the entire 2020 O_3 season.

**The CAMS 1620 and 6602 averages represent 2-year and 1-year values, respectively

These data suggest that despite the long-term trends in reduce O_3 pollution in the region, it remains a problem for the region that can become acute quickly during a single O_3 season if the weather is highly conducive to O_3 formation as it appears to be this year. 2022 is on track to be as bad if not worse than the 2011 O_3 season, when the region recorded 20 days when O_3 exceeded 70 ppb.

5.2 EPA Reconsideration of NAAQS for O_3 and $PM_{2.5}$

Two of the key issues that CAPCOG is tracking is EPA's reconsiderations of its decisions in late 2020 to retain the 2012 PM NAAQS and 2015 O_3 NAAQS. Some of the ranges being considered for these NAAQS could put the region at risk of being designated nonattainment at some point in the coming years.

5.2.1 $PM_{2.5}$ Reconsideration

On June 10, 2021, EPA announced that it will reconsider the previous administration's decision to retain the PM NAAQS. According to EPA, "available scientific evidence and technical information indicate that the current standards may not be adequate to protect public health and welfare, as required by the Clean Air Act."[51] EPA is aiming to make a proposal in Summer 2022 with finalization in 2023, at the time of this report the proposal is still pending. Assuming EPA revises the PM NAAQS, the designation process would go from 2023 – 2025.

[51] https://www.epa.gov/newsreleases/epa-reexamine-health-standards-harmful-soot-previous-administration-left-unchanged

The Clean Air Scientific Advisory Committee (CASAC) began meeting in fall 2021 to receive EPA updates and review the relevant policy and scientific materials. On March 18, 2022, the CASAC PM Panel released their Final Review of the EPA's Policy Assessment (PA) for the Reconsideration of the NAAQS for PM[52]. In that Review, the CASAC made the following statements regarding the $PM_{2.5}$ standards:

- "Regarding the annual $PM_{2.5}$ standard, all CASAC members agree that the current level of the annual standard is not sufficiently protective of public health and should be lowered."
    - However, the level of the annual $PM_{2.5}$ standard recommendation is debated.
        - A majority of the CASAC recommended a range of 8-10 $\mu g/m^3$.
        - A minority of the CASAC recommended a range of 10-11 $\mu g/m^3$.
    - Based on the EPA, the MSA's annual $PM_{2.5}$ design value is 9.5$\mu g/m^3$ for 2019-2021.
- "Regarding the 24-hour $PM_{2.5}$ standard, the majority of CASAC members find that the available evidence calls into question the adequacy of the current 24-hour standard."
    - A range of 25-30 $\mu g/m^3$ for the 24-hour $PM_{2.5}$ NAAQS was recommended by the CASAC.
    - Based on the EPA, the MSA's 24-hour $PM_{2.5}$ design value remains 22 $\mu g/m^3$ for 2019-2021.

5.2.2 O_3 Reconsideration

On November 1, 2021, EPA announced that it will reconsider the previous administration's decision to retain the O_3 NAAQS.[53] EPA is targeting the end of 2023 to complete this reconsideration. On April 29, 2022, the CASAC and the CASAC O_3 Panel met to receive to receive presentations from EPA staff on the Draft O_3 PA.[54] On page 3-102 of the draft PA, EPA staff make the following preliminary conclusions for the primary O_3 standard.

- Regarding health effects, "the available evidence and exposure/risk information does not call into question the adequacy of protection provided by the existing standard or the scientific and public health judgments that informed the 2020 decision to retain the current standard, which was established in the 2015 review."
- "Accordingly, we conclude it is appropriate in this reconsideration of the 2020 decision that consideration be given to retaining the current primary standard of 0.070 parts per million (ppm) O_3, as the fourth-highest daily maximum 8-hour concentration averaged across three years, without revision."
    - Based on the EPA, the MSA's O_3 design value was lowered to 0.063 ppm for 2019-2021.

The CASAC is scheduled to meet in September 2022 to discuss the findings of this draft PA and to receive public comment. However, this meeting was delayed from June 2022 so that the CASAC could

[52]EPA, CASAC Review of the EPA's Policy Assessment for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (External Review Draft – October 2021), EPA-CASAC-22-002, https://casac.epa.gov/ords/sab/f?p=113:18:3535904573143:::RP,18:P18_ID:2607#report

[53] https://www.epa.gov/ground-level-ozone-pollution/epa-reconsider-previous-administrations-decision-retain-2015-ozone

[54] EPA, Policy Assessment for the Reconsideration of the Ozone National Ambient Air Quality Standards (External Review Draft), April 2022, https://casac.epa.gov/ords/sab/apex_util.get_blob?s=16421065551082&a=113&c=38573346139779440&p=19&k1=2477&k2=&ck=Th47CIAO9f4c-uVPum5HPnt4Uef7ub1Kp9kdXrk1qa34V-drx62pUpyR6MNH9QPmzNqeScTyiH9PM3DexxoMQA&rt=IR

determine if studies outside of the draft PA should be analyzed. It is possible that the CASAC may make a different recommendation to EPA as this reconsideration process continues in 2022 and 2023.

5.3 Rider 7 Grant Program

The "Rider 7 Grant Program" refers to Rider 7 to the TCEQ's budget, which directs the agency to award $4.5 million in grants for local/regional air quality planning in "near-nonattainment areas" for O_3-related monitoring and emissions inventory research. For the 2020-2021 biennium, CAPCOG received $281,250 in grant funding for the Austin area. However, due to a change in the Rider for the 2022-2023 biennium, funding increased to ~$1,009,018.93 for the Austin area for the 2022-2023 biennium. Funding remains restricted to O3-related monitoring and emissions inventory development, so CAPCOG plans to use the increase funding to continue operating CAPCOG's existing eight O_3 monitoring stations, establish two new O_3 monitoring stations in Kyle (Hays County) and Taylor (Williamson County), enhance quality control (QC) at CAMS 1605 at St. Edwards University, and use the balance of the funding for emissions inventory development. One notable project CAPCOG expects to proceed with in fall 2022 is to fund the installation and maintenance of fleet monitoring software that can be used to develop fleet-specific emissions inventories for CAC members – CAPCOG plans to dedicate approximately $325,000 for that effort.

On August 10, 2022, the TCEQ approved its 2024-2025 Legislative Appropriation Request (LAR), which included continuation of the Rider 7 grant program, while removing El Paso County from the areas eligible for Rider 7 funding next biennium due to its recent designation as a nonattainment area for the 2015 O_3 NAAQS. Due to the funding formula in the Rider, the Austin area's continued rapid growth relative to other near-nonattainment areas, and the remove of El Paso from the list of eligible areas, CAPCOG estimates the Austin area could receive as much as an additional $300,000 - $400,000 in funding for the 2024-2025 if the Rider is approved by the Legislature. One of the key issues CAPCOG will be tracking is whether the Legislature considers expanding the use of this funding to allow for it to be used on a wider variety of activities that can currently only be funded using local funding, including monitoring data analysis, modeling, control strategy analysis, and general air quality planning, as well as whether it might be expanded to cover PM as well, in light of EPA's pending proposal on the PM NAAQS.

5.4 Texas Emission Reduction Plan

As mentioned in Section 3.1.2, the Legislature passed landmark TERP legislation in 2019 (HB 3745) in that is intended address the continued growth of -the TERP account due to under-appropriation of funds for grants ($155 million for 2020-2021) relative to the revenues collected (over $550 million for the 2020-2021 biennium), which has resulted in a fund balance approaching $2 billion that has accumulated since 2001. The legislation extended all TERP revenue provisions until all areas of the state are designated "attainment" for all O_3 NAAQS. This would coincide with when the authorization for awarding grants would end, would establish a new "TERP Fund" that would receive all TERP revenue collected after August 31, 2021, and enable TCEQ to award funds out of the fund without needing to go through the appropriations process. This change was expected to dramatically increase the amount of funding available for the TERP program starting in state FY 2022 (i.e., 9/1/2021 – 8/31/2022).

During the 2021 regular legislative session, the Legislature passed HB 4472, which redirected 35% of the funding that would be deposited into the TERP Fund to go to TxDOT's State Highway Fund (SHF) on projects that reduce congestion and improve air quality. The fiscal note attached to the bill estimated that this would redirect $90 million to TxDOT in FY 2022, $92 million in FY 2023, $93 million in FY 2024, $95 million in FY 2025, and climbing to $96 million in FY 2026. TxDOT is required to provide a report to the Legislature each year on October 1st for projects funded using these resources in the prior 10 years. Since that milestone has not yet been reached, no data is yet available.

TCEQ's FY 2023 operating budget for TERP is shown in the table below. An estimated $167-$170 million is available for each fiscal year 2022-2023, representing more than double the amount available in FY 2021. These additional funds should be able to increase the amount of emission reductions achieved within the Austin area in future years.

Table 5-2. FY 2021-2023 TERP Funding by Program

Program	FY 2021[55]	FY 2022[56]	FY 2023
DERI	$30,169,911	$81,824,975	$80,733,250[57]
Administration	$8,000,000	$13,301,961	$16,000,000
Regional Air Monitoring	$3,000,000	$3,000,000	$3,000,000
Clean School Bus	$3,094,795	$6,799,558	$6,591,000
Alt. Fueling Facilities	$6,000,000	$6,000,000	$6,000,000
Texas Clean Fleet	$3,868,493	$8,499,448	$8,238,750
Texas Nat. Gas Vehicle Grant Program	$7,736,987	$16,998,896	$16,477,500
Light-Duty Motor Vehicle Purchase or Lease Incentive Program	$3,868,493	$8,499,448	$8,238,750
Port Authority Studies and Pilot Projects	$500,000	$500,000	$500,000
Governmental Alternative Fueling Fleet	$3,000,000	$5,099,669	$2,389,335
New Technology Implementation Grant	$2,321,096	$5,099,669	$4,943,250
Seaport and Rail Yard Areas Emissions Reduction	$4,642,192	$10,199,338	$9,886,500
Health Effects Study	$200,000	$200,000	$200,000
Research	$750,000	$750,000	$750,000
Energy Systems Lab	$216,000	$216,000	$216,000
Research for Demonstrations to EPA	n/a	$2,500,000	$2,500,000
Air Quality Planning	$500,000	$500,000	$500,000
Total	**$77,871,767**	**$169,988,962**	**$167,164,335**

[55] As appropriated

[56] From TCEQ's FY 2022 operating budget

[57] From TCEQ's FY 2023 operating budget

5.5 Enhanced Monitoring Grant Application

In early 2022, CAPCOG applied for funding under the American Rescue Plan (ARP) Enhanced Monitoring Grant program for $PM_{2.5}$ monitoring. CAPCOG applied for two separate grants:

- 1 application for speciated $PM_{2.5}$ monitoring at one location within the region from 2023-2025; and
- 1 application for continuous $PM_{2.5}$ monitoring at seven locations within the region from 2023-2025.

CAPCOG is currently awaiting word on whether either or both of these applications were approved. If either grant was approved, CAPCOG could significantly enhanced PM2.5 monitoring within the region over the next several years.

6 CONCLUSION

In general, 2021 air quality conditions in the Austin metro were like those in 2020. There were a few more days which reach moderate or worse AQI levels in 2021 compared to 2020, however, from a regulatory perspective both the 8-hr ozone and annual $PM_{2.5}$ design values dropped. Emissions in the region dropped compared to previous years, which is largely due to Austin Energy shutting down the Decker Creek Power Plant's steam unit 1 in October 2020. This decrease in emissions from Decker is expected to continue since Decker shutdown steam unit 2 in 2022. In addition, on-road emissions dropped in 2021, this attributable to emissions reductions from heavy-duty commercial trucking and passenger vehicles. There was an increase in vehicles inspected in Travis and Williamson County indicating that while the region grows, improvements in vehicle emissions may be enough to see continued decreases in on-road emissions.

It will be important to monitor $PM_{2.5}$ concentrations in the region. The PM NAAQS are current under reconsideration and there is a possibility that the region could be closer to or exceeding the standard in the near future. Compared to O_3 there has been a lot less investment in PM planning monitoring efforts in the region and thus there is a lot more uncertainty about the conditions that lead to greater PM levels.

In addition, it will be important to continue to monitor O_3 levels in the region. The O_3 NAAQS are also under reconsideration and though it is less certain that the standards would be lowered, there is still that possibility. In addition, there was only one day at TCEQ's CAMS 3 which measured high O_3 levels and none at TCEQs CAMS 38, while there were three at CAPCOG's CAMS 614. This highlights the importance of having more monitors across the entire region.

Moving forward, CAPCOG and the CAC should work to:

- Expand the monitoring network for both $PM_{2.5}$ and O_3 in the region.
- Promote activities that reduce NO_x emissions in the region.
- Work to better understand PM emission in the region.
- Continue to monitor regulatory activities at the state and federal levels.

7 APPENDIX

CAC members reported on their implementation of Tier 1 and 2 emissions reduction measures in 2021. Organization-specific measures and information that were implemented is provided in this Appendix as an Excel workbook.

2021 Clean Air Coalition Membership Actions Survey Results