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# MEMORANDUM
## April 24, 2020

**TO:** **Clean Air Coalition and Clean Air Coalition Advisory Committee**

**FROM:** **Andrew Hoekzema, CAPCOG Director of Regional Planning and Services**

**RE:** **Analysis of Potential Impacts of COVID-19 Crisis on Regional Air Quality**

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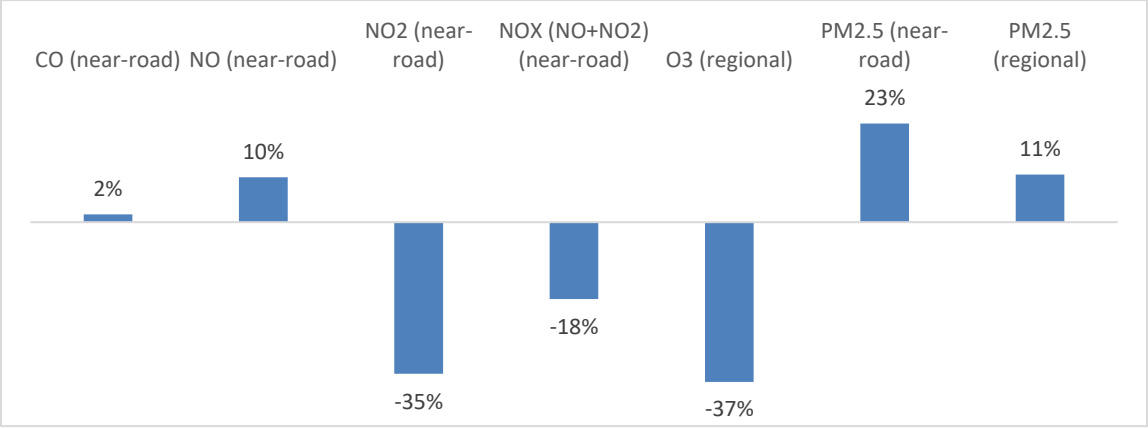
In the past few weeks, CAPCOG has fielded many inquiries about the impact of COVID-19 and associated changes in behavior on air quality. While the question seems straight-forward enough, answering the question is more difficult that it might seem. Data collected at Texas Commission on Environmental Quality's (TCEQ's) local air pollution monitoring stations show lower concentrations of nitrogen dioxide ($NO_2$) and ozone ($O_3$) during the last two weeks of March 2020 than were observed during the same two weeks of March from 2017-2019. This is consistent with the roughly 50% decrease in regional vehicle traffic. Satellite data also show lower $NO_2$ concentrations across eastern Texas and in metro areas across the country. However, local monitors also showed higher concentrations of carbon monoxide (CO), nitric oxide (NO), and fine particulate matter ($PM_{2.5}$).

*Figure 1. Average Air Pollution Concentrations, March 18 - 31, 2020, compared to same dates, 2017-2019*




There are many different reasons why these concentrations might be higher or lower than during same two-weeks from 2017 – 2019. These include differences in meteorology, changes in average vehicle emissions rates due to fleet turnover, and variations in power plant emissions, among others. For example:

- Average solar radiation levels (i.e., sunlight at ground level) were 38% lower due to cloud cover, etc., which would have led to lower $O_3$ levels;

- Average wind speeds were 14% slower, which can lead to higher air pollution concentrations;
- Projected on-road $NO_X$ emissions in the region in 2020 were 20% lower in 2020 than they were from 2017-2019 under "business as usual" scenarios due to federal vehicle standards; and
- From March 18– March 31, 2020, local power plant $NO_X$ emissions were about double what they averaged for the same two weeks from 2017 – 2019, despite regional electricity demand being only 5% higher.

While we can be sure that regional air pollution levels from March 18 – 31, 2020, were better than they would have been if traffic had been higher, we can't draw a straight line between a 50% reduction in vehicle traffic and a 20% reduction in ambient $NO_X$ concentrations any more than we could draw a straight line between that same reduction in vehicle traffic and the increases in CO and $PM_{2.5}$ concentrations. Due to its impact on $O_3$, the main focus of our region's air quality plan is to reduce $NO_X$ emissions, and what we can say is that the $NO_X$ emissions reduction from reductions in on-road vehicle activity likely outweighed the increase in power plant $NO_X$ emissions. On balance, $NO_X$ emissions for these two weeks were likely about 10-16% lower than expected in a "business as usual" scenario. This reduction in $NO_X$ emissions is consistent with, and contributed to, lower observed ambient concentrations of $NO_2$, $NO_X$, and $O_3$. However, it would require complex regional air quality modeling to get a more definitive idea of the exact extent this impact, or to differentiate the impact of local changes in traffic from the impact of changes in traffic across the state and country.

Since on-road sources account for only a small fraction of the region's direct $PM_{2.5}$ emissions (about 7%) and the Austin area's $PM_{2.5}$ concentrations can be heavily influenced by natural sources and background levels coming into the region, the fact that there were higher $PM_{2.5}$ concentrations observed during these two weeks than the data showed in 2018 or 2019 does not mean that $PM_{2.5}$ concentrations aren't lower than they would have been with the extra vehicle traffic. It is harder to explain the lack of a reduction in ambient near-road CO concentrations compared to prior years, since on-road sources account for about 58% of all on-road sources of CO emissions within the region, and we would have expected on-road sources of CO to be about 6% lower than they were from 2017 – 2019 due to federal engine standards. The most likely explanation is year-to-year variability in meteorology.

From a policy standpoint, there are also some important points to consider regarding telecommuting:

- Telecommuting has double-benefits for air quality by both eliminating emissions from the commuter's vehicle and *other* vehicles by reducing congestion on the roads;
- The large number of people that have been able to shift to telecommuting full-time in recent weeks does suggest that increased use of telecommuting can be an important regional air quality strategy;
- A 50% reduction in vehicle activity may not mean a 50% reduction in $NO_X$, since personal vehicles make up about 90% of the region's vehicle activity, but only about 50% of the on-road $NO_X$ emissions; and
- We don't know what share of the roughly 50% reduction in vehicle traffic can be attributed to telecommuting at this stage versus other factors, such as the cancellation of large events like SXSW and the Austin Rodeo, increased unemployment, and fewer trips to bars, restaurants, and other local businesses that are closed due to the virus.

Since we are only at the beginning of the $O_3$ season, it is hard to know what impact these changes may have on our overall $O_3$ levels for the year. CAPCOG will continue to review an analyze data as it becomes available and keep the CAC and CACAC informed of our analyses.