Written Testimony of
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Before the United States House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Environment

"San Antonio Ozone Levels and the Impact of International Emissions and Transport"
June 21, 2018
10:00 a.m.

2321 Rayburn House Office Building

I am Diane Rath, Executive Director of the Alamo Area Council of Governments. I am pleased to appear today to provide the Committee information on the history of public and private partnerships that have helped reduce ozone concentrations in the San Antonio-New Braunfels Metropolitan Statistical Area (MSA) over the years, and how background ozone, international emissions, and ozone transport contributes to San Antonio's ozone levels.

The San Antonio-New Braunfels MSA has experienced significant improvement in its ozone levels in the last several years, with nearly a 20% decline in design value from 91 parts per billion (ppb) in 2004 to 73 ppb in 2016.[1] These improvements occurred despite a population increase of over 568,000 across the 8-county MSA during that period.[2,3] The MSA consists of Atascosa, Bandera, Bexar, Comal, Guadalupe, Kendall, Medina, and Wilson Counties. San Antonio is currently the largest city in the country with an attainment designation. The City of San Antonio, located in Bexar County, added the most people of any city in the United States (US) between 2016 and 2017,[4] and high population growth is expected to continue in the region for the foreseeable future.

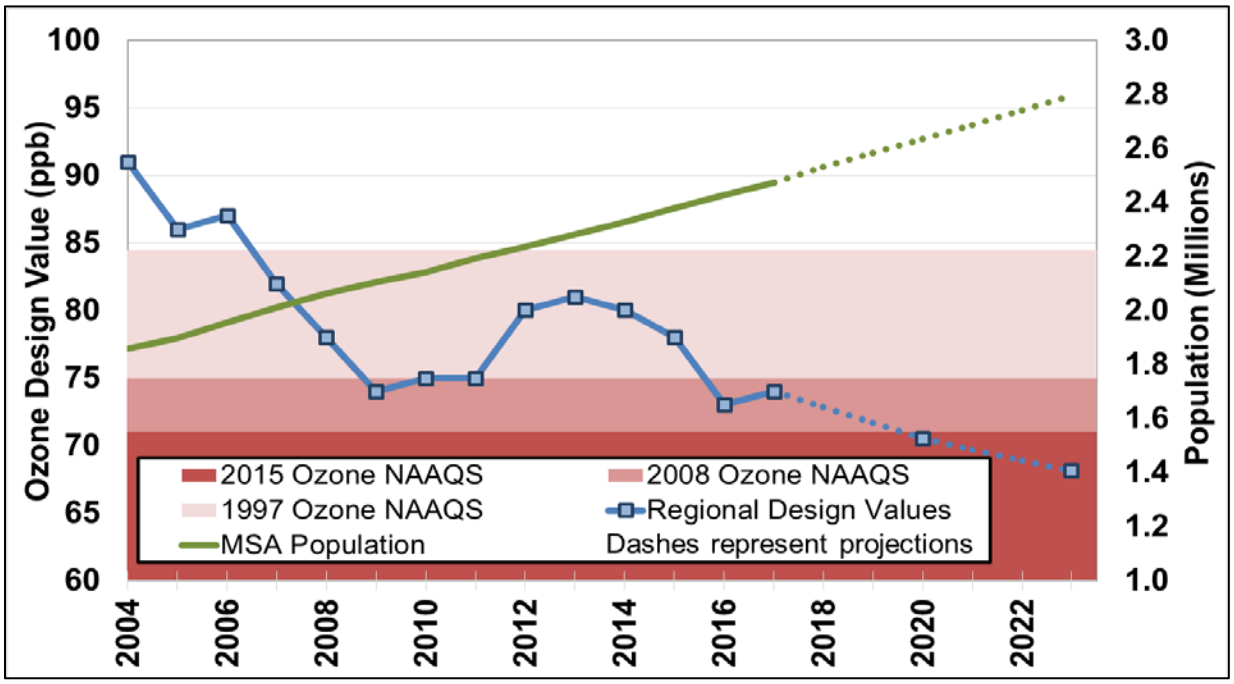

Figure 1: Design Value and Population Trend and Projections for San Antonio, 2004-2023[5,6]

[1] TCEQ. "Compliance with Eight-Hour Ozone Standard." Austin, TX. Available online: https://www.tceq.texas.gov/cgi-bin/compliance/monops/8hr_attainment.pl. Accessed June 7, 2018.

[2] U.S. Census Bureau, April 2017. "County Intercensal Tables: 2000-2010." Available online: https://www2.census.gov/programs-surveys/popest/tables/2000-2010/intercensal/county/co-est00int-01-48.xls. Accessed June 7, 2018.

[3] U.S. Census Bureau. American Fact Finder, March 2018. "Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017 - United States -- Metropolitan Statistical Area; and for Puerto Rico 2017 Population Estimates." Available online: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk. Accessed June 7, 2018.

[4] O'Hare, Peggy. (2018) 'City's population growth largest in nation, census data shows', *San Antonio Express-News*, May 23. Available online: https://www.expressnews.com/news/local/article/City-s-population-growth-largest-in-nation-12939249.php. Accessed June 7, 2018.

[5] Texas Demographic Center. "2014 Texas Population Projections by Migration Scenario Data Tool." Available online: http://txsdc.utsa.edu/Data/TPEPP/Projections/Tool?fid=59C8EB01DC924235BC194ED95001697F. Accessed June 11, 2018.

[6] Assumes population change due to migration at a rate equal to the 2000-2010 migration rate

Another testament to the improvement of ozone levels in San Antonio is in the number of days when any monitor exceeded an 8-hr average over 70 ppb in 2017 compared to the 2010-2017 annual average. These are days classified by the Air Quality Index (AQI) as "Unhealthy for Sensitive Groups." In 2017, there were only five such days at regulatory monitors, compared to a 2010-2017 average of twelve. There were 49 days with moderate ozone as classified by the AQI (8-hr average ozone above 54 ppb) in 2017, while the 2010-2017 average is 64 days per year.

The region's success in improving ozone levels is due in large part to local voluntary public and private partnerships to reduce ozone precursor emissions. Some of these efforts include:

- Bexar County and Cities of San Antonio, Leon Valley, and Seguin Anti-Idling Ordinances;
- CPS Energy's Save For Tomorrow Energy Plan (STEP) to reduce demand for electricity generated by coal-fired power plants, equal to shutting down a medium-sized coal plant;
- CPS Energy met its goal of 1,500 megawatts (MW) of renewable energy capacity two years ahead of schedule through the management and expansion of a diverse energy generation portfolio, including wind, rooftop solar, and utility-scale solar; the 1,500 MW amounts to 20% of CPS Energy's total generation capacity;
- Participating in the Texas Emission Reduction Program (TERP) to facilitate turnover of older and dirtier diesel engines; engage in community outreach to spread awareness of TERP among local industry and business leaders;
- Installing selective non-catalytic reduction at cement kilns in Bexar and Comal Counties;
- Equipment and lighting retrofits by San Antonio Water System (SAWS) using incentives from CPS Energy's Commercial Energy Efficiency Program; SAWS biogas capture from new Dos Rios water treatment facility;
- City of San Antonio ban on coal tar sealants; San Antonio is the largest city in the country with such an ordinance;
- VIA Metropolitan Transit (VIA) began converting its diesel bus fleet to compressed natural gas (CNG) in April 2017; VIA's new CNG fueling facility is the largest in North America; and
- Investments in the latest technology by both the energy industry in the Eagle Ford shale and the cement industry to reduce emissions.

One example of technology employed by the cement industry to reduce emissions is the implementation of SkyMine® technology. Developed at San Antonio's Southwest Research Institute and implemented in September 2015, SkyMine® removes carbon dioxide (CO_2), sulfur oxides (SO_X), and nitrogen oxides (NO_X) from industrial waste streams and transforms them into marketable products like baking soda, bleach, and hydrochloric acid. The Capitol Aggregates cement plant in San Antonio was the first facility in the U.S. to use this technology. SkyMine® requires 30% less energy to operate compared to traditional carbon removal techniques.[7]

Future improvements to local ozone levels will continue to occur as CPS Energy's Deely Units 1 and 2 will be retired in 2018, resulting in over seven tons of NO_X reduced per summer day. Two other large coal-fired plants in central Texas were retired in January 2018. In addition, VIA has committed to convert its entire diesel bus fleet to CNG by 2020.

[7] Capitol Aggregates, Inc. "Capitol Skymine®: Pro-Business, Pro-Environment." Available online: http://www.capitolaggregates.com/s/Sustainability-Skyonic. Accessed June 7, 2018.

Thanks to these united efforts to reduce ozone precursors, photochemical modeling reviewed by the US Environmental Protection Agency (EPA) and the Texas Commission on Environmental Quality (TCEQ) projects that Bexar County monitors will meet the 2015 ozone NAAQS by 2020, which is earlier than would be required under a marginal nonattainment designation. Every regulatory monitor in the area (CAMS 23, CAMS 58, and CAMS 59) is projected to be well below the 2015 standard by 2023.

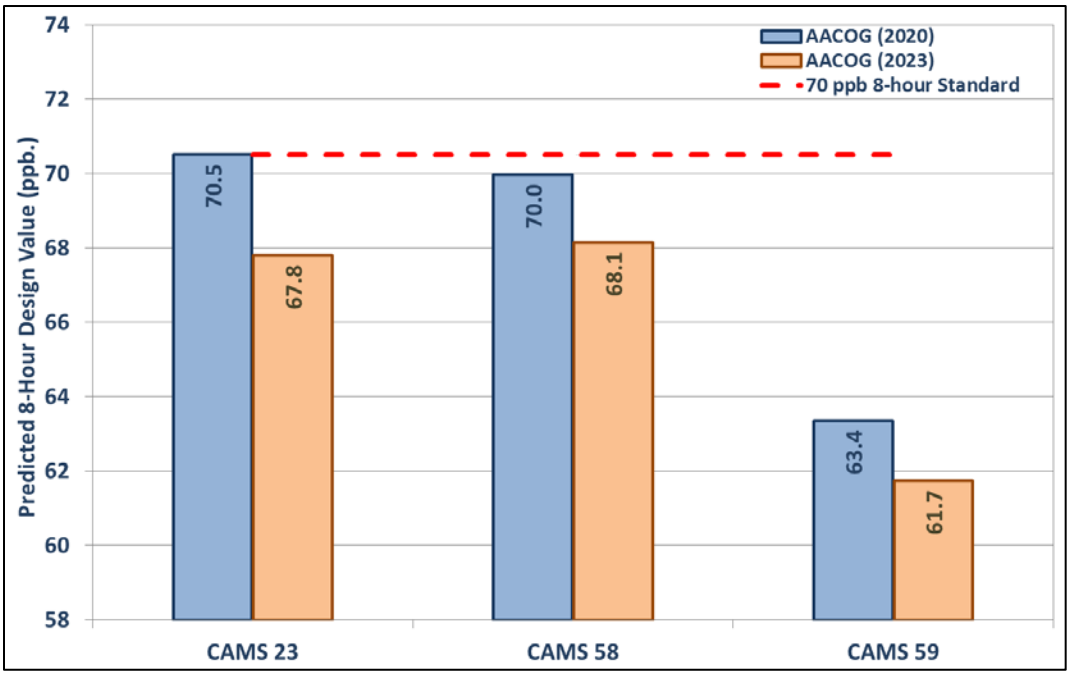

Figure 2: Projected Change in San Antonio-New Braunfels MSA Eight-Hour Design Values with a 2017 Base Line, 2020 and 2023[8]

Photochemical modeling can be used to estimate the contribution from other geographic areas to ozone levels at a given location using the Anthropogenic Precursor Culpability Assessment (APCA). APCA analysis suggest that in 2017, the maximum local contribution to San Antonio's ozone at Camp Bullis C58 on days > 60 ppb was 12.86 ppb, or 20.5%. This means that 79.5% of San Antonio's ozone is caused by emissions and transport from outside the San Antonio-New Braunfels MSA, that is, outside of local control.

[8] AAMPO, November 2017. "Ozone Analysis of the 2012 Ozone Season Photochemical Modeling Episode." P. 8-7. San Antonio, TX.

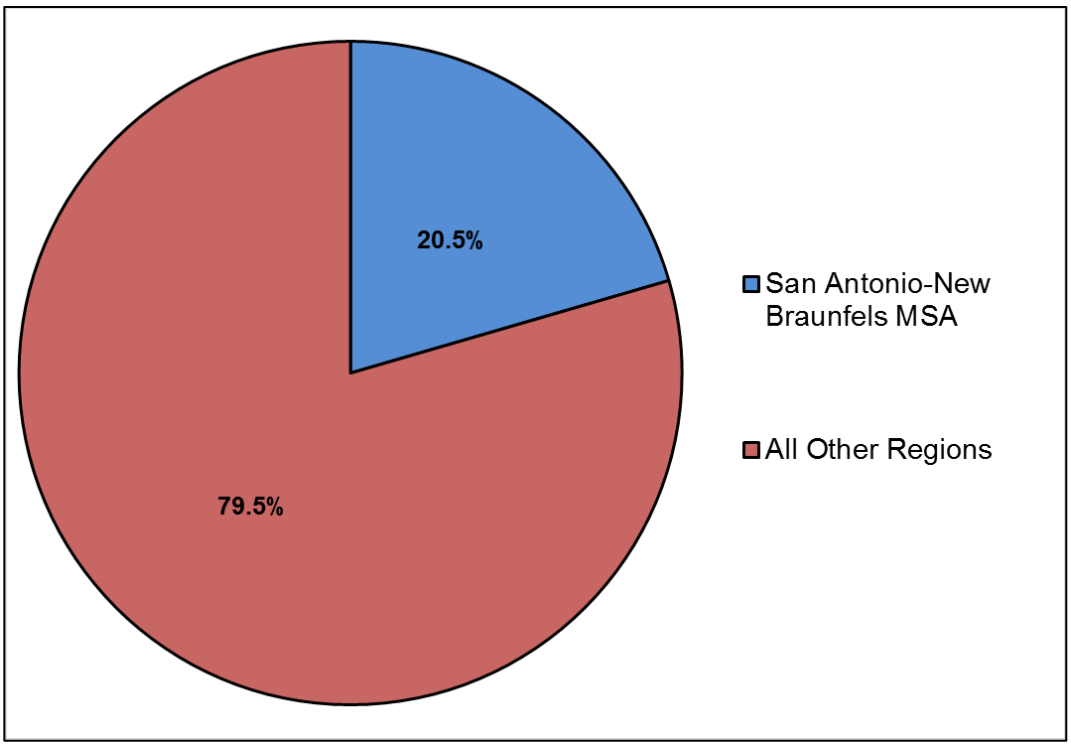

Figure 3: Local vs. Transported Ozone Measured at CAMS 58 Camp Bullis, 2017[9]

A further breakdown of San Antonio ozone contribution reveals that 24.05 ppb, or 38.4% of San Antonio's ozone on days > 60 ppb originates from international sources. Specifically, these are ozone precursors or ozone located outside of the black box labeled "RPO 36 km".

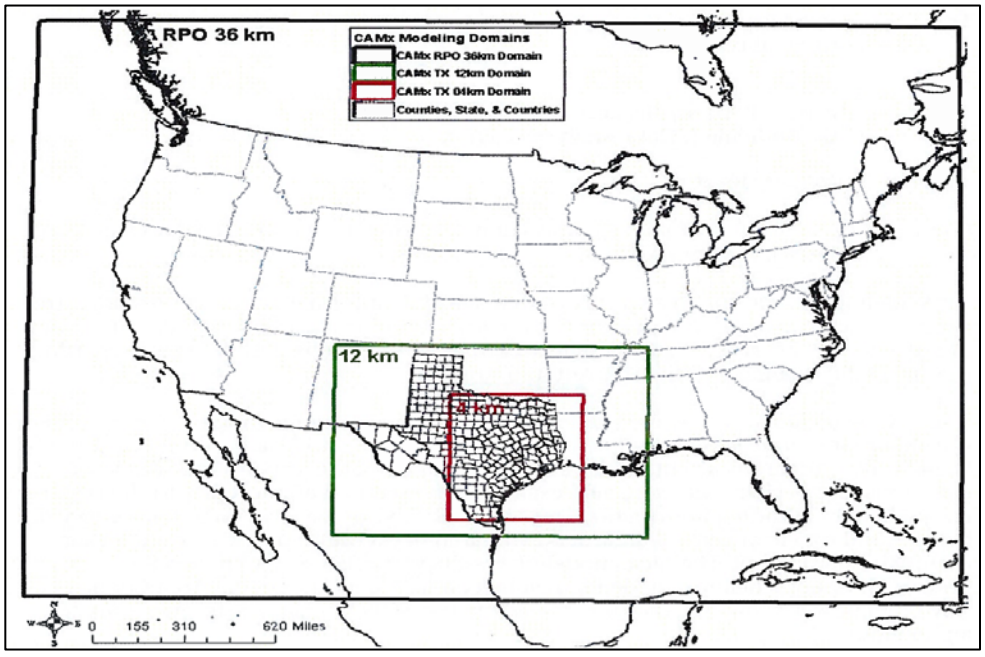

Figure 4: Nested Photochemical Modeling Grids for Ozone Season 2012 Episode[10]

[9] AACOG, March 2018. "International Contribution to Local Ozone in the San Antonio-New Braunfels MSA, 2017 and 2023." San Antonio, TX. Email correspondence to TCEQ.

[10] TCEQ. "Texas Air Quality Modeling – Domains". Austin, Texas. Available online: http://www.tceq.texas.gov/airquality/airmod/rider8/modeling/domain. Accessed June 7, 2018.

It is estimated that areas within Texas (including the San Antonio-New Braunfels MSA) contribute to 36.6% of San Antonio's ozone. Areas outside Texas but within the modeling domain (including southern Canada, northern Mexico, the northwest Caribbean, and adjacent offshore areas) contribute 25% to San Antonio's ozone. A summary of modeled contribution to San Antonio area ozone by geographic region is provided in Figure 5.

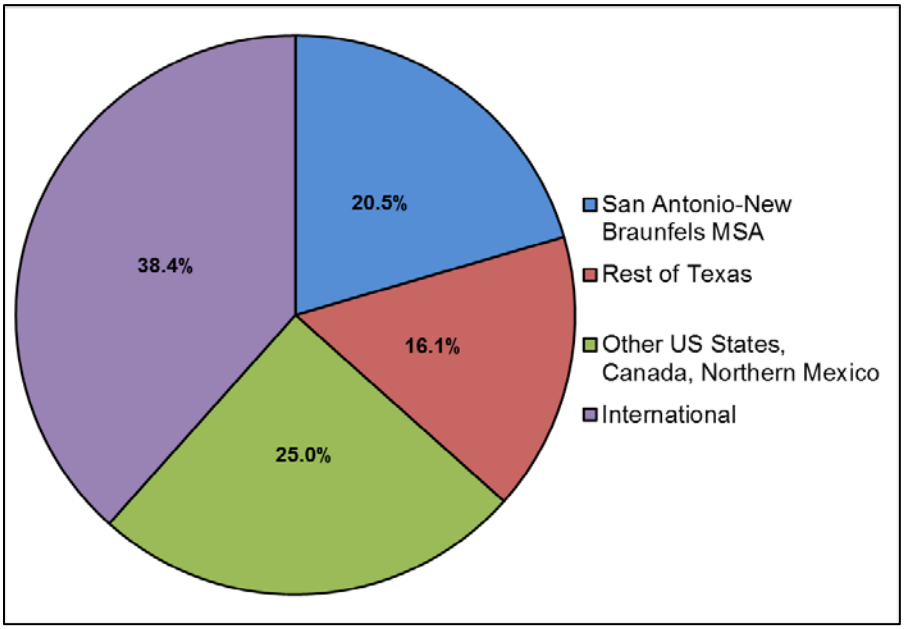

Figure 5: Projected Contribution to San Antonio Maximum Ozone at Camp Bullis CAMS 58 by Geographic Region on Days > 60 ppb, 2017 [11]

Daily local meteorological observations during high ozone events show that elevated ozone levels typically occur in the days following the passage of a frontal boundary. In the absence of large-scale weather features like fronts, southeasterly flow dominates. This flow regime transports relatively clean air (< 55 ppb ozone) from the Gulf of Mexico over the San Antonio region. When a front passes through south Texas, northerly winds transport relatively dirty continental air containing ozone and ozone precursors from major metropolitan areas and heavily-traveled transportation corridors like Interstate 35. Under these conditions, ozone concentrations typically rise to moderate levels (55-70 ppb). As frontal boundaries either dissipate or continue to move south away from the region, high pressure in the southeastern U.S. becomes reestablished, and southeasterly flow begins to return to the San Antonio region. The highest ozone levels coincide with this flow transition from northerly to southeasterly, which is most pronounced at the Camp Bullis CAMS 58 monitor. Wind roses comparing morning and afternoon wind direction and speed at CAMS 58 on high ozone days clearly show this flow reversal (Figure 6). Ozone levels fall back to below moderate levels about a day after southeasterly flow returns.

[11] AACOG, March 2018. "International Contribution to Local Ozone in the San Antonio-New Braunfels MSA, 2017 and 2023." San Antonio, TX. Email correspondence to TCEQ.

Landfalling tropical cyclones in the southeastern U.S. can also cause a spike in local ozone levels by creating a similar flow reversal pattern seen after a frontal passage. When San Antonio is west of a large cyclonic (counterclockwise) circulation, northerly winds are observed locally. As the weakening tropical cyclone moves farther inland and away from San Antonio, its influence on local weather diminishes, and southeasterly flow returns, initiating a high ozone event. The most recent such occurrence was Hurricane Irma in September 2017, whose landfall in Florida on September 10 triggered a high ozone event in San Antonio on September 13. Other meteorological characteristics that are conducive to high ozone in San Antonio are low humidity, weak or variable steering flow, a large diurnal temperature difference, and a rapid rise in mixing height during the day.

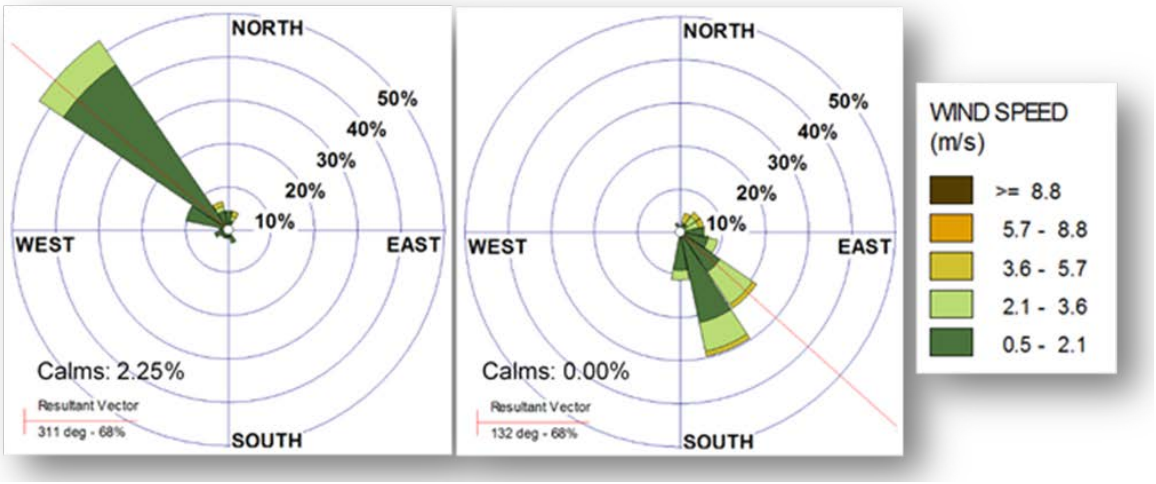

Figure 6: Wind Roses Comparing Morning and Afternoon Winds at CAMS 58 on Ozone Days > 70 ppb, 2010-2017

The San Antonio-New Braunfels MSA has proven to be a leader when it comes to reducing ozone levels through its numerous public and private initiatives that limit ozone precursor emissions. These efforts have helped reduce San Antonio's ozone design value from 91 ppb in 2004 to 73 ppb in 2016, and is predicted to continue falling through 2023. These ozone reductions are all the more impressive given the unique ozone transport situation that San Antonio faces, with over 38% of ozone contribution coming from international sources.

We urge EPA to take advantage of the flexibility in the Clean Air Act to evaluate and actively consider during NAAQS designation the impact of background ozone levels and all foreign transport on a region. It is important to acknowledge the amount of ozone that is produced locally and able to be impacted by local actions. The regulatory burden and economic consequences of a nonattainment designation can be devastating to a region when the region is not able to impact the ozone levels by its own actions.

Thank you for providing this opportunity to discuss the unique impact of background ozone and foreign transport on our region and share the great progress we have made as a result of the voluntary public-private partnerships.