



**Testimony of
Mark Hammond, Director
Bureau of Air Quality
Pennsylvania Department of Environmental Protection
Senate Transportation Committee
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Good afternoon, Chairman Langerholc, Chairman Sabatina, and members of the committee. On behalf of DEP, I would like to thank you for the opportunity to provide data and analysis to the committee regarding the air quality in the Commonwealth and the impact of transportation related trends, including an increasingly electrified vehicle fleet, on Pennsylvania's ability to meet the requirements set forth in the federal Clean Air Act and U.S. Environmental Protection Agency regulations.

Air quality has clearly improved across the Commonwealth but not to the extent that our air is classified as "attainment" for all categories of air pollutants. Likely the best indicator of the total air quality considering the ambient level of various air contaminants is the Air Quality Index (AQI). The AQI uses actual pollutant measurements collected by state, local and tribal agencies. The AQI is based on EPA's national ambient air quality standards, which are established based on health studies. Generally, when calculated AQI values are at or less than 100, air quality is generally thought of as satisfactory during that time period. When AQI values are above 100, air quality is unhealthy (<https://www.airnow.gov>).

AQI values vary daily and by specific geographic area. Based on 2020 data, without any adjustments or "normalization" due to reduced emissions resulting from Covid-19's impacts on travel or commerce, the number of days statewide with AQI values above 100 were rare. This was less true in Allegheny County—approximately 4% of all days exceeded the AQI threshold of 100, causing elevated health risks on those days. In Philadelphia County, approximately 2% of all days exceed the AQI threshold of 100, again causing elevated health risks.

Emissions of criteria pollutants has fallen dramatically during the period 1990 to 2017. During that time period, Sulfur Dioxide (SO₂) emissions fell 93% and Nitrogen Dioxide (NO₂) emissions fell 83%. Less impressively, Volatile Organic Compound emissions fell by 60% and Particulate Matter emissions fell just 31%. From January 2, 2019 through September 1, 2021, PA saw an average of 32 ozone exceedances per calendar year and 11 days with ozone exceedance on average per calendar year.

Analyzing the monitored and measured ambient air levels and pollutant emission levels, several important trends emerge.

1. Despite the long-term improvements, significant portions of the state have days of unhealthy air.
2. Regions within the state have not reached “attainment” for ambient air quality for several pollutants.
3. The relative proportion of emissions of various emissions occurring from different sectors of the economy has changed significantly.
4. In particular, the concentrated level of emissions occurring in high-traffic areas, particularly freeways through urban areas, is a significant and growing hurdle to achieving clean air in those regions.

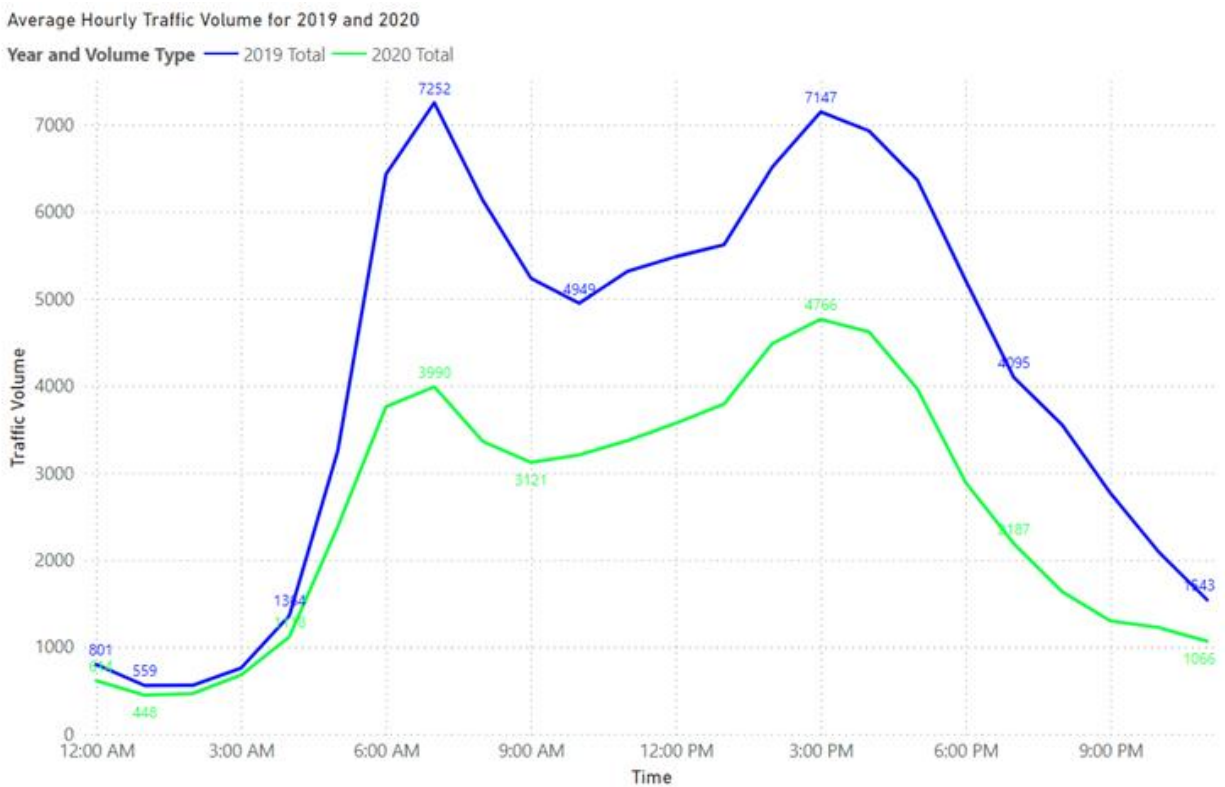
Air quality varies by specific pollutant and region, as shown in this table documenting improvements in air quality from 2002 to 2020.

	SW			SC			SE		
	2002	2020	% Change	2002	2020	% Change	2002	2020	% Change
Ozone (ppb)	95	68	28.4%	94	65	30.9%	104	74	28.8%
Annual PM2.5 (µg/m ³)	20.8	11.1	46.6%	17.5	9.3	46.9%	15.7	10.8	31.2%
Daily PM2.5 (µg/m ³)	68	32	52.9%	44	27	38.6%	35	28	20.0%
SO ₂ (ppb)	132	85	35.6%	61	7	88.5%	62	12	80.6%

	NW			NC			NE		
	2002	2020	% Change	2002	2020	% Change	2002	2020	% Change
Ozone (ppb)	88	62	29.5%	79	59	25.3%	85	60	29.4%
Annual PM2.5 (µg/m ³)	12.9	7.5	41.9%	13.4	8.6	35.8%	12.2	7.2	41.0%
Daily PM2.5 (µg/m ³)	34	18	47.1%	38	22	42.1%	33	18	45.5%
PM2.5 (µg/m ³)	351	36	89.7%	Not Available			42	3	92.9%

In mid-March 2020, steps were taken by PA’s government to combat the COVID-19 pandemic. One of these steps was to issue a stay-at-home order to limit the spread of the COVID-19 virus. As a result of the stay-at-home order, vehicular and truck traffic on PA’s interstates saw a reduction in the number of vehicles on the roadways, primarily during the work week. An analysis of PennDOT’s daily traffic counter data in three major population centers across PA (Harrisburg, Philadelphia, and Pittsburgh) illustrated the impact of the stay-at-home order on vehicles traveling on PA’s roads. The three graphics below illustrate the reduction of vehicles during weekdays on PA’s roadways for the first two months of the stay-at-home order. Generally speaking, there was a decline of the number of total vehicles on the road, especially during the typical morning and evening rush hour periods.

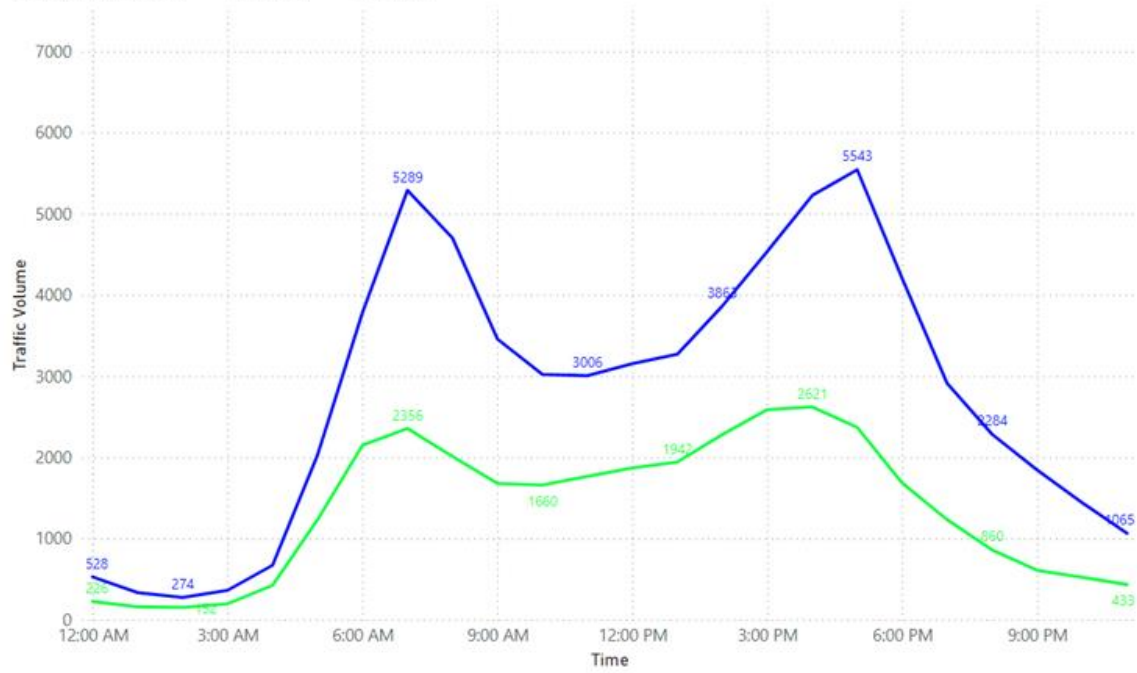
Harrisburg (Monitored at PennDOT Station # 1640)



Philadelphia (Monitored at PennDOT Station # 701)

Average Hourly Traffic Volume for 2019 and 2020

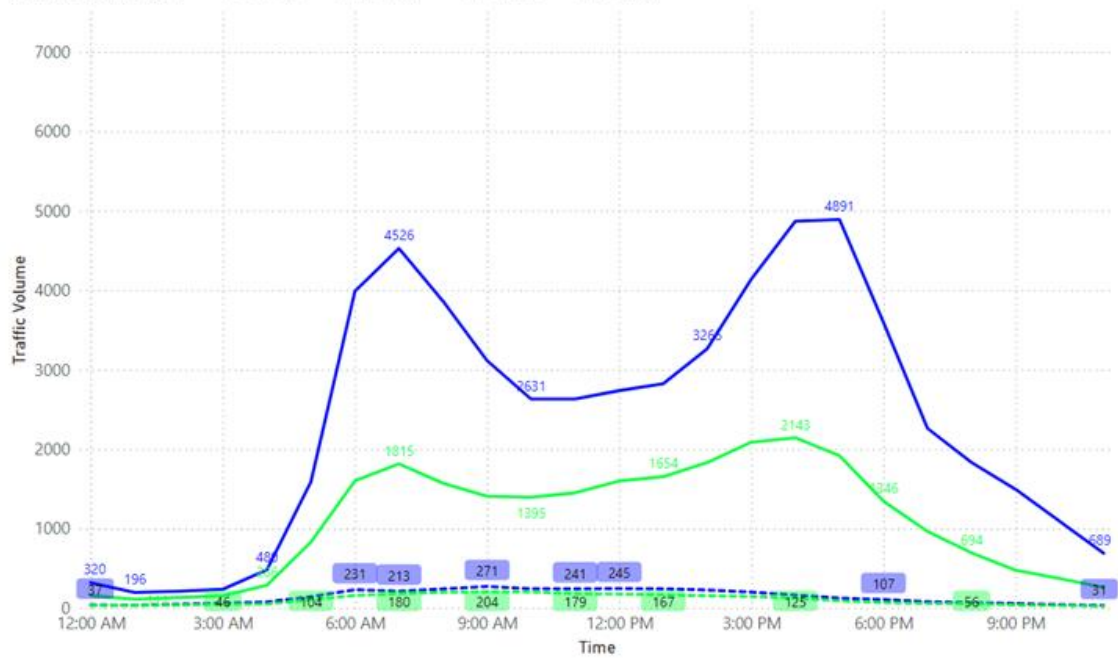
Year and Volume Type — 2019 Total — 2020 Total



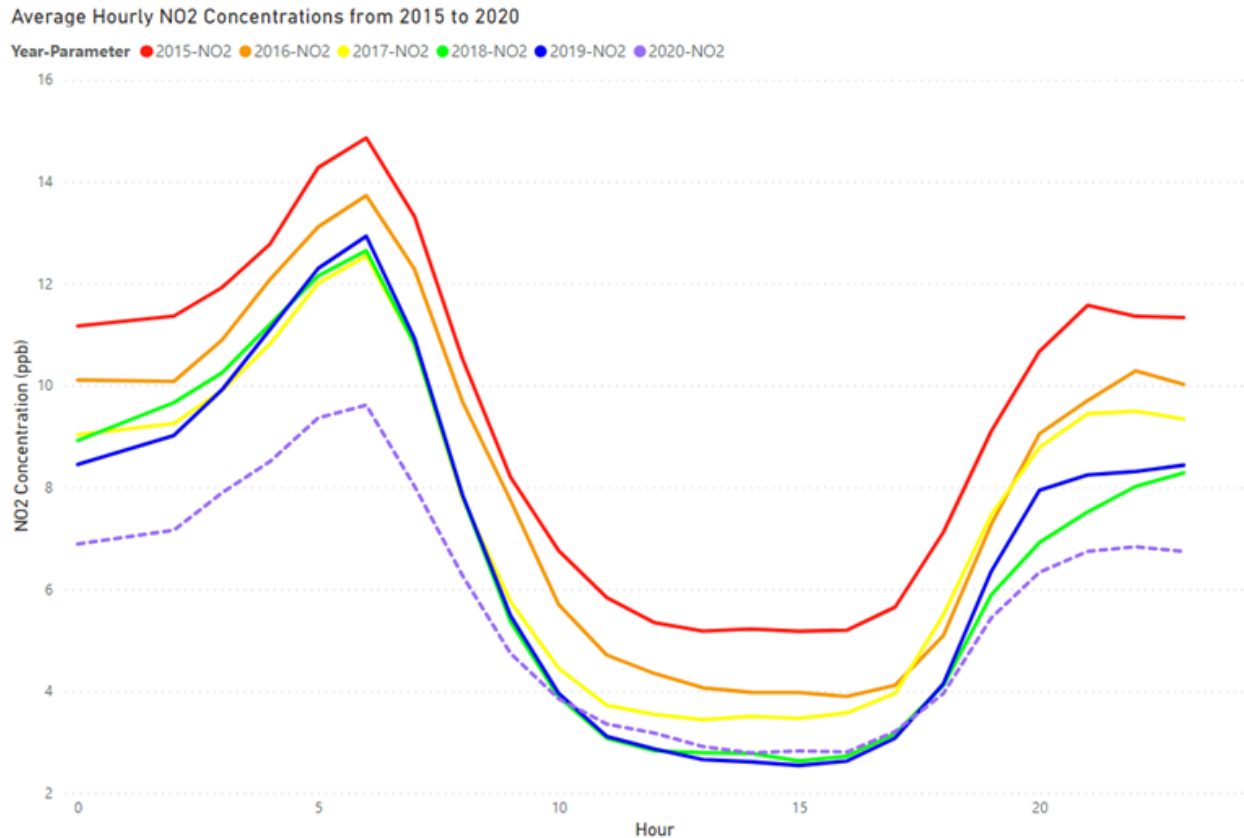
Pittsburgh (Monitored at PennDOT Station # 96)

Average Hourly Traffic Volume for 2019 and 2020

Year and Volume Type — 2019 Total — 2019 Truck — 2020 Total — 2020 Truck



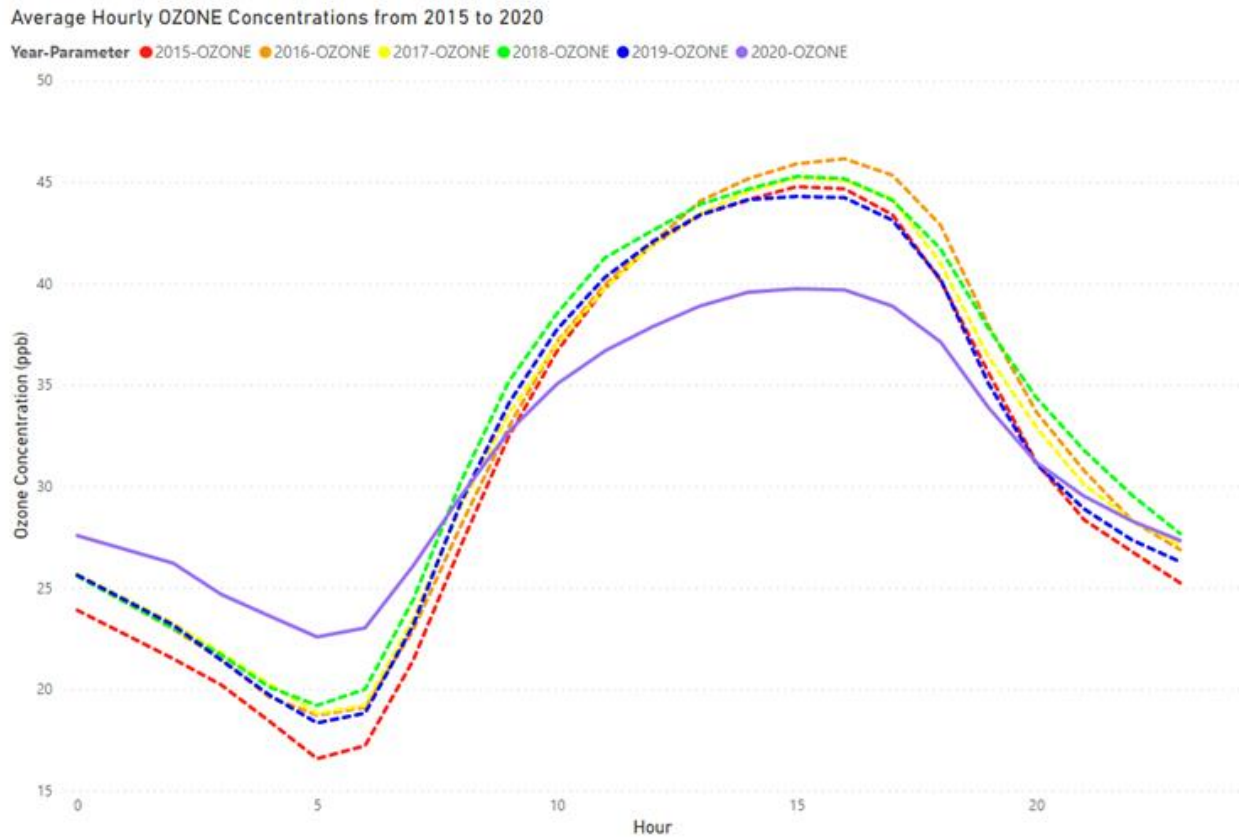
As a result of this decline in the number of the vehicles on PA’s roads during the first two months of the stay-at-home order, PA saw an improvement in air quality. NO₂, which is one of the pollutants that is directly emitted from tailpipes of vehicles, is monitored by the DEP across the Commonwealth. The graphic below displays the average hourly trend in weekday NO₂ concentrations from 2015 to 2020 across all of the urban sites that the DEP monitors for NO₂ and ground-level ozone at the same location.



As illustrated in the above graphic, NO₂ levels generally peak during the morning hour due to rush hour traffic and local meteorological conditions. Meteorological conditions, such as inversions, can trap pollutants near the ground, causing pollutant levels to rise. Inversions generally form as a function of cooler air near the surface and warmer air aloft, such as occurs during the morning hours. As the sun comes out and the surface warms, more vertical mixing occurs and NO₂ concentrations can disperse. Overall, the lower NO₂ concentrations in 2020 compared to the 2015 to 2019 period correlates well with the decline in the number of vehicles on the road. With less vehicles on the road, we would expect to see a decline in the NO₂ concentrations at our air monitoring stations as a result of less emissions being emitted into the atmosphere. Our NO₂ monitoring data illustrated that. NO₂ levels in 2020 declined approximately 28% at its peak hourly concentration (approximately around 6-7 AM).

PA also experienced an improvement in the ground-level ozone concentrations. NO₂ is one of the precursors needed, along with sunlight, to form ozone. A decline in the overall NO₂ levels will reduce ambient ozone concentrations. The graphic below displays the average hourly trend

in weekday ground-level ozone concentrations from 2015 to 2020 across all of the urban sites that the DEP monitors for NO₂ and ozone at the same location.



As illustrated in the above graphic, ozone concentrations are at a minimum during the morning hours and maximum during the afternoon hours. Ground-level ozone generally peaks in the afternoon hours partially because of the morning NO₂ concentrations and afternoon sunshine. With less NO₂ available in the morning to form ozone locally, ground-level ozone levels in 2020 declined approximately 12% at its peak hourly concentration (approximately around 4-5 PM).

Electric vehicles represent a small share of the overall vehicle market, although their year-over-year market share continues to increase by 20-50%, both nationally and in Pennsylvania. In 2020 electric vehicles represented just over 1% of new vehicle sales in Pennsylvania, which places Pennsylvania well below the national average of about 2.5% of new vehicle sales. In terms of ranking the states in order based on the percentage of new vehicle sales, Pennsylvania was near the median of all states. California has the highest EV sales by far, and most of the other high adoption states are Zero Emission Vehicle (ZEV) mandated states. Ultimately, what the high adoption states have in common is comprehensive and substantial programs and policies to increase EV sales. These programs and policies sometimes result in automotive manufacturers directing EV vehicles away from states such as Pennsylvania towards states with ZEV programs, both to meet their compliance requirements and because there is higher consumer demand. This

can limit the availability of ZEV automobiles in Pennsylvania, negatively impacting consumer choice and dealership opportunity.

President Biden’s and Congress’ plans for infrastructure improvements will have a positive impact on EV vehicle sales and will result in lower emissions overall from the transportation sector. Experts generally agree that there are four primary barriers to electric vehicle adoption:

1. low concentrations of electric vehicle charging infrastructure,
2. high up-front cost,
3. low model availability, and
4. low public education.

A significant increase in charging infrastructure, as planned by the federal government, would reduce one of the four primary barriers, thereby triggering a modest increase in the likelihood of electric vehicle adoption in PA. Substantial progress on all four barriers will be necessary for electric vehicles to achieve widespread adoption quickly in PA. The additive infrastructure support, along with our efforts to date, points us then to focus additional efforts on supporting driving down costs of EVs, encouraging model availability through policy choices as occurs in other states and getting the word out about the economic and public health benefits of eliminating tailpipe emissions with EVs. Life cycle emissions of EVs only stand to improve as we work as well to reduce the emissions from our own Pennsylvania electricity generation fleet which will in fact support and fuel these vehicles well into the future.

Pennsylvania is a member of the Northeast Ozone Transport Region (OTR) established in 1990 by Congress. Each Pennsylvania county currently with an I/M Program is required by federal law to continue to have an I/M Program—regardless of whether these counties have attained federal air pollution standards. Any changes to Pennsylvania’s I/M Program require EPA approval—and these changes would be examined in conjunction with all other aspects of the I/M Program. If Pennsylvania were to remove a county or make any other changes without EPA approval, Pennsylvania could face sanctions. If the General Assembly were to enact legislation directing PennDOT or DEP to modify the I/M Program without first ensuring that the revisions to the I/M Program are approvable by USEPA, DEP believes—after conferring with US EPA—that:

- EPA may not approve the SIP revision.
- Pennsylvania could be sanctioned for failing to implement its *approved SIP*. The economic sanctions placed on Pennsylvania could be harsh—including up to a 16% loss of all federal highway money (\$300MM of \$1.8B). See the PENNDOT “Pennsylvania 2021 Transportation Improvement Program Financial Guidance” prepared in July 2019 (Appendix 2 – FFY 2021).
- Another sanction that could be imposed would affect new and modified major stationary sources of air emissions. Currently there are approximately 600 permitted major stationary sources in Pennsylvania across large segments of the manufacturing, waste

disposal, mining, oil and gas, and other industries. This sanction would require existing facilities to purchase additional emission reduction credits in order to expand their operations. Similarly, any companies looking to build new facilities would also be required to obtain additional emission reduction credits than would otherwise be required. This sanction would have a negative impact on growing industries in Pennsylvania as well as impede Pennsylvania's attractiveness to companies looking to relocate from out-of-state.

In summary, air quality trends are positive, although additional progress is necessary to provide clean air throughout Pennsylvania. EV's are slowly gaining in popularity, but still account for a very small portion of new vehicle sales in Pennsylvania. The federal administration's infrastructure plans will make EV ownership slightly more attractive. Any modifications to the current I/M Program will require USEPA's review and approval to avoid costly sanctions.