

# Impact of Vehicle Rule on Air Quality in 2055

Margaret Zawacki<sup>a</sup>, Sharon Phillips<sup>b</sup>, Grace Kuiper<sup>a</sup>, Alison Eyth<sup>b</sup>, Shannon Koplitz<sup>b</sup>, Ken Davidson<sup>a</sup>, Ali Kamal<sup>a</sup>

<sup>a</sup> Office of Transportation and Air Quality

<sup>b</sup> Office of Air Quality Planning and Standards

## Vehicle Standards Impact Multiple Sectors

April 2024: EPA finalized more stringent emission standards for light- and medium-duty “onroad” vehicles

- <https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model>

Vehicle emission standards will affect emissions from multiple sources

- Onroad (e.g., tailpipe emissions)
- Upstream (e.g., power plants, refineries, crude and natural gas production)

Photochemical air quality modeling (AQM) was used to assess the impact of these emission standards on ambient concentrations of criteria and toxic air pollutants for the year 2055

## Methods

Relied upon existing regulatory models/approaches with updated inputs (e.g., vehicle miles traveled (VMT) and electric vehicle (EV) penetration) to estimate activity and emissions changes for onroad and electrical generating unit (EGU) sources

- Motor Vehicle Emission Simulator (MOVES) for onroad emissions
- Integrated Planning Model (IPM) for power sector emissions

Preliminary screening with an integrated model (Global Change Analysis Model or GCAM) suggested the largest impacts from increased vehicle electrification would occur in the onroad, power, and oil and gas sectors

Adjustment factors were applied to refineries, crude production wells and pipeline pumps, and natural gas production wells and pipeline pumps

CMAQv5.4 - 2016v3 Emissions Modeling Platform and 2055 future year projection

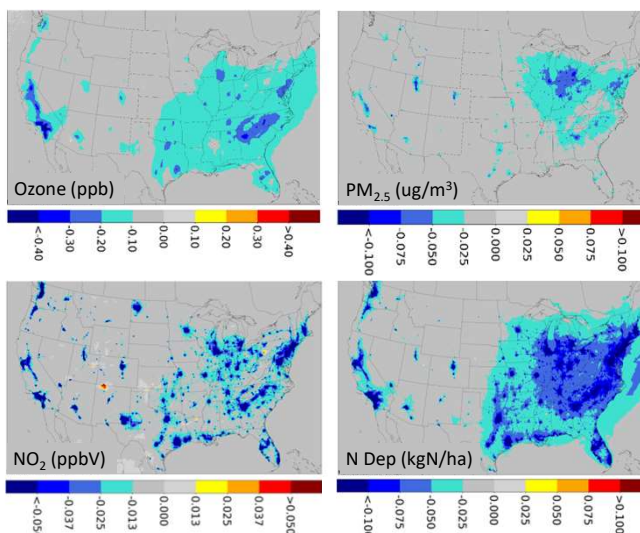
## Changes in Emissions Due to Vehicle Standards



U.S. Environmental Protection Agency  
Office of Air and Radiation

Emissions Change Due to Rule in 2055 (annual tons)	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC
Onroad Total	8,326	84,692	2,334	165,159
Upstream Total	1,393	9,643	2,929	29,029
Power Plants	-1,039	-1,605	-1,946	-467
Refineries	2,467	10,468	3,067	7,205
Crude Production	102	4,778	1,867	33,343
Natural Gas Production	-137	-3,999	-59	-11,052
Total	9,719	94,335	5,263	194,188

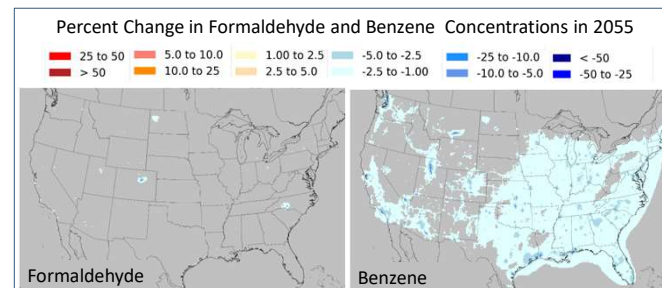
## Changes in Air Pollution Due to Vehicle Standards



### Impacts on Ambient Concentrations in 2055

	Population-weighted average change	Maximum	
		Increase	Decrease
PM <sub>2.5</sub> (ug/m <sup>3</sup> )	-0.04	+0.20	-0.36
Ozone (ppb)	-0.16	+0.36	-0.71
NO <sub>2</sub> (ppbv)	-0.08	+0.11	-0.34
N deposition (kgN/ha)	-0.17	+0.14	-0.76

Rule will have relatively little impact on concentrations of Acetaldehyde, Benzene, 1,3-Butadiene, Formaldehyde, and Naphthalene



## Summary

Widespread reductions were projected for ambient concentrations of ozone, PM<sub>2.5</sub>, NO<sub>2</sub>, CO and some air toxics in 2055

- Leading to substantial public health and environmental benefits

Increased electricity generation is projected to cause localized increases in ambient SO<sub>2</sub>, PM<sub>2.5</sub>, ozone, and some air toxics

- Fewer than 0.1% of the US population lives in grid cells projected to have increases in concentration of any pollutant
- As power sector becomes cleaner these impacts will decrease, e.g., analysis did not account for April 2024 Final Carbon Pollution Standards to Reduce Greenhouse Gas Emissions from Power Plants

## Discussion & More Information

- Efforts are needed to model and estimate the cross-sector impacts of emission changes, where changes in one sector influence emissions in other sectors
- Further Information can be found in the Regulatory Impact Assessment and in the Air Quality Modeling Memo to the Docket

## Acknowledgments

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