Union of Concerned Scientists

Inequitable exposure to $PM_{2.5}$ from on-road vehicles

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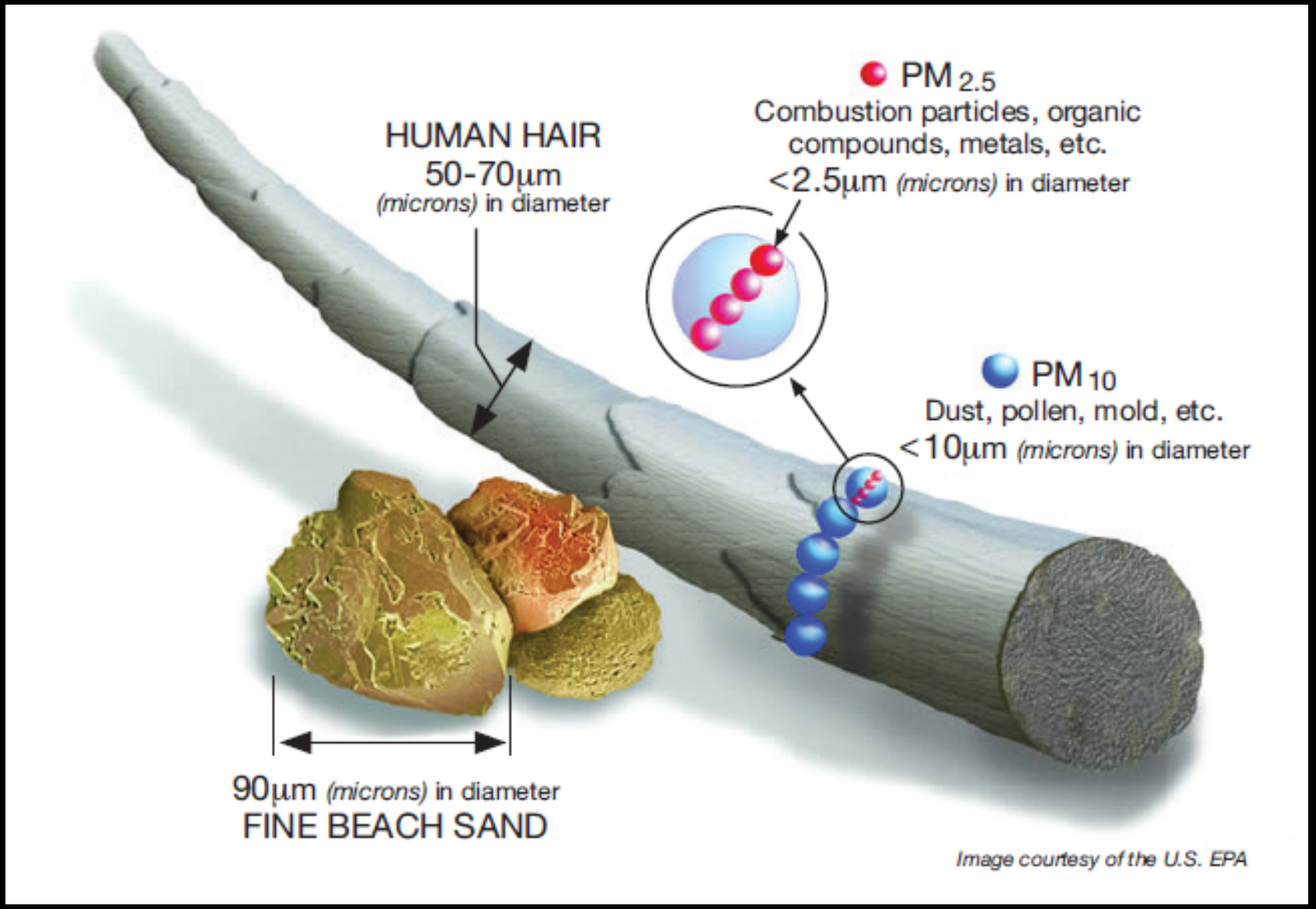
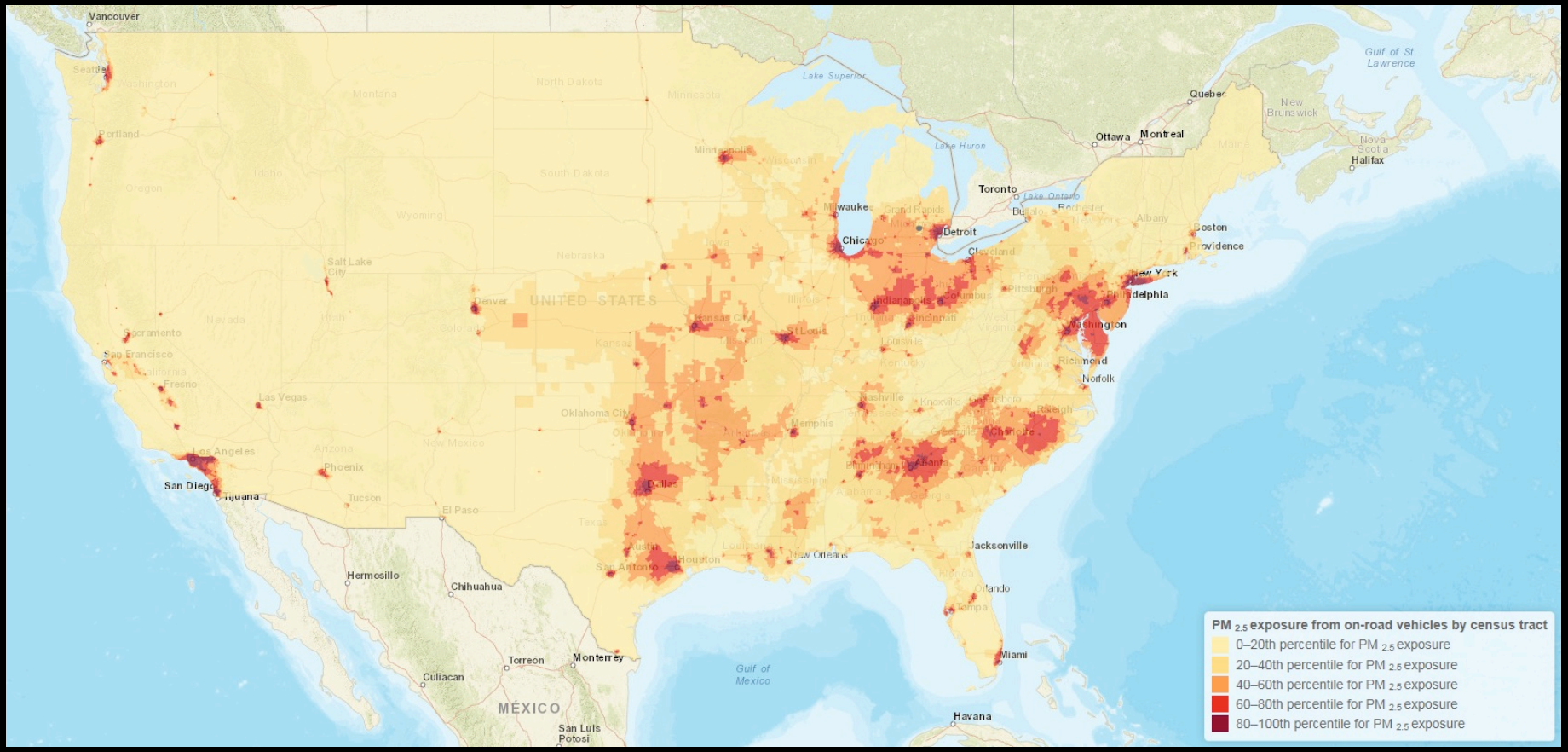
Transportation emissions are a double-edged sword:

- **On one side, health damage from local air pollution**
- **On the other, climate-damaging emissions**

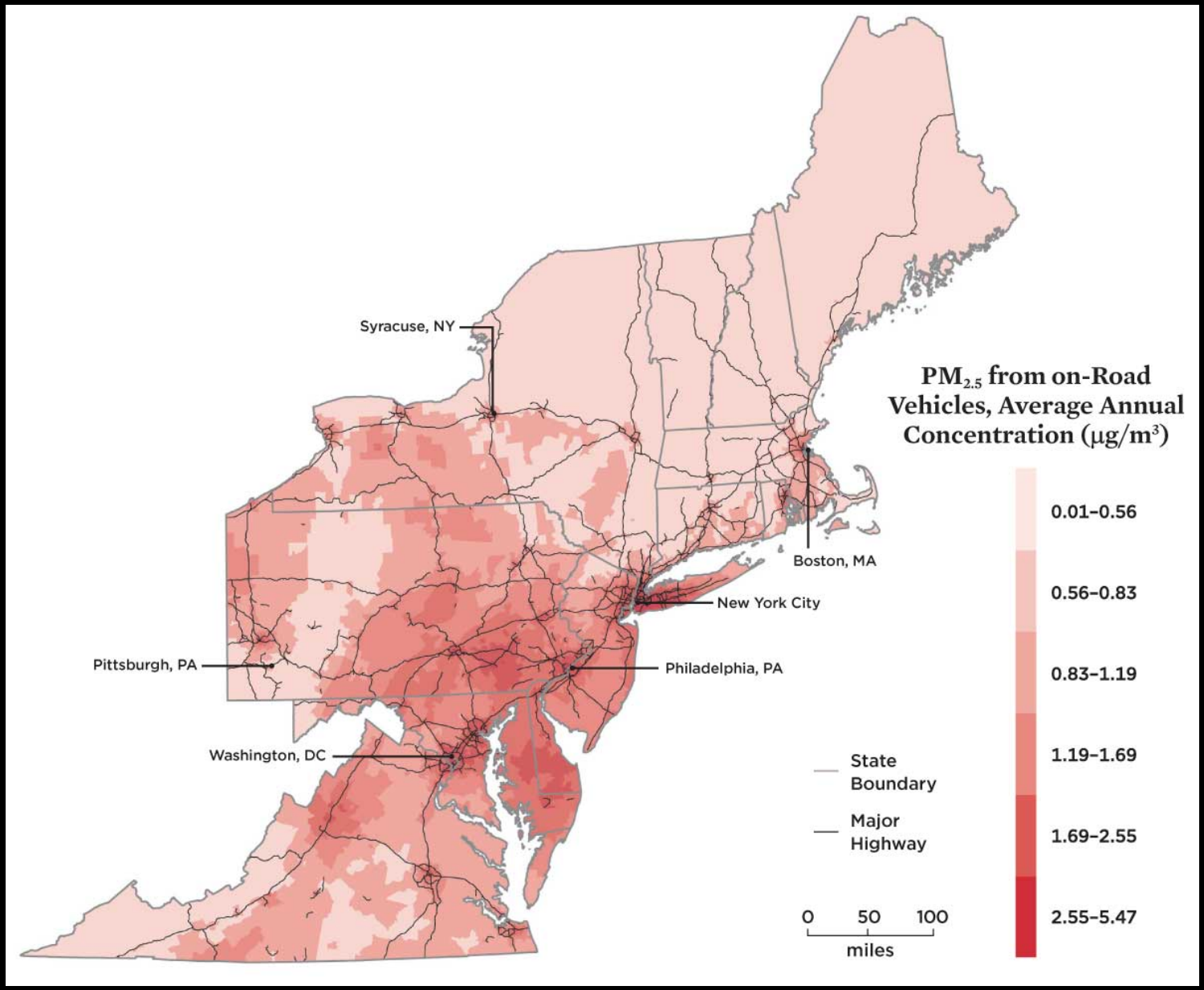
Size matters



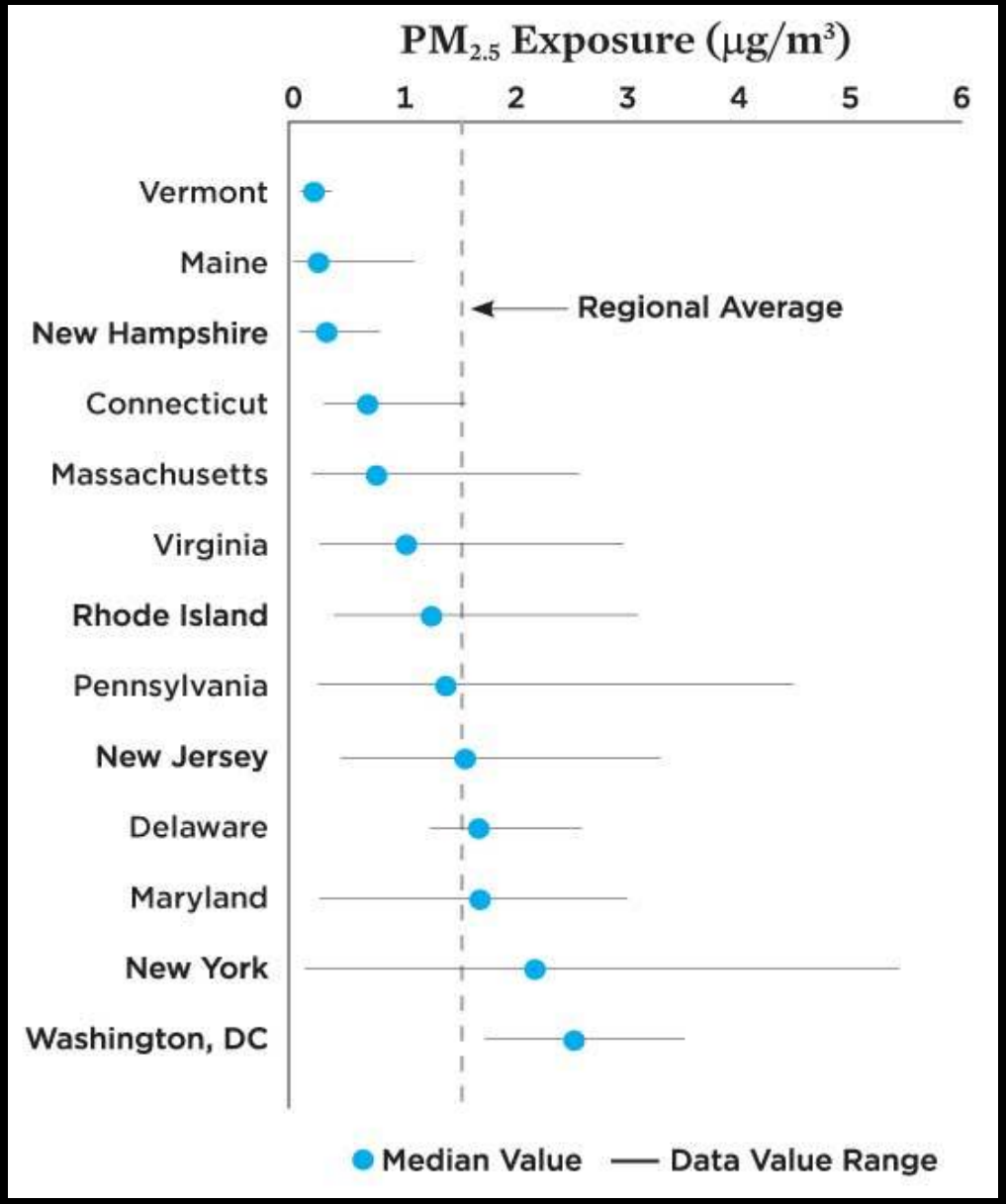
$PM_{2.5}$ exposure from on-road vehicles



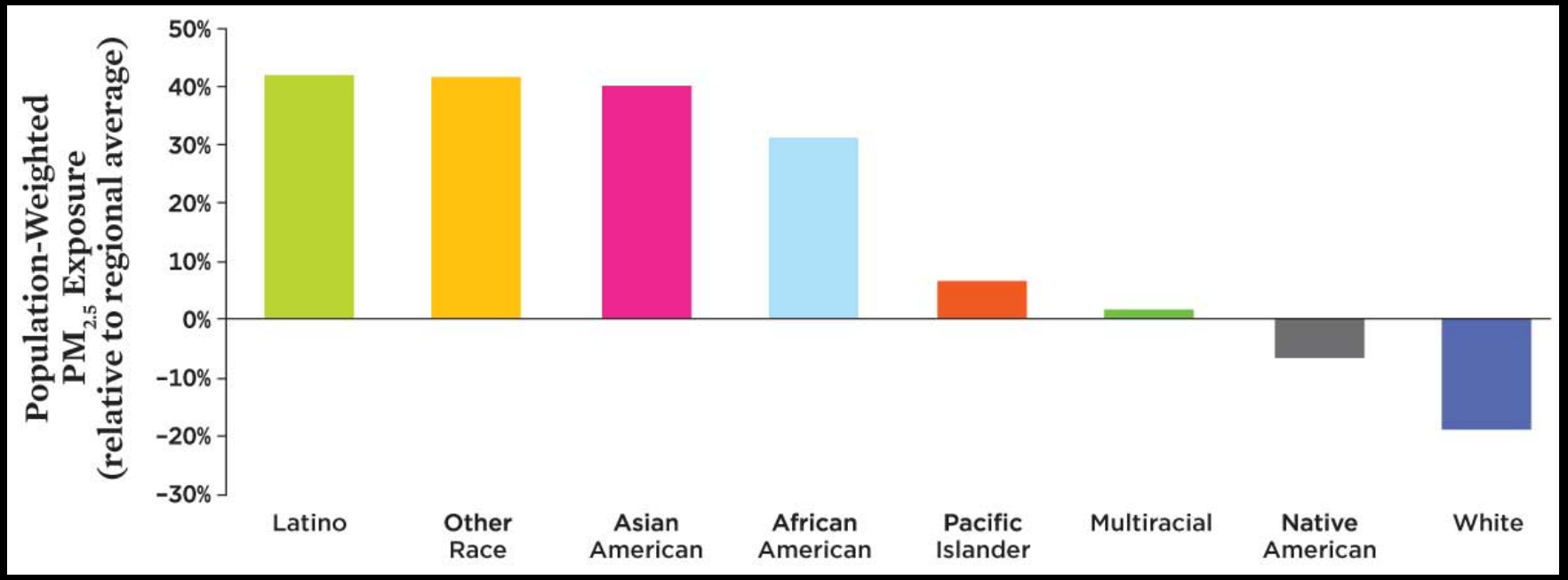
$PM_{2.5}$ exposure in Northeast and Mid-Atlantic



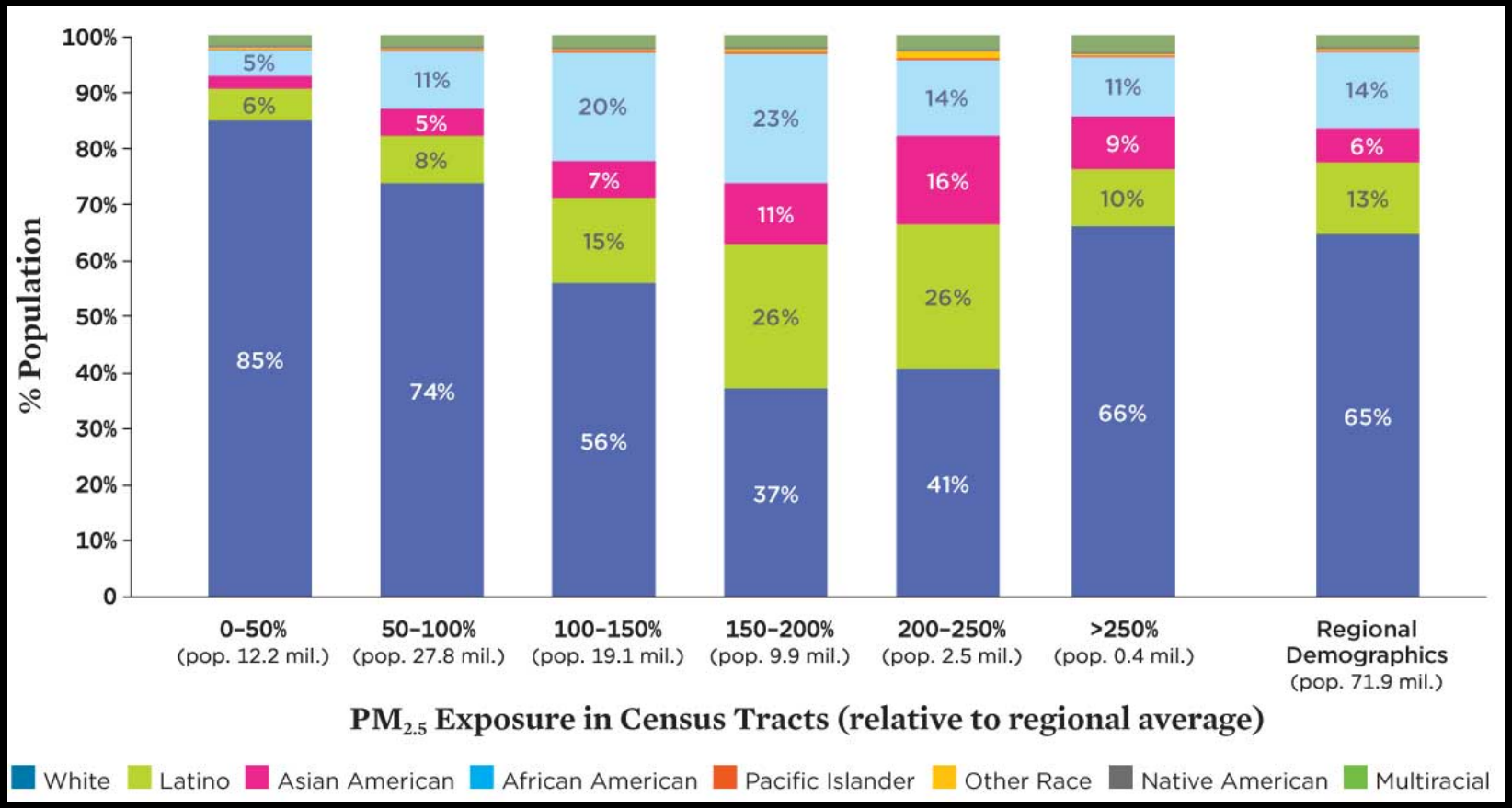
Variability



Disproportionately high exposure for people of color



In areas where $PM_{2.5}$ exposure is low, fraction of white residents is high



$PM_{2.5}$ from on-road transportation

Health impact of $PM_{2.5}$ depends on:

Intake fraction

Persistence of exposure

Vulnerability

Strategies to decrease air pollution in transportation

- Improve fuel efficiency
- Electrification of cars, buses and trucks
- Lower-carbon fuels

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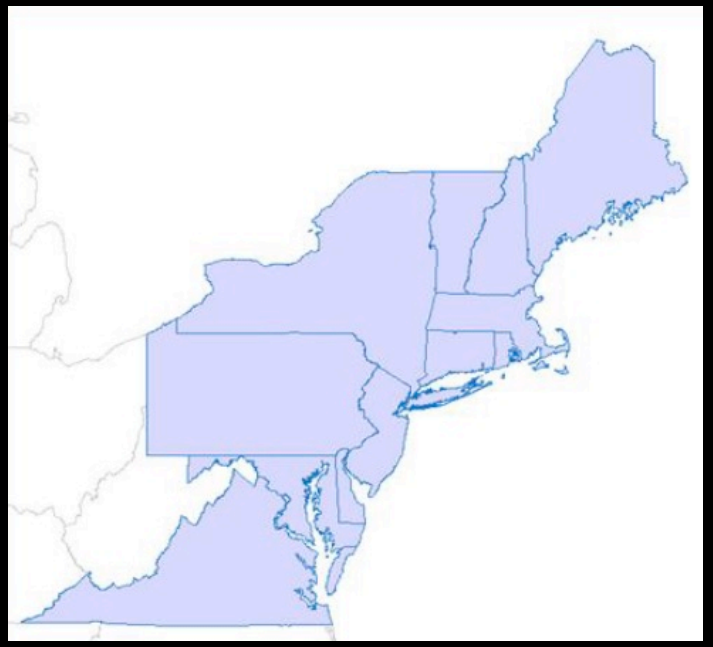
Credit: Rivian

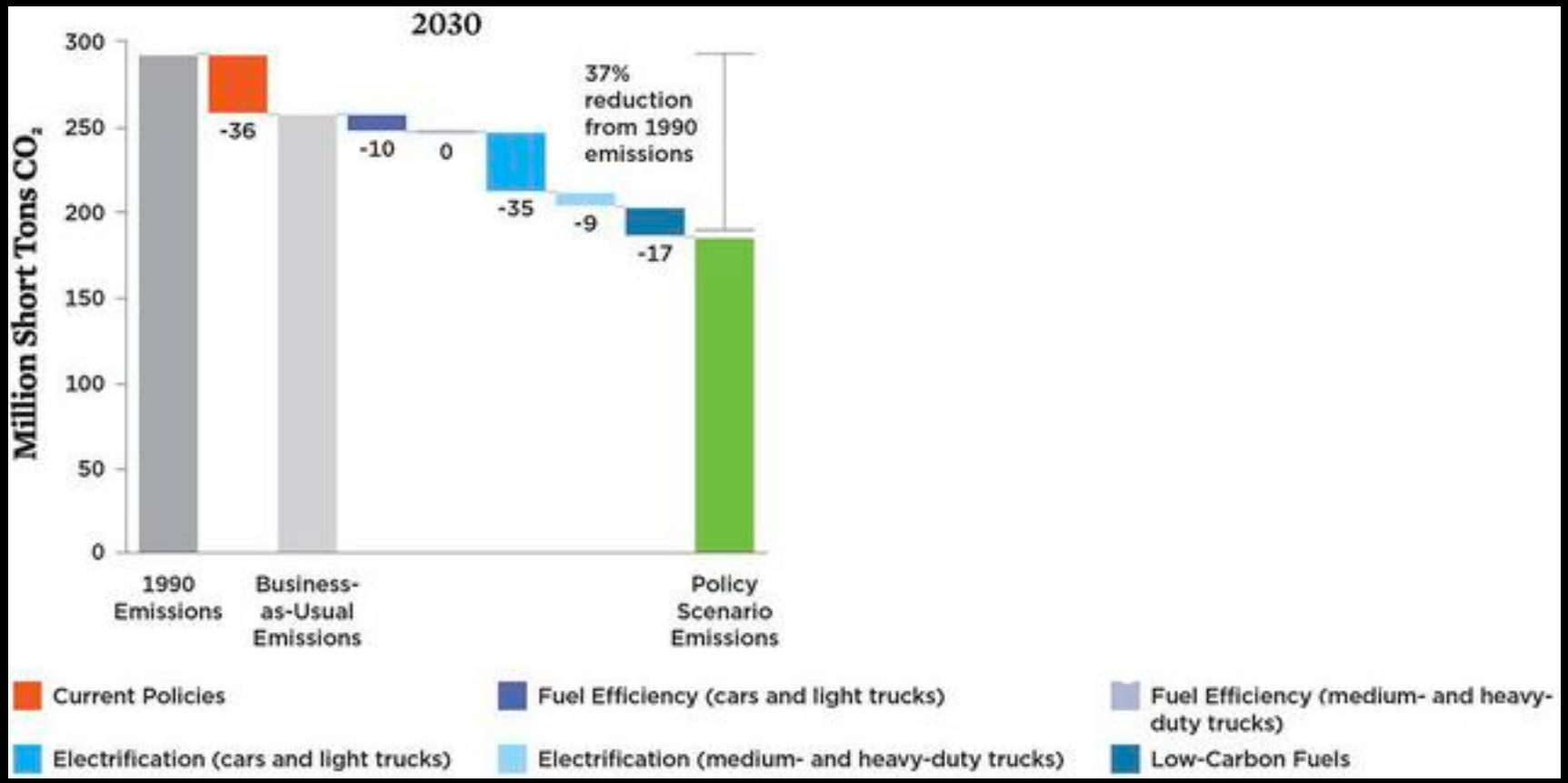
UCS Study: Decarbonizing On-road Vehicles in the Northeast and Mid-Atlantic



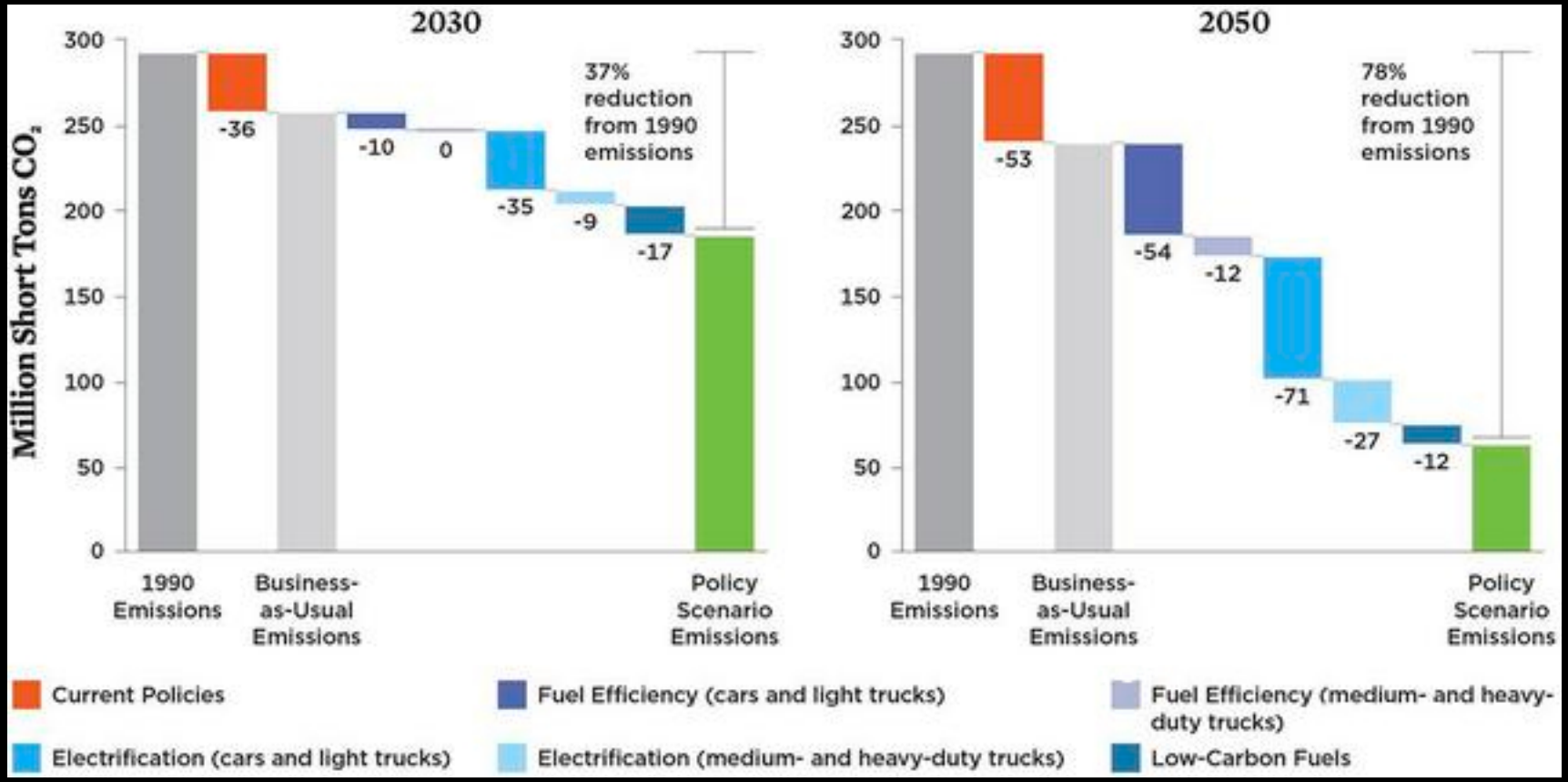
Climate target: 40% reduction by 2030, and 80% by 2050 (relative to 1990)

Co-benefits: Reducing CO_2 reduces local air pollution

CO_2 emissions reduction from 3 strategies



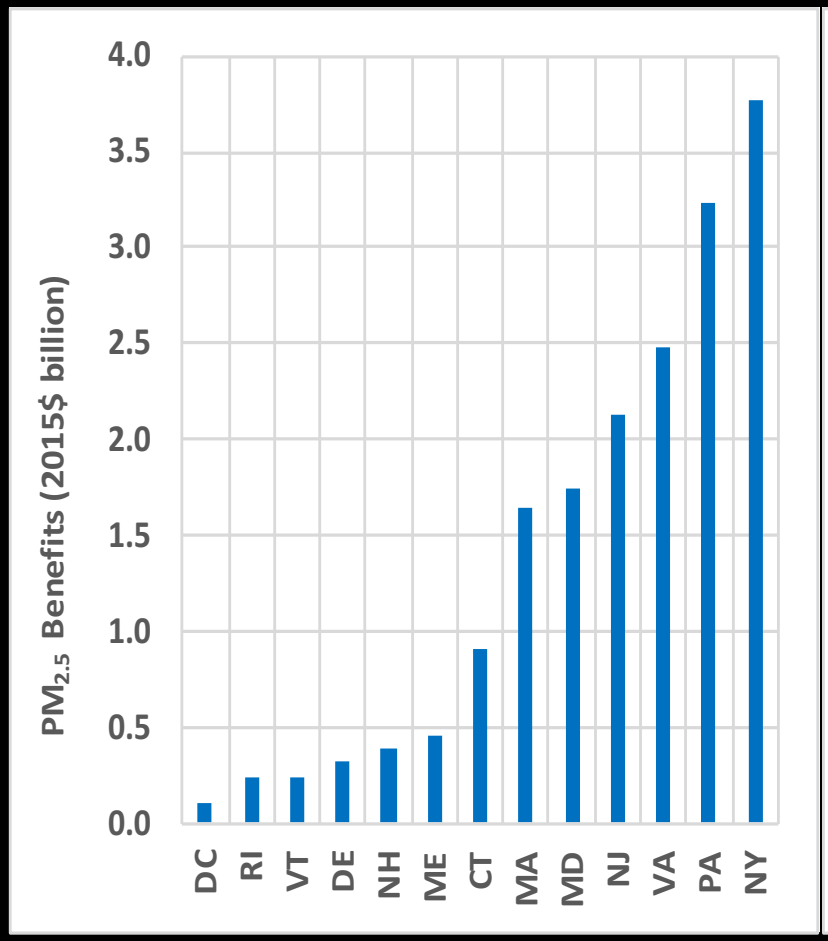
CO_2 emissions reduction from 3 strategies

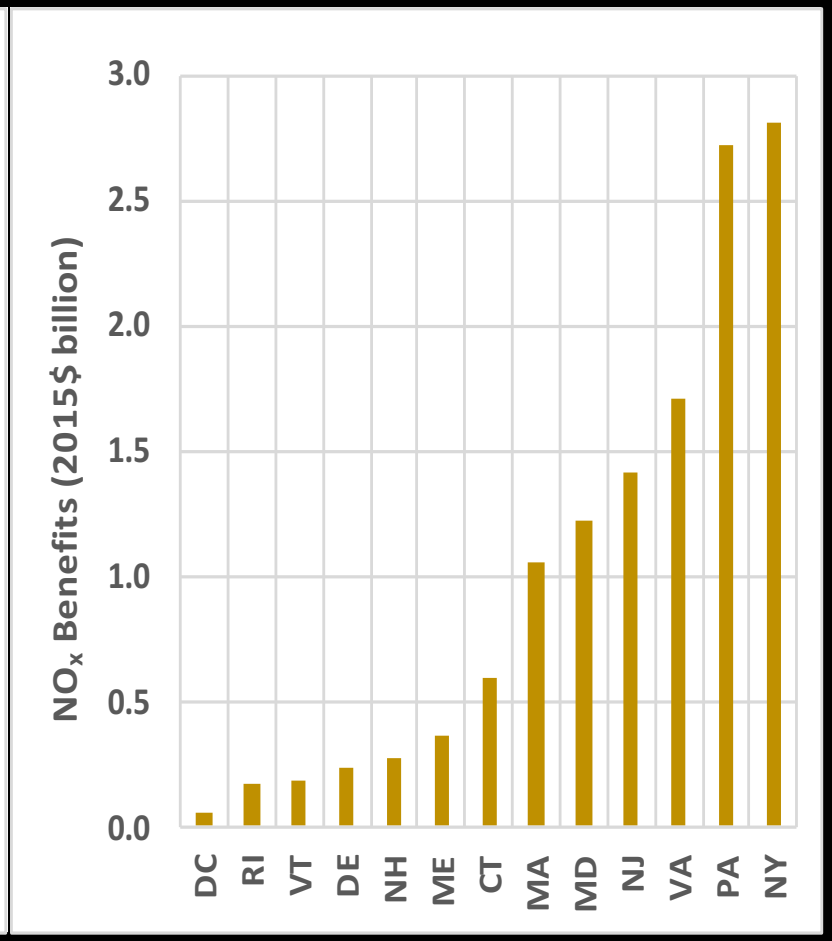


Investments and financial benefits

2015 $ billion	**2030**	**2050**
Vehicle technology and fuels	-$24.1	$158.5
Monetized GHG	$24.4	$194.9
Monetized NOx	$1.3	$12.8
Monetized PM2.5	$1.9	$17.6

State-level $PM_{2.5}$ and NO_x avoided damage costs





How do we get there?

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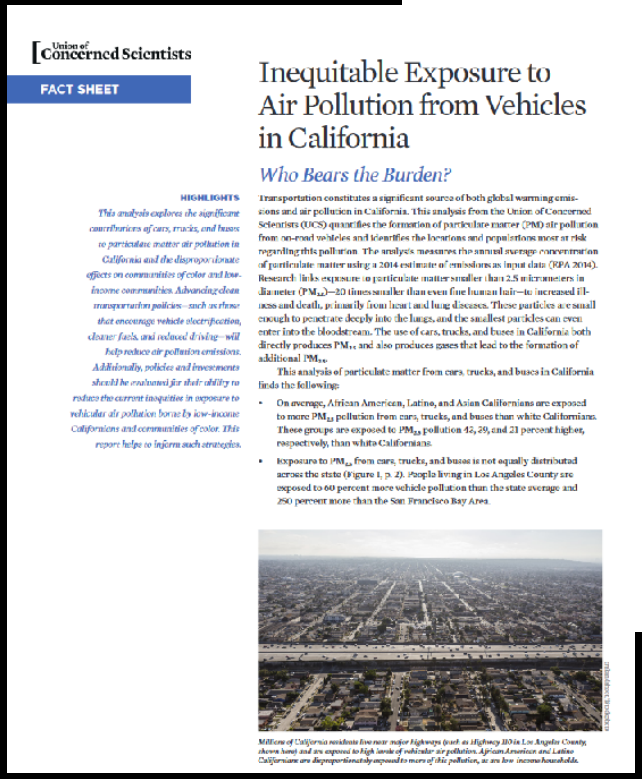


Union of Concerned Scientists

FACT SHEET

Inequitable Exposure to Air Pollution from Vehicles in California

Who Bears the Burden?

HIGHLIGHTS

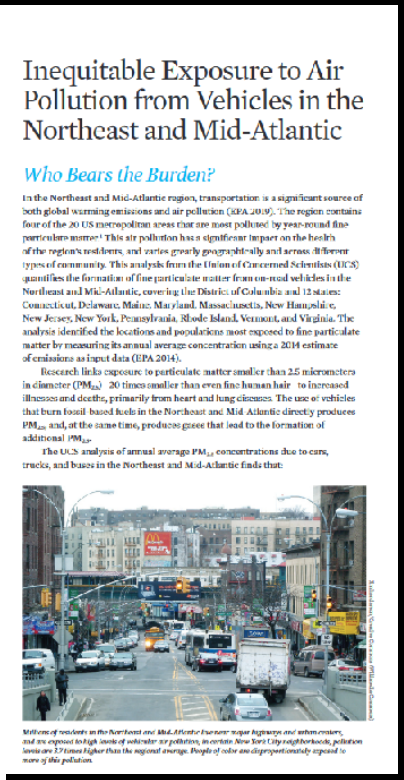
This analysis explores the significant contributions of cars, trucks, and buses to particulate matter air pollution in California and the disproportionate effects on communities of color and low-income communities. Advancing clean transportation policies—such as those that encourage vehicle electrification, cleaner fuels, and reduced driving—will help reduce air pollution emissions. Additionally, policies and investments should be evaluated for their ability to reduce the current inequities in exposure to vehicular air pollution borne by low-income Californians and communities of color. This report helps to inform such strategies.

Transportation constitutes a significant source of both global warming emissions and air pollution in California. This analysis from the Union of Concerned Scientists (UCS) quantifies the formation of particulate matter (PM) air pollution from on-road vehicles and identifies the locations and populations most at risk regarding this pollution. The analysis measures the annual average concentration of particulate matter using a 2014 estimate of emissions as input data (EPA 2014). Research links exposure to particulate matter smaller than 2.5 micrometers in diameter ($PM_{2.5}$)—20 times smaller than even fine human hair—to increased illness and death, primarily from heart and lung diseases. These particles are small enough to penetrate deeply into the lungs, and the smallest particles can even enter into the bloodstream. The use of cars, trucks, and buses in California both directly produces $PM_{2.5}$ and also produces gases that lead to the formation of additional $PM_{2.5}$.

This analysis of particulate matter from cars, trucks, and buses in California finds the following:

- On average, African American, Latino, and Asian Californians are exposed to more $PM_{2.5}$ pollution from cars, trucks, and buses than white Californians. These groups are exposed to $PM_{2.5}$ pollution 42, 29, and 21 percent higher, respectively, than white Californians.
- Exposure to $PM_{2.5}$ from cars, trucks, and buses is not equally distributed across the state (Figure 1, p. 2). People living in Los Angeles County are exposed to 60 percent more vehicle pollution than the state average and 280 percent more than the San Francisco Bay Area.

Millions of California residents live near major highways (such as Highway 110 in Los Angeles County, shown here) and are exposed to high levels of vehicular air pollution. African American and Latino Californians are disproportionately exposed to more of this pollution, as are low-income households.



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FACT SHEET

Inequitable Exposure to Air Pollution from Vehicles in the Northeast and Mid-Atlantic

Who Bears the Burden?

In the Northeast and Mid-Atlantic region, transportation is a significant source of both global warming emissions and air pollution (EPA 2019). The region contains four of the 20 US metropolitan areas that are most polluted by year-round fine particulate matter.[1] This air pollution has a significant impact on the health of the region's residents, and varies greatly geographically and across different types of community. This analysis from the Union of Concerned Scientists (UCS) quantifies the formation of fine particulate matter from on-road vehicles in the Northeast and Mid-Atlantic, covering the District of Columbia and 12 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia. The analysis identified the locations and populations most exposed to fine particulate matter by measuring its annual average concentration using a 2014 estimate of emissions as input data (EPA 2014).

Research links exposure to particulate matter smaller than 2.5 micrometers in diameter ($PM_{2.5}$)—20 times smaller than even fine human hair—to increased illnesses and deaths, primarily from heart and lung diseases. The use of vehicles that burn fossil-based fuels in the Northeast and Mid-Atlantic directly produces $PM_{2.5}$, and, at the same time, produces gases that lead to the formation of additional $PM_{2.5}$.

The UCS analysis of annual average $PM_{2.5}$ concentrations due to cars, trucks, and buses in the Northeast and Mid-Atlantic finds that:

Millions of residents in the Northeast and Mid-Atlantic live near major highways and urban centers, and are exposed to high levels of vehicular air pollution, in certain New York City neighborhoods, pollution levels are 2.9 times higher than the regional average. People of color are disproportionately exposed to more of this pollution.

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FACT SHEET

Reducing Emissions from Transportation in the Northeast and Mid-Atlantic

HIGHLIGHTS

Our transportation system—how we move people and goods around—is outdated, inefficient, costly, and unhealthy. Our gasoline- and diesel-burning vehicles are not only a major source of air pollution but also the largest source of climate pollution in the Northeast and Mid-Atlantic, responsible for almost 40 percent of regional emissions. By investing in three proven technologies—vehicle efficiency, electric vehicles, and clean fuels—the region can reduce spending on petroleum-based fuels by more than $1 trillion by 2050 while dramatically reducing pollution, improving public health, and saving consumers money. Together with ambitious efforts to provide better transportation options and affordable housing near transit, clean vehicles and clean fuels can help create the clean, equitable, and modern transportation system needed in the Northeast and Mid-Atlantic.

We can cut oil use, reduce climate and air pollution, lower costs for consumers, and strengthen our regional economy by investing in three proven strategies: increasing vehicle efficiency; transitioning to electric cars, buses, and trucks; and shifting to cleaner fuels. According to a new analysis for the Union of Concerned Scientists (UCS) by M.J. Bradley and Associates,[1] the states in the Northeast and Mid-Atlantic region can:

- Cut climate-damaging carbon dioxide (CO_2) pollution from on-road transportation by 37 percent in 2030, relative to 1990 levels, and by 78 percent in 2050.
- Reduce consumer spending on gasoline and diesel fuel by more than $125 billion by 2030 and more than $1 trillion by 2050.[2]
- Improve air quality, leading to more than $3 billion in cumulative avoided health impacts by 2030 and more than $30 billion by 2050.[3]
- Save almost $25 billion in environmental damages region-wide by 2030 and almost $195 billion in 2050, by diminishing the risk of property damage from extreme climate events, preserving ecosystems, and avoiding climate-related changes in agricultural productivity, among other benefits.

Together with efforts to provide residents with more transportation options through investments in public transportation, walking and biking infrastructure, and affordable housing near transit, these investments in clean vehicles and fuels can put the region on track to build a clean and modern transportation system. Furthermore, by directing investments toward the communities that need them the most, the region can make its transportation system more equitable (see the box, p. 2).

Massachusetts' Pioneer Valley Transit Authority is just one of a growing number of companies turning to electric vehicles in their fleets. These vehicles not only cost less to operate compared with their conventional counterparts, but also play a major role in reducing carbon emissions and air pollution in the region.

Inequitable exposure to air pollution: https://www.ucsusa.org/resources/inequitable-exposure-air-pollution-vehicles

Decarbonizing transportation: https://www.ucsusa.org/resources/reducing-emissions-transportation-northeast-and-mid-atlantic