Use of Ambient Air Quality Monitoring Data for Mobile Sources

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** Office of Research & Development*

Overview

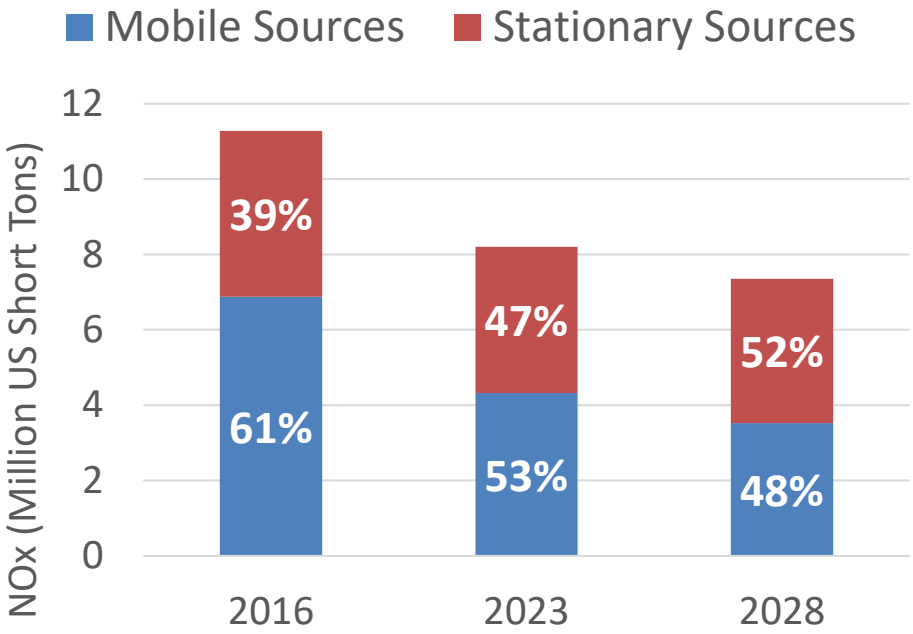
- **Mobile Source Emissions** for criteria and air toxic pollutants
- **Health concerns** from exposures to transport emissions
- **Policies and programs** reducing Mobile Source Emissions
- **Ambient Air Monitoring** data uses and issues

Mobile Source Emissions

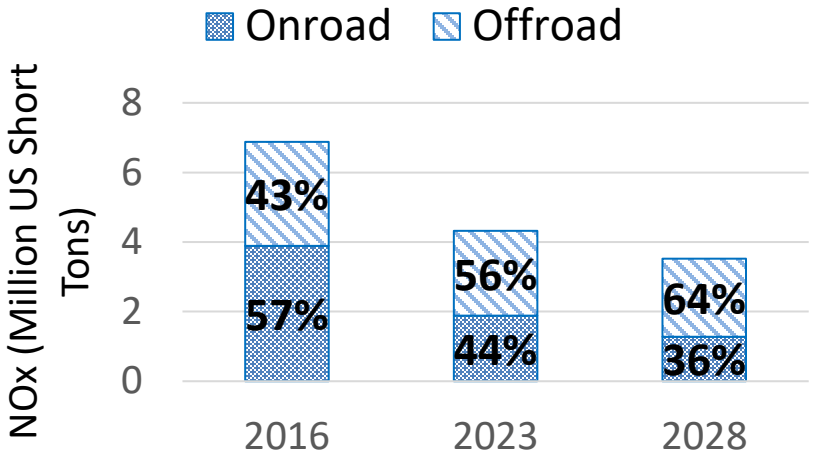
- Mobile sources emit over a thousand compounds through multiple mechanisms including fuel combustion, fluid evaporation, and wear from brakes and tires
- Some of the common pollutants measured include:
  - Criteria Pollutants (NOx, PM, CO)
  - Air Toxics (BTEX, PAHs, metals)
  - GHGs (CO2, BC, N2O, methane)

NOx

Contribution to Total Emissions



Mobile Source Trends

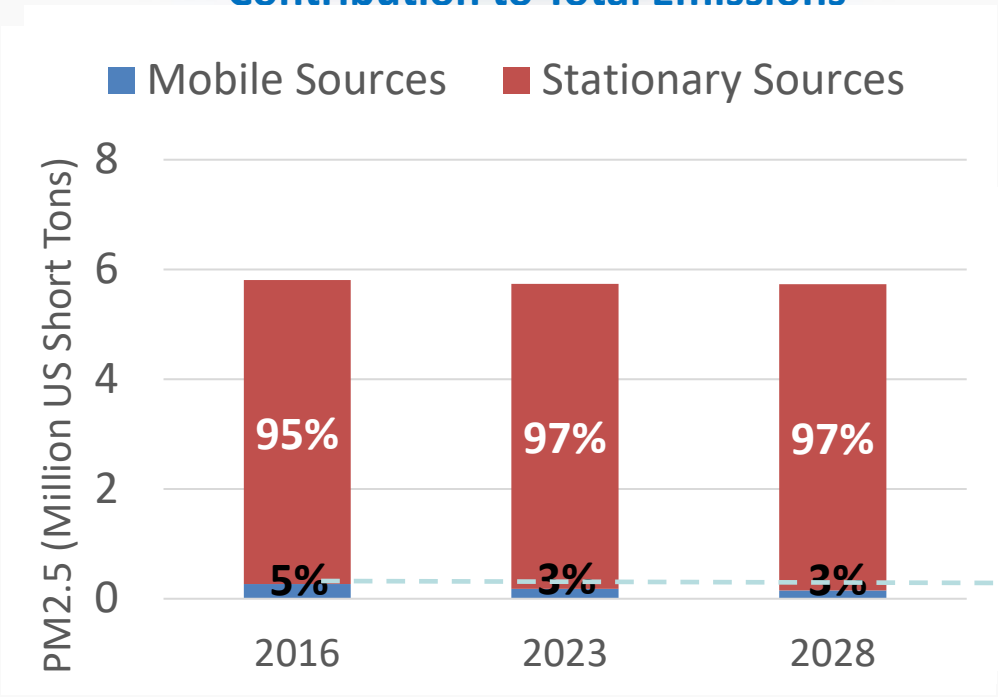


Key Points:

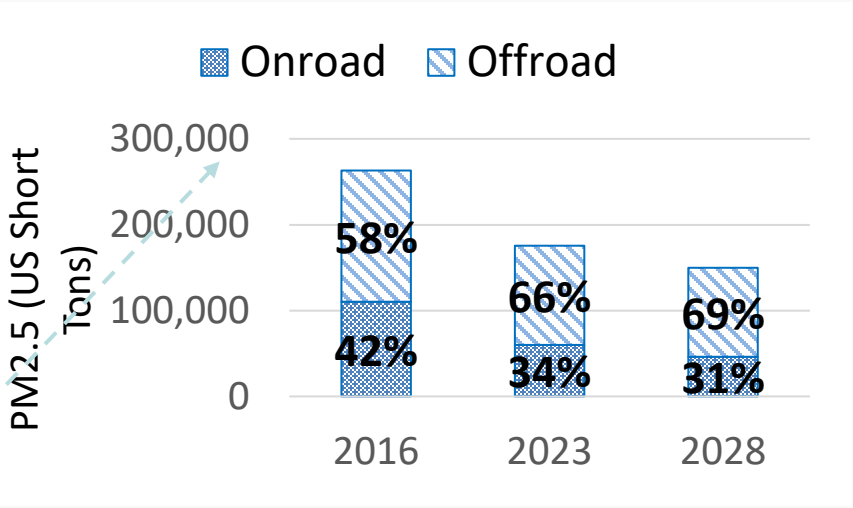
- Mobile sources represent almost half of NOx inventory in 2028
- Offroad sources become dominant due to onroad vehicle regulations

Direct $PM_{2.5}$

Contribution to Total Emissions



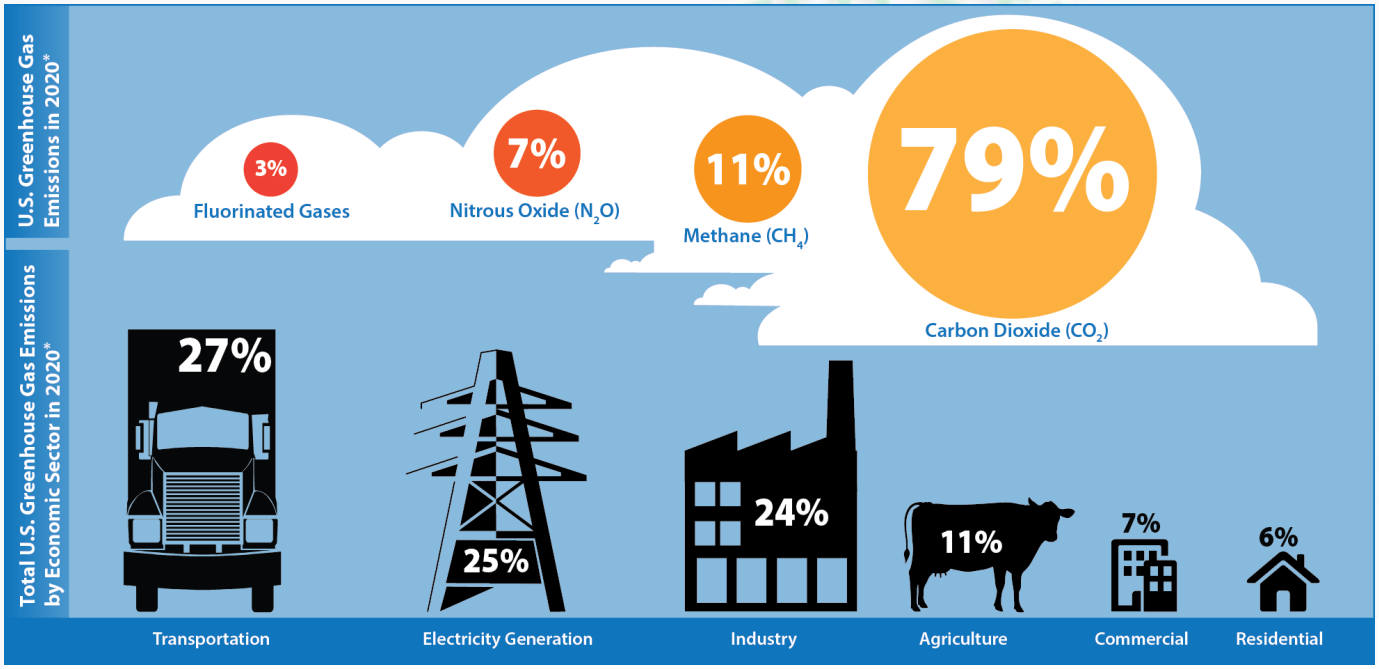
Mobile Source Trends



Key Points:

- Mobile sources contribute significantly more PM to ambient air than the direct PM2.5 inventory suggests such as secondary PM formation or PM number concentrations
- Offroad sources contribute nearly 70% of mobile source $PM_{2.5}$ by 2028

NATIONAL GHG INVENTORY: 2020



	Transportation	Electricity Generation	Industry	Agriculture	Commercial	Residential	Territories	Total
2020 MMT CO2e	1627.6	1482.2	1426.2	635.1	425.3	362.0	23.0	5981.4

- For the fifth year in a row, the transportation sector accounts for the largest portion of total U.S. greenhouse gas emissions

Percentages may not add to 100% due to independent rounding and the way the inventory quantifies U.S. territories as a separate sector. Note: transportation total does not include rail electricity emissions.

Transportation sources are also significant contributors to Black Carbon, a Short-Lived Climate Pollutant

Control of emissions from U.S. mobile sources:

- **Emissions standards** for new engines
  - Standards for mobile sources are “technology forcing”
  - Standards are implemented for fuels and vehicle technology to result in emissions reductions for on-road and non-road sources
    - On-Road diesel fuel and aftertreatment technology vehicle standards
    - On-Road gasoline fuel and vehicle technology standards
    - Nonroad engine and fuels standards

- **Voluntary programs** to address emissions from the existing vehicle fleet and non-road sources:
  - National Clean Diesel Campaign
  - SmartWay Transport Partnership Program
  - EPA Ports Initiative

Executive Orders on Transportation and Climate Change

Strengthening American Leadership in Clean Cars and Trucks (August 5, 2021)

- Set a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles
- EPA directed to set new emissions standards:
  - Multi-pollutant standards, including for GHG emissions, for light- and medium-duty vehicles for model year (MY) 2027 and beyond
  - Multipollutant (GHG and NOx) standards for heavy-duty engines and vehicles for MY2027 and beyond
    - Final rule by Dec. 2022
  - GHG standards for heavy-duty engines and vehicles to be implemented as soon as MY 2030

The Bipartisan Infrastructure Law

- The Bipartisan Infrastructure Law (BIL) provides $5 billion over 5 years (FY22-26) for the replacement of existing school buses with clean and zero-emission school buses (separate from the DERA program).
- Half the funding is for “zero-emission school buses” and half for “clean school buses,” which also includes zero-emission school buses.
- Priority may be given to high-need local education agencies, tribal schools, rural areas or low-income areas, and applicants with other external funding.
- EPA is currently developing education and outreach to promote and explain the program, coordinated with stakeholders.
  - Guidance on how to apply for awards
  - Eligible technologies and their benefits
  - Best practices for clean and electric school bus acquisition and deployment, workforce training, and planning and installing associated infrastructure.

DERA & Ports Initiative Programs

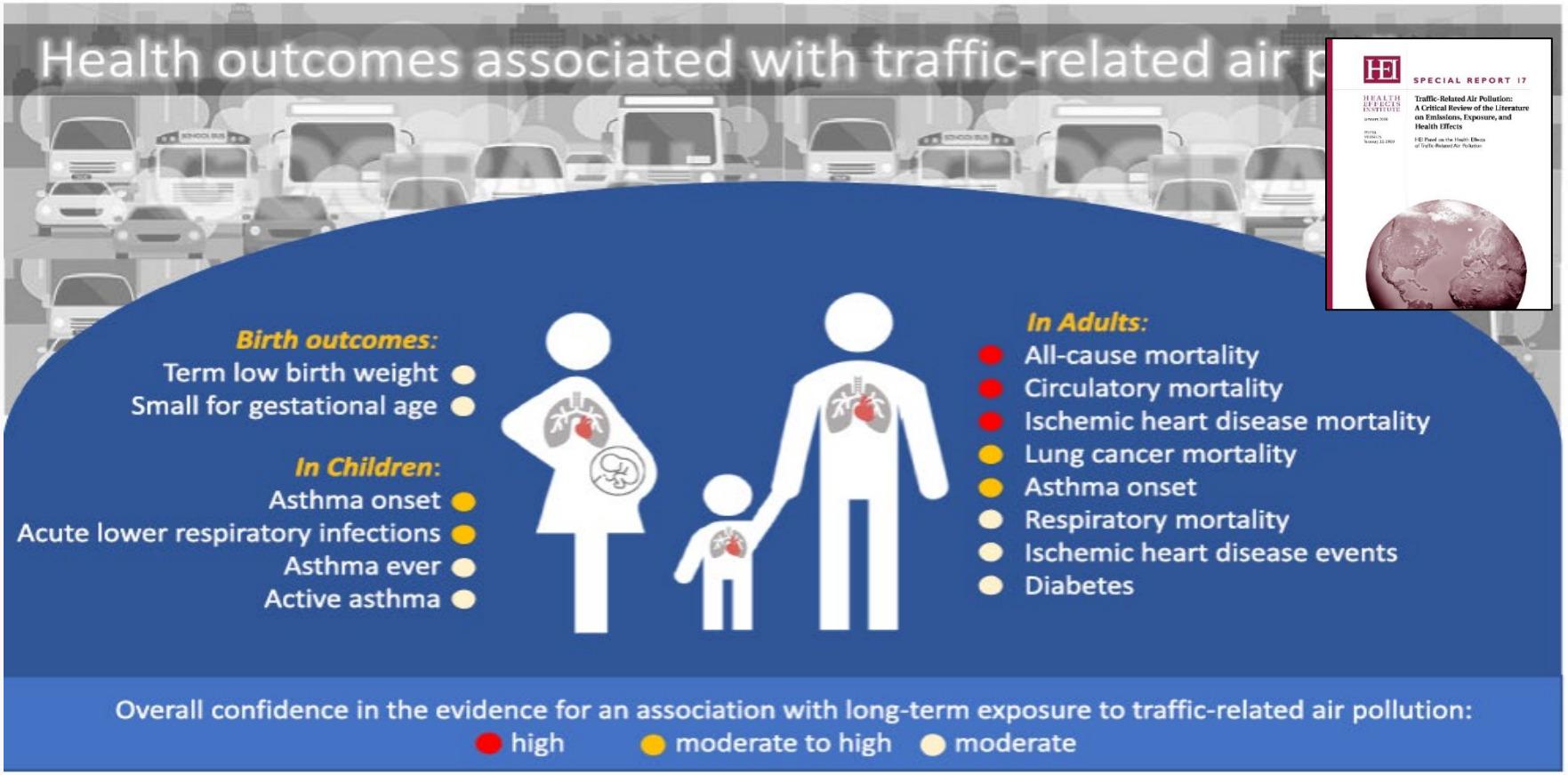
The DERA program provides funding to eligible entities to replace or retrofit existing vehicles and equipment across a wide range of sectors.

- There are four parts to the DERA program: National Grants, State Grants, Tribal/Insular Grants, and School Bus Rebates
- Through the program, EPA has helped to retrofit or replace over 67,300 engines since its start in 2008.
- In 2020, DERA was reauthorized for up to $100 million annually through 2024

The Ports Initiative program forms partnerships with port stakeholders and provides tools and assistance to help accelerate the adoption of:

- cleaner technologies
- clean air planning practices such as emissions inventories and community engagement

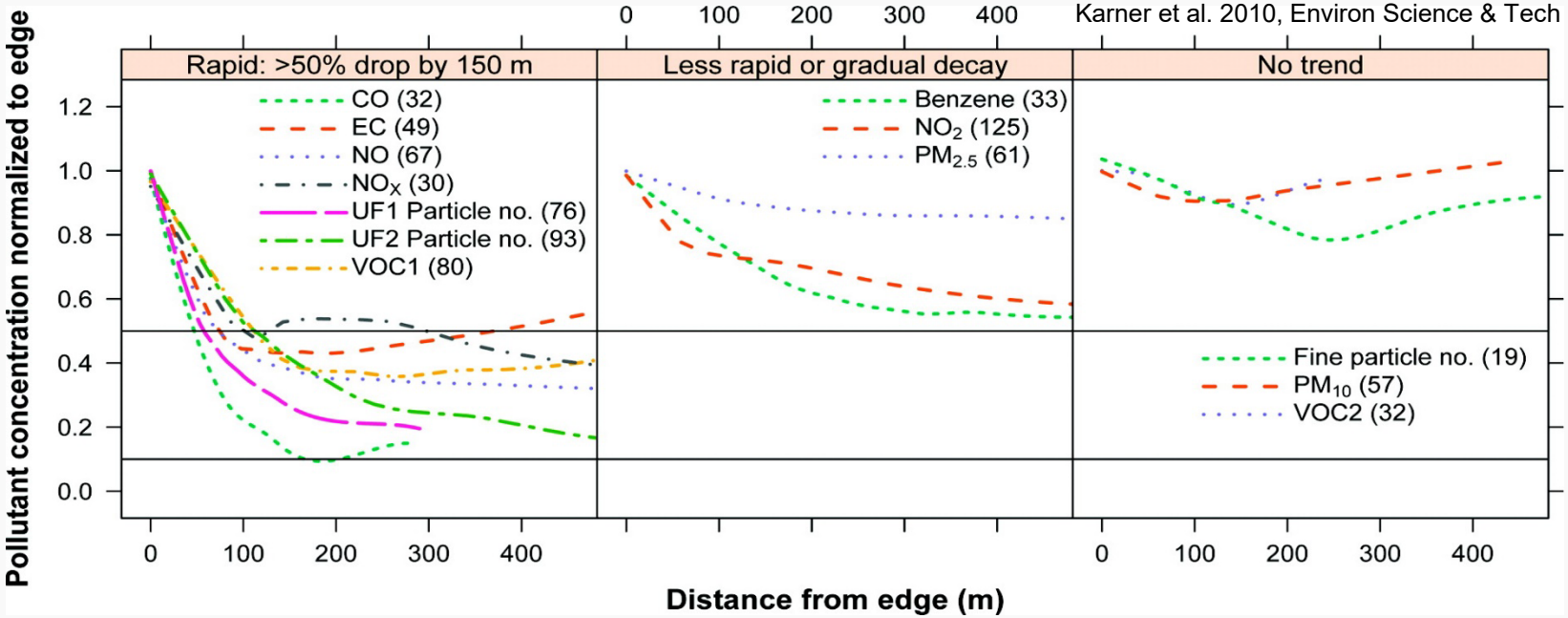
Near-Road Health Concerns



People living, working and going to school near highways and large transportation facilities face increased health risks

Near-Road Health Concerns

Air pollution and exposures often highly elevated near large transportation sources, especially within first 200-300 meters



Near-Road Health Concerns

Large portion of the population exposed to near-road traffic emissions, in the US:

- Over 50 million people estimated to live within 100 m of a large highway or other transportation facility (e.g. airport, rail yard)
- Almost 17,000 schools in the U.S. are estimated to be within 250 meters of a heavily traveled road

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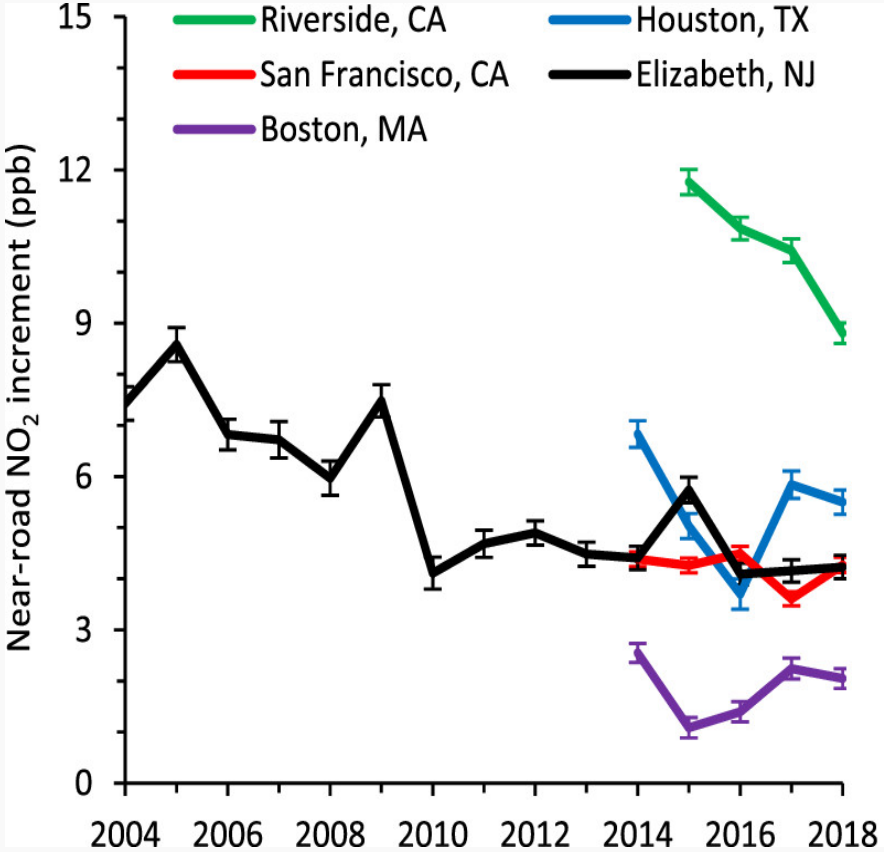
Near-Road/Near-Source Air Quality and Health Activities

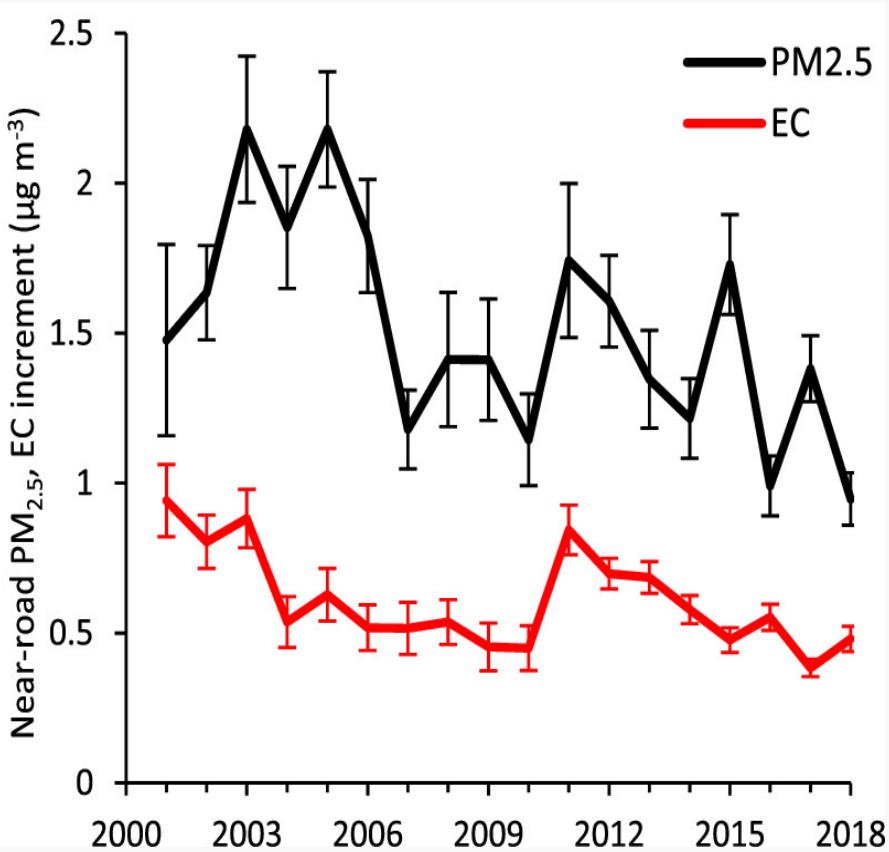
- Near-roadway exposure mitigation best practices
- Local-scale air quality model evaluation and development, including near roads and airports
- Demographic analysis near transportation sources
- Systematic literature review on air quality near airports

OTAQ Use of Air Quality Monitoring Data

- Near-Road and other NAAQS monitoring data
  - Trends in air quality as emissions standards and voluntary programs are implemented
  - Identification of needs for future regulations
  - Evaluation of health effects from exposures to traffic and other transportation sources
  - Special events evaluations
    - COVID pandemic change in transport habits
    - Road closures

Near-Road Pollutant Increments





OTAQ Use of Air Quality Monitoring Data

- Community and citizen science data
  - Understanding exposure differences in varying transport microenvironments including highways, railyards, and airports
  - Evaluation of mitigation programs such as:
    - School HVAC improvements
    - Roadside vegetation and solid barriers
  - For example, the Community-Scale Air Toxics Monitoring grants have provided useful information, including:
    - Benzene in Anchorage, Alaska
    - Pb near airports

OTAQ Use of Air Quality Monitoring Data

- Air quality modeling development and evaluation
  - Comparisons of ambient air quality with emissions data and dispersion estimates to develop and refine models
  - Develop and evaluate models to characterize the impacts of emissions at airports
  - Develop and evaluate models to assess the impacts and mitigation potential of roadside solid and vegetative barriers