

Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities: *Progress Toward Reducing Inequities*

Office of Environmental Health Hazard Assessment (OEHHA)

February 8, 2022



Background

- Executive Directive
 - Analyze the benefits and impacts in disadvantaged communities of GHG emission limits adopted by CARB
 - The initial report in 2017 and updated every three years.
- Previous Report
 - Analyzed emissions from facilities subject to Cap-and-Trade Program
- Findings from Previous Report
 - A large fraction of facilities subject to the Cap-and-Trade Program are located in or near disadvantaged communities.
 - Reductions in GHGs are likely to result in lower emissions of co-pollutants.

New for this Report

- Analyzed emissions from:
 - Facilities subject to Cap-and-Trade Program (extension of original work)
 - Heavy-Duty Vehicles
- Modeled exposure to pollutants and health outcomes
- Compared results based on CalEnviroScreen score and race/ethnicity

Modeling Methodology

Population

- CalEnviroScreen
- Race/ethnicity

Emissions

- Gridded HDV emissions
- Facility stack emissions

Exposure

- InMAP
- Air quality modeling

Health

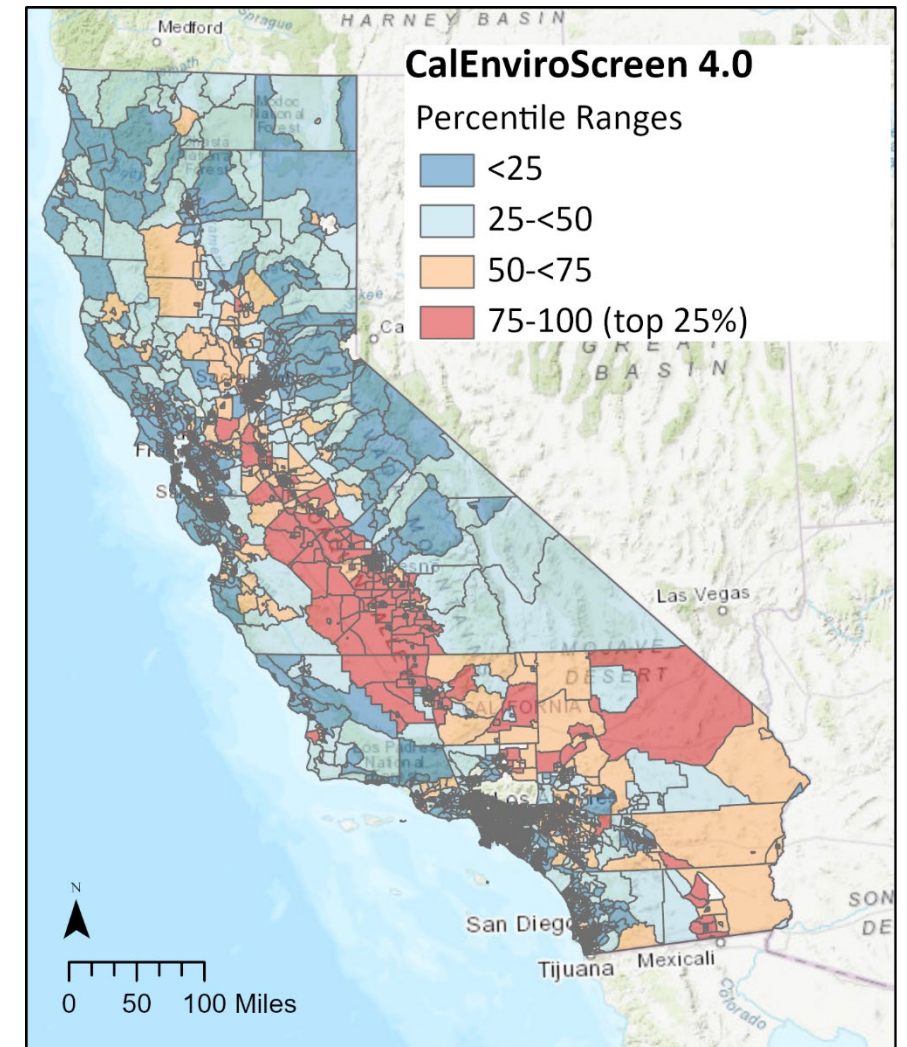
- BenMAP
- Premature mortality

CalEnviroScreen 4.0: Quartile Analysis

- CalEnviroScreen 4.0 census tract scores were grouped into quartiles

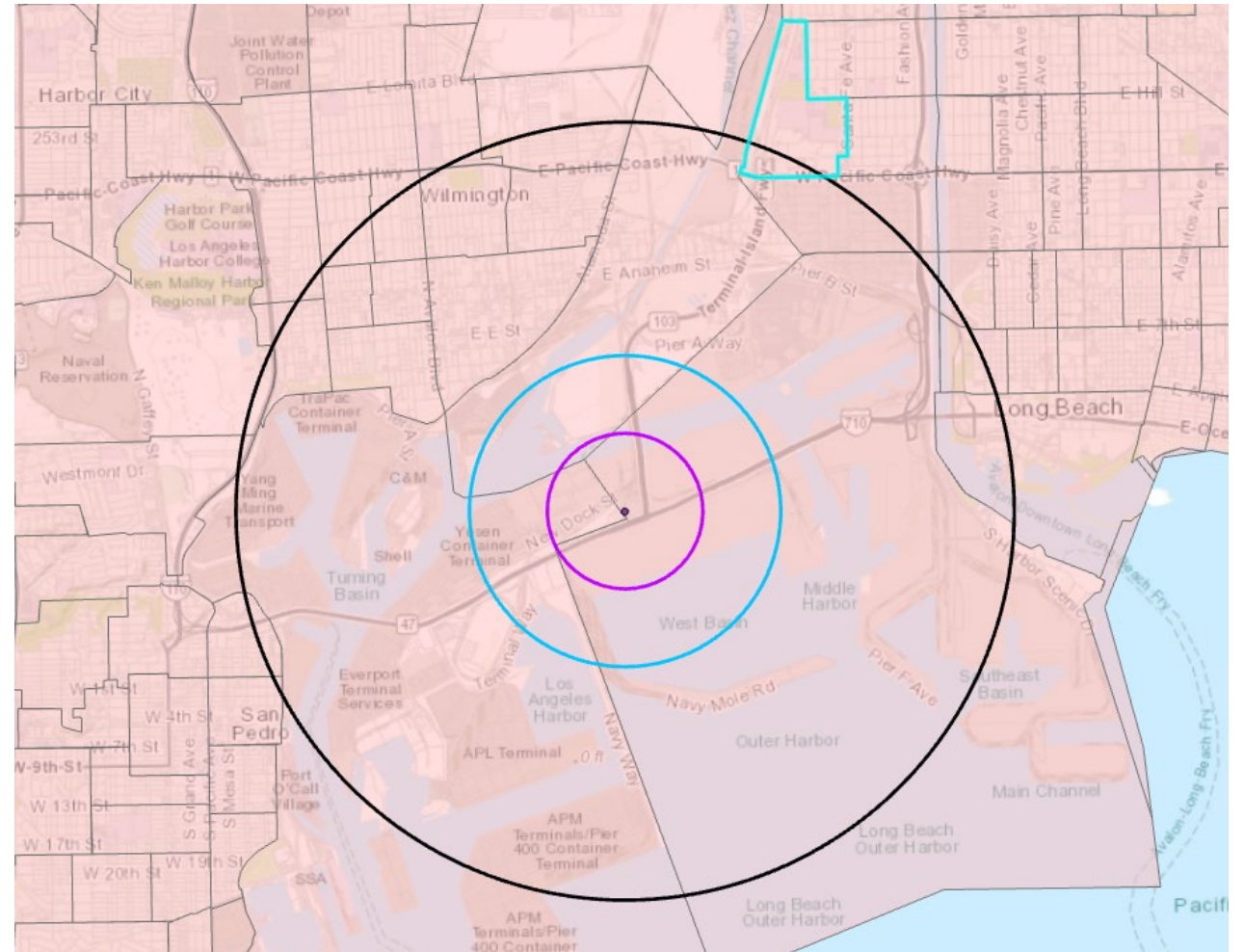
Quartile	Percentile Range
1	<25
2	25 – <50
3	50 – <75
4	≥75

Map of California with CalEnviroScreen 4.0 Quartiles



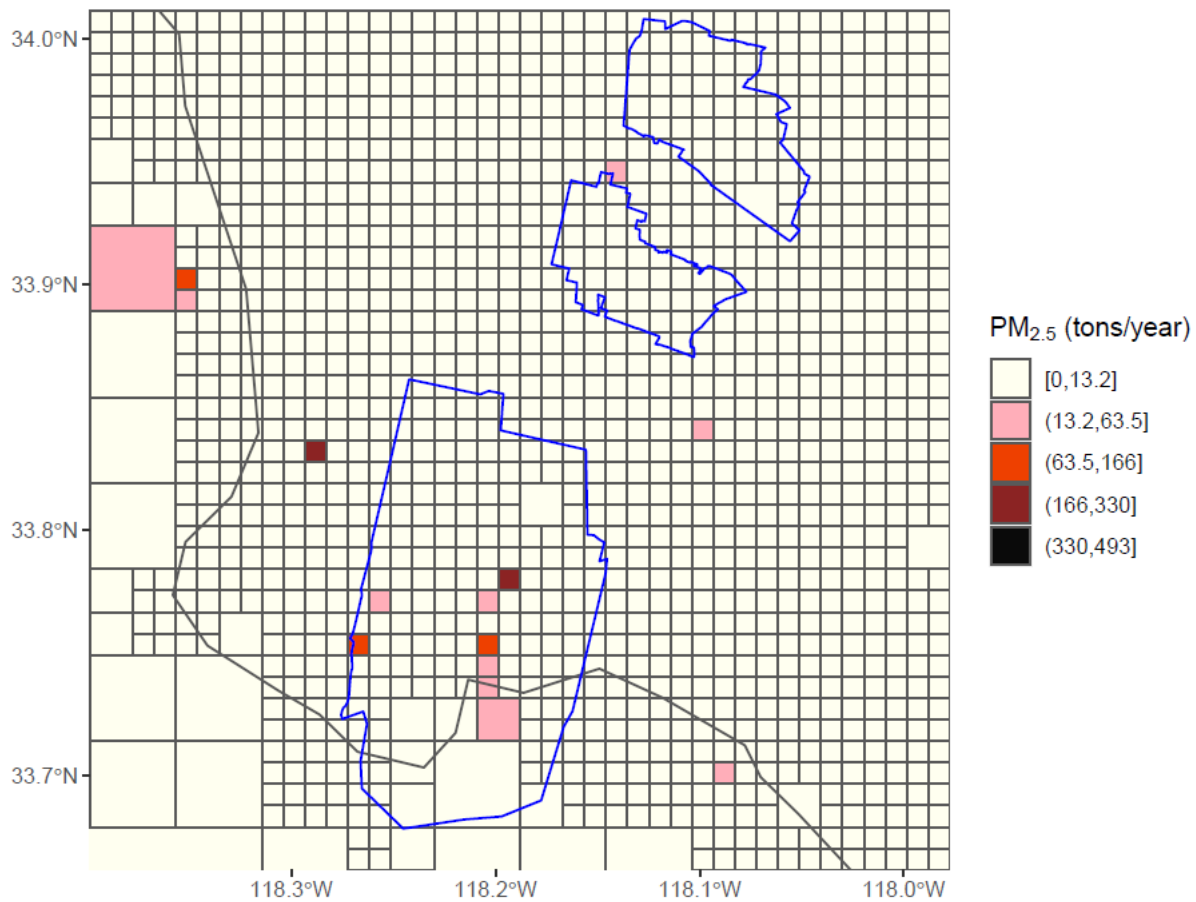
Example: Southeast Resource Recovery Facility

- Assign maximum CalEnviroScreen score to each facility
- Facility assigned CalEnviroScreen score of 99
 - Highest tract within 0.5 to 2.5 mile
 - Range of CalEnviroScreen scores 51-99

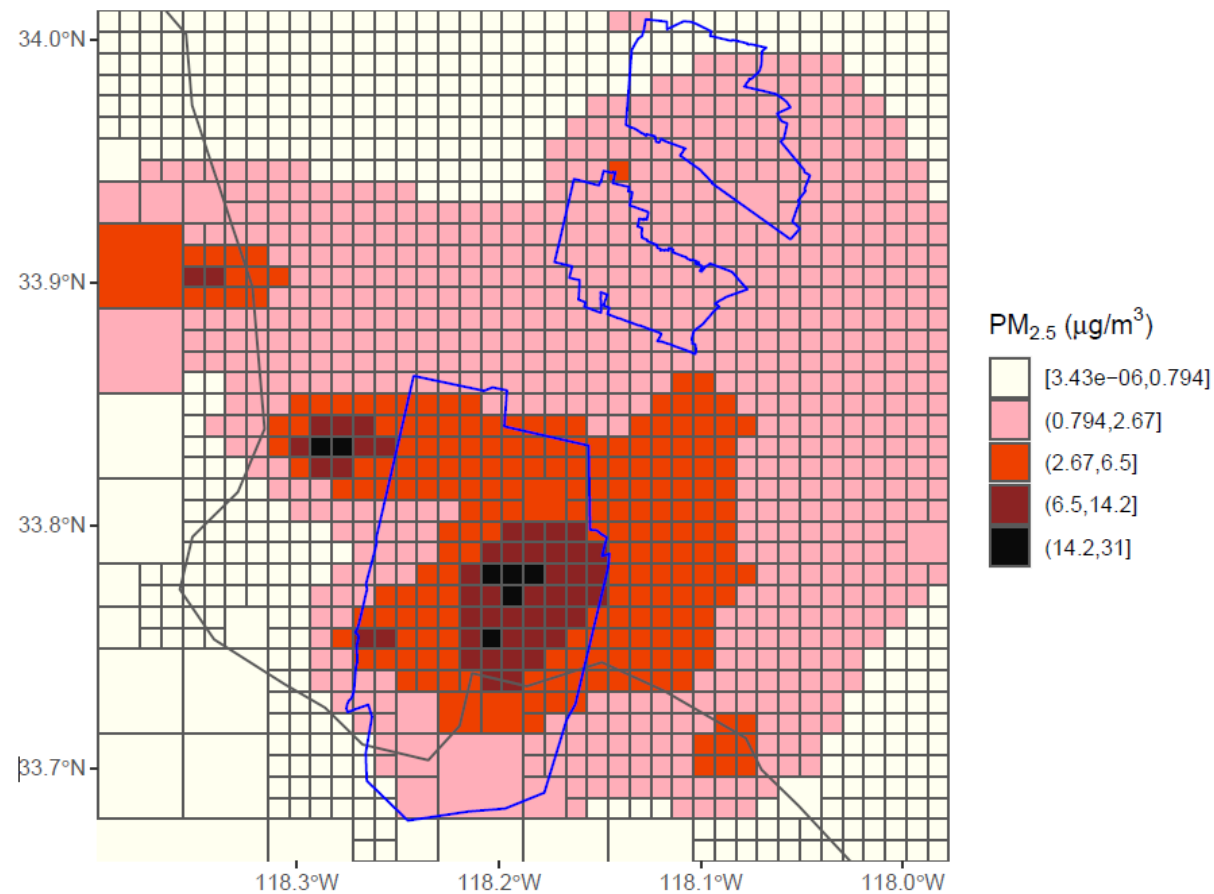


Emissions \neq Concentrations

2012 Primary PM_{2.5} total emissions



2012 Total PM_{2.5} concentrations from all emissions



AB 617 communities are shown in blue

Questions Addressed Using InMAP

- Where does the pollution come from and where does it go?
- Which sources contribute the most to disparities by race/ethnicity and CalEnviroScreen score?
- What are the health benefits associated with reducing emissions? (input to BenMAP).



Heavy-Duty Trucks



High-Scoring CES Communities Have the Greatest Reduction in Diesel PM Concentrations Over the Last 20 Years

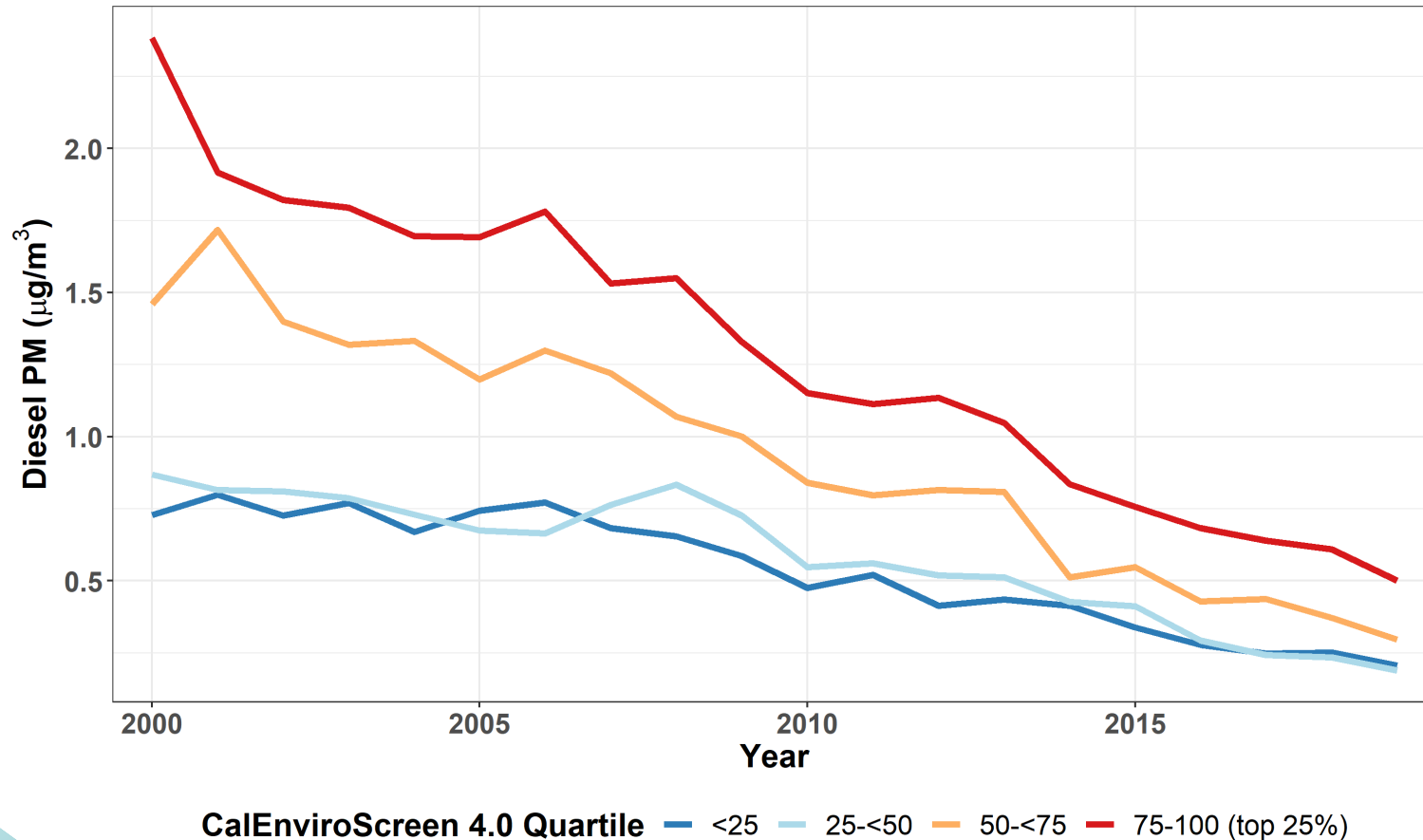


Figure 5. Diesel Particulate Matter Trend by CalEnviroScreen 4.0 Quartile from 2000 to 2019

High-Scoring CES Communities will Benefit the Most from PM2.5 Reductions from Deployment of Zero-Emission Heavy-Duty Vehicles

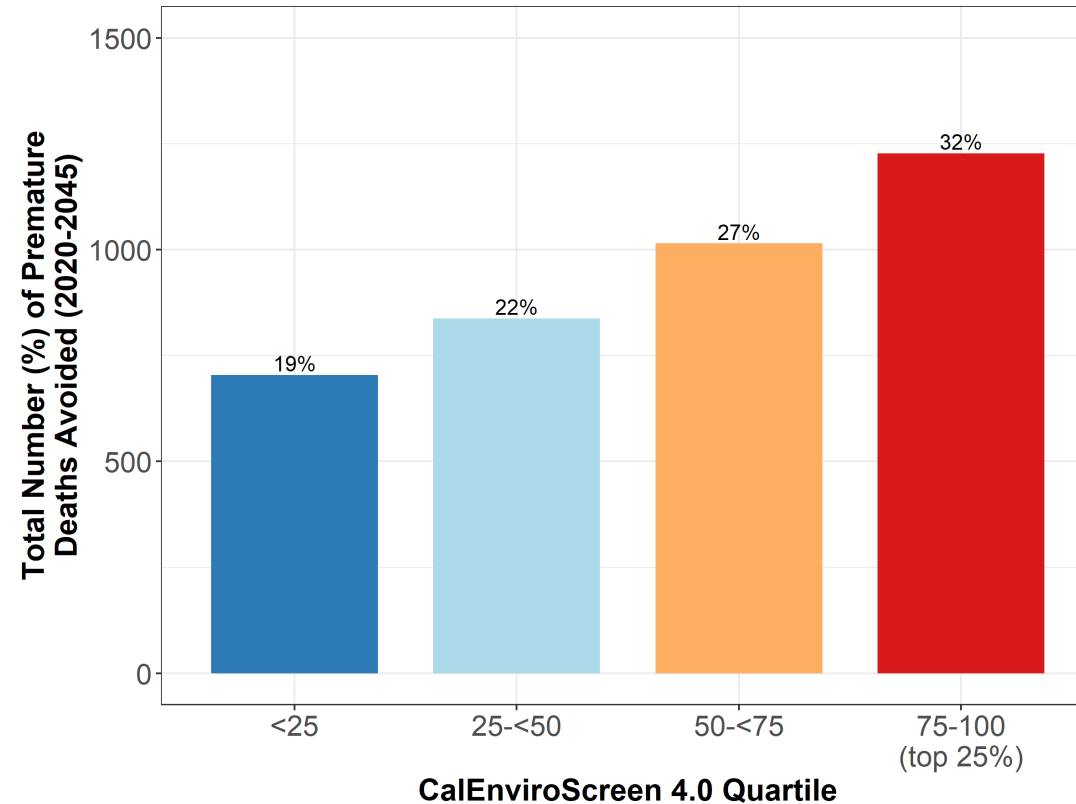


Figure 7. Total Estimated Number and Percent Premature Deaths Avoided with Change in PM2.5 Emissions Resulting from Transition to Zero-Emission Heavy-Duty Vehicles from 2020–2045 by CalEnviroScreen 4.0 Quartile

Communities of Color will Benefit the Most from PM2.5 Reductions from Deployment of Zero-Emission Heavy-Duty Vehicles

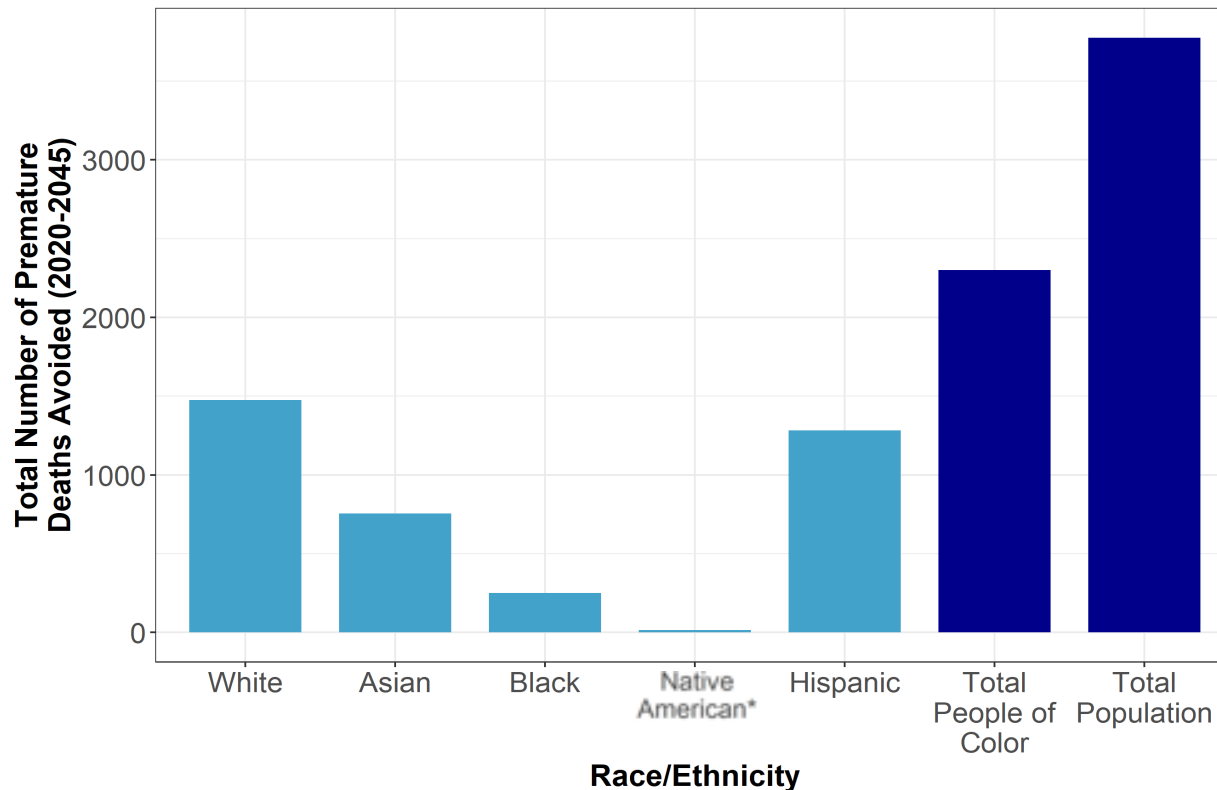


Figure 8. (A) Total Number Premature Deaths Estimated Avoided with Change in PM2.5 Emissions Resulting from Complete Transition to Zero-Emission Heavy-Duty Vehicles from 2020–2045 by Race/Ethnicity.



Facilities Subject to Cap-and-Trade

Most Covered Facilities in All Sectors are Located in or near High-Scoring CES Communities

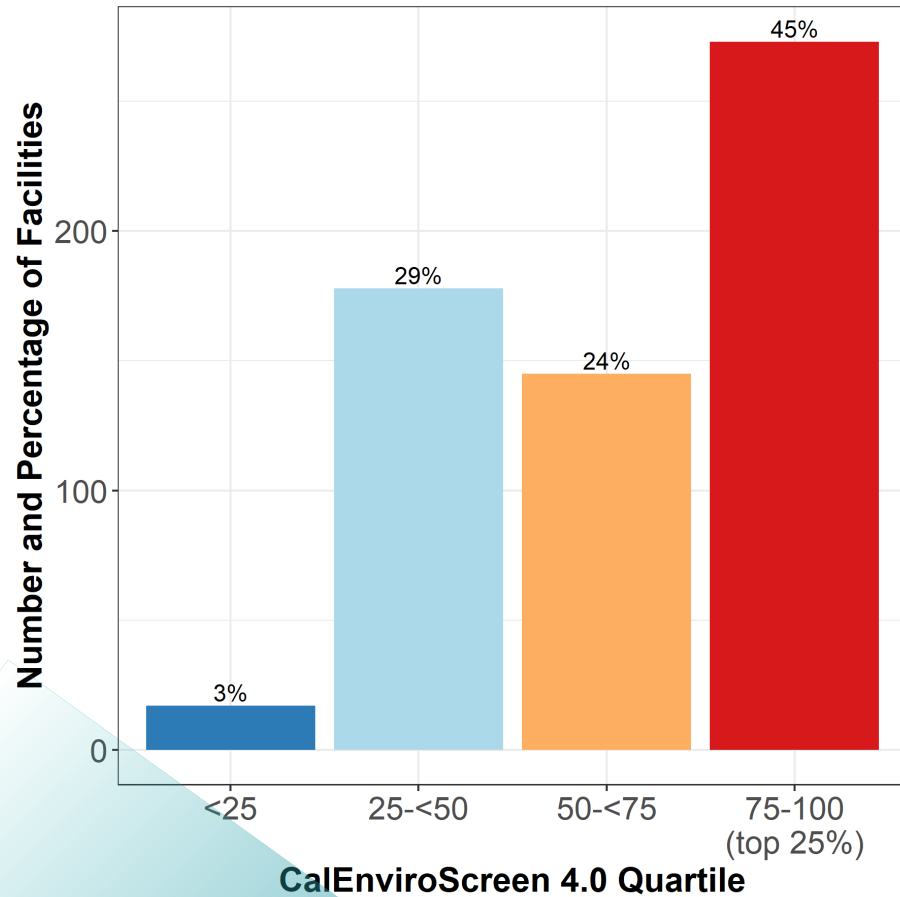


Figure 9. Number and Percentage of Facilities by CalEnviroScreen 4.0 Quartile

Table 1. Facilities Categorized in High CalEnviroScreen 4.0 Quartile by Sector

Sector (Number of facilities)	Percentage of Facilities
Refinery (21)	71%
Other Combustion Sources (130)	61%
Electricity Generation (96)	49%
Cogeneration (42)	57%

High-Scoring CES Communities Experienced the Greatest PM2.5 Exposure Reductions from Facilities Subject to the Cap-and-Trade Covered Program

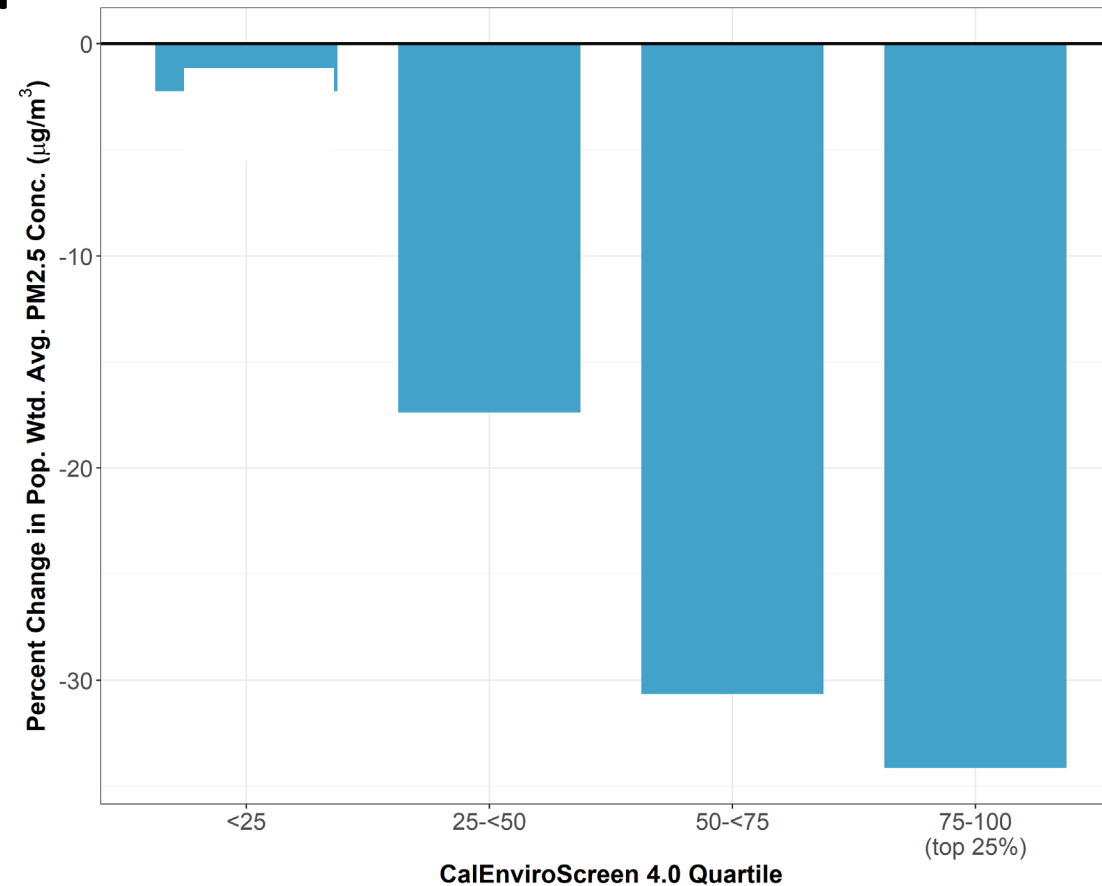


Figure 12. Percent Change in Population-Weighted Average PM2.5 Exposure Concentration from Facilities between 2012 and 2017 by CalEnviroScreen 4.0 Quartile: InMAP Results

Black Californian's Experienced the Greatest PM2.5 Exposure Reductions from Facilities Subject to the Cap-and-Trade Program

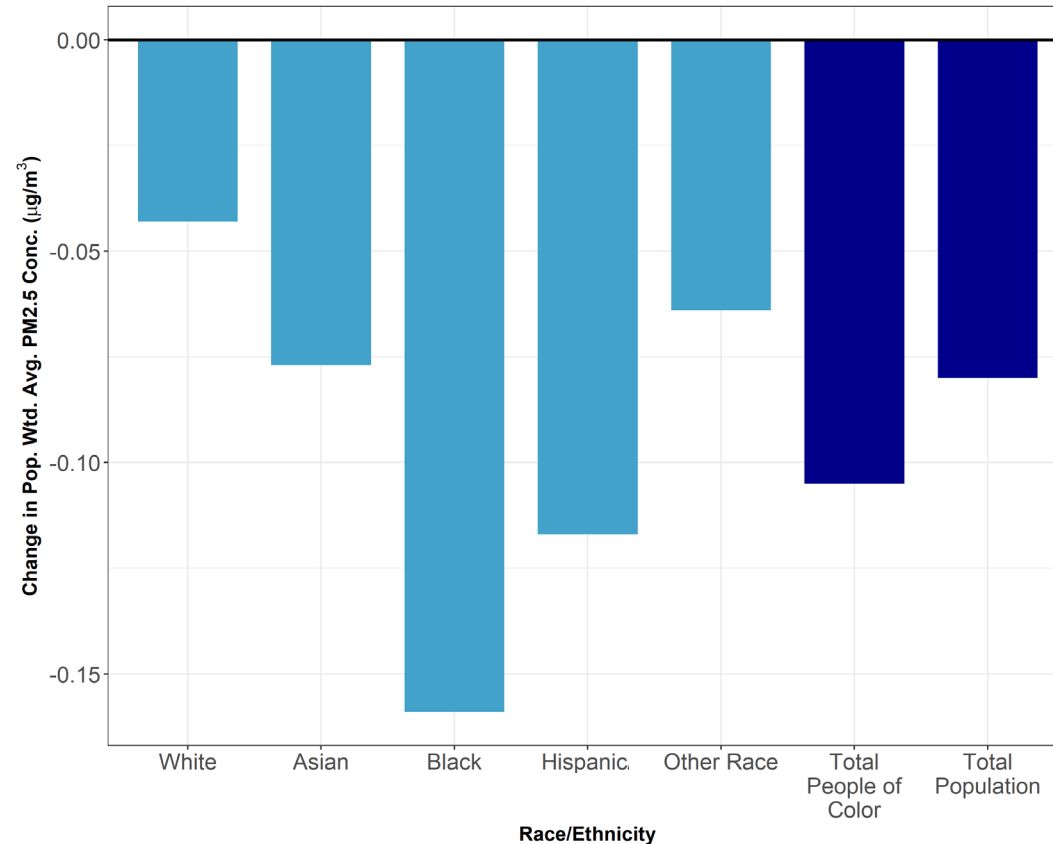


Figure 14. Change in Population-Weighted Average PM2.5 Exposure Concentration from Facilities between 2012 to 2017 by Race/Ethnicity: InMAP Results

High-Scoring CES Communities Experienced Greatest Health Benefits from Emissions Reductions at Facilities Subject to the Cap-and-Trade Covered Program

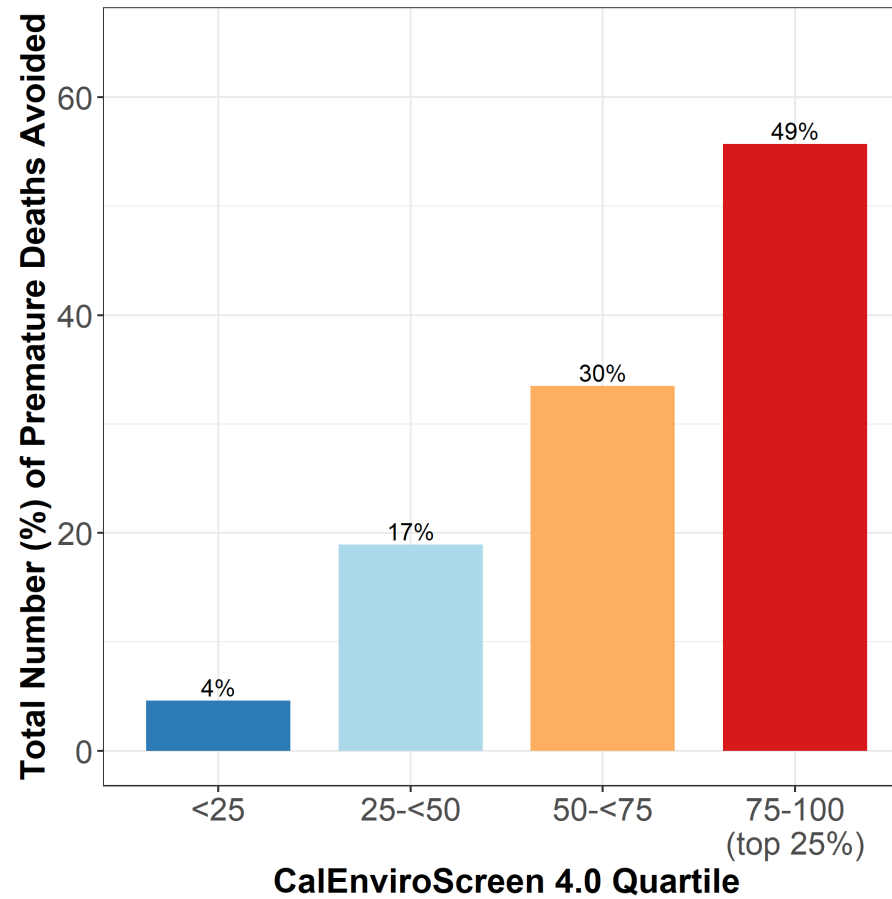


Figure 13. Total Number Premature Deaths Avoided with Change in PM2.5 Emissions from Covered Facilities between 2012 to 2017 by CalEnviroScreen 4.0 Quartile

A Wide Gap in PM2.5 and Air Toxics Emissions Remains Between High and Low-Scoring CalEnviroScreen Communities

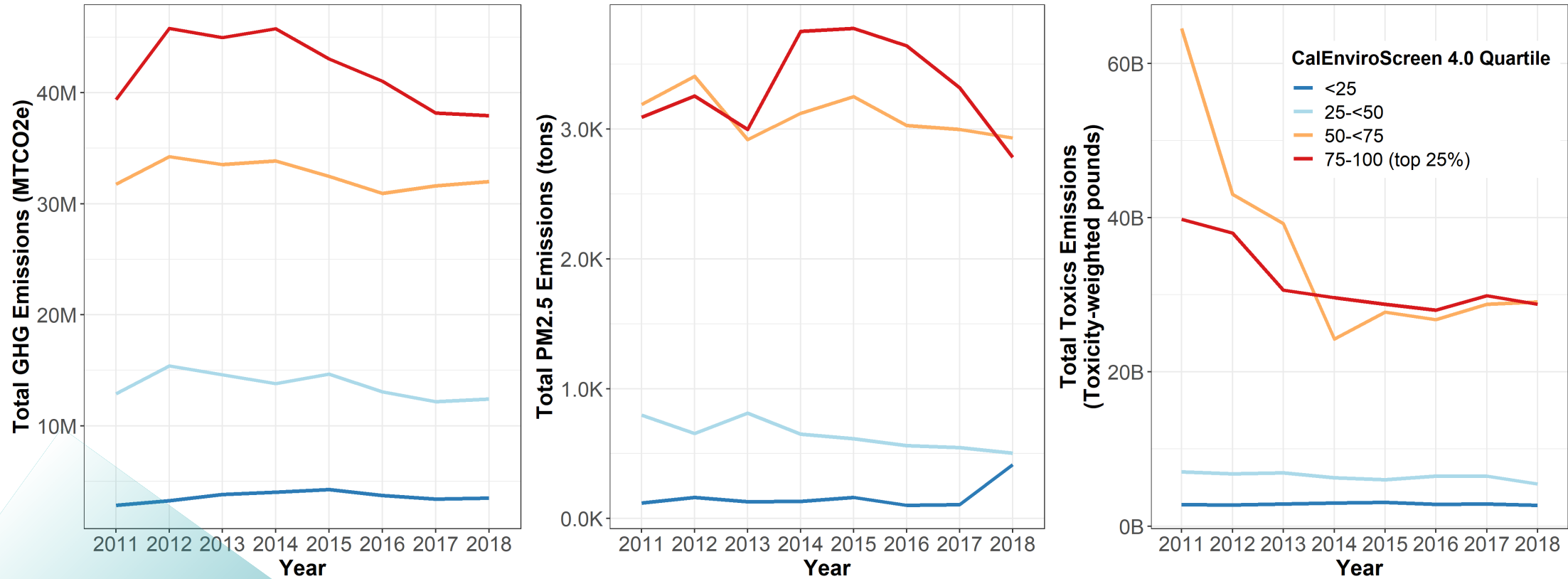


Figure 16. Trend in Total GHG, PM2.5, and Air Toxic Emissions from Facilities between 2011–2018 by CalEnviroScreen 4.0 Quartile

Black Californians Experience the Highest PM2.5 Concentrations from Refinery Emissions

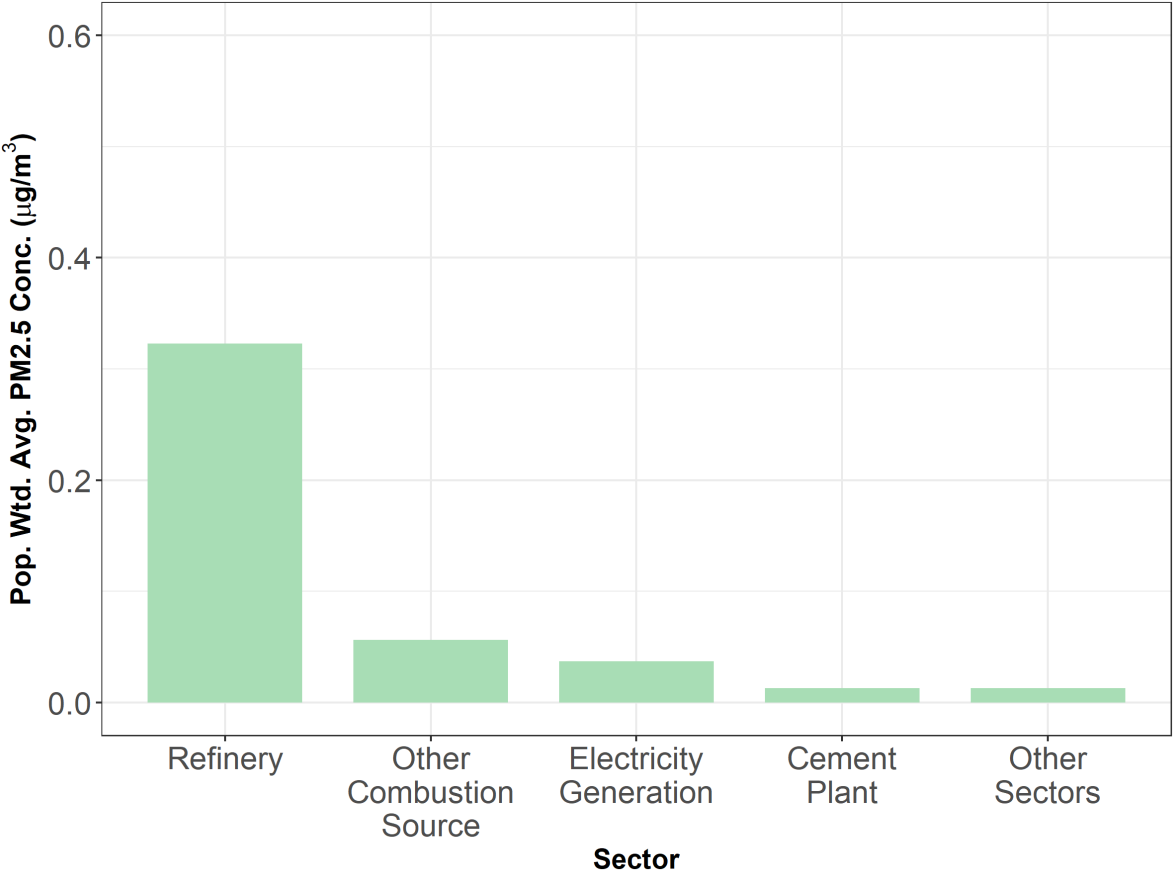


Figure 18. Population-Weighted Average PM2.5 Concentration from Facilities in 2017 for Black Californians by Sector: InMAP Results

Future Work: Areas for Facilitating Future Analysis

1. Collecting granular, community-level data for mobile sources.
2. Improving data accessibility for criteria pollutant and air toxics emissions data.
3. Adding finer scale criteria pollutant and air toxics emissions for the oil and gas sector.
4. Implementing statewide data standards for all emission sources.
5. Increasing the transparency in offset entity information.
6. Creating environmental and health equity benchmarks.

Areas for Facilitating Future Analysis

1. Collecting granular, community-level data for mobile sources.
 - Some data is at the county-level
 - Finer resolution data is needed to better understand community-scale impacts
 - Evaluating data from smartphones and road sensors could provide data travel routes, the distribution of vehicle fleets, and mobility patterns

Future Work: Areas for Facilitating Future Analysis

2. Improving data accessibility for criteria pollutant and air toxics emissions data.
 - Datasets are not in one place or only available upon request
 - Putting more data on the Pollution Mapping Tool would improve accessibility
 - Historical data
 - More detailed facility notes
 - Regulations have been implemented that aim to address many of these critical data gaps.

Future Work: Areas for Facilitating Future Analysis

3. Adding finer scale criteria pollutant and air toxics emissions for the oil and gas sector.
 - GHG emissions are seldom available at the facility-level and locations not always accurate
 - Add individual well data to Pollution Mapping Tool
 - Harmonization of facility definition in GHG and CEIDARS reporting to ensure correct crosswalking of emissions between GHG and co-pollutants is possible

Future Work: Areas for Facilitating Future Analysis

4. Implementing statewide data standards for all emission sources.
 - To model exposure and health impacts improved CEIDARS data is needed from districts
 - Locations in consistent coordinate system
 - Standardized emissions factors and emissions calculation methods
 - More frequent updates
 - Some data only available by special request to air districts:
facility boundaries, control technology, health risk assessments

Future Work: Areas for Facilitating Future Analysis

5. Increasing the transparency in offset entity information.
 - Only entity (parent company) information on offset use available
 - Not possible to assess
 - Community emissions impacts
 - Individual facility use of offsets
 - Health impacts

Future Work: Areas for Facilitating Future Analysis

6. Creating environmental and health equity benchmarks.

- Health and equity benchmarks help measure progress toward achieving environmental justice
- Here we include analysis
 - Emissions, exposure, health impacts
 - CalEnviroScreen score
 - Race/ethnicity

Thank You

For more information, please contact:

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The report and additional material is available here:

<https://oehha.ca.gov/environmental-justice/report/ab32-benefits>