



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

AGENDA: 4

# Advisory Council New Members

**Jack P. Broadbent**

Executive Officer/Air Pollution Control Officer

# LINDA RUDOLPH

## DIRECTOR OF THE CENTER OF CLIMATE CHANGE AND HEALTH, PUBLIC HEALTH INSTITUTE



Doctorate of Medicine,  
University of California San Francisco  
Master of Public Health, Epidemiology,  
University of California Berkeley

- Previous Deputy Director for Chronic Disease Prevention and Public Health in the California Department of Public Health (CDPH)
- Previous Health Officer and Public Health Director for the City of Berkeley
- Founding Chair of the Strategic Growth Council's Health in All Policies Task Force
- Founding Chair California Climate Action Team's Public Health Work Group
- Previous Chief Medical Officer for Medi-Cal Managed Care
- Previous Medical Director for the California Division of Workers' Compensation

# GINA SOLOMON

CLINICAL PROFESSOR OF MEDICINE, UNIVERSITY OF CALIFORNIA SAN FRANCISCO

PRINCIPAL INVESTIGATOR, PUBLIC HEALTH INSTITUTE



Doctorate of Medicine,  
Yale University School of Medicine  
Master of Public Health,  
Harvard School of Public Health

- Serves on Environmental Protection Agency's Board of Scientific Counselors
- Serves on National Academy of Science (NAS) Board on Environmental Studies and Toxicology
- Serves on NAS Committee on Emerging Science for Environmental Health Decisions
- Previous Senior Scientist at the Natural Resources Defense Council
- Previous Deputy Secretary for Science and Health at the California Environmental Protection Agency
- Published work includes cumulative impacts and environmental justice, new tools in toxicology, the health effects of diesel exhaust, endocrine disrupting chemicals, pesticides, refinery safety, and the health effects of climate change

# **Update on Assembly Bill 617 (AB 617) : Improving Neighborhood Air Quality**

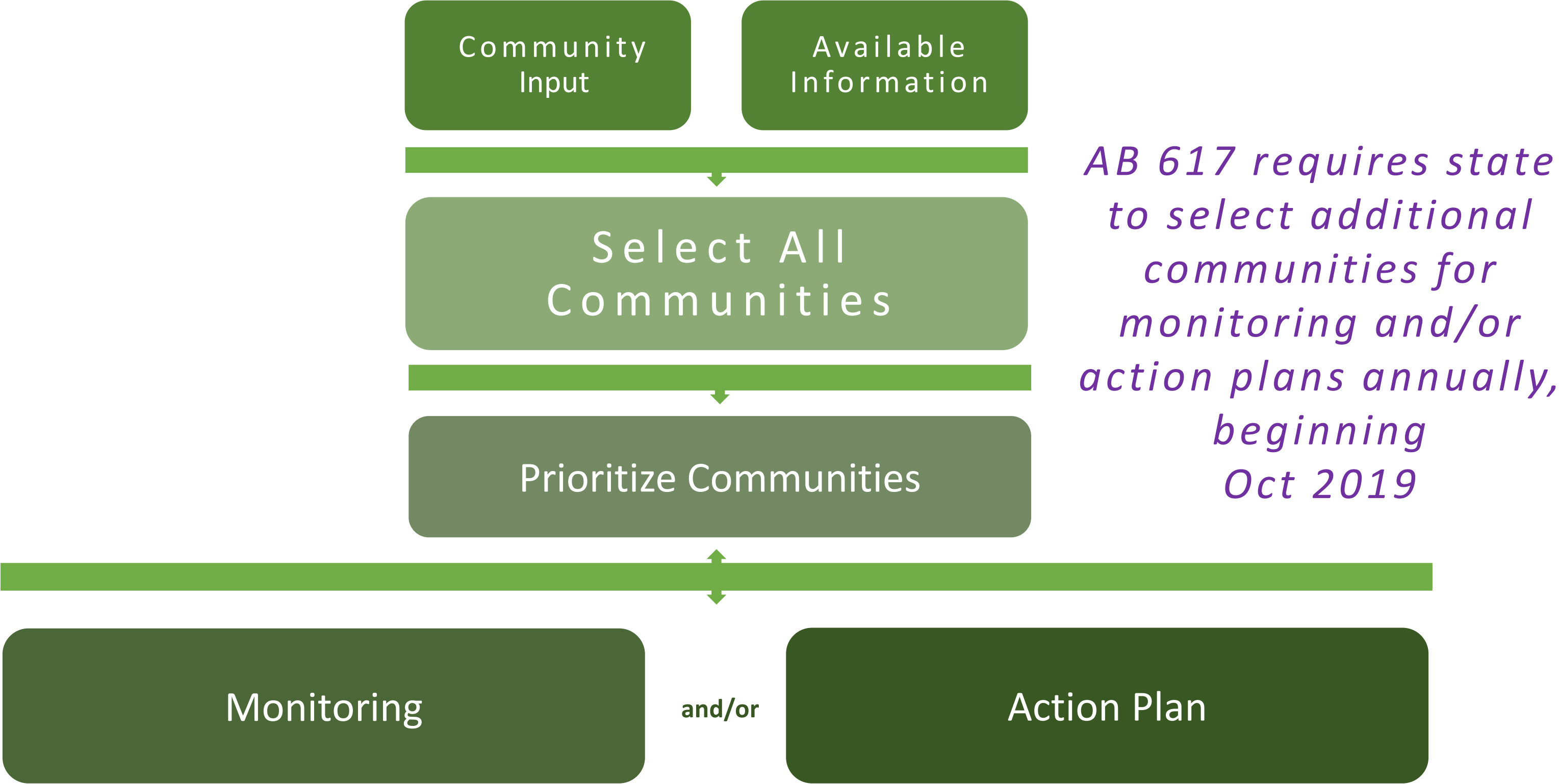
# Program Goals

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- Community Participation
- Eliminate Air Quality Disparities
- Reduce Health Burdens
- Continuous Evaluation and Improvement



# Program Components





# Community Selection

*State requires districts to work with communities to select all areas in the region that have a “high cumulative exposure burden” and then prioritize areas for community monitoring and/or actions plans over the next 6 years.*



# Criteria for Selecting *All* AB 617 Areas

## Community Air Risk Evaluation (CARE)

High pollutants

fine particles

toxics

ozone

Mortality

Cancer risk

ER visits and  
hospitalizations  
due to air  
pollution

## Health and Vulnerability

Life expectancy

Low birth weight

Diesel exhaust

Traffic

Socioeconomic factors

Education

Housing costs

Access to transportation

## Large Sources

Oil refineries

Cement plants

Chemical plants

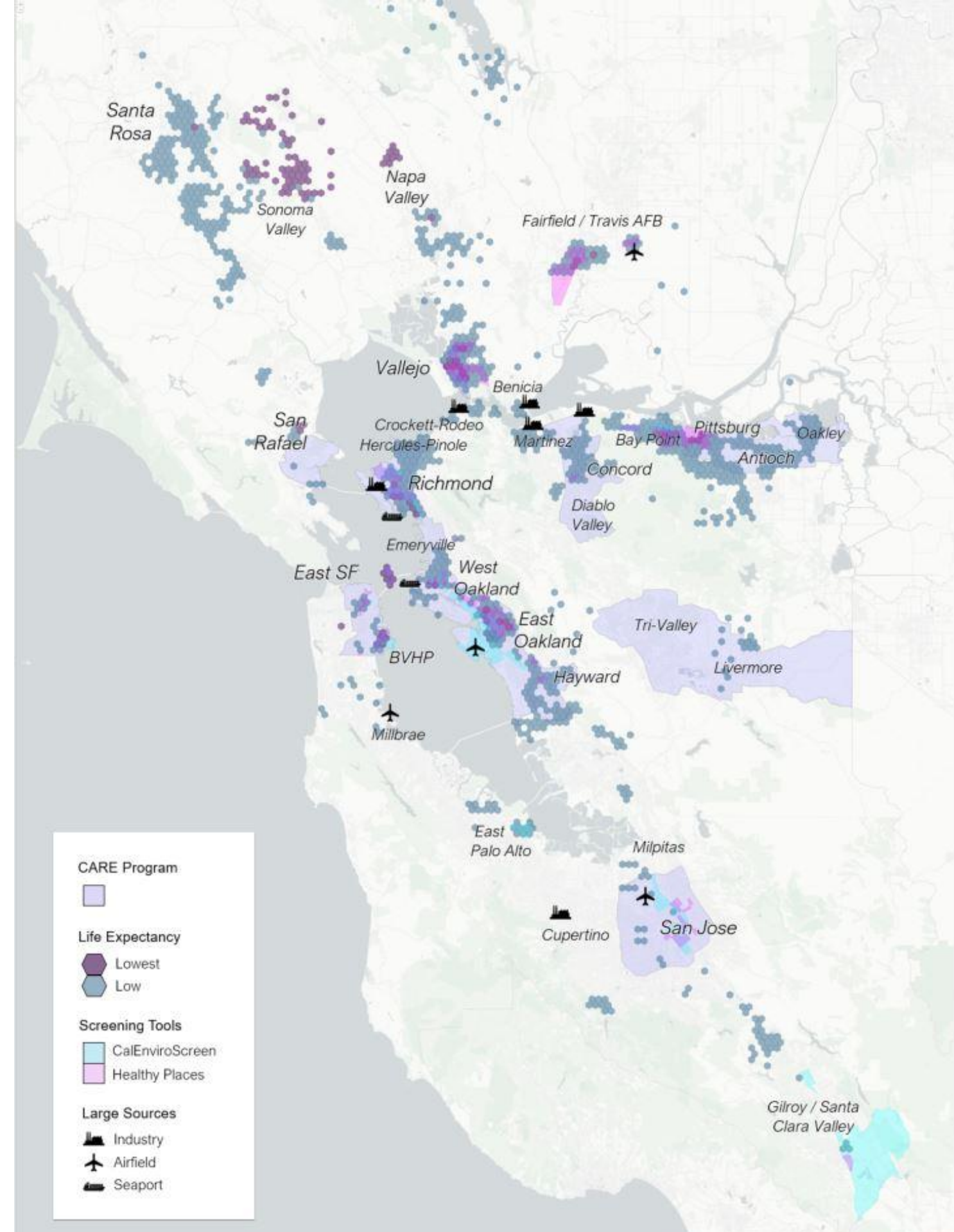
Marine ports

Airports



# All Areas Recommended

- CARE Areas
- Areas with large sources
- Areas with health vulnerability and pollution impacts
- Areas with low life expectancy



# Criteria to Prioritize Communities for Action

## Air Quality

Fine particles  
Toxics

## Health

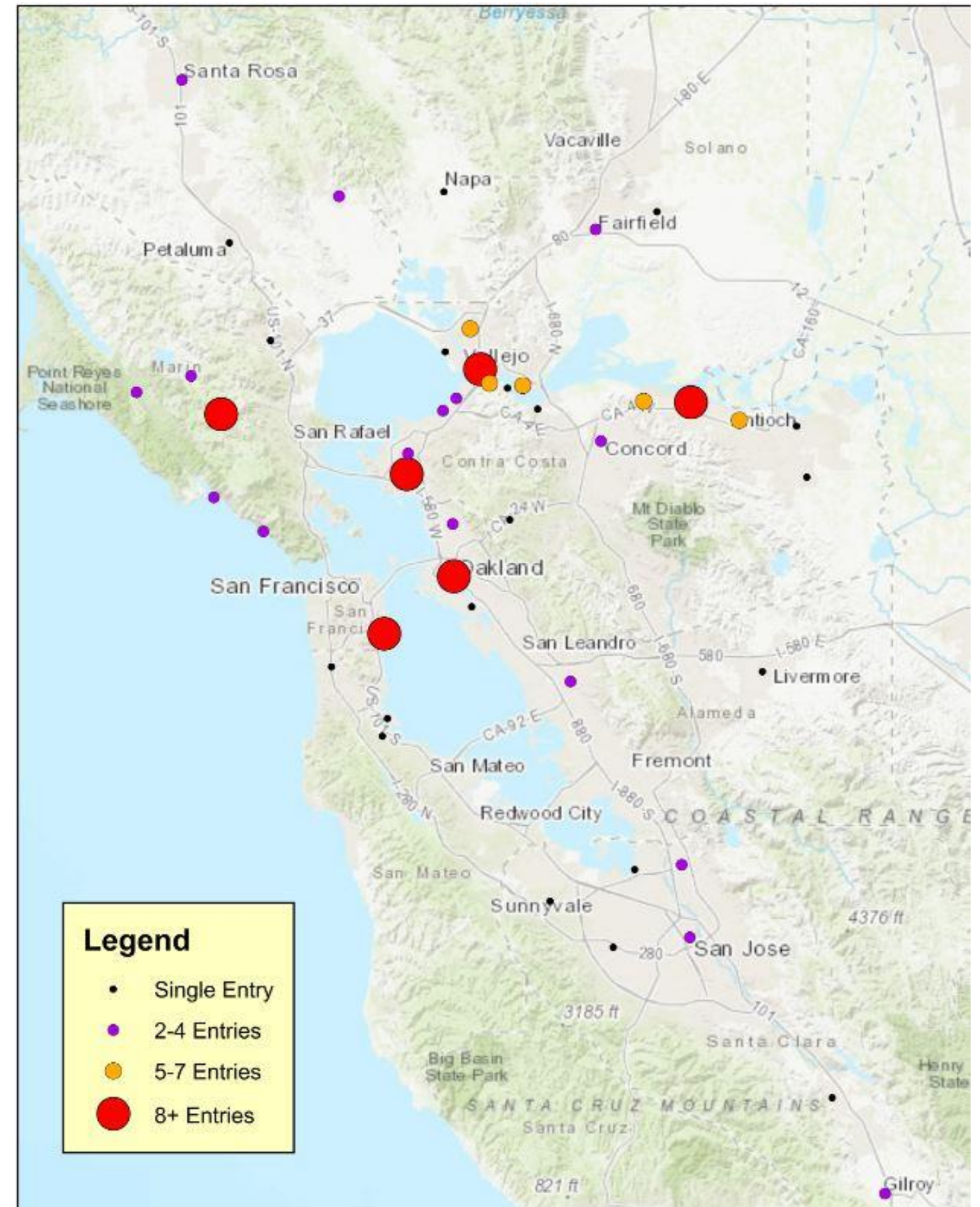
Life expectancy  
Lung disease  
Heart disease

## Other

Resources  
Data  
Planning  
Collaboration  
Capacity

# Community Priorities

- West Marin, due to concerns over woodsmoke
- West Oakland
- Richmond
- Pittsburg-Bay Point area
- Vallejo
- East San Francisco



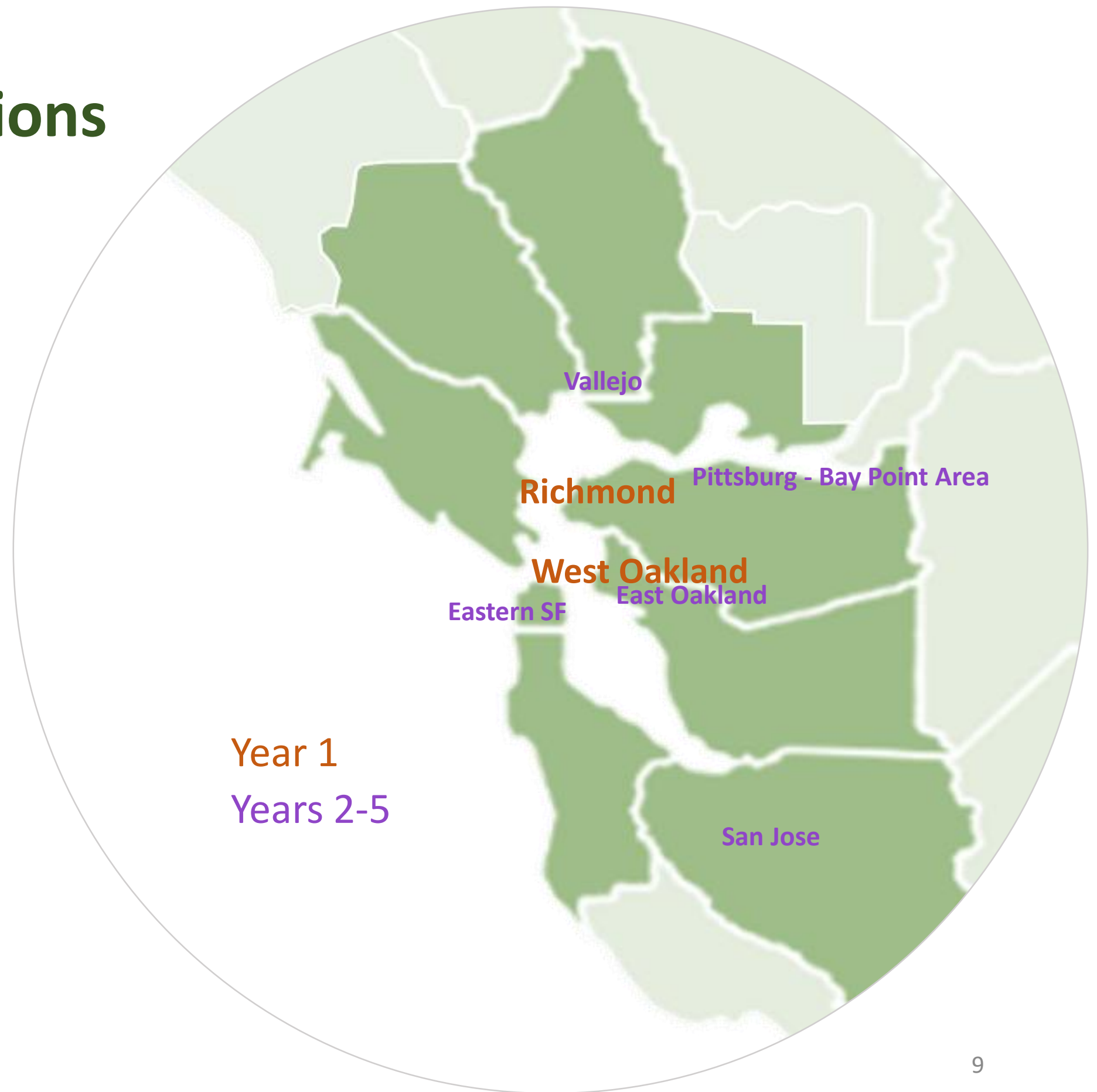


# Community Recommendations

Year 1

West Oakland — action plan

Richmond - monitoring



Year 1

Years 2-5

# West Oakland

## *Action Plan*

- Very high mobile source emissions
  - Port of Oakland largest single source of diesel particulate matter (diesel PM)
  - Roadways contribute significantly to PM<sub>2.5</sub>
- High health burden
- High socio-economic vulnerability
- Concerns about new development at Port of Oakland and Oakland Army Base
- Goal of zero emissions environment
- Leverage previous and ongoing collaboration and research



# Action Plan Components

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- Local air quality conditions and impacts
- Emission reduction targets
- Stationary and mobile sources
- Source apportionment
- Exposure reduction strategies
- Implementation schedule
- Enforcement plan
- Method for tracking progress



# Richmond

## *Monitoring Plan*

- High emissions from stationary and mobile sources:
    - Refinery, chemical plant, landfills, water treatment facility, metal scrapping, marine terminals, freeways, port
  - High health burden
  - High socio-economic vulnerability
- Regional monitoring data are not consistent with observed health issues
  - More monitoring to evaluate which sources may be contributing to issues
  - Leverage ongoing data analysis and monitoring work

# Monitoring Plans

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- Engage local community and key stakeholders
- Develop shared concerns and air monitoring objectives
  - Identify potential issues
  - Determine contributing sources
- Use a combination of monitoring methods
- Collected data will be publicly available
- Analyze and interpret data and communicate results





# Emissions Inventory

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- Annual stationary source emissions reporting for facilities:
  - already subject to mandatory GHG reporting
  - emit 250 tons/year or more of any nonattainment pollutant/precursor
  - has an “elevated prioritization score” based on cancer or noncancer impacts



# Emissions Inventory (continued)

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- Uniform statewide annual reporting for criteria and toxic emissions
- Air District intends to continue requiring reporting, but will work with CARB, CAPCOA, and industry to develop uniform methods





# Updated Pollution Control Standards and Technology

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- Non-attainment pollutants
- Determine Best Available Retrofit Control Technology
- Coordinate with state and other districts





# Updated Pollution Control Standards and Technology (continued)

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- Adopt BARCT implementation schedule
  - include Cap & Trade sources
  - consider:
    - benefits to local community
    - cost effectiveness
    - air quality attainment benefits
  - deadline December 31, 2023



# What's Next?

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- Action Plan in West Oakland
- Monitoring in Richmond
- New rules and regulations
- Provide incentives for cleaner vehicles
- Build capacity and relationships



# Questions?

Greg Nudd  
Deputy Air Pollution Control Officer  
[gnudd@baaqmd.gov](mailto:gnudd@baaqmd.gov)





# **Diesel Particulate Matter (Diesel PM) Health Impacts and Impacted Areas**

**Advisory Council Meeting  
July 19, 2018**

**Judith Cutino, DO, PE, Health Officer  
Virginia Lau, Advanced Projects Advisor**



# Overview

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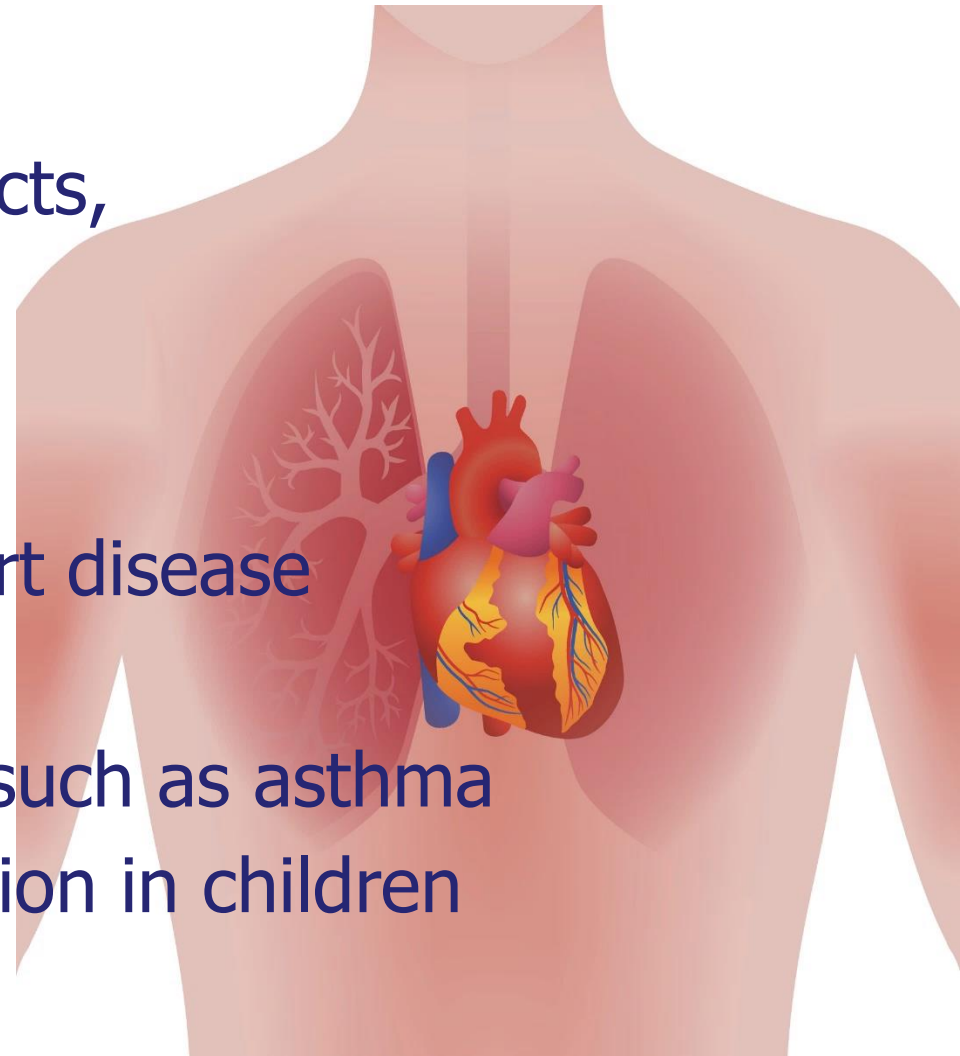
- Fine particles can penetrate deep into the lungs causing cardiovascular and pulmonary health impacts
- Health effect studies have shown that diesel particulate matter (diesel PM) is a potent carcinogen
- Bay Area studies show diesel PM remains a significant contributor to regional cancer risk from air pollution
- Diesel PM from mobile sources contributes a majority of the risk to vulnerable, impacted areas

- Major sources include heavy-duty trucks, trains, ships, and large generators
- Composed of carbon particles, inorganic solids, and over 40 known toxic air contaminants (TACs) including
  - Polycyclic aromatic hydrocarbons
  - Benzene
  - Formaldehyde
  - Acetaldehyde
  - Acrolein
  - 1,3-Butadiene



# Health Effects of Diesel PM

- Exposure contributes to non-cancer health effects, including:
  - Premature death
  - Increased risk of heart disease and stroke
  - Respiratory disease, such as asthma
  - Decreased lung function in children



# Studies of PM

- Harvard School of Public Health studies of Medicare patients:
  - Higher estimated risk of death from PM<sub>2.5</sub> exposure
  - At concentrations below the current NAAQS
  - Higher effects for racial minorities, low socioeconomic status

Di, Q. et al, N Engl J Med (2017) and JAMA (2017)
- Numerous health studies show:
  - Increased health effects for those living near major sources of diesel PM
  - Example: higher new-onset asthma in children living near roadways

McConnell, R., et al. Environ Health Perspect (2010)

# Diesel PM Identified as Carcinogen

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- California Air Resources Board identified diesel PM as a Toxic Air Contaminant:
  - Cal EPA Office of Environmental Health Hazard Assessment (OEHHA) evaluation of diesel exhaust (1998)
- World Health Organization – International Agency for Research on Cancer classified diesel engine exhaust as carcinogen:
  - Lung cancer
  - Possible increased risk of bladder cancer



# Who is Affected?

- Higher diesel PM near vulnerable Bay Area residents with low income and high cumulative health burden:
  - Disproportionately affecting people of color
- Those most vulnerable to health effects:
  - Children
  - Pregnant women
  - Elderly



# Impacted Areas

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- Highly populated, urban core, residential areas have higher exposure to diesel PM
- Community Air Risk Evaluation (CARE) Program and the new Community Health Protection Program are identifying these areas using emissions data, health outcome results, and air quality modeling

# Diesel PM Contributes to PM<sub>2.5</sub> and Black Carbon (BC)

## REGIONAL EMISSIONS INVENTORY

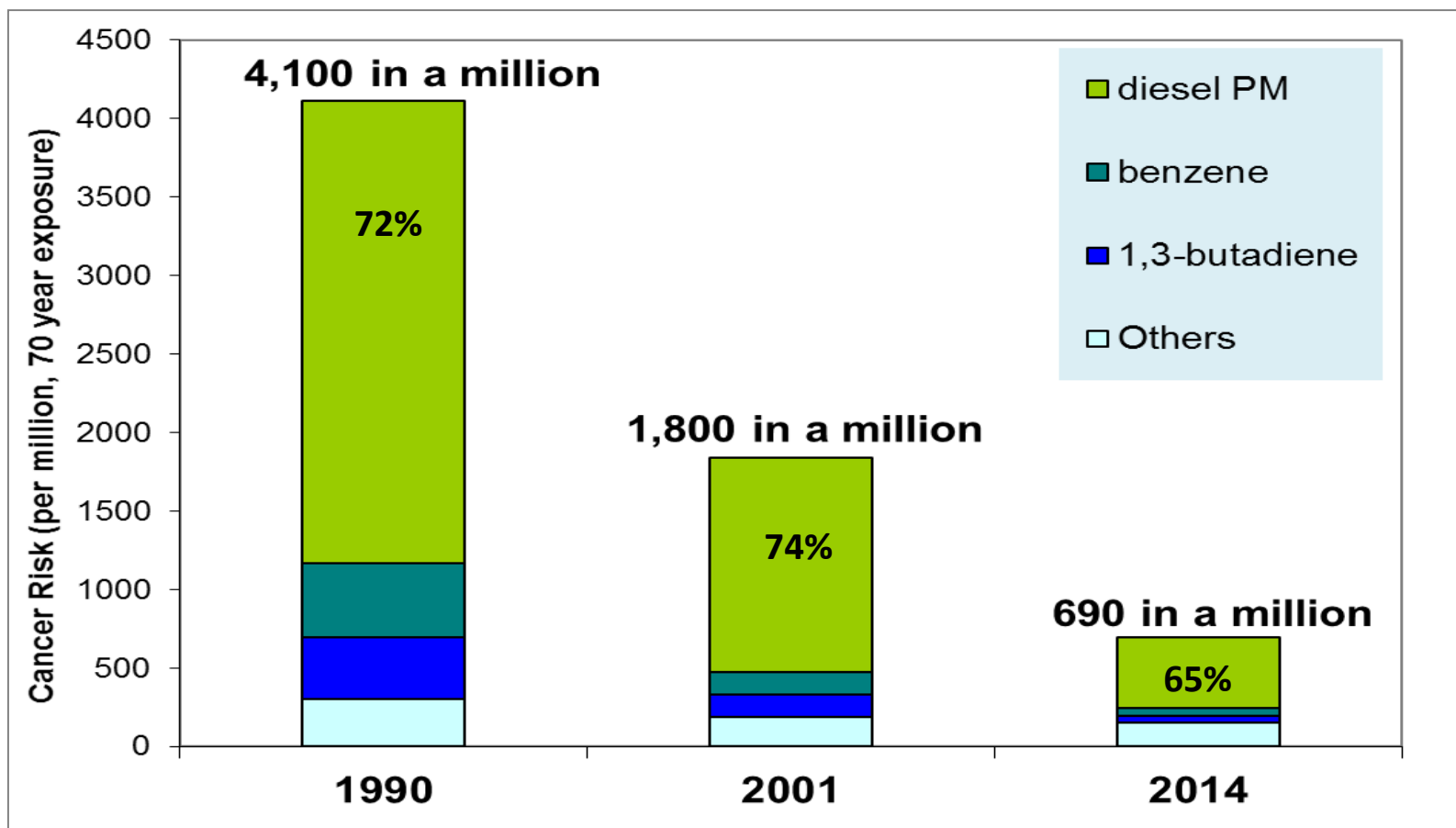
Description	DPM/PM2.5 Fraction	DPM/BC Fraction
2014 Bay Area Emissions Inventory	14%	30%

## MONITORED DATA (2009-2010)

City	Annual DPM/PM2.5 Fraction
San Jose	12%
West Oakland	13%

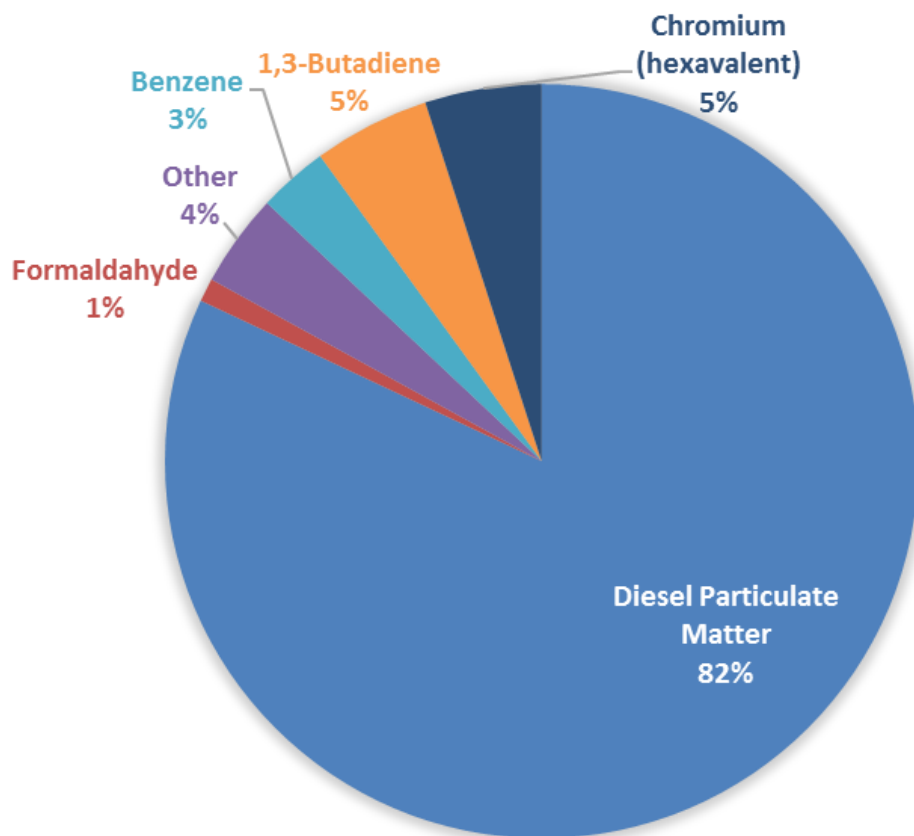
# Diesel PM is Regional Pollutant

## Lifetime Cancer Risk Based on Air Monitoring Data

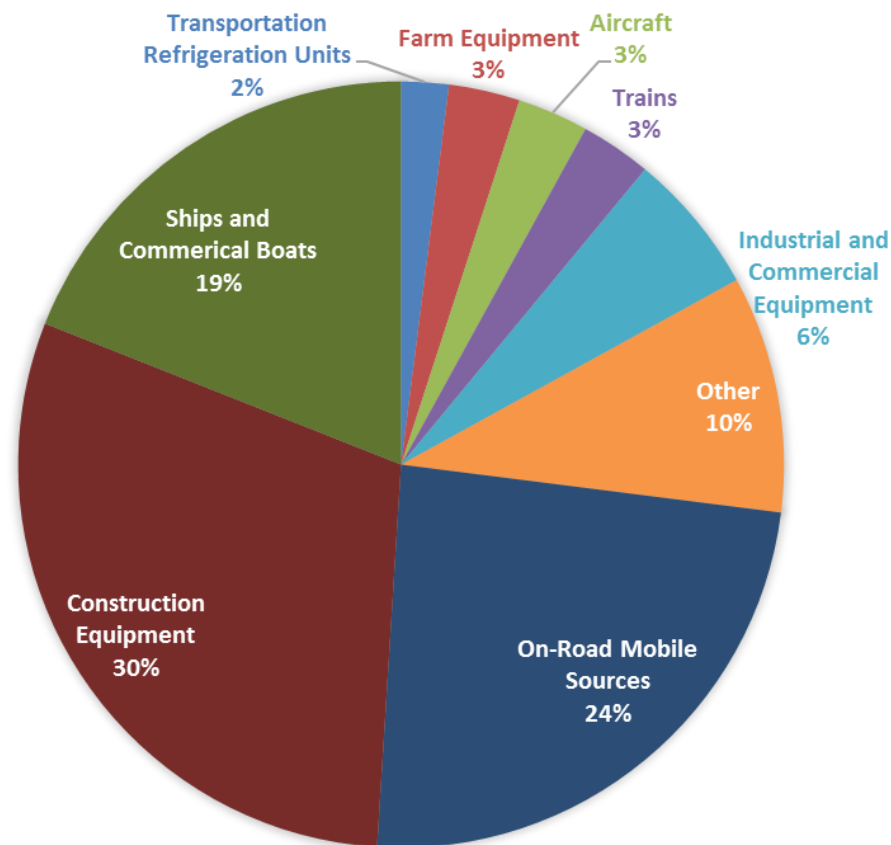


# Diesel PM from Mobile Sources is Primary Risk Driver

Cancer-Risk Weighted Emission  
Estimates by TAC, 2015

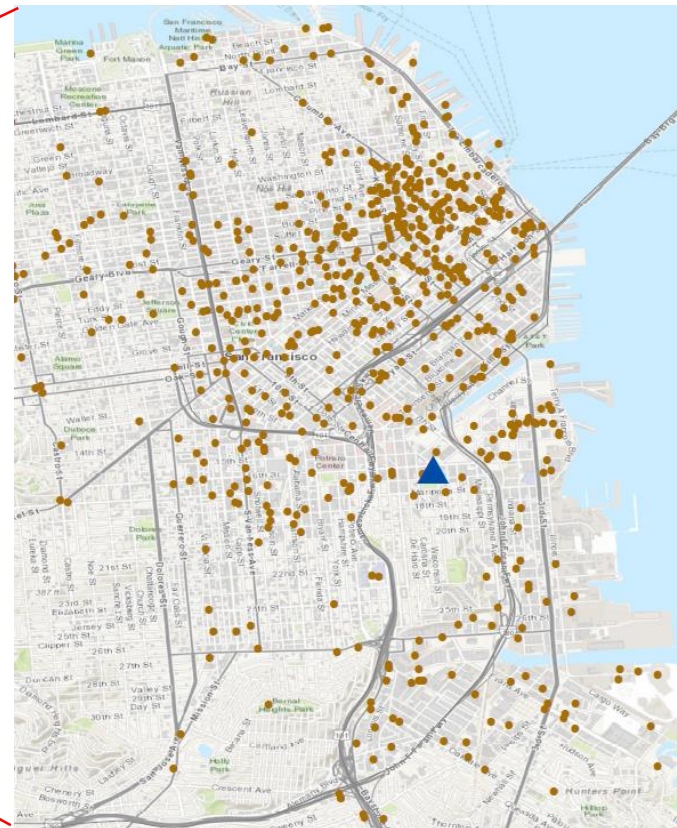
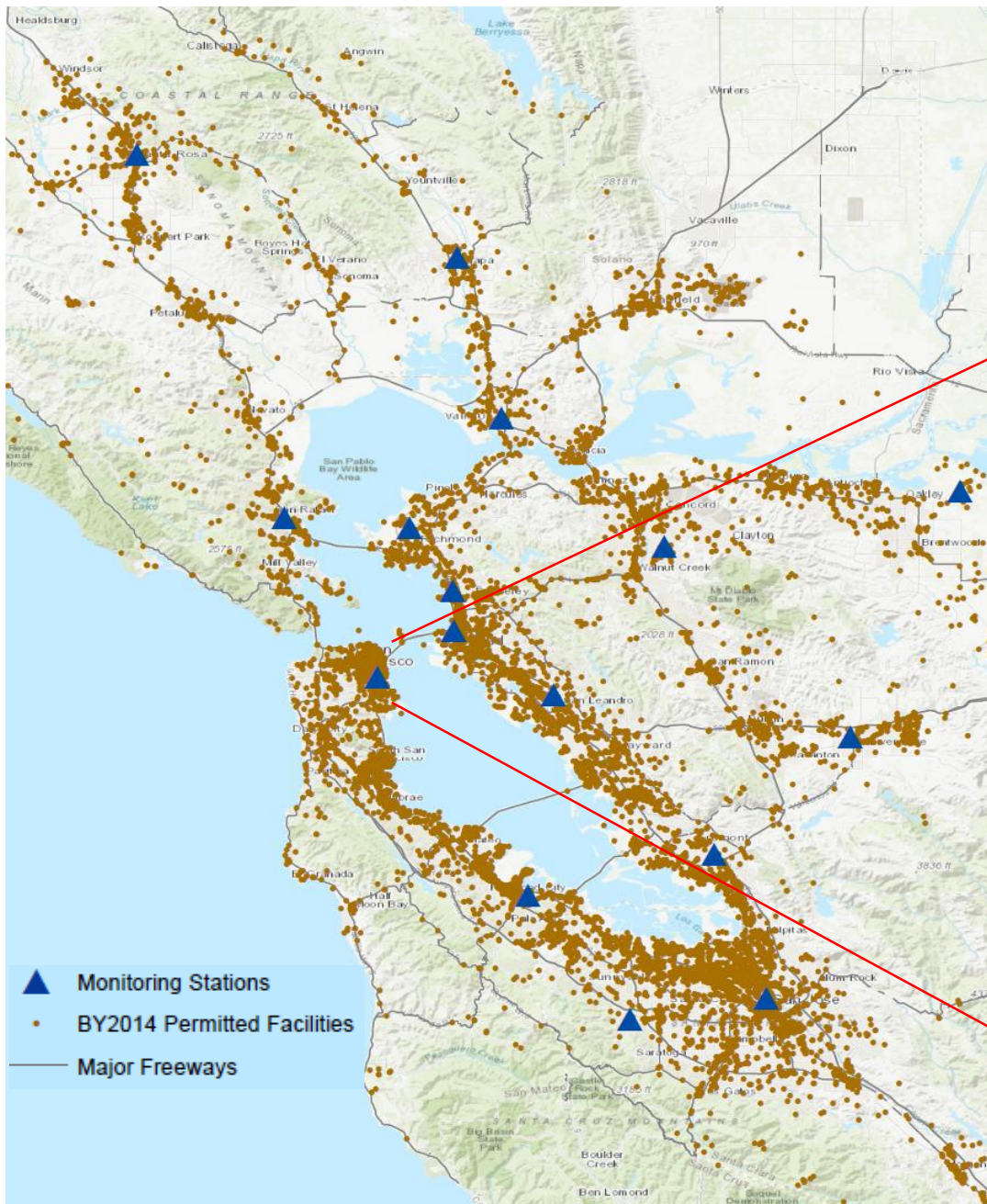


Cancer-Risk Weighted TAC Emissions  
by Source Category, 2015





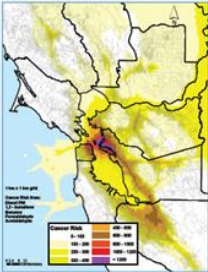
# Regional and Localized Impacts



# CARE Program

- Evaluate regional and community health impacts from outdoor air pollution
- Identify sensitive populations
- Develop strategy for reducing risks in locations with higher impacts and sensitive populations


## IMPROVING AIR QUALITY & HEALTH IN BAY AREA COMMUNITIES




Community Air Risk  
Evaluation Program  
Retrospective &  
Path Forward  
(2004 - 2013)

April 2014

HEALTHY NEIGHBORHOODS | EXPOSURE ASSESSMENTS | SCIENTIFIC STUDIES



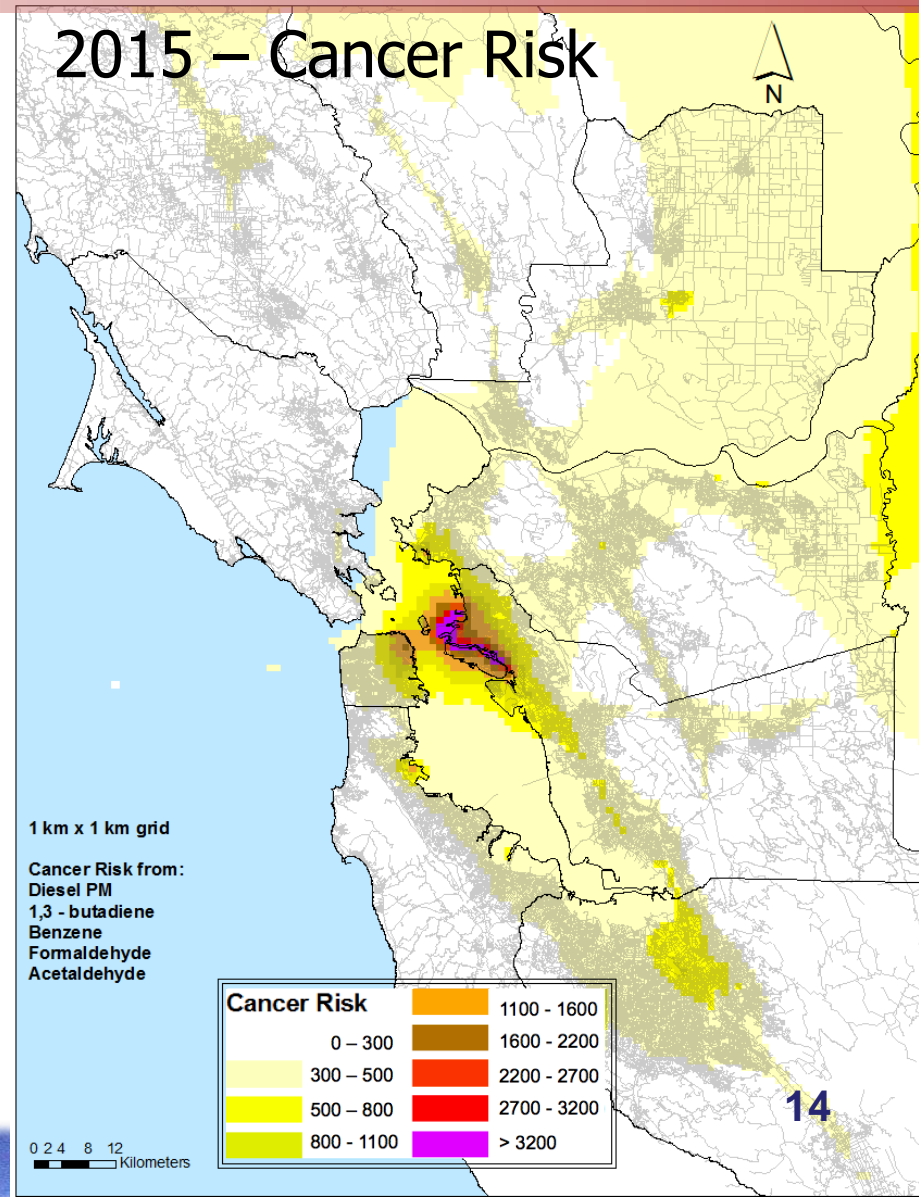
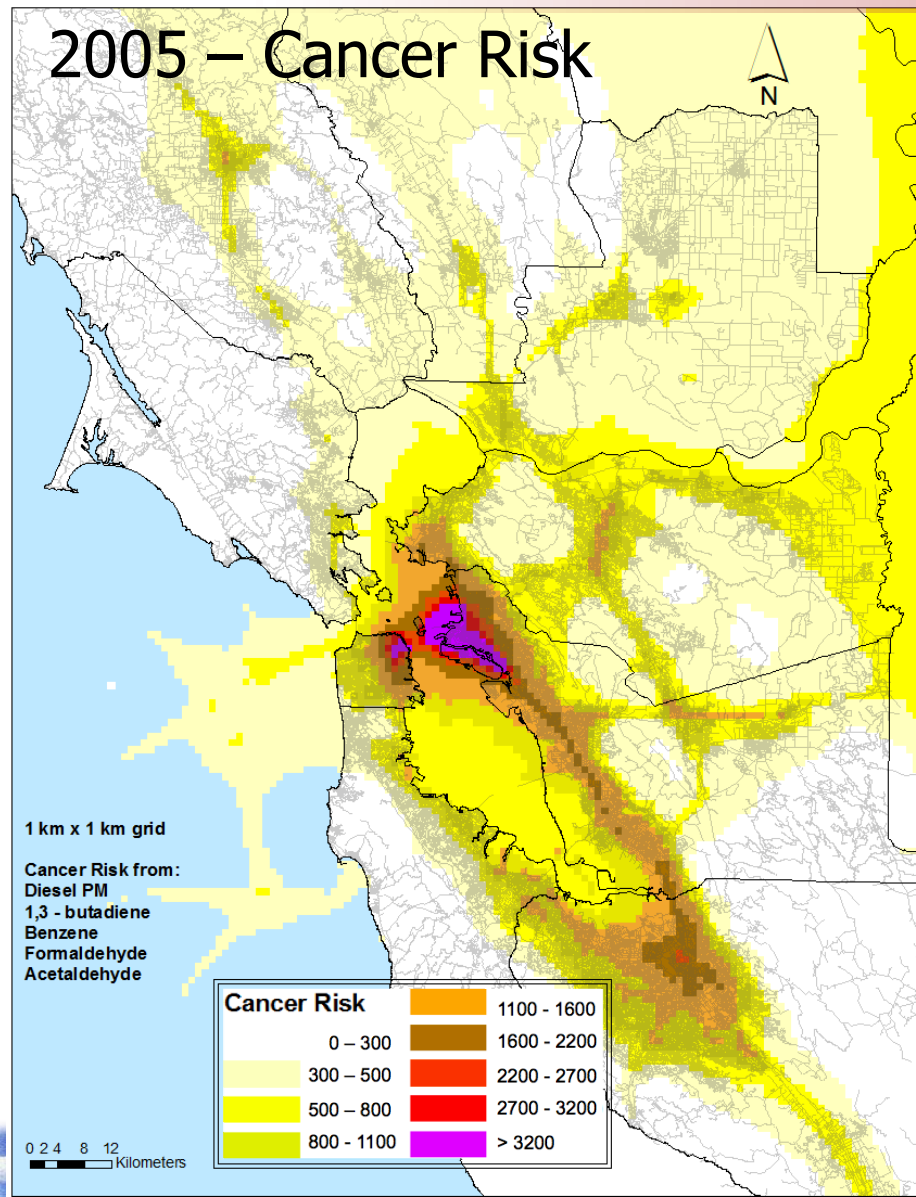
Collaborations with the Public, Researchers, and Health & Planning Departments



BAY AREA AIR QUALITY MANAGEMENT DISTRICT

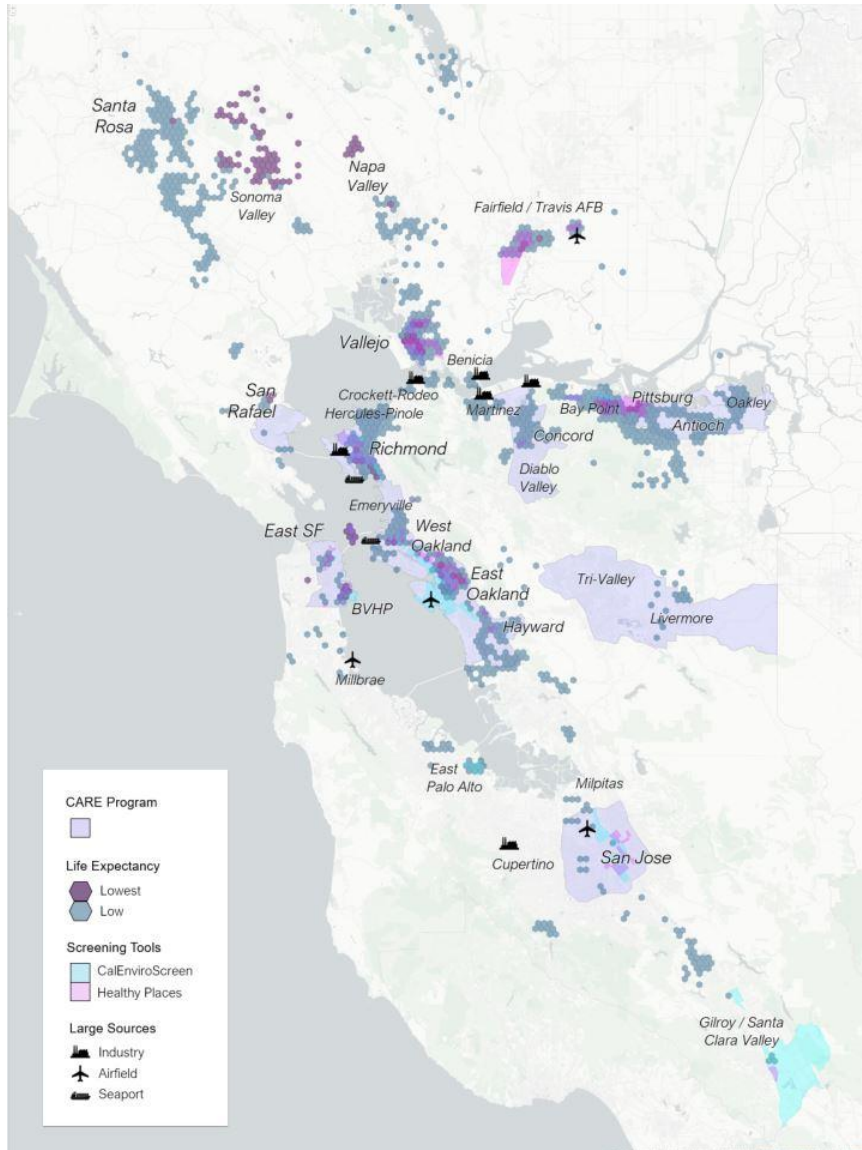


# Overall Air Pollution Down, but Higher Risks in Some Communities





# Vulnerable Populations



## Vulnerable populations:

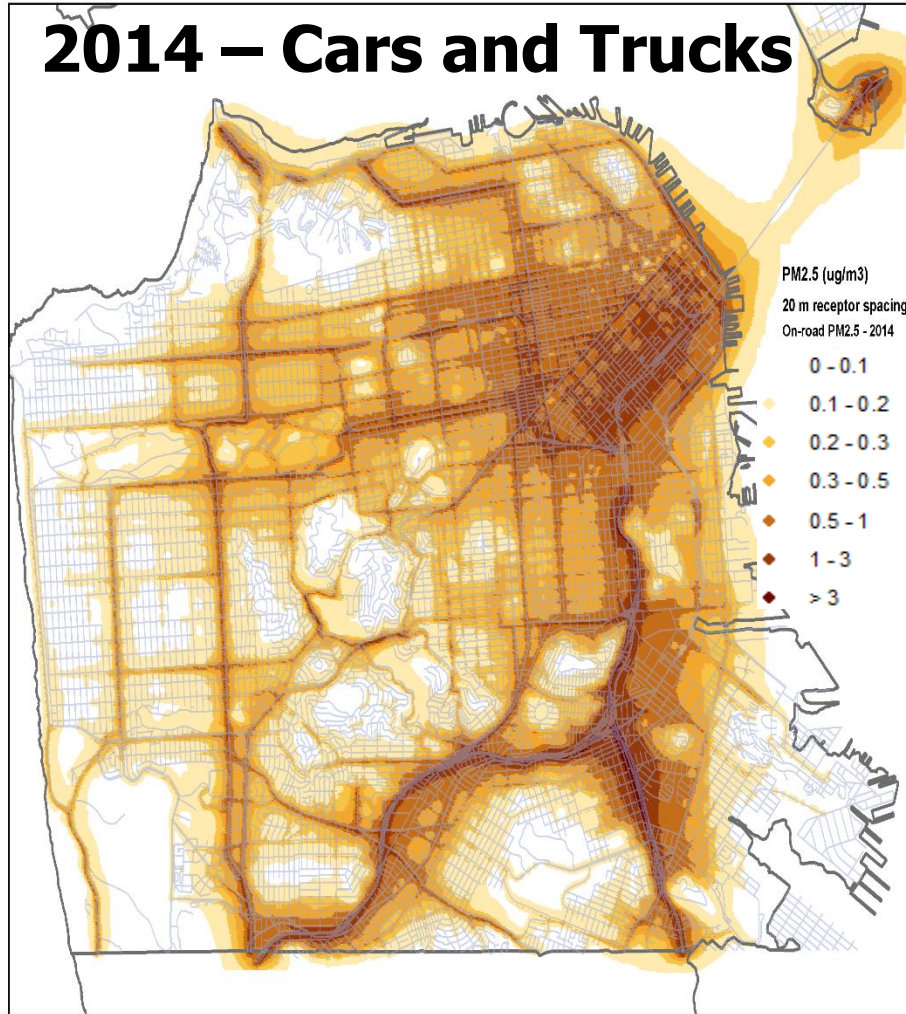
- Based on health records and predicted health outcome
- Proximity to high emission sources

## Outcome:

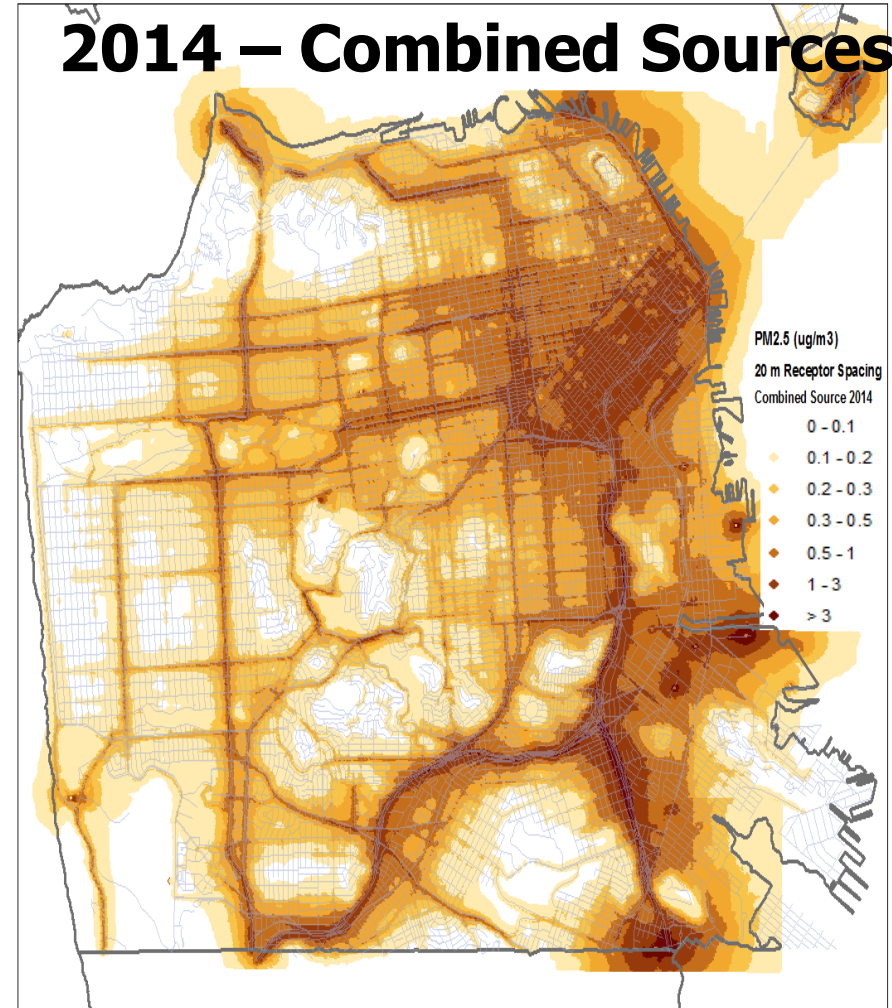
- Disproportionate health impact along transportation corridors and near high emission sources

# Sources of Fine Particles in SF

## 2014 – Cars and Trucks



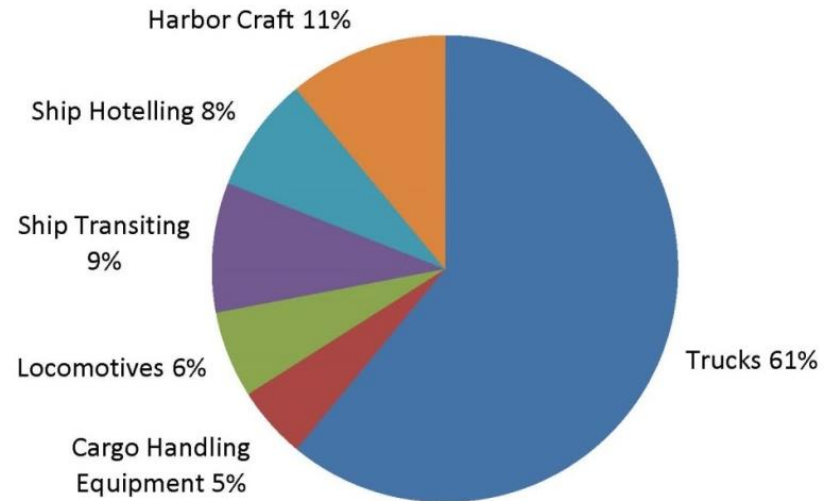
## 2014 – Combined Sources



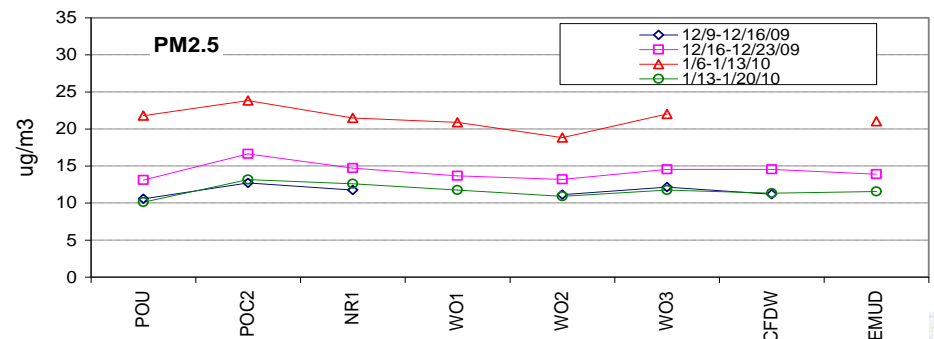
# West Oakland Studies

- Cancer risk in West Oakland was three times higher than Bay Area average in 2005
- Central air monitoring sites shows similar concentrations to other urban areas, but concentrations are higher near major roads and at the Port
- The drayage truck rule, in combination with enforcement efforts and grants, reduced risks from Port trucks by about 70%

*Contributors to West Oakland cancer risk by diesel source*

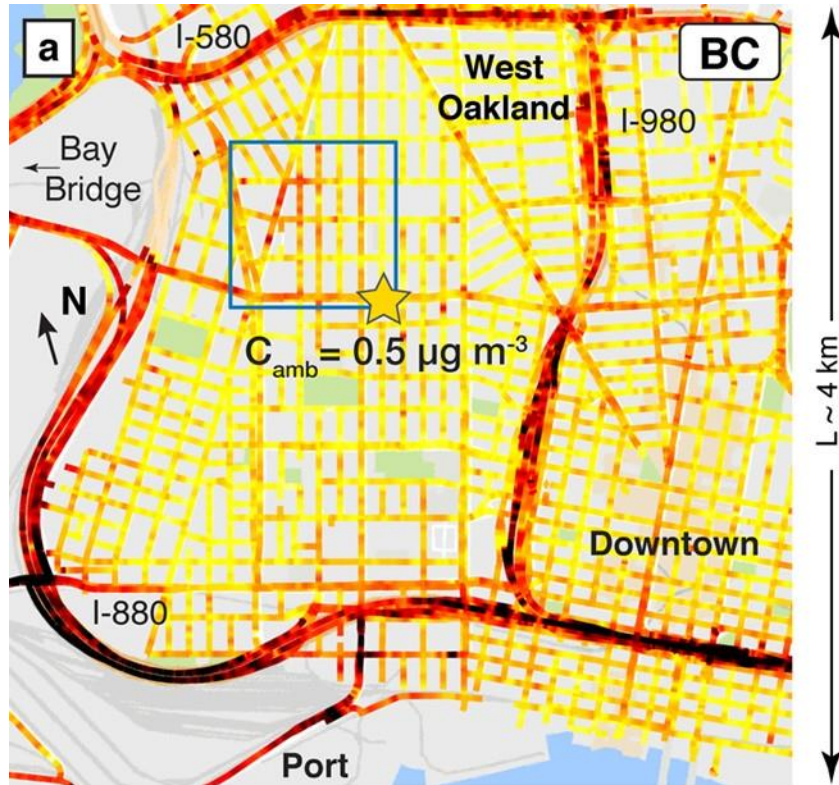


*PM<sub>2.5</sub> concentrations across I-880 (west to east, 7-day averages)*





# West Oakland Google Car Monitoring Study



# Key Findings

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- Diesel PM is still the main contributor to cancer risk from toxic air contaminants
- Diesel PM, especially from mobile sources, is still an important contributor to health risk in impacted areas
- Fine PM of all types is linked to poor health outcomes and mortality
- Diesel PM is a significant source of black carbon, a climate forcing pollutant known to cause the same health effects as PM<sub>2.5</sub>

# Key Findings (continued)

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- Grants, regulatory programs, and enforcement efforts have resulted in significant reductions in diesel PM
- More reductions in diesel PM are needed to prevent back sliding and to accelerate air quality improvements in impacted areas





# **Update on Air District's Diesel Particulate Matter (Diesel PM) Emissions Reduction Strategy**

Advisory Council Meeting  
July 19, 2018

Damian Breen  
Deputy Air Pollution Control Officer



# Diesel PM Reduction Strategy

- Why Diesel PM?
- ARB Regulatory Efforts
- Air District Strategy:
  - Compliance and Enforcement
  - Regulations and Permitting
  - Monitoring
  - Planning and CEQA guidance
  - AB 617 Community Air Protection Program
  - Grants
  - Voluntary Emissions Reductions
- Technology Solutions
- Commitments by Others
- Request for Input and Support



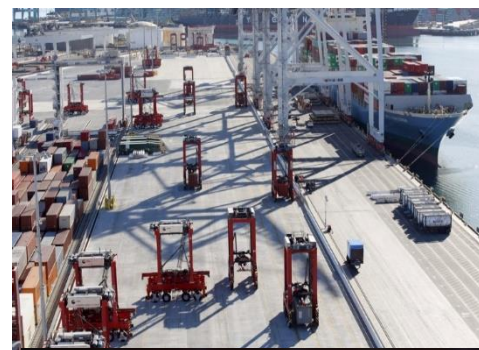
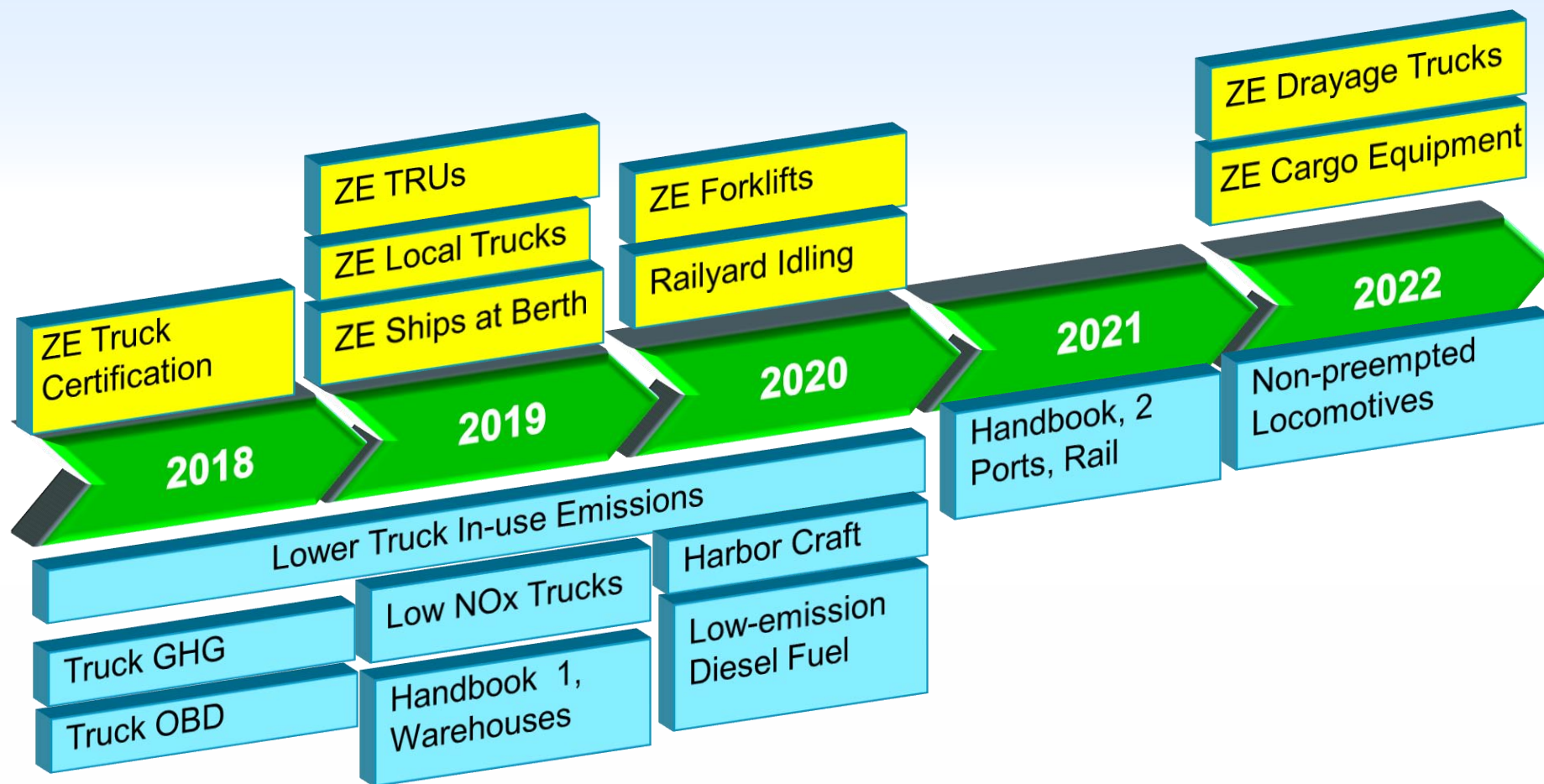
- Diesel PM significant driver of health risk in many Bay Area communities
- Contributes to Black Carbon Emissions







# New ARB Freight Rules





# Diesel PM Strategy – Compliance & Enforcement

- Stationary Source Inspection
- Drayage Trucks
- Idling Commercial Trucks/Buses
- Terminal Idling limits at Ports
- Ocean-Going Vessels at Berth
- Fuel Sulfur Limits for Ocean-Going Vessels
- Commercial Harbor Craft
- Portable Equipment
- Construction Equipment
- Transportation Refrigeration Units (TRUs)
- Mobile Cargo Handling Equipment





# Diesel PM Strategy – Regulation and Permitting

## **Air District Rules and Regulations**

Regulation 2-5: New Source Review of Toxic Air Contaminants

Regulation 6-1: Particulate Matter – Ringelmann Standard, “visible emissions”

Regulation 9-8: NOx and CO from Stationary Internal Combustion Engines

Regulation 11-18: Reduction of Risk from Air Toxic Emissions at Existing Facilities

## **State Regulations**

Airborne Toxic Control Measure (ATCM) for Stationary Diesel Engines

ATCM for Portable Diesel Engines

## **Federal Regulations**

New Source Performance Standards (NSPS), Subpart IIII

National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart ZZZZ





# Diesel PM Strategy – Monitoring

## Historic

- 2009/10 – West Oakland - Black Carbon, PM, Organic Carbon, BETX, Metals, Nitrogen Oxides

## Current

- 4 Near Roadway Monitors – PM, Black Carbon, Gaseous TACs, Nitrogen Oxides, Ultra Fine Particulates
- Black Carbon Monitoring - West Oakland, Livermore, Forest Knolls
- Partnership UC Berkeley
  - Caldecott Tunnel - gas and diesel plume studies (since 1990s)
  - Port of Oakland - drayage truck plume studies (since 2000s)

## Upcoming

- AB 617
  - Richmond – Based on Community Consultation
  - Future Communities





# Diesel PM Strategy – Planning and CEQA

## Guidance Documents:

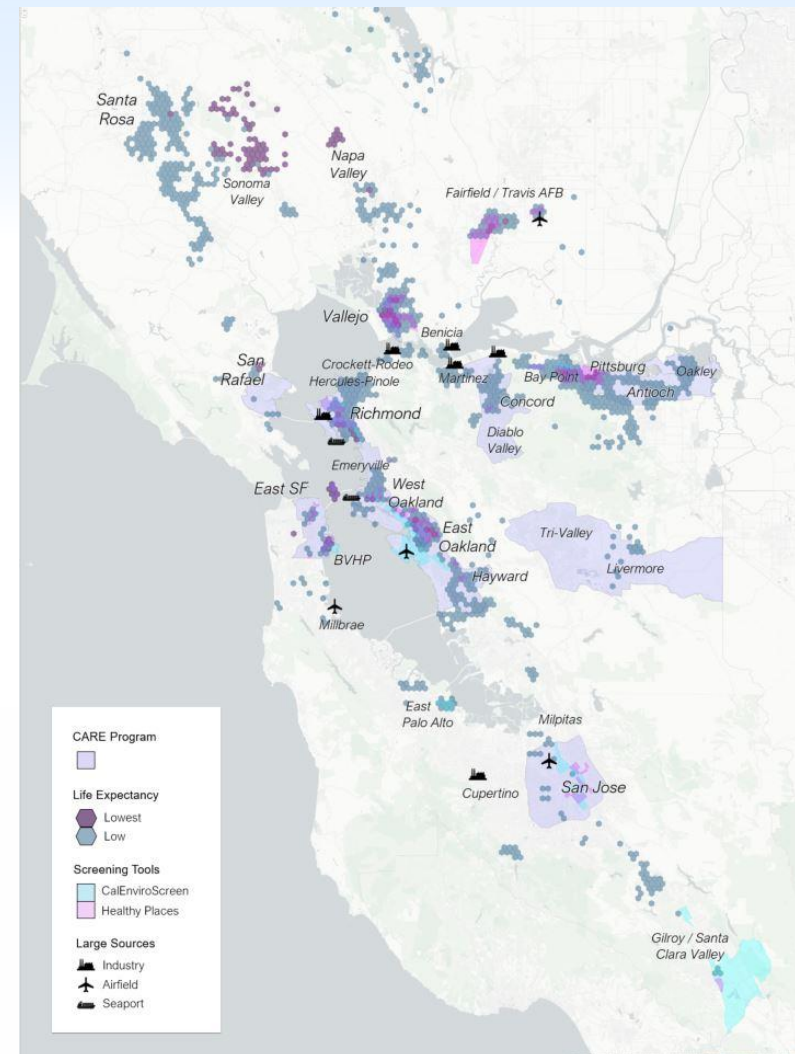
- **2016 - Planning Healthy Places**
  - Emissions reductions strategies
  - Best practices for reducing exposure
- **2017 – California Environmental Quality Act (CEQA)  
Air Quality Guidelines**
  - Thresholds for localized exposure
  - Recommended mitigation actions





# Diesel PM Strategy – AB 617 Community Air Protection Program

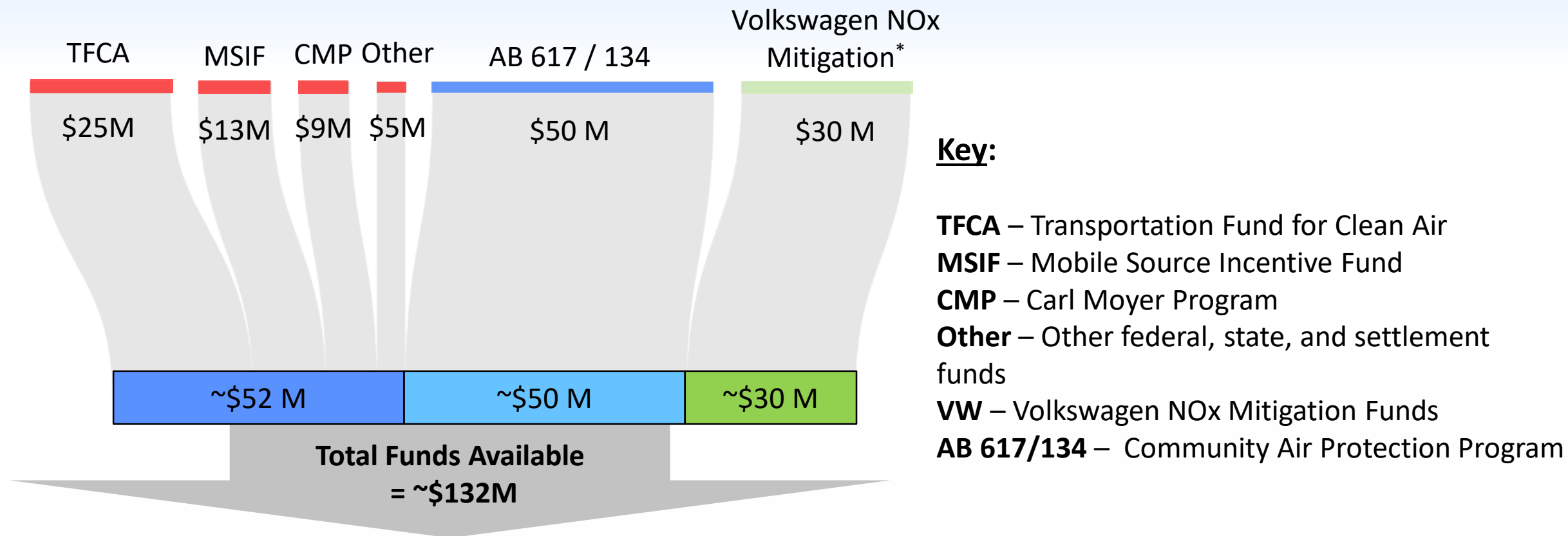
- AB 617 analysis shows disproportionate health impacts along transportation corridors and near high emission sources
- Diesel PM is a contributing factor to health impacts in every community
- West Oakland Community has been selected to move directly to a community emissions reductions program
- Diesel PM reductions to be a significant component of West Oakland Program
- AB 617 Grant funds currently targeted at Diesel PM reductions







# Diesel PM Strategy – Grants





# Diesel PM Strategy – Voluntary Emissions Reductions

Mayors, city and county governments, industry and business leaders will adopt innovative solutions to eliminate diesel emissions and black carbon from communities:

- Collaborate and coordinate on ordinances, policies, and procurement practices that will reduce diesel emissions to zero within their jurisdictions, communities or companies;
- Share and promote effective financing mechanisms domestically and internationally to the extent feasible that allow for the purchase of zero emissions equipment;





# Diesel PM Strategy – Voluntary Emissions Reductions (continued)

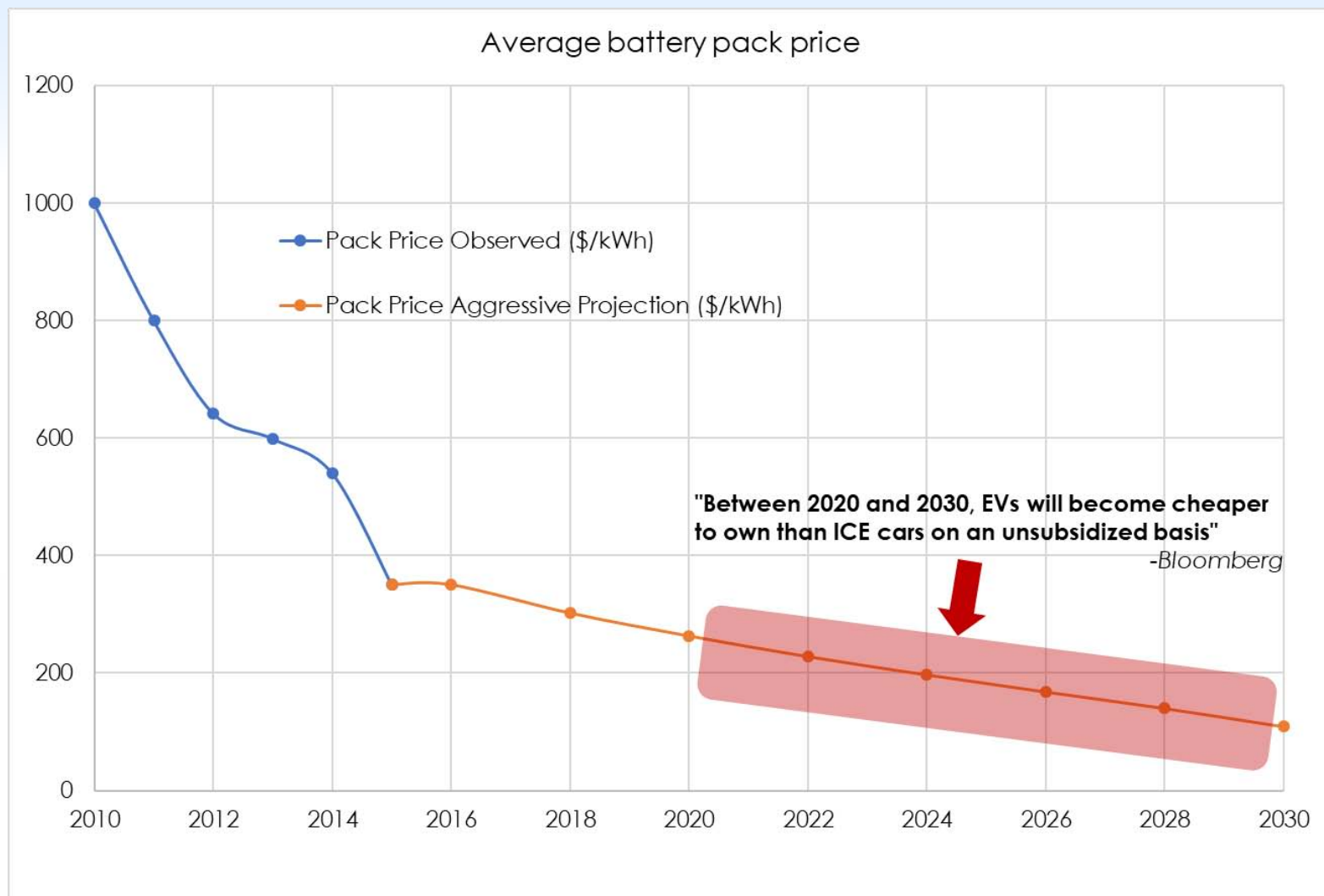
- Share information and assessments regarding zero emissions technology;
- Build capacity for action and technology adaptation through technology transfer and sharing expertise; and
- Use policies and incentives that assist the private sector as it moves to diesel-free fleets and buildings.
- Periodic reporting to all signers of progress towards the zero-diesel emissions goal.







# Technology Assessment – Trends for Batteries





# Technology Assessment

Technology Readiness Level	Vehicle / Equipment Category
Commercially Available	Light-duty cars/SUVs
	Buses
	Cargo handling equipment
	Locomotives - switchers/yard goats
	Ocean going vessels (at berth)
	Transportation refrigeration units
	Medium-duty trucks
	Batteries for emergency or backup power (~5kW or shorter load durations)
	Fuel cell systems for emergency or backup power (~5-20kW)
Early Commercialization	Small construction equipment
	Batteries for emergency or backup power (>5kW)
Demonstration	Heavy-duty trucks
	Cargo handling equipment (container top/side picks)
Not Yet Available	Commercial harbor craft
	Large construction equipment
	Locomotive - line haul
	Ocean going vessels (at sea)





# Commitments on Diesel PM to reduce petroleum/diesel

## Legend:

Country/regional, ban sales of gasoline/diesel vehicles

■ By 2025 ■ By 2040

■ By 2030 ■ TBD

Country/regional, all zero emission vehicles

■ By 2050

State, reduce petroleum consumption by 50%

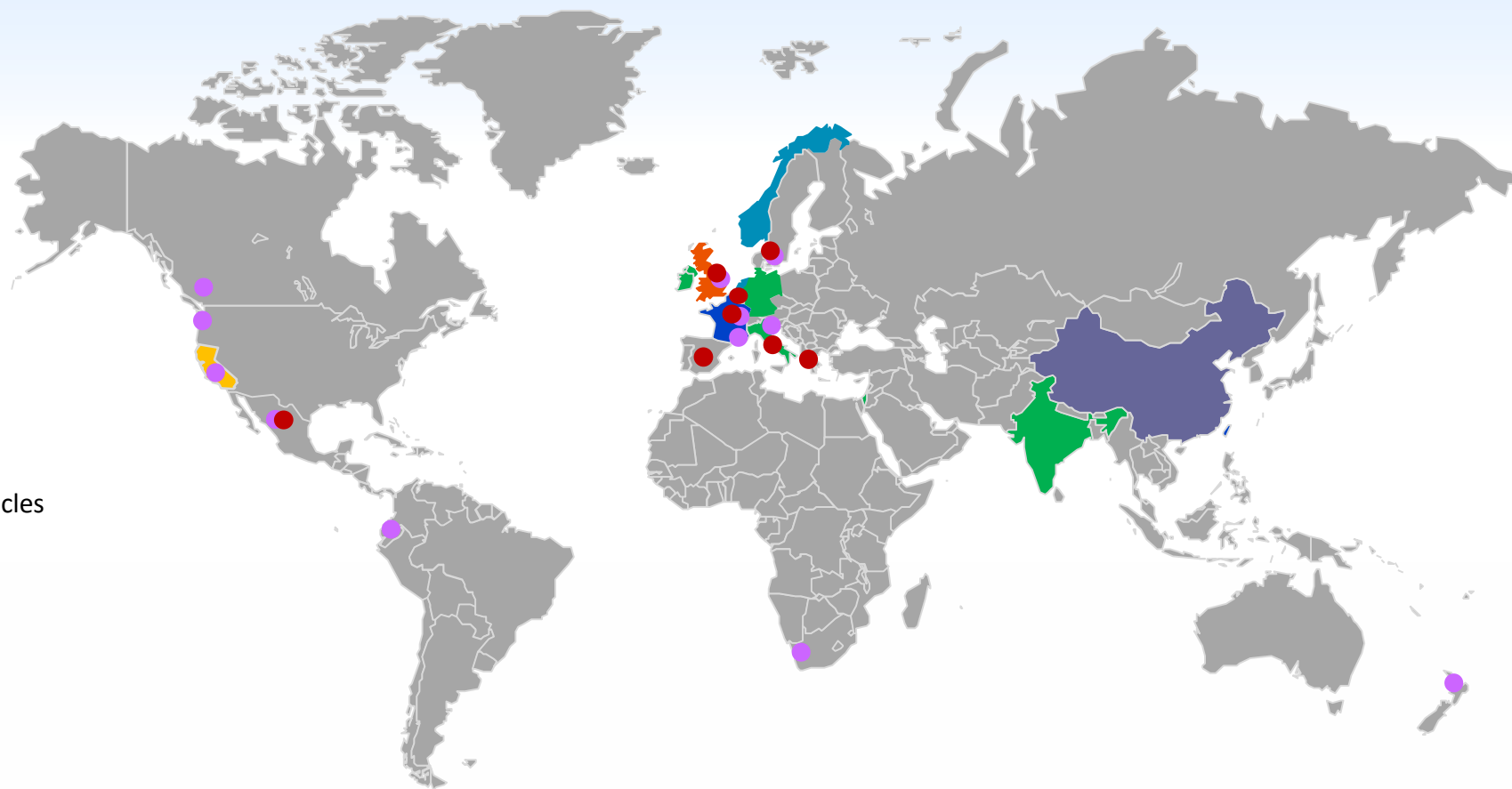
■ By 2030

City, diesel vehicle ban

● 2018-2025

C40 cities with pledges for zero emissions

● By 2030







# Request for Input & Support

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- What are we missing?

## **Request for Support:**

- Provide input to the Air District's Board of Directors in support of voluntary diesel emissions reduction efforts.