

Policy strategies to reduce health impacts from urban particulate pollution



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Context: Regional Air Pollution Challenges for Infill Development

■ Infill Benefits: Reducing Regional VMT

- Energy efficiency
- lowered regional pollution emissions
- Increased active transportation



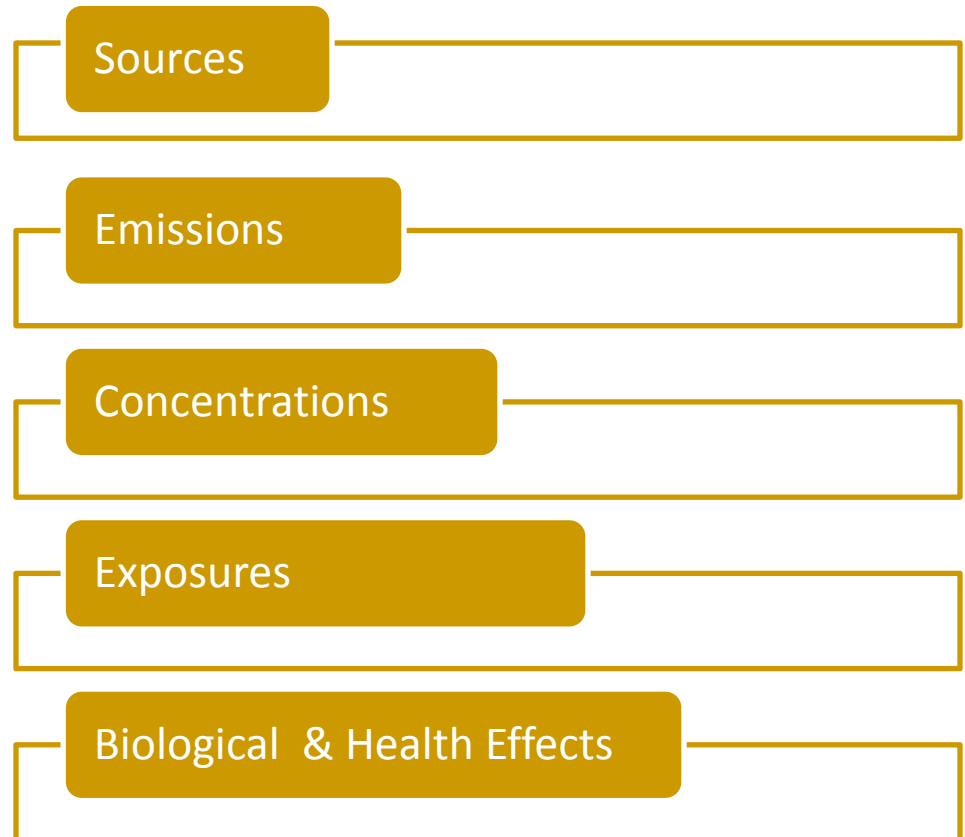
■ Infill Costs: Health and Social Equity Hazards

- Increased exposure to urban environmental hazards (air noise, traffic)
- Displacement



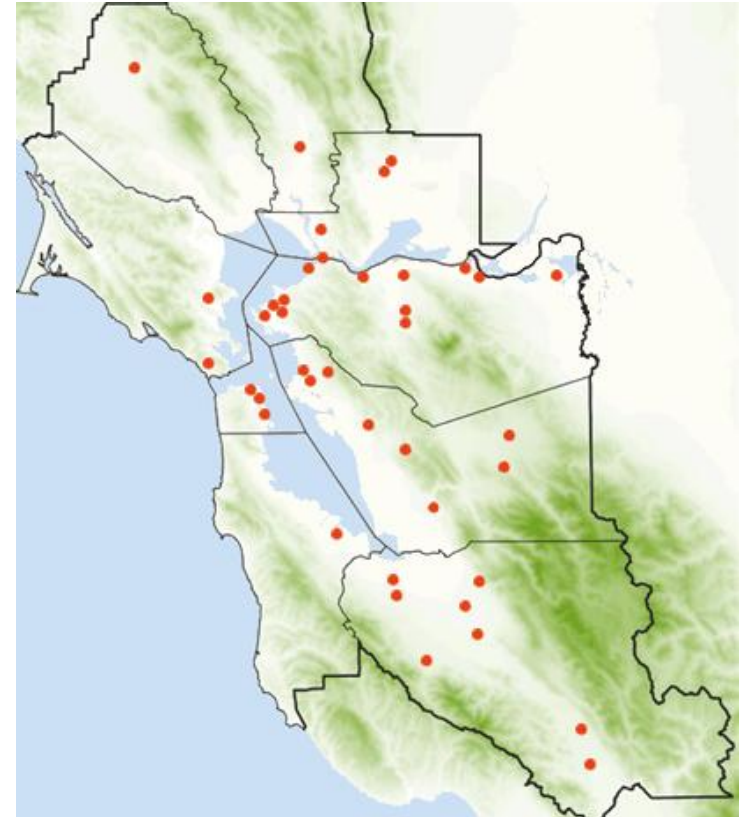
San Francisco Approach Cumulative Effects Analysis

- ❑ Analyze different health outcomes independently
- ❑ Assess “cumulative” exposure to key individual pollutants at the neighborhood level
- ❑ Incorporate social vulnerability by allowing baseline health outcomes to vary by neighborhood in health impacts analysis

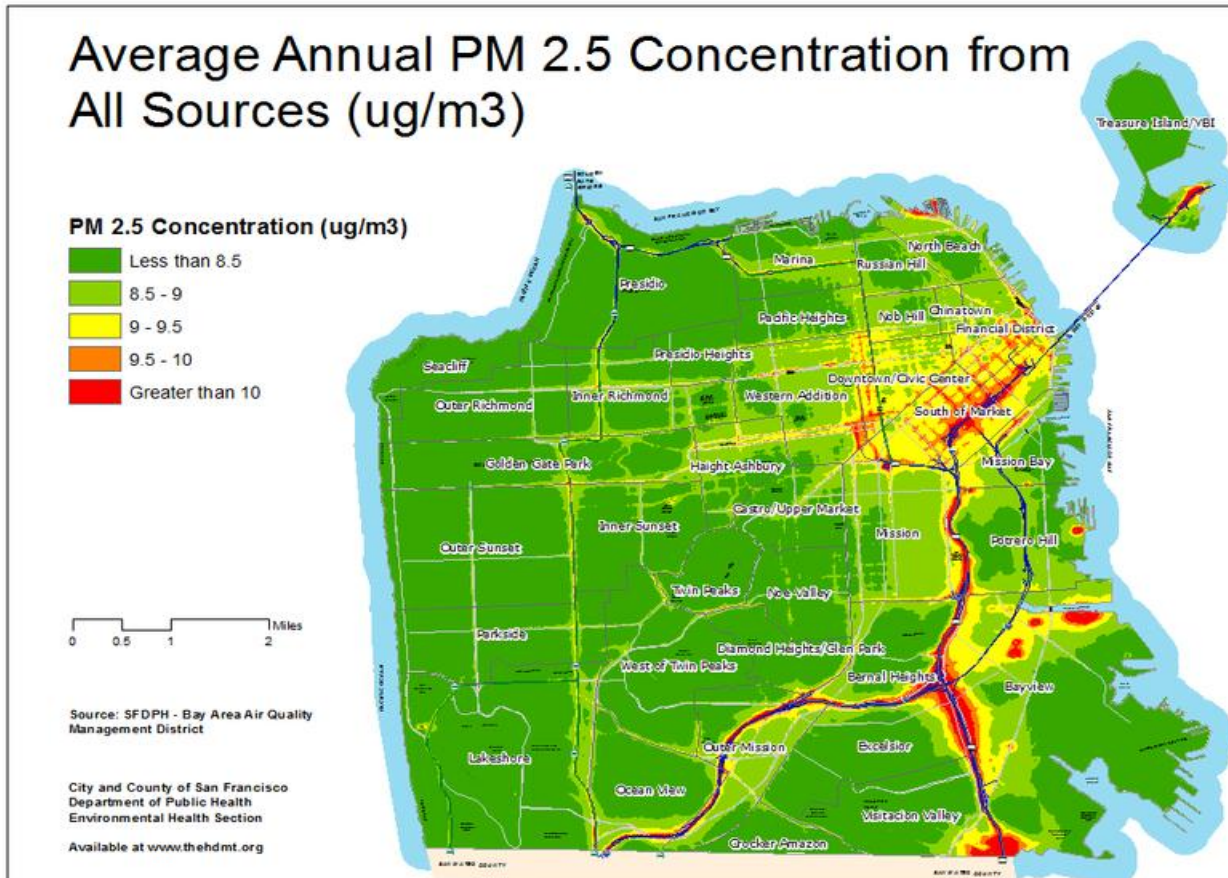


Limits of Regional Air Pollutant Monitoring

- Regional monitors not sufficient for neighborhood scale exposure and health impact analysis
- May not provide sufficient data for good policy



Estimated cumulative PM 2.5 concentration



Pre-mature mortality attributable to cumulative PM 2.5 in San Francisco

Modeled PM2.5 Concentration (ug/ m3)	Residential Population Exposed	Estimated Excess Annual Pre-mature Deaths	Annual Pre-mature Deaths (Lower Bound Estimate)	Annual Pre-mature Deaths (Upper Bound Estimate)
8-8.99	700,529	82.8	42.5	126.2
9-9.99	100,785	19.0	9.7	29.0
>=10	3,895	1.3	0.7	2.0
Unclassified Exposure	25	0.0	0.0	0.0
Total	805,235	103	52	157

Relationship Between Average PM2.5 Concentration and Median Household Income



Local PM 2.5 Risk Reduction Strategies

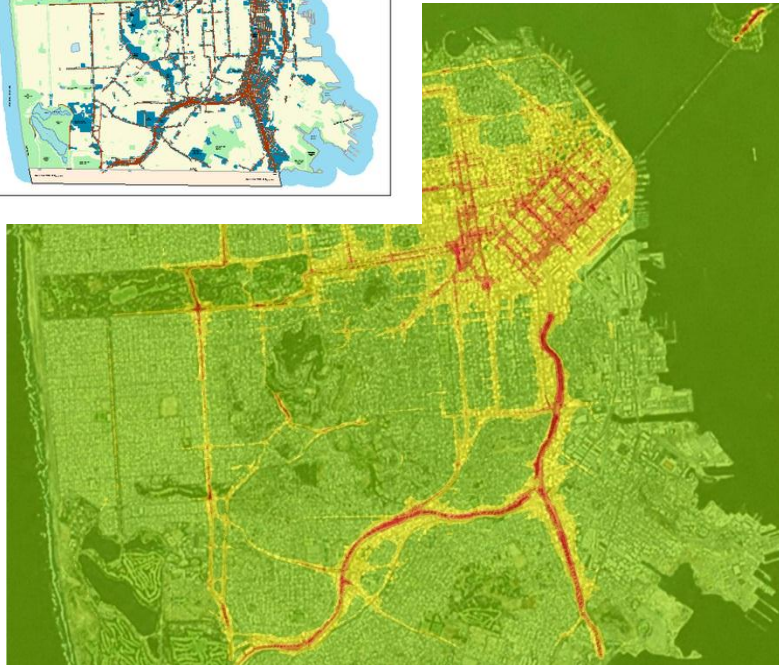
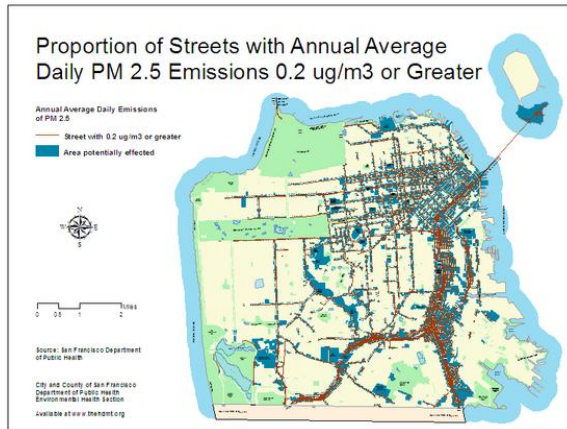
Emissions Reductions

- Limit growth of traffic density through land use, pricing, parking control, impact fees, improved transit, bicycle, and pedestrian environments
- Construction equipment air pollution controls

Exposure Management

- Enhanced ventilation systems for new residences with high fine particulate levels or high cancer risks
- Improving ventilation in existing residential dwellings

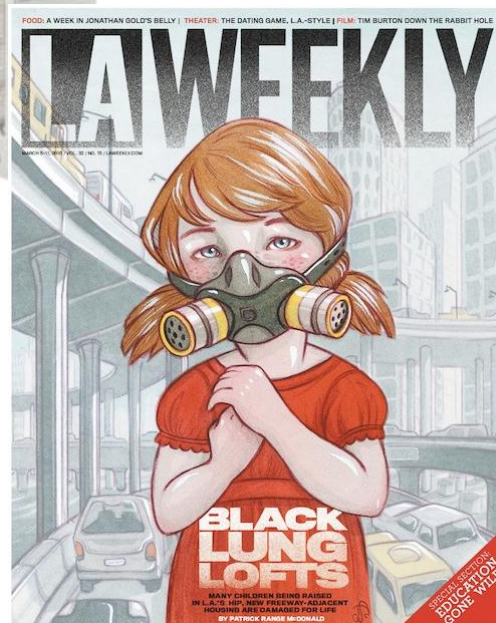
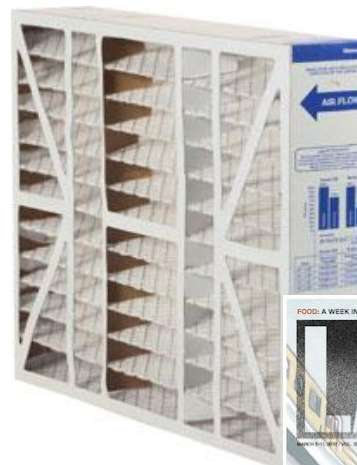
Sensitive Use Protections for Air Pollution Hot Spots (SF Health Code Article 38)



- Identify Areas with Potential Conflicts
- Establish Action Level for Mitigations
- Mitigation via Building Design or Engineered Ventilation to remove 80% of outdoor PM 2.5

Benefits and Limits to Exposure Mitigations

- Inexpensive/ low marginal costs
- No change to land use or transportation systems
- Multiple health benefits of filtered air
- Can be implemented via planning, health, or building codes
- Does not address noise or other roadway proximity hazards!
- Does not protect existing sensitive uses!



Thoughts for Regional Air Pollution Policy

- Priority need for neighborhood scale air pollution models – regional monitors are not sufficient
- Regionalize local best practices
 - Ventilation upgrades via weatherization programs
- Regulated of traffic corridors as emissions sources
 - Limits on highway capacity expansion
 - Innovative solutions such as urban freeway speed control
- Identify and prevent new of local air pollution use conflicts (e.g. commercial exhausts)



Speed and Flow Controls Reduce Roadway Particulate Emissions

- Technology
 - Lowered / variable Speed Limits with photo enforcement
- Benefits
 - GHGs
 - PM 2.5 and NOx
 - Injuries and fatalities
 - Noise
 - Congestion
- Needs regional agency leadership and public education



Protecting Urban Air Quality: A Work in Progress



- Industry
- Roadways
- Construction & demolition
- Generators /Boilers
- Recycling and waste handling
- Truck routes
- Restaurant exhausts
- Urban canyons