



West Oakland
Environmental
Indicators
Project

WOCAP Steering Committee – working session

March 4, 2026

Content

- 1 Welcome
- 2 Roll Call
- 3 February Recap - Clean Ports EPA
- 4 WOAQ Black Carbon
- 5 Open forum



February Meeting - Public

Clean Ports Program (CPP) Overview

- \$322 million EPA grant program
 - \$467 million total including partner contributions
- Deploys zero-emission trucks, cargo-handling equipment, and charging/energy infrastructure to reduce pollution at the Port of Oakland
- Delivers nearly 700 zero emission (ZE) drayage trucks and ZE cargo handling equipment, solar and battery storage, and major site electrical upgrades
- Includes community engagement, air quality monitoring, and ZE workforce training for near-port residents



Key Benefits



Cleaner Air

Deploys zero-emission vehicles and equipment to reduce emissions



Resiliency

Strengthens power resiliency through solar and battery storage



Healthier Community

Better air quality means a healthier environment for Oakland and the surrounding area



Workforce Development Opportunities

Job training and access to jobs in clean technology in the community

Black Carbon Measurements in West Oakland 2024–2025

Steve Brown, Spheros Environmental
Nicole Merino Tsui, WOEIP

Presentation with WOEIP Steering Committee

March 4, 2026



Agenda

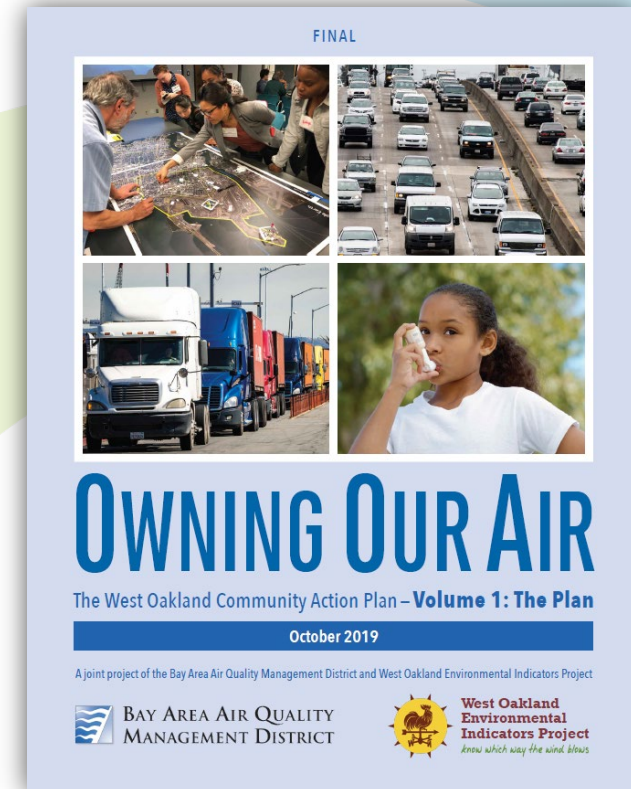
- Review of project scope and background
- Review of air monitoring goals

Black Carbon Monitoring Results

- Trends in BC from 2017 to 2024, 2025
- Comparison of ambient BC to BAAD modeling
- Spatial and Seasonal Trends
- Weekday/weekend difference is small

Background - West Oakland Air Quality (WOAQ) Monitoring Network

1. West Oakland Environmental Indicators Project (WOEIP) received funding via California Air Resources Board (CARB) Supplemental Environmental Project (SEP) program for air quality monitoring and other tasks in West Oakland
2. Goals: Measure air pollution in West Oakland with regard to WOCAP strategies and goals
3. Air monitoring
 - Community locations – what is the air quality in the community? Are pollution levels approaching WOCAP goals?
 - Street sweeping – does street sweeping change the amount of dust on the road and in the local air?



Black Carbon Background

- Black Carbon is measured as a proxy for diesel particulate matter
- Diesel particulate matter is toxic and is the largest cancer risk driver in West Oakland as per the WOCAP and BAAD modeling
- We measured BC at 8 West Oakland locations during 2024-2025 and compare these concentrations to:
 - Summer of 2017 measurements (UC Berkeley)
 - 2017 and 2024 modeling predictions (BAAD)
 - Goals in the WOCAP
- We also examined spatial, weekday/weekend and diurnal trends

Aligning with WOCAP: Diesel Particulate Matter

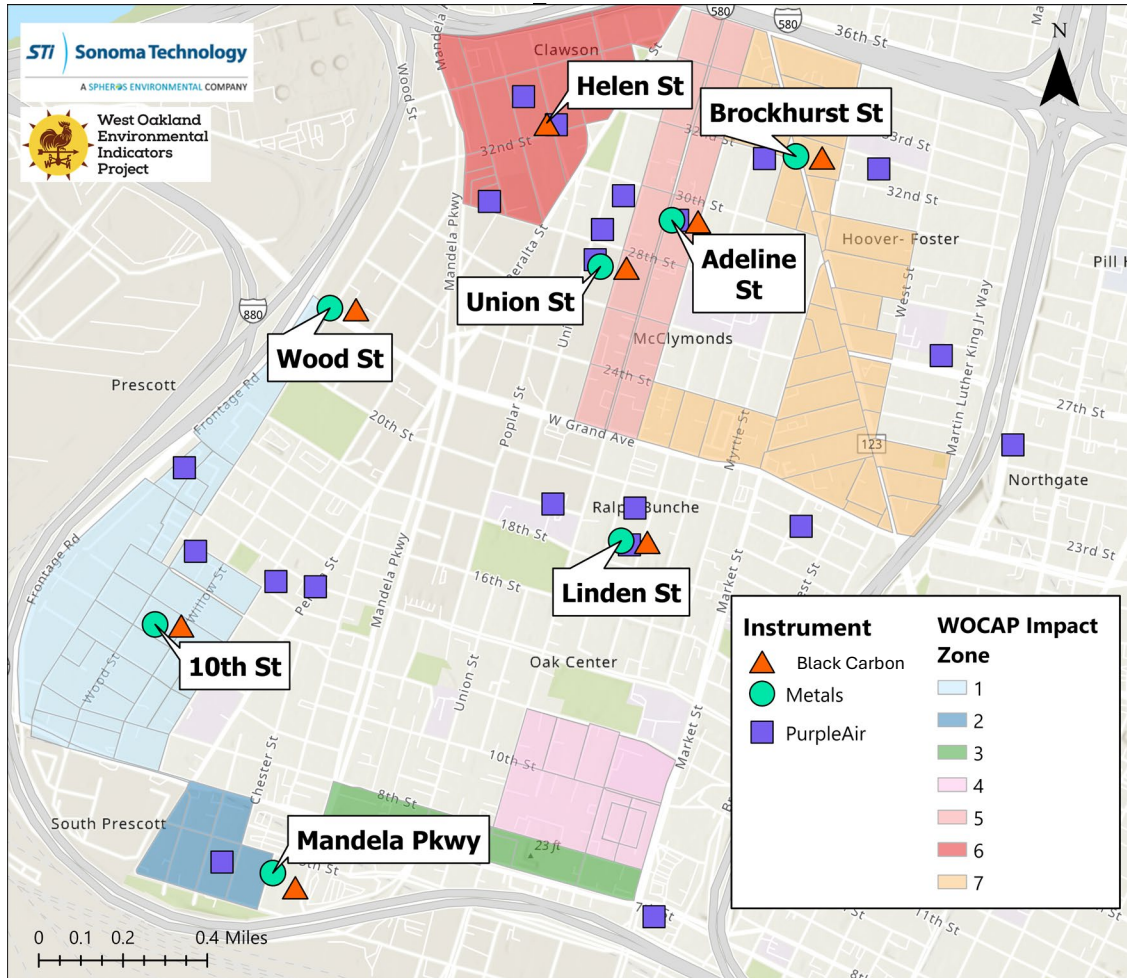
WOCAP Goal to have all neighborhoods:

- Experience average air quality
- $< 0.25 \mu\text{g}/\text{m}^3$ average Diesel PM by 2025
- < 200 in a million cancer risk

GOAL			
To protect and improve community health by eliminating disparities in exposure to local air pollution.			
	BASELINE	2025 TARGET	2030 TARGET
	Baseline conditions in West Oakland in the year 2017.	All neighborhoods experience West Oakland's <i>average</i> air quality.	All neighborhoods experience West Oakland's <i>best</i> air quality.
Diesel PM	$0.30 \mu\text{g}/\text{m}^3$	$< 0.25 \mu\text{g}/\text{m}^3$	$< 0.13 \mu\text{g}/\text{m}^3$

1. What are concentrations in 2024-2025 compared to targets?
2. Are strategies from the Plan working?

West Oakland Air Quality Monitoring



- Speciated PM_{2.5} (metals, dust) network
- Black carbon (diesel PM) network
- Hourly metals and dust measurements at 2 locations
- PurpleAir for PM mass

Targeted pollutants

PM_{2.5}

Black Carbon

Metals and hazardous air particulate pollutants

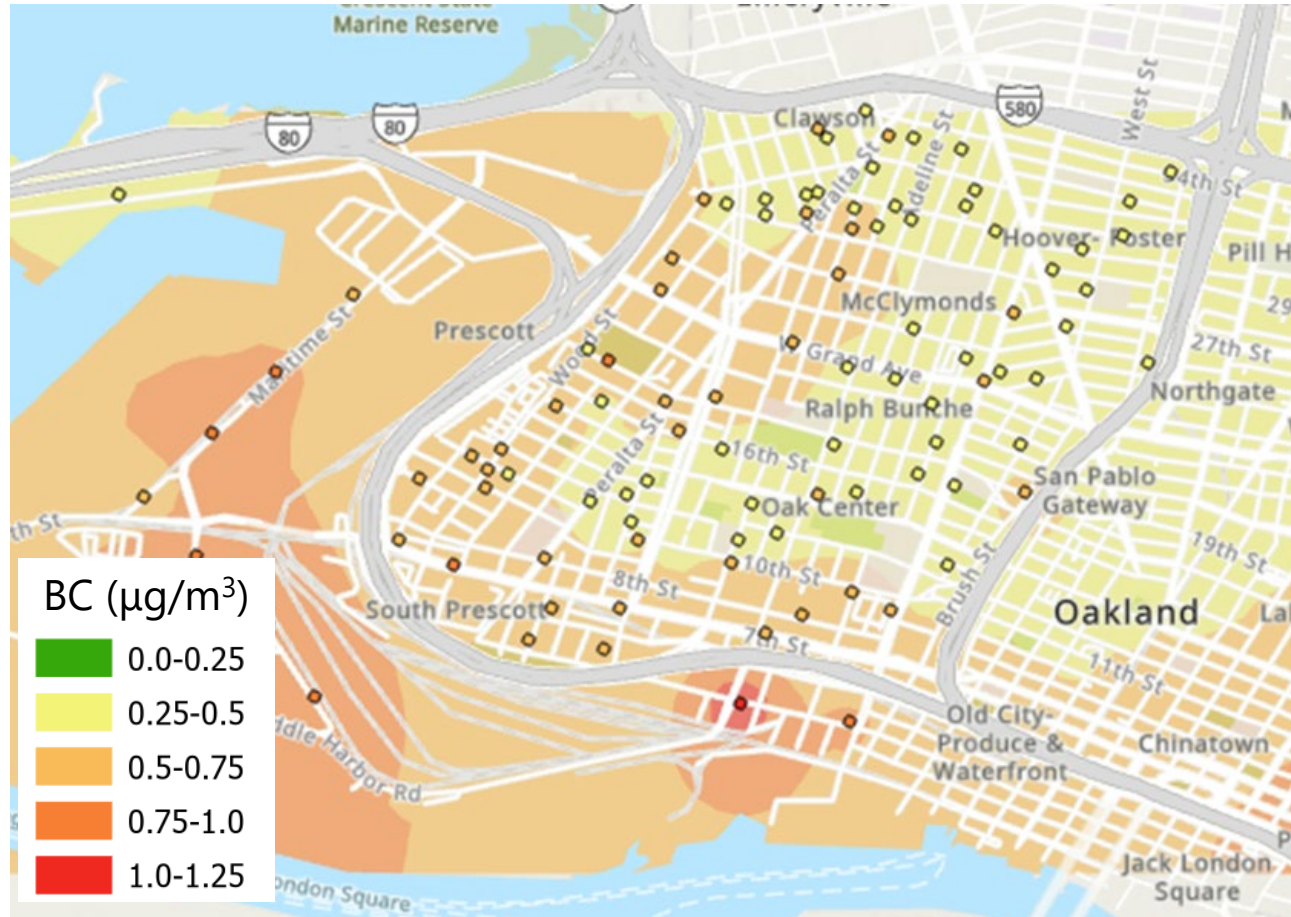
Comparison to 2017 100x100 Study

Measurement period	Study	BC ($\mu\text{g}/\text{m}^3$)
Summer 2017	Caubel et al 2019; 100 x 100 study, locations at or near our 2024/2025 sites	0.52
Summer 2024	WOAQ	0.30
Summer 2025	WOAQ	0.25

- Summer 2017 vs summer 2024/2025 average shows a **>40% decrease**.
- This is similar to BAAD modeling, which predicted a decrease of 31% in diesel particulate matter from 2017 to 2024.

Black carbon measurements - 2017

Case study: comparison to 2017 measurements in 100x100 Study

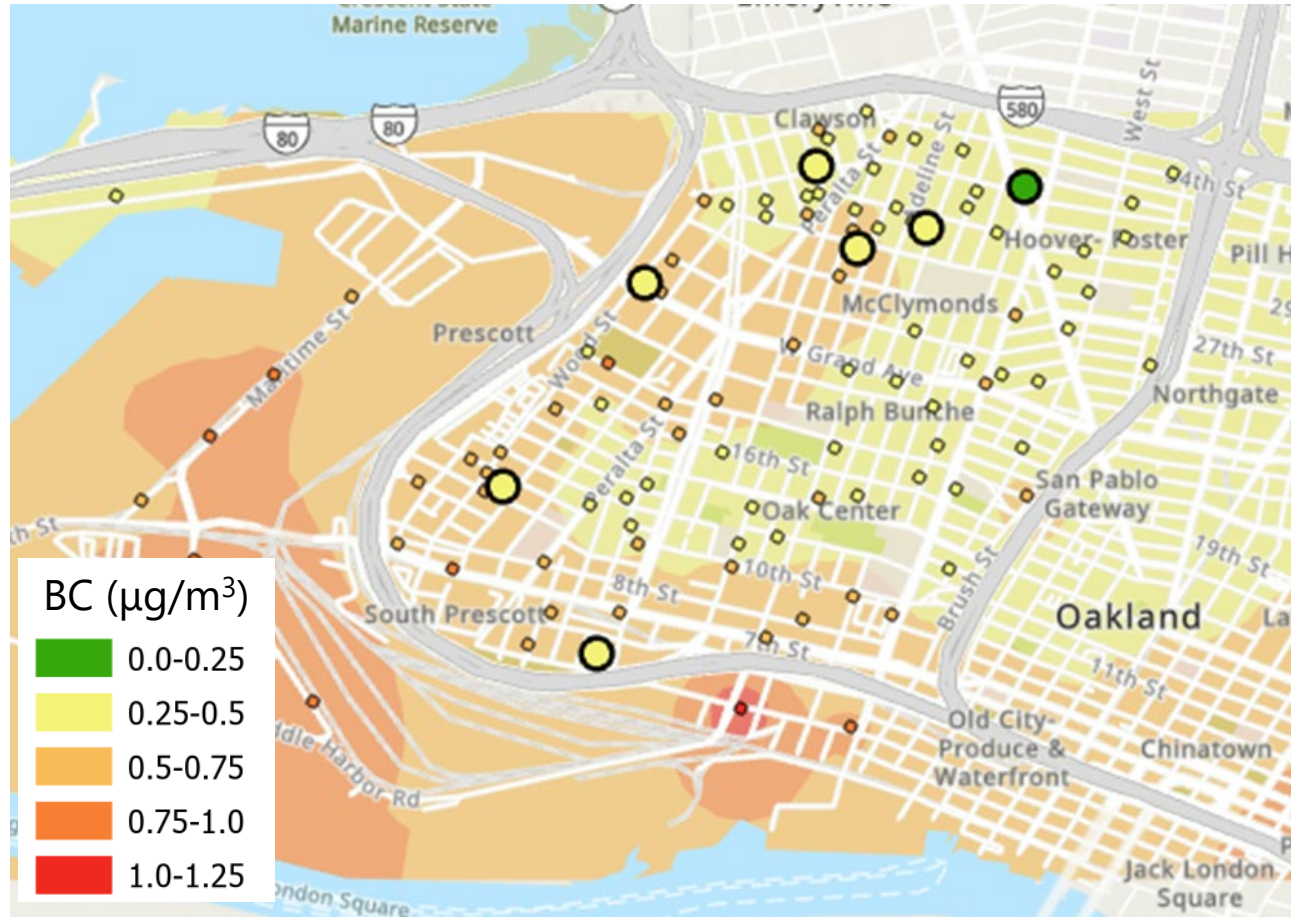


• 2017 Measurements (May-Aug)

- Points on this map are average concentrations measured in Caubel, 2019
- We then interpolated among the points via inverse distance weighting to estimate concentrations where our 2024-2025 measurements occurred
- Measurements showed distinct gradient to the west and south of West Oakland.

Black carbon measurements – 2024, 2025

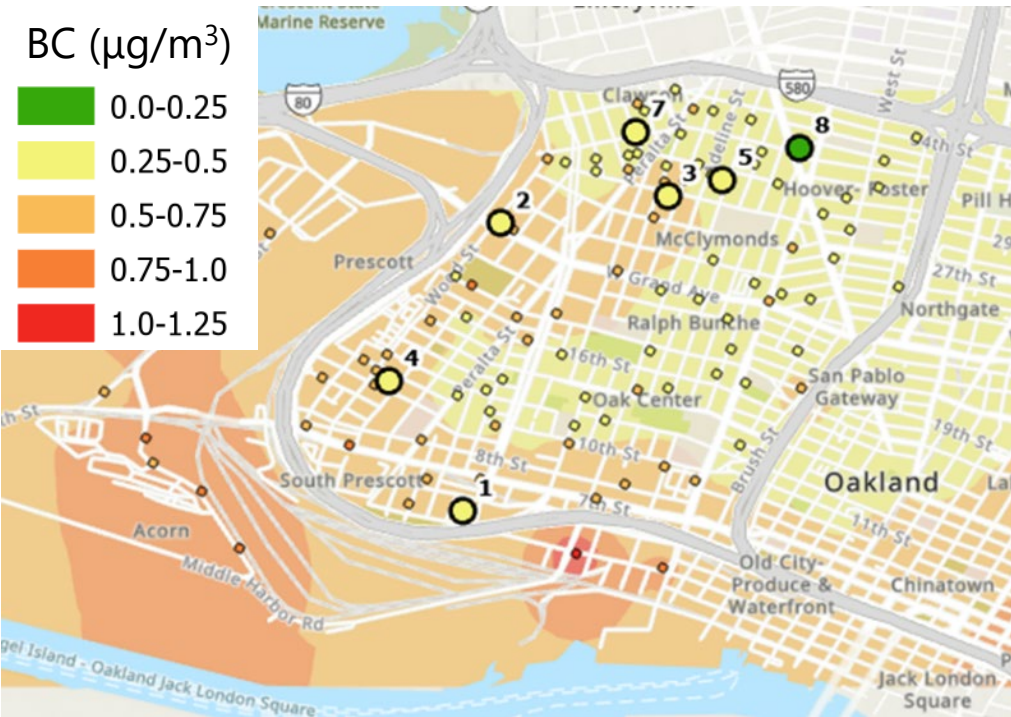
Case study: comparison to 2017 measurements



- 2017 Measurements (May-Aug)
 - Points are measurements, gradient is inverse distance weighted concentrations
- 2024 and 2025 Measurements (June-August)
 - Lower concentrations than in 2017 at all sites
 - Modest gradient within West Oakland similar to 2017

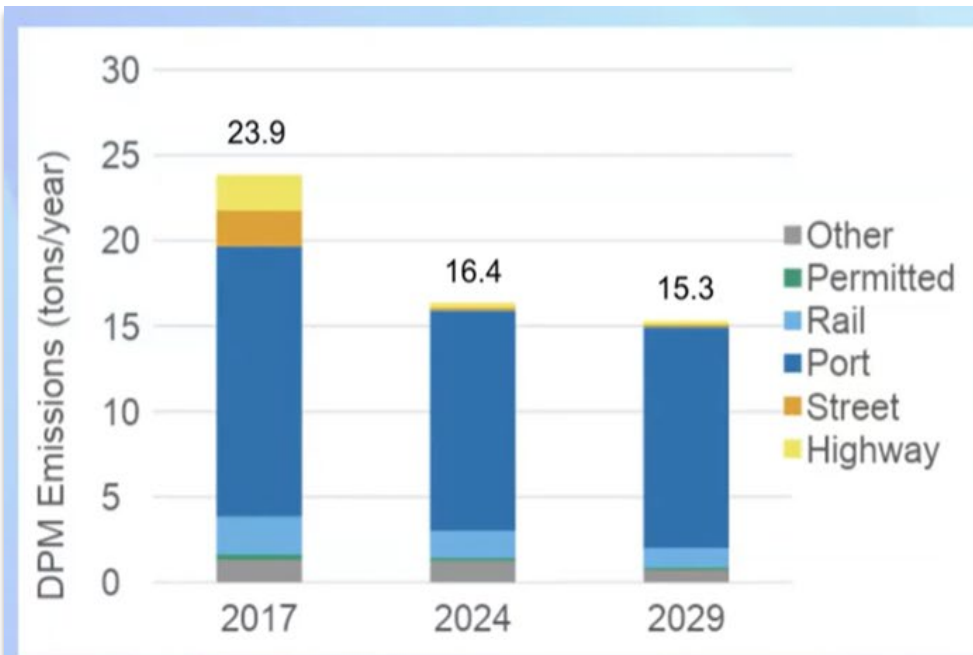
Black carbon reduced by >40%

Case study: comparison to summer 2017 measurements



Site	2017 IDW ($\mu\text{g}/\text{m}^3$)	2024 ($\mu\text{g}/\text{m}^3$)	2025 ($\mu\text{g}/\text{m}^3$)	2024, 2025 avg	Difference 2024/25 (%)
1	0.58	0.35	0.31	0.33	-43
2	0.65	0.34	0.23	0.29	-55
3	0.60	NA	0.27	0.27	-55
4	0.50	0.30	0.23	0.27	-46
5	0.45	0.27	0.23	0.26	-42
7	0.47	0.25	0.26	0.25	-46
8	0.42	0.25	NA	0.25	-40
Average	0.52	0.30	0.25	0.28	-46%

Bay Area AQMD modeling predicts similar 31% decrease in diesel PM emissions



- DPM emissions decreased by 31% (7.5 tons) between 2017 and 2024
- The largest decreases were for diesel trucks (3.9 tons) and harbor craft (2.3 tons)
- Additional reductions for 2029 largely offset by forecasted growth
- Updated DPM emissions for 2024 are 13% lower than WOCAP projections (18.8 tons)

59

Measurements: **-46%**

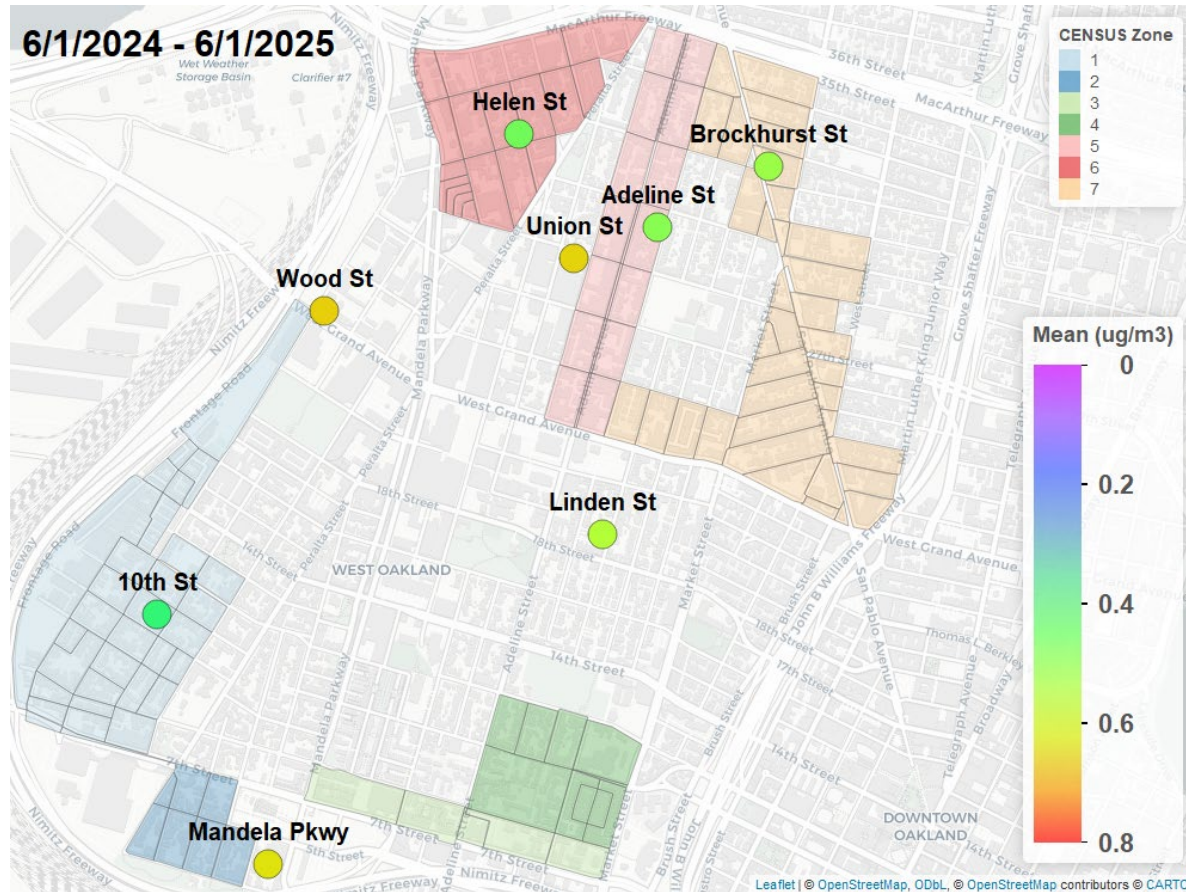
Modeling: **-31%**

- On-road vehicles
 - New CA regulations for vehicles
- Port
 - 13 new tugboats
 - 16 cranes updated to hybrid
 - 30 hydrogen trucks
 - 102 electric heavy duty truck chargers

AB617 Steering Committee Meeting overview, Sept 4, 2024.

Black carbon spatial pattern

- Sites near freeway (Mandela Pkwy, Wood St) & truck route have the highest concentrations
- Avg values are > WOCAP goal, which is for local-only BC



Site	June 2024 – May 2025 Daily Average (ug/m ³)	Type of Location
Wood St.	.65	Near Freeway
Union St.	.65	Near Industry, Truck Route
Mandela Pkwy	.64	Near Freeway
Linden St.	.55	Near Truck Route
Brockhurst St.	.51	Near Truck Route
Adeline St.	.49	Residential
Helen St.	.46	Residential
10 th St.	.39	Residential

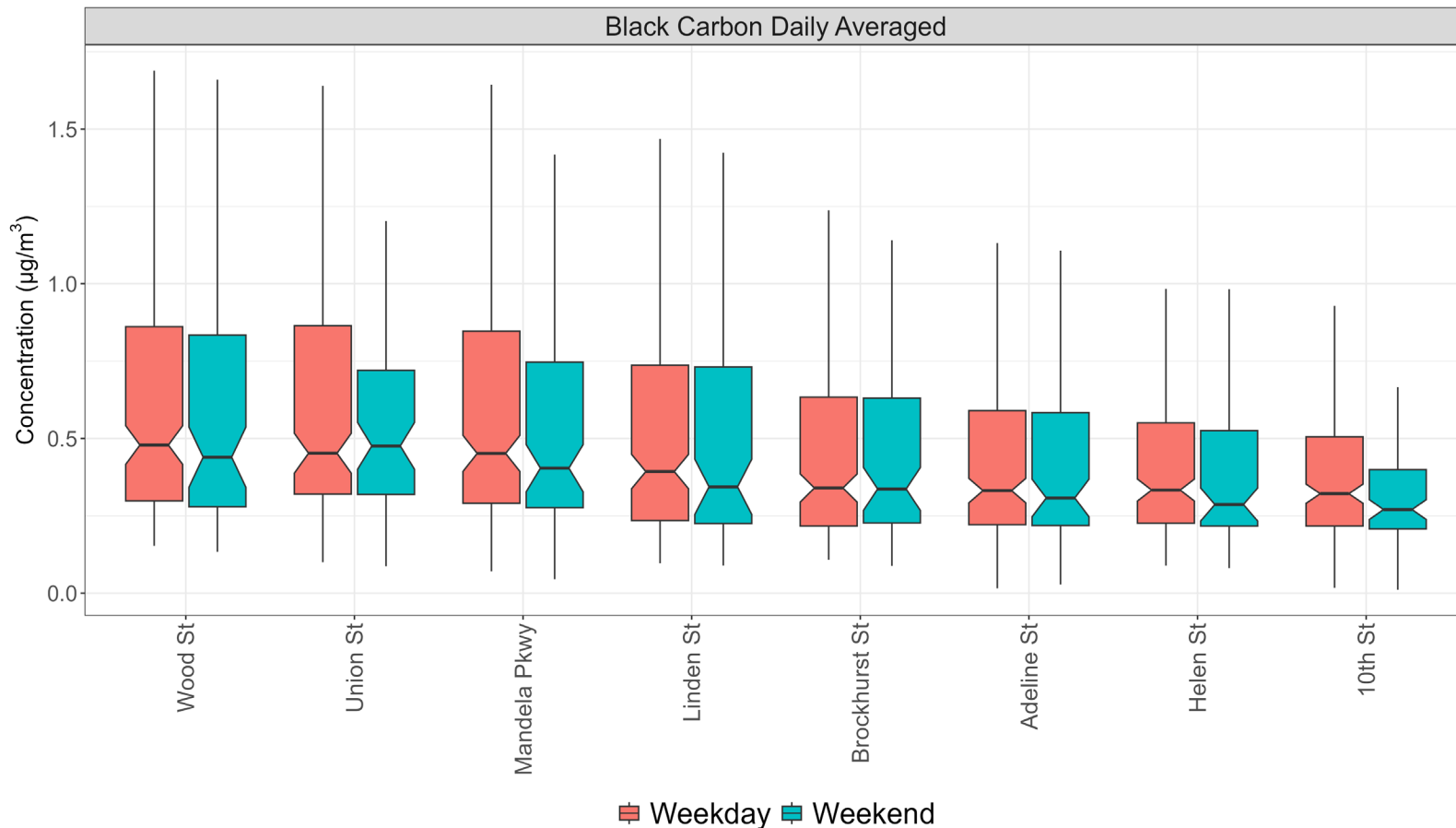
Weekday/Weekend Trends

- BC and other pollutant concentrations are often significantly lower on Sundays compared to weekdays since there is often less traffic, less industrial emissions, etc.
- In 2017 100x100 study (Caubel et al 2019), weekend BC concentrations were ~40% lower than weekdays.
- Recent study in Richmond (Sugrue et al 2024) found that there was little difference in weekday and weekend BC during 2023.

Rebecca A. Sugrue, Chelsea V. Preble, James D.A. Butler, Alaia J. Redon-Gabel, Pietro Marconi, Karan D. Shetty, Lee Ann L. Hill, Audrey M. Amezcua-Smith, Boris R. Lukanov, Thomas W. Kirchstetter, *The value of adding black carbon to community monitoring of particulate matter*, Atmospheric Environment, Volume 325, 2024, 120434, ISSN 1352-2310, <https://doi.org/10.1016/j.atmosenv.2024.120434>

Weekday/Weekend Trends

- BC concentrations are similar on weekends and on weekdays; suggests that source emissions are similar on these days.
- Working with Steve Reid at BAAD to see how the truck volume and emissions vary WD/WE compared to ambient values.



BC daily averaged during June 2024-May 2025

What Changes on Weekdays vs Weekends – Local Diesel Particulate Matter Emissions from BAAD

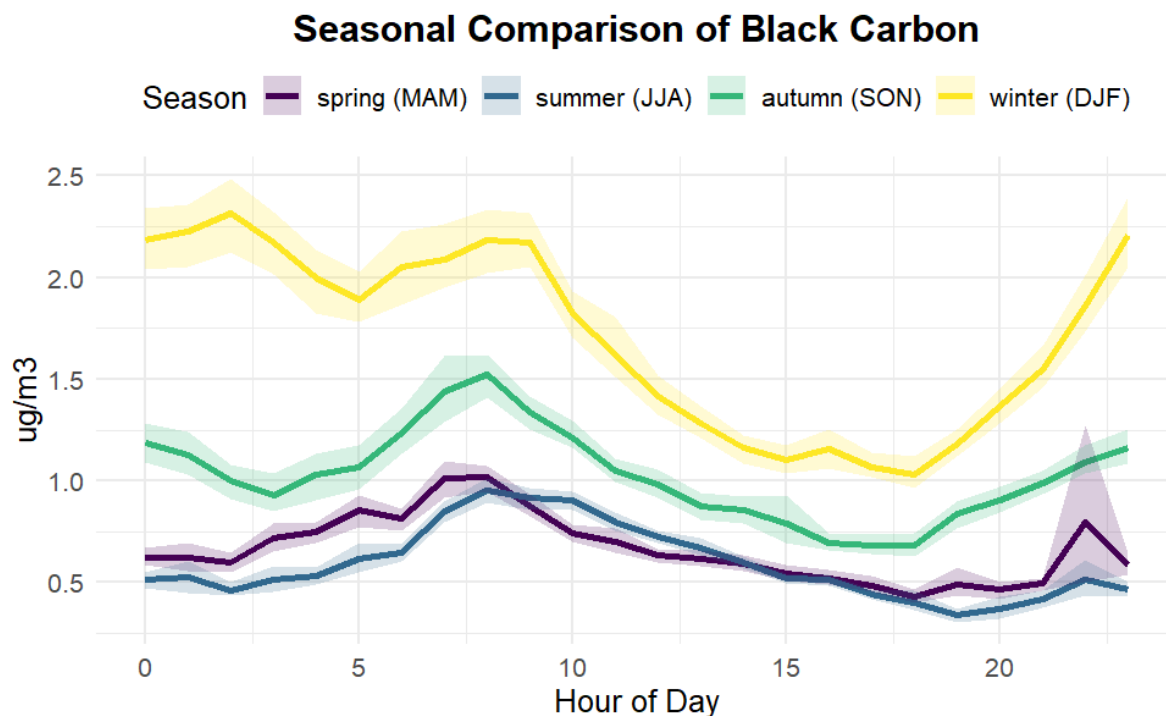
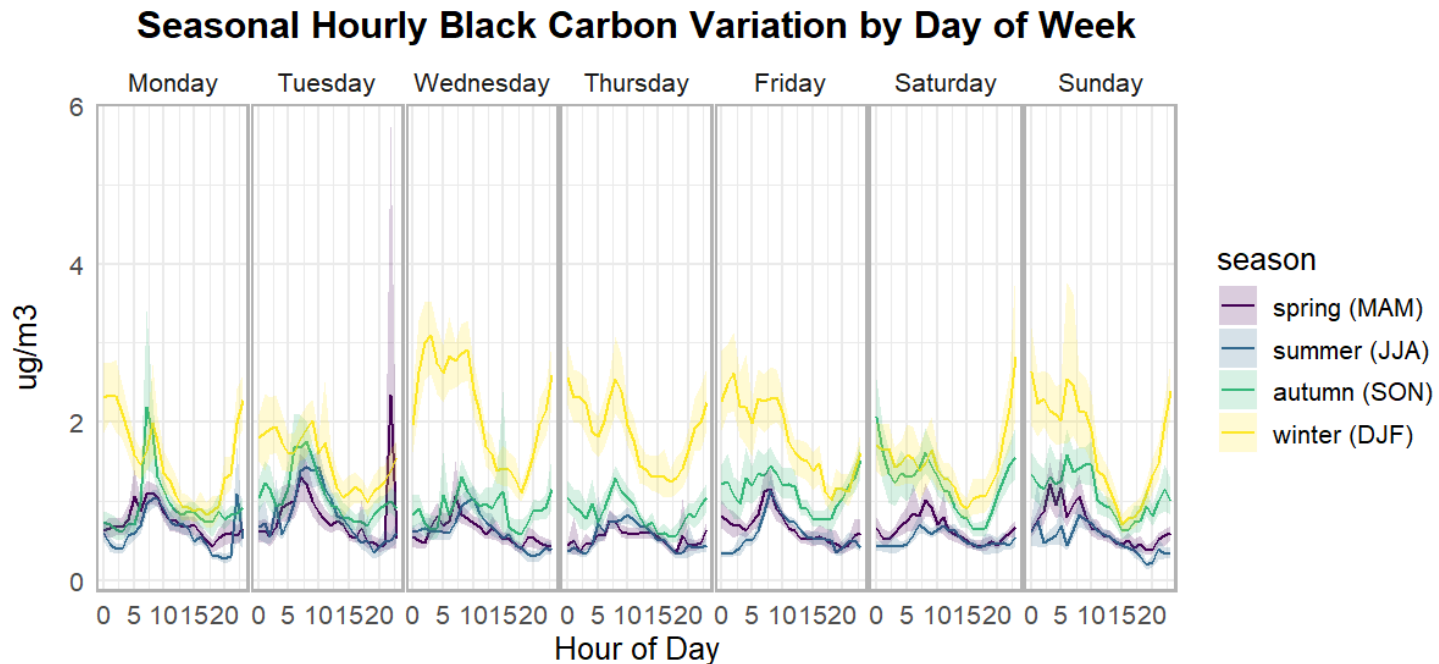
Source	2017	2024	% of total, 2024
Highway	2.85	0.44	4%
Street	1.16	0.14	1%
Port	8.46	6.05	60%
Rail	2.66	2.02	20%
Permitted	0.3	0.18	2%
Other	1.3	1.25	12%

Summary from WOCAP 2025 Update
Table A4-4. Diesel PM Emissions Summaries; tons per year

- Traffic and emissions on Highway and Street are expected to decrease on weekends vs weekdays (need to confirm).
- Port, rail and some “other” emissions likely similar on weekdays and weekends, since operations are 7 days/week.
- Regional BC also has low weekday/weekend difference, based on Richmond results

Diurnal Trends

- Winter concentrations were highest; in particular in evening and overnight when winds and boundary layer are low
- Sunday morning ~ weekday mornings, even though truck traffic generally lower on Sundays



Average BC values over all sites; June 2024-May 2025

BC Summary

How have BC concentrations changed? How do they vary across impact zones? What does this say about emission reduction strategies?

- BC concentrations have decreased from 2017, similar to model predictions, largely due to state or national regulations, as summarized in WOCAP.
- BC concentrations are highest in the west near the freeways (Wood St, Mandel Pkwy) and along truck route (Union St); while summer concentrations are similar to the WOCAP goals, annual average concentrations are higher (0.39-0.65 ug/m³).
- There is little difference between weekday and weekend concentrations; working with BAAD to see how this matches with estimated emissions.

DPM Emissions from WOCAP:

Additional emission reductions from mobile sources will be << than in prior 5 years

Source	2017	2024	% of total (2024)	2029	% of total (2029)
Highway	2.85	0.44	4%	0.28	3%
Street	1.16	0.14	1%	0.09	1%
Port	8.46	6.05	60%	6.12	69%
Rail	2.66	2.02	20%	1.51	17%
Permitted	0.3	0.18	2%	0.18	2%
Other	1.3	1.25	12%	0.73	8%

Table A4-4. Diesel PM Emissions Summaries and Differences, Best Methods (tons per year)

What Next

- Mobile source emission reductions will continue, but anticipated improvements only $\sim 1/10^{\text{th}}$ compared to the change in the prior 5 years; what emissions reductions can be gained from other sources?
- How will anticipated emissions reductions, and resulting changes in ambient pollution, be tracked?
- What sources/activities should WOEIP focus on to see additional progress?

Extra Slides



- Modeled truck traffic in 2019
WOCAP;
Appendix A

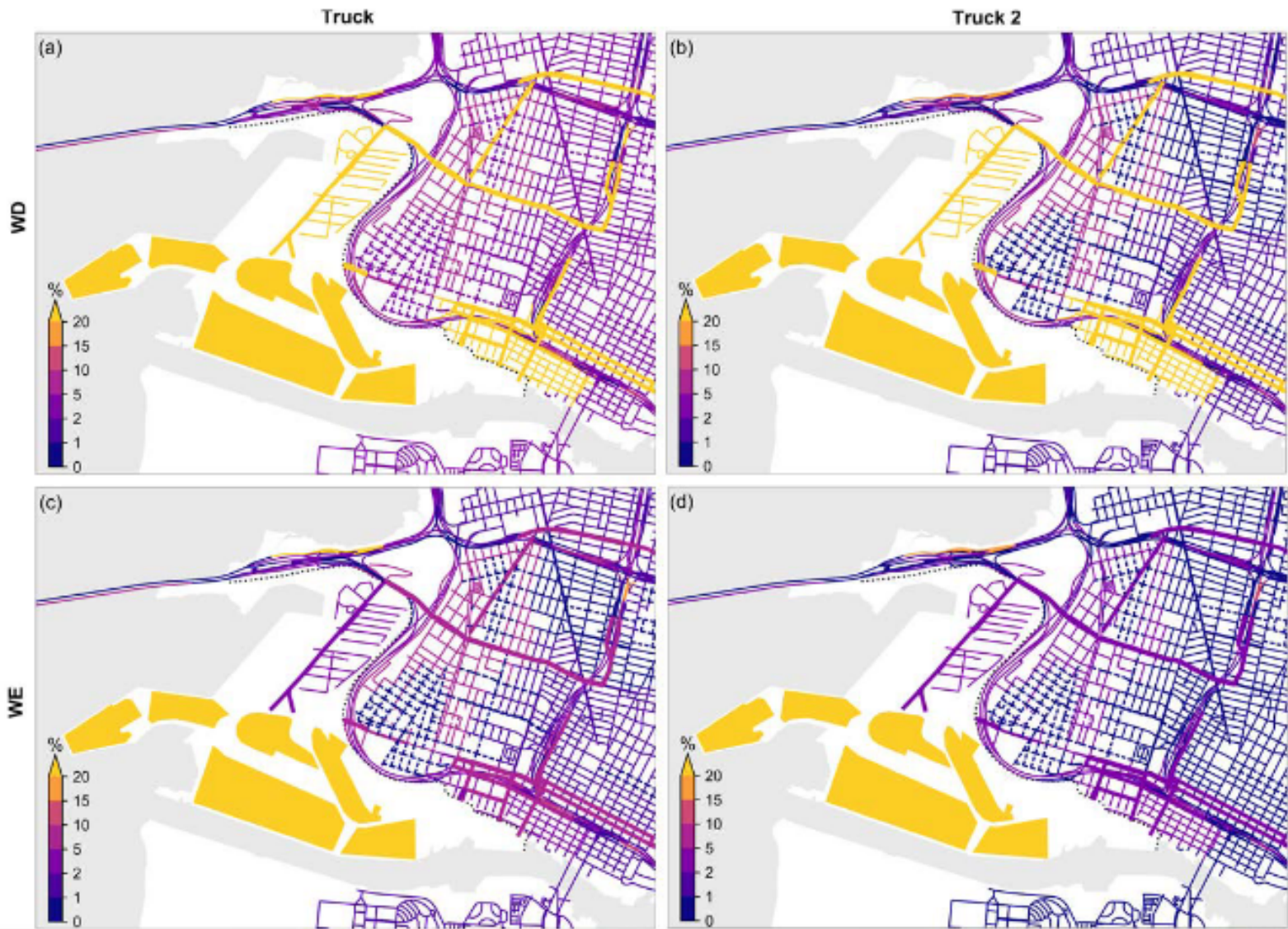


Figure 2-7. Total daily average fleet mix by roadway link in West Oakland for total (a, c) Trucks and (b, d) Truck 2 vehicles by day type (WD, WE). Fleet mix (%) is displayed by roadway (solid line), major truck route (thick solid line), and truck-prohibited route (dashed line). Total fleet volume varies by roadway link. Only roadway segments modeled as volume sources in AERMOD are plotted (*c.f.* Figure 2-1); emissions from on-road mobile sources operating within the Port are plotted as polygons.

Figure 5-8 WOCAP

How Much is Local?

Modeled Impact, on Residential Diesel PM, of Local (versus Regional) Emissions

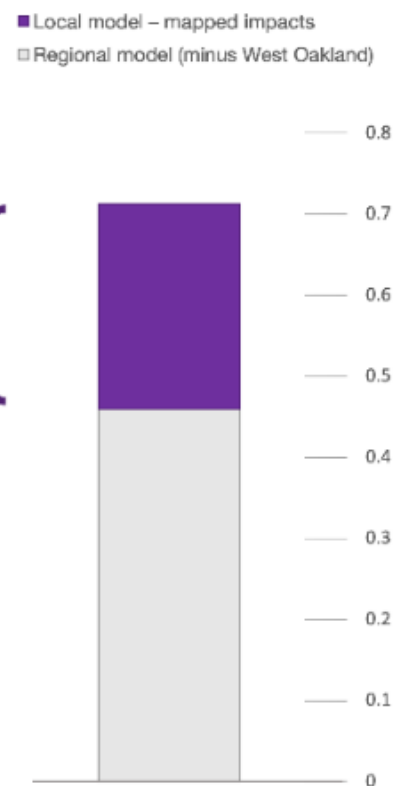
Top Local Contributors*

- Trucks (42%)
- Marine Vessels (33%)
- Rail (18%)

Diesel PM

+ 0.3
 $\mu\text{g}/\text{m}^3$

* construction in West Oakland not included



Discussion

Open Forum

Thank you.



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