BAY AREA AIR QUALITY MANAGEMENT DISTRICT

AGENDA: 3

Cumulative Impacts in Air District Policies and Programs

Advisory Council
September 19, 2024

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Presentation Outline

- **Cumulative Impacts in Key Policies and Programs**
  - Air Quality Planning
    - Current regional approach
    - Opportunities for a community-focused approach
  - California Environmental Quality Act Guidance
    - Current guidance on thresholds of significance
    - Opportunities for more thorough consideration of cumulative
  - Permits (New and Modified Facilities)
    - Current approach with stricter risk limits in overburdened communities
    - Opportunities for a more refined and protective health risk assessments
  - Stationary Source Regulations (Existing Facilities)
    - Current approach derived from regional planning
    - Opportunities to consider cumulative impacts when setting emission standards

Air Quality Planning: Current Regional Approach

- **Ozone and fine particulate matter ($PM_{2.5}$) regional approach**
  - Ozone forms in the atmosphere from emissions of volatile organic compounds (VOC) and oxides of nitrogen (NO_X) – regional approach is required
  - $PM_{2.5}$ has a significant secondary component that forms due to atmospheric chemistry (contributing pollutants: VOC, NO_X, oxides of sulfur, ammonia) but it is also directly emitted
  - The California Air Resources Board (CARB) and the United States Environmental Protection Agency (US EPA) set ambient air quality standards designed to protect most vulnerable individuals
  - Attainment is typically based on the monitor within the region with the highest (most impaired) measurements
    - Worst ozone pollution in the Bay Area typically in the Tri-Valley Area of the East Bay
    - Worst $PM_{2.5}$ pollution measured near major roadways in East and South Bay

Air Quality Planning: Current Regional Approach

- **Ozone and ($PM_{2.5}$) regional approach continued**
  - Permitting new and modified facilities
    - No net increase in pollutants contributing to ozone or $PM_{2.5}$ concentrations
      - Offsets only required for significant increases
      - Offsets can come from anywhere in the region
    - Best Available Control Technology (BACT) is required
  - Control strategies
    - Air District develops a plan to reduce pollutants and precursors
      - Includes more stringent regulations, incentive programs, and limits on the growth of transportation emissions
      - Regulations set limits on the amount of pollution equipment can emit (e.g. NO_X emissions per unit of heat input for boilers of a certain size)
      - Regulatory limits must be feasible
    - The combined control strategies are applied to a computer model of the regional atmosphere to provide evidence that, if enacted, the area would achieve the ambient air quality standards

Air Quality Planning: Current Regional Approach

- **Air Toxics**
  - California and US EPA identify toxic compounds and set risk values
    - Neither have identified $PM_{2.5}$ as a “toxic” contaminant, leaving its control to the regional approach
  - US EPA and CARB develop source-specific regulations intended to provide maximum levels of control of toxic contaminants
  - California Office of Environmental Health Hazard Assessment (OEHHA) develops Health Risk Assessment (HRA) methodology
    - HRA uses health risk factors designed to protect most vulnerable
    - HRA considers multiple pollutants, but on an additive basis, not considering synergistic effects
  - Air District:
    - Permitting: Sets maximum acceptable risk limits for new/modified facilities with stricter limits in overburdened communities
    - Rule 11-18: This rule sets a risk threshold for existing facilities. Facilities must develop emission reduction plans if an HRA shows an exceedance of the threshold

Air Quality Planning: Community-Focused Approach

- Opportunities for a community-focused approach
  - Address sources that are significantly impacting vulnerable communities but may not be significant on a regional basis (e.g. dust sources, odor sources)
  - Design control strategies to achieve multiple goals:
    - Attain regional state and federal ambient air quality standards
    - Address sources identified by community members as impactful
    - Reduce inequity in pollution exposure
    - Prioritize reductions most beneficial to vulnerable communities
    - Address specific health endpoints (e.g. cancer risk, asthma onset, all cause mortality)

California Environmental Quality Act Guidance

- **Current Practice**
  - Local governments must analyze the environmental impacts of their decisions under the California Environmental Quality Act (CEQA)
  - The Air District provides guidance, based on substantial evidence, to local governments on conducting air quality and greenhouse gas impact reviews under CEQA
  - The guidance document also addresses how to incorporate environmental justice considerations into decision making
  - This guidance includes recommendations for significance thresholds for air pollutants. Projects with impacts below the significance thresholds are often easier and faster to approve
  - The Air District Board gives final approval of these significance thresholds
  - Local governments are not required to adhere to our thresholds, if their determinations are also supported by substantial evidence

California Environmental Quality Act Guidance

- **Opportunities for improvement**
  - Incorporate Air District-developed local risk methodology for $PM_{2.5}$
  - Set more protective significance thresholds in overburdened and vulnerable communities
  - Incorporate consideration of synergistic effects into significance determinations for air toxics

Permits for New and Modified Facilities

- **Current approach**
  - Requires Best Available Control Technology
  - Use current OEHHA guidance for HRAs
    - Does not address synergistic effects of pollutants
    - Does not include localized impacts of $PM_{2.5}$ emissions
  - Significant increases in $PM_{2.5}$ and/or precursor emissions must be offset with reductions elsewhere in the region
  - Stricter requirements for new toxic emissions in overburdened communities
    - Overburdened communities defined as those in the 70^{th}+ percentile in CalEnviroScreen plus 1,000 ft buffer
    - Enhanced public notice process
    - Stricter toxic risk limits (6/1M vs 10/1M elsewhere)

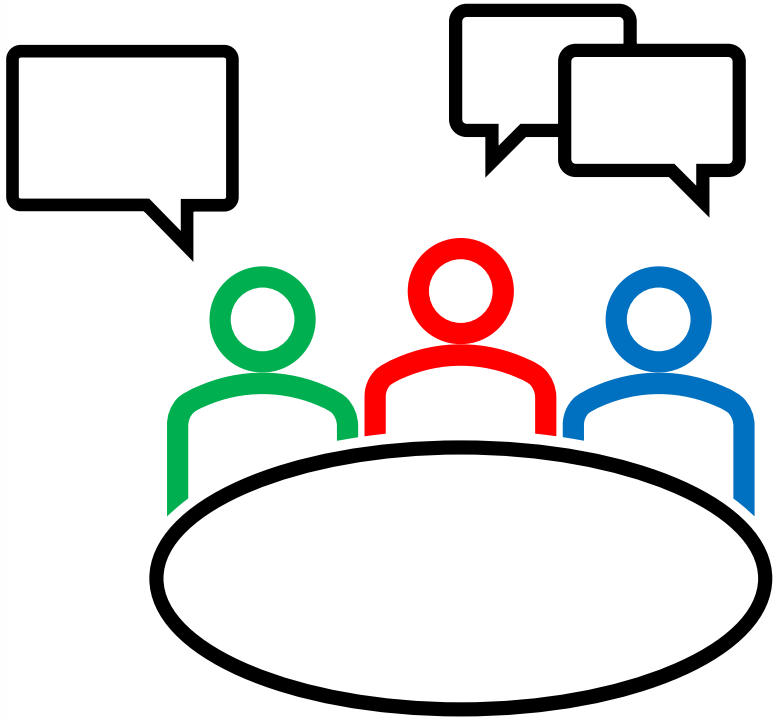
Permits for New and Modified Facilities

- **Opportunities for more protective and refined health risk assessments**
  - Set a local risk maximums for $PM_{2.5}$ exposure, with consideration of cumulative impacts
  - Update HRA methodology to consider interactions between pollutants
  - Update HRA methodology to include consideration of community vulnerability

Stationary Source Regulations (Existing Facilities)

- **Current approach derived from regional planning**
  - Focused on sources of regional significance
  - Emissions standards must be feasible (technical and economic component)
  - Same emissions standard applies across the region
- **Opportunities to consider cumulative impacts**
  - Use community-focused planning to prioritize sources for more stringent rules
  - Set different performance standards for different locations, considering cumulative impacts

Discussion



AGENDA: 4

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

CalEnviroScreen in Air District Policy and Practice

Advisory Council Meeting
September 19, 2024

David Holstius, PhD
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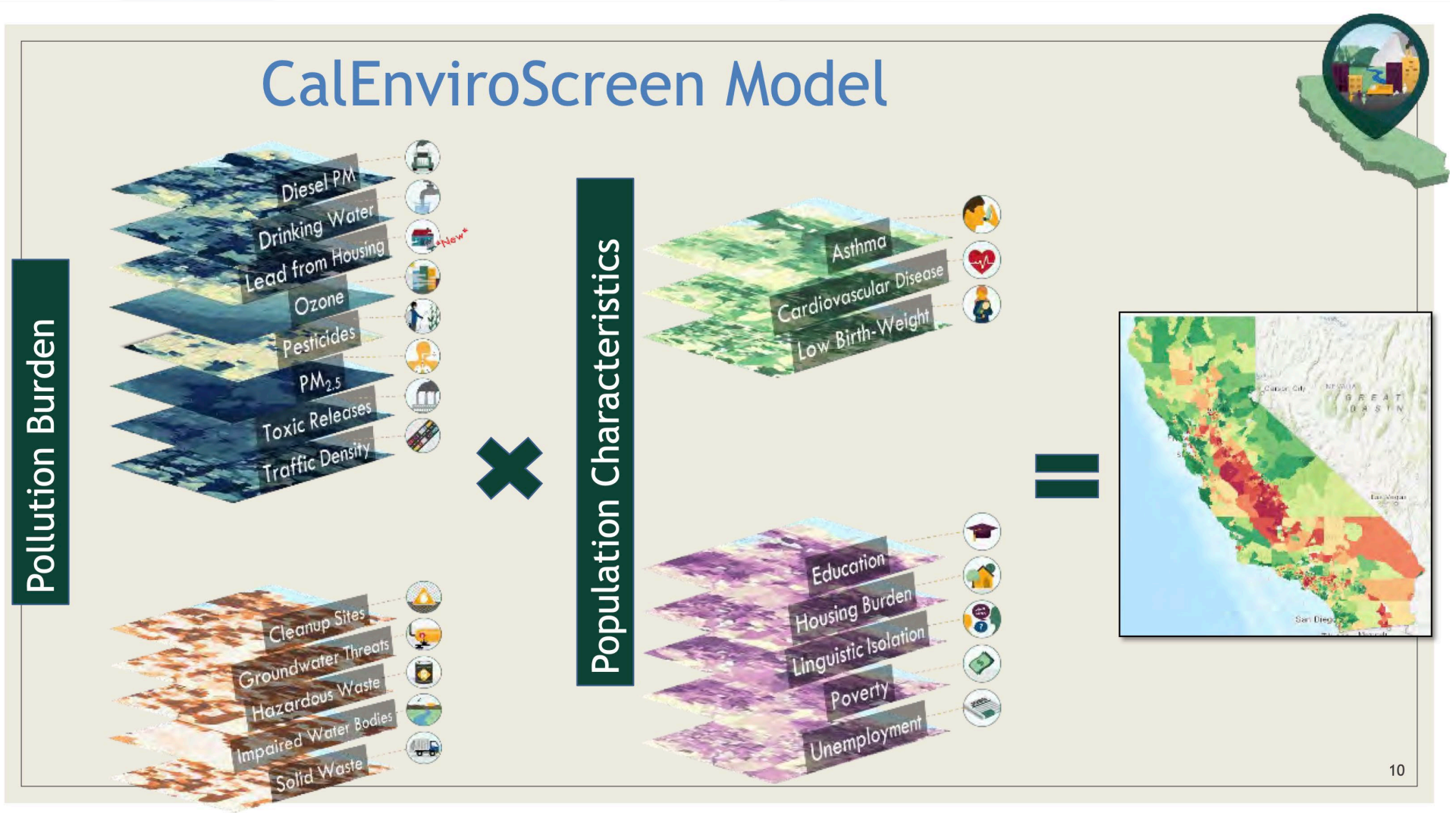
Presentation Outline

- CalEnviroScreen (CES) at the Air District
  - Approach and key implementation decisions
    - Notable indicators in other tools
  - Applications at the Air District
    1. Regulatory requirements; incentive programs
    2. Broader context: tools, designations, and programs

GIS-Based Approach



https://oehha.ca.gov/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf

Design Decisions

For the implementation of any such tool:

1. Spatial scale
2. Set of indicators (emphasized in this presentation)
3. How indicators are operationalized*
4. Numeric transformations*
5. Post-transform weighting
6. Reduction method (incl. handling missing data)

** Can affect whether tracking is possible, or only relative prioritization*

Notable Indicators in Other Tools

Sensitive populations*

- % young, old, people of color, minority, w/disabilities, uninsured
- Schools, long-term care, public housing, childcare, prisons

Health endpoints*

- Prevalence: elevated blood lead, chronic obstructive pulmonary disease (COPD), coronary heart disease, asthma in schools
- Incidence: premature mortality

** CES labels its group of health endpoints "Sensitive Populations"*

Notable Indicators in Other Tools (cont.)

Air toxics risk metrics

- Non-cancer risk
- Cancer risk from diesel particulate matter (DPM), and not from DPM

Major sources of emissions

- Facilities listed in multiple major registries
  - CES uses EPA Toxics Release Inventory
- More layers for specific facility types (e.g. incinerators; scrap metal)
  - CES has several, but some tools have more
  - More layers ≈ upweighting this class of sources
- Airports, ports, rail yards, rail lines, heavy-duty trucks

Notable Indicators in Other Tools (cont.)

Climate

- Projected flooding
- Extreme heat

- **Other notable indicators**
  - Driving time to hospital
  - Redlining (HOLC grade)
  - Agricultural land
  - Vegetative cover
  - Impervious surface
  - Open recreational space
  - Energy poverty
  - Homes without internet
  - Homes built before 1960
  - Renter-occupied housing

CalEnviroScreen (CES) at the Air District

Currently, CalEnviroScreen (CES) contributes to Air District efforts to:

Designate areas

- For enhanced regulatory requirements
- For prioritized and/or enhanced resource allocations
- For development of localized emission reduction plans (AB 617)

Characterize local conditions

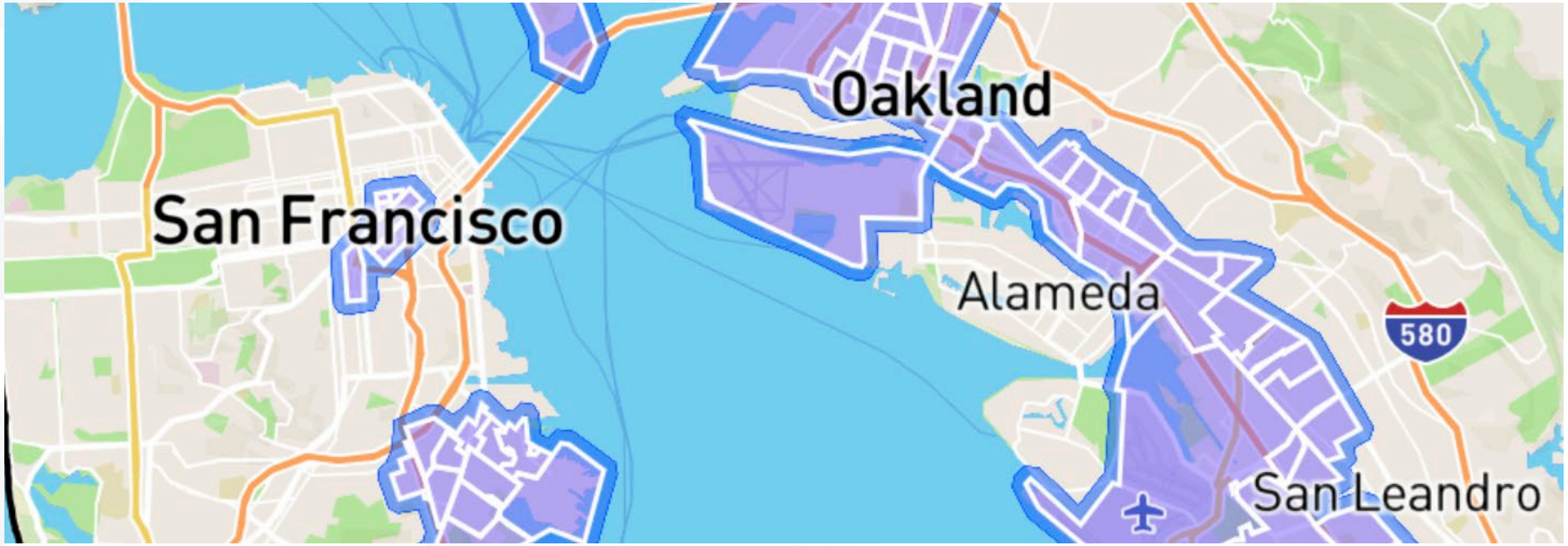
- In Community Description chapters in AB 617 plans
- In CEQA comments supporting EJ concerns

Assess project/program investments

- Which communities are likely benefiting and how much?

“Overburdened Community” Designation

2-1-243 **Overburdened Community**: An area located (i) within a census tract identified by the California Communities Environmental Health Screening Tool (CalEnviroScreen), Version 4.0, as having an overall CalEnviroScreen score at or above the 70th percentile, or (ii) within 1,000 feet of any such census tract.



“Overburdened Community” Designation (cont.)

Overburdened Community designations trigger **enhanced permit requirements and fees**

2-5-302 **Project Risk Requirement:** The APCO shall deny an Authority to Construct or Permit to Operate for any new or modified source of TACs if the project risk exceeds any of the following project risk limits:

302.1 A cancer risk of 10.0 in one million (10×10^{-6} or 10E-6); or for a project located within an Overburdened Community as defined in Regulation 2-1-243 (other than a project at an Essential Public Service), a cancer risk of 6.0 in one million (6.0×10^{-6} or 6.0E-6);

302.2 A chronic hazard index of 1.0;

302.3 An acute hazard index of 1.0.

302.7 Fee for applications in an Overburdened Community: An applicant with a project that requires a Health Risk Assessment in an Overburdened Community shall pay a fee of $1,000 in addition to any other permit application fees.

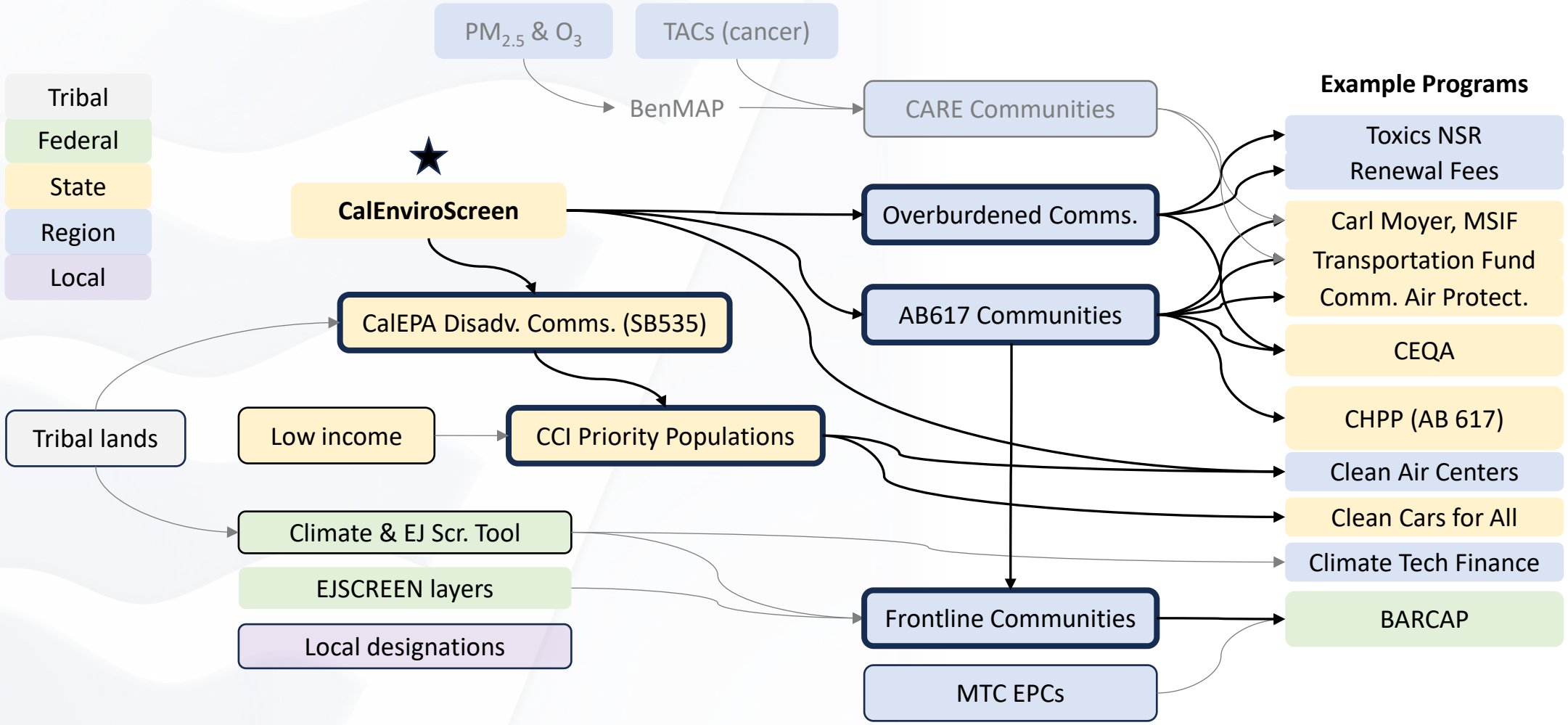
Incentive Projects

CES-influenced designations

- Have largely superseded CARE Program maps
- Shape certain funding eligibility, prioritization, and award amounts
- Used to focus marketing and outreach
- Used to structure evaluation (required by some state programs)
- Programs may aim to allocate significant % to projects in designated areas

Place-Based Tools, Designations, & Programs

(Illustrative, not exhaustive; centering CalEnviroScreen & Air District



Assessment vs. Designation

Customizing a *tool* is one way to change relative scores

- Six key parameters listed on slide 5

For constructing *designations*, these also matter:

- Choice of threshold
- Topping off with additional inclusion *criteria* (very common in practice)
  - Unioning with other maps; buffering; grandfathering; etc.
  - Example: Overburdened Communities (slides 10–11)
  - Example: CA Climate Investment Priority Populations
- Larger *process* in which the tool may play a supporting role
  - Example: AB 617 community boundaries
    - Designations refined via participatory process with community co-leads

Discussion

- Thank you
- Questions

AGENDA: 5

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

BenMAP-CE in Air District Policy and Practice

Advisory Council Meeting
September 19, 2024

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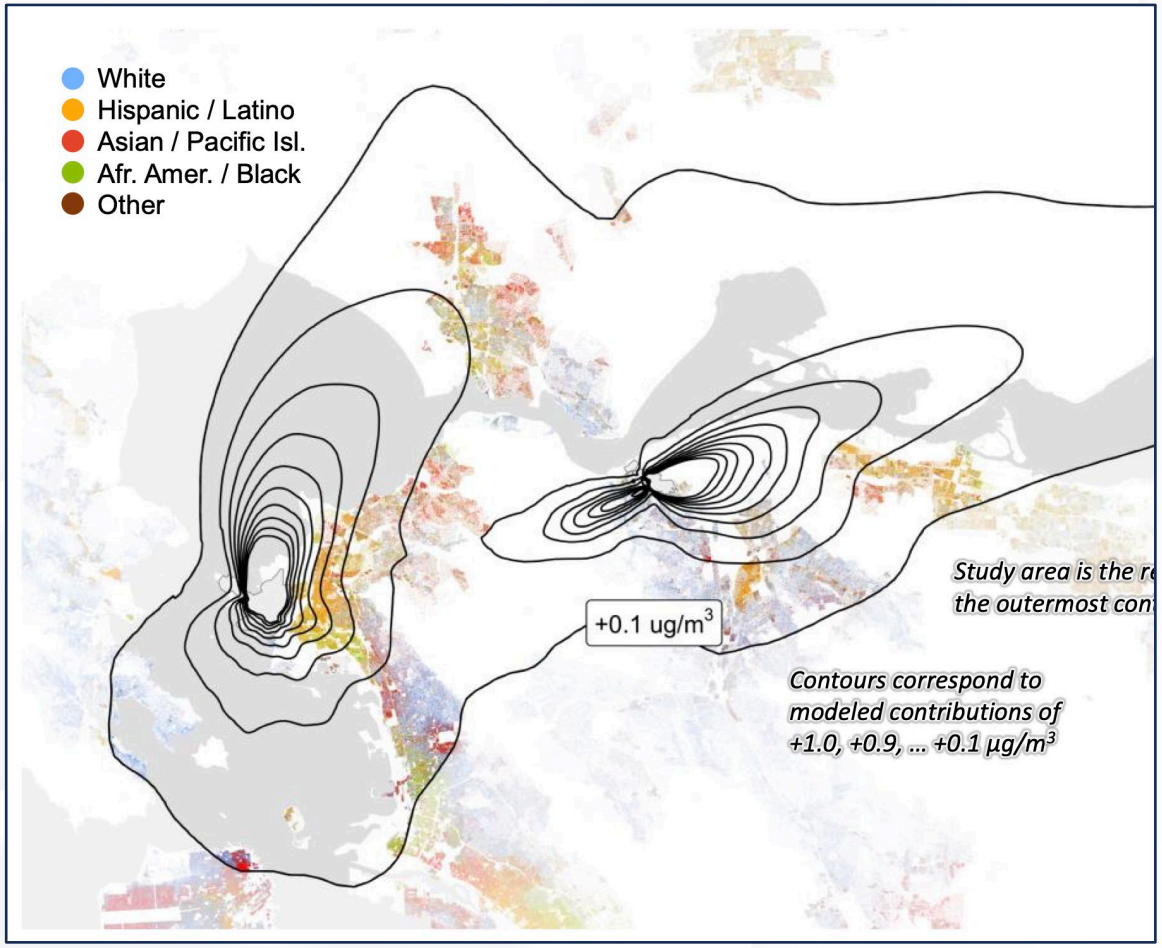
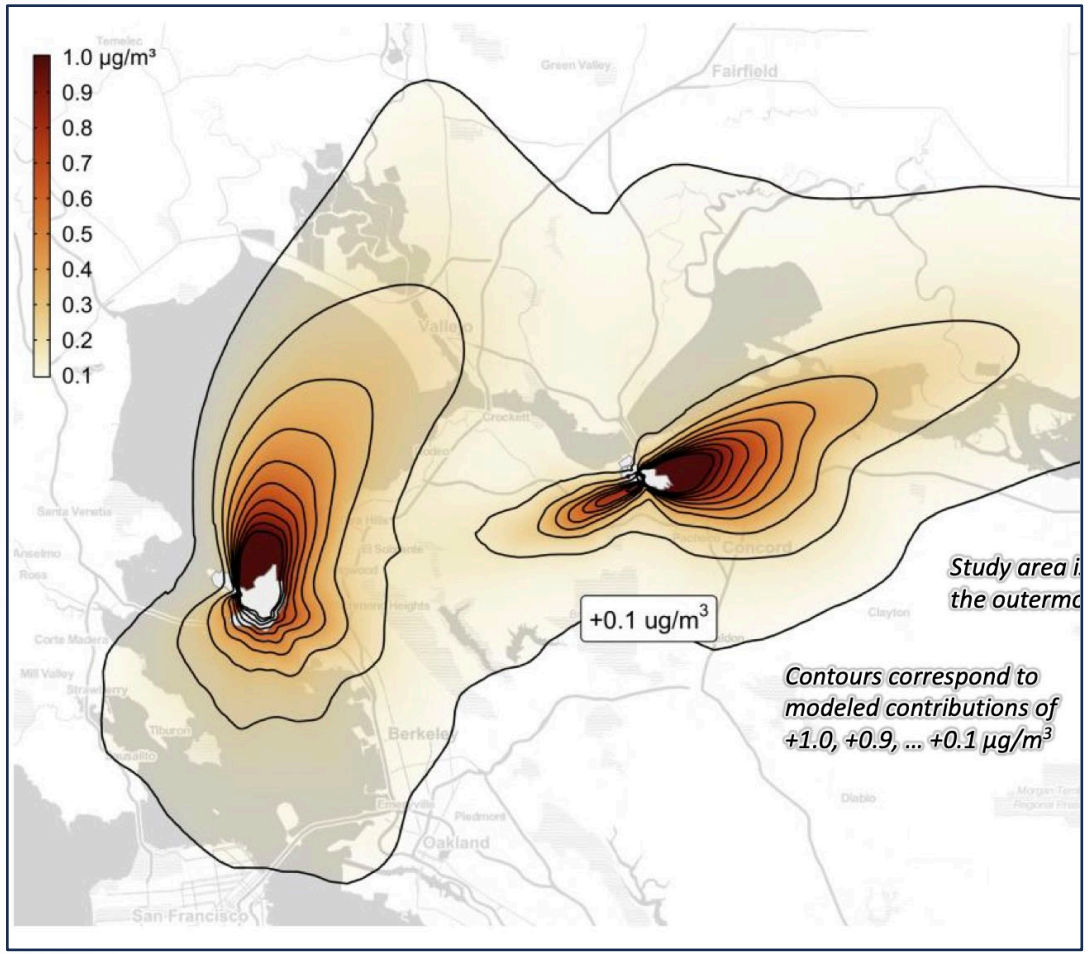
Presentation Outline

- BenMAP-CE at the Air District
  - Example application
  - Approach and key decisions
  - Extensibility to combinations of stressors

Example Application





Simulation-Based Approach

Key design decisions in any application

1. Spatial scale
2. Extent of study area / population coverage
3. Set of health impact functions (HIFs)*
4. Economic valuation approaches*
5. Levels and dimensions of analyses of variation

* See also: Martenies et al (2015) *Health impact metrics for air pollution management strategies*

BenMAP-CE at the Air District

Currently, BenMAP-CE contributes to Air District efforts to:

Attribute impacts due to anthropogenic emissions

- From large or ubiquitous sources
- For selected health endpoints (generally “causal” or “likely”)

Predict benefits from proposed interventions

- As a supplement to policy development
- In terms of geographic and/or demographic variation
- In terms of net impacts, and economic valuations thereof

Multi-Pollutant BenMAP-CE

Coffman et al (2024)

Conducted 12 km photochemical modeling (WRF; CMAQ) of changes in criteria pollutants across Atlanta, 2011–2025, attributed to sector-level growth & controls

Modified BenMAP-CE code to handle multipollutant HIFs

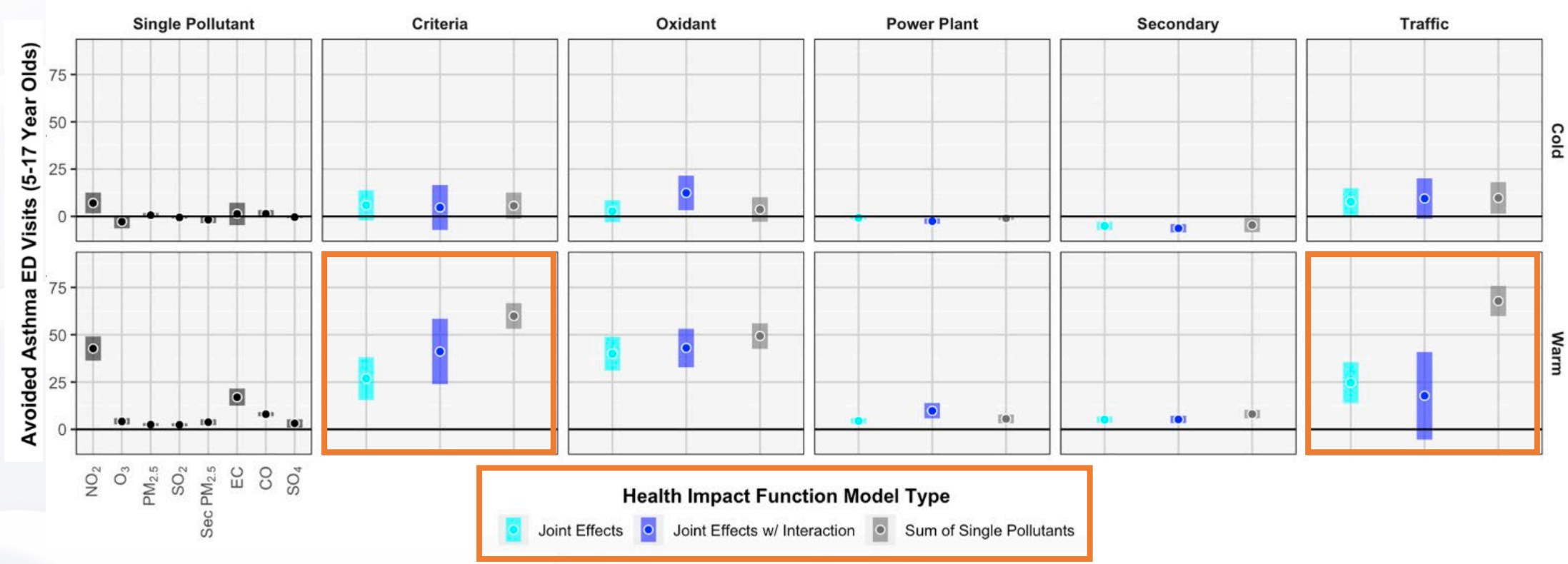
Used pollutant-specific HIF coefficients for asthma emergency department (ED) visit rates, derived from study of same region (Winquist et al 2014)

Holding population constant, predicted change in # events, 2025 vs 2011, via:

a) "Joint" (multi-pollutant) HIF, no interaction terms
b) "Joint" (multi-pollutant) HIF, including first-order interaction terms
c) Sum of single-pollutant HIFs

Multi-Pollutant vs Single-Pollutant

"The multipollutant results were generally of the same magnitude as the summed single-pollutant results, the exceptions being the results for the traffic and criteria pollutants in the warm season."



Coffman et al 2024. Quantifying Multipollutant Health Impacts Using BenMAP-CE: A Case Study in Atlanta, Georgia. *Environmental Health Perspectives*, 132(3), 037003.

Multi-Pollutant Caveats

1. Additional uncertainty
   - Statistical: interaction terms result in wider confidence intervals
     - Results tend to be more likely to include null
   - Scientific: no ISA-level* causal determinations for these combinations
2. Value of information
   - Additional cost in terms of time and effort
   - Not all differences (in findings) make a difference (to policy)
3. Availability of required inputs

** ISA = Integrated Science Assessment, e.g. https://www.epa.gov/isa/integrated-science-assessment-isa-particulate-matter*

Non-Chemical Stressors

In principle, the same crank can be turned

- Chiger and Nachman (2024) encourage this line of research
- For health impact functions (HIFs), a variable is just a variable

A suitable study or meta-review would be required

- Both Chiger & Coffman note that not all studies fit the requisite *type* of model, or publish enough details when they do
- The study by Winquist et al (2014) is an outlier in this regard

Discussion

- Thank you
- Questions