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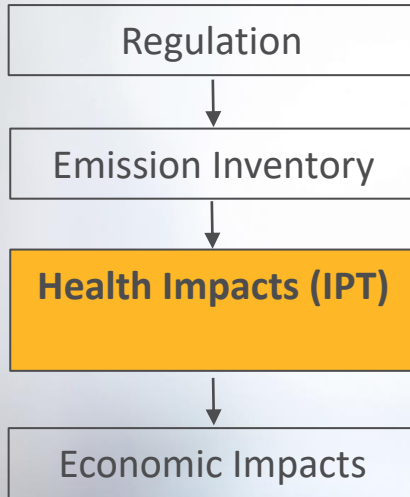
CARB Health Analysis Methodology and Scoping Plan Health Overview

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Presentation Overview

- What is IPT, CARB's methodology of health impact assessment?
- What health endpoints does CARB estimate?
- What is the scale of the results provided by CARB's methodology?
- Overview of CARB Health Analysis Results for the 2022 Scoping Plan

Background on CARB's Health Analysis



- Health analysis informs the benefits of CARB regulations, plans, and programs.
 - **Changes in emissions** estimated for a regulation or program.
 - **Incidents Per Ton (IPT) methodology** relates changes in emissions to changes in health outcomes **statewide** and by **air basin**.
 - **Valuation of health benefits** - CARB economics staff

CARB's IPT (Incidence-Per-Ton) Method

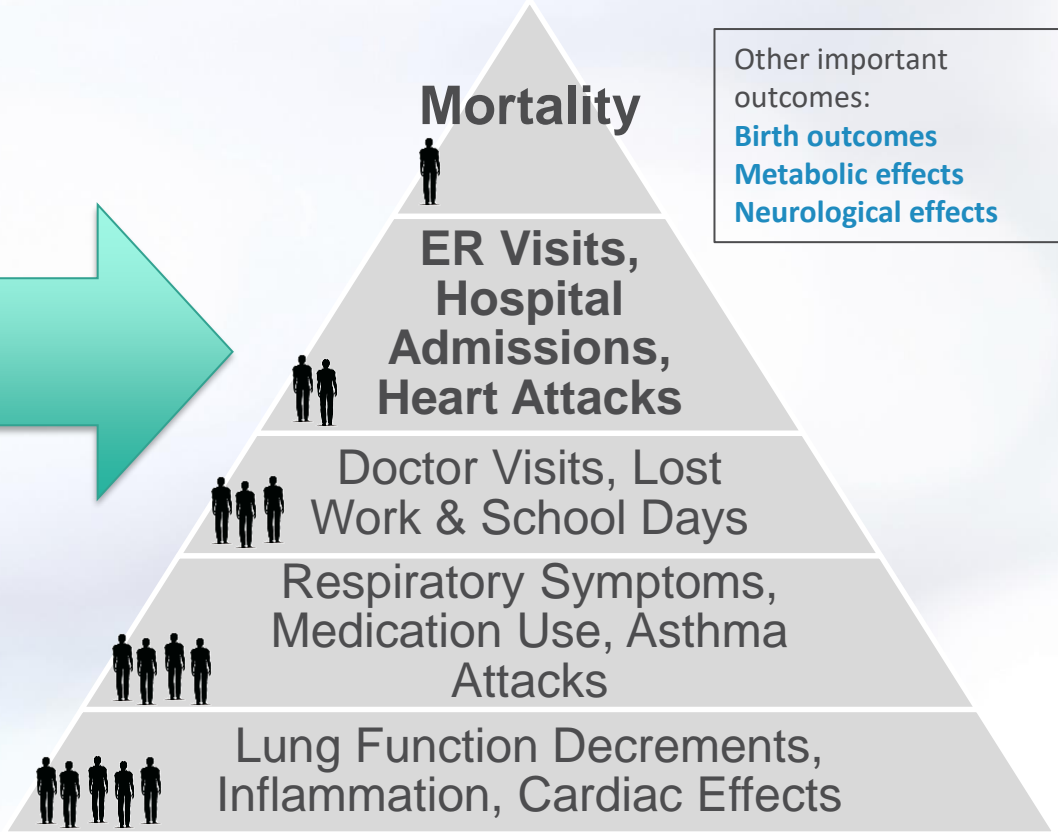
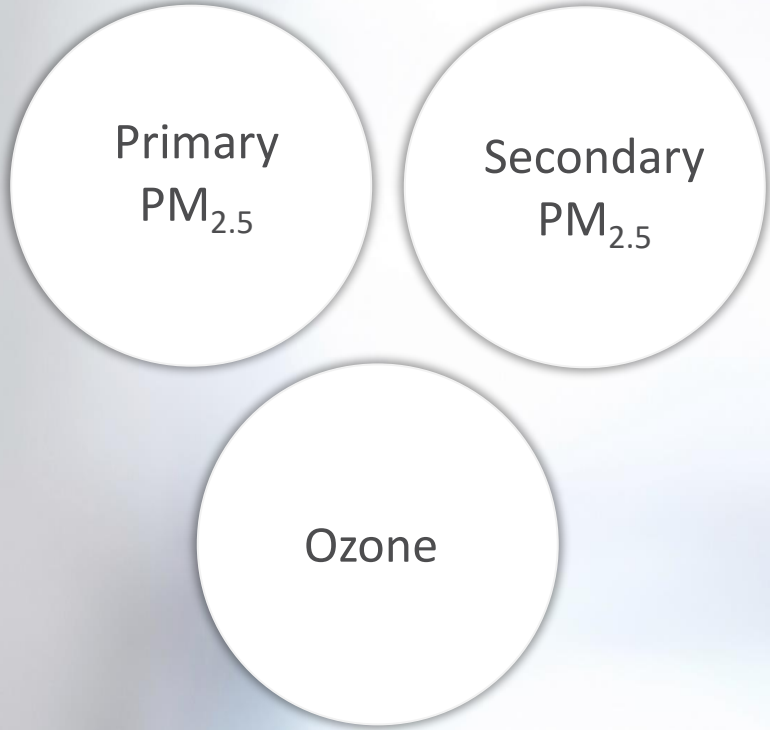
Δ Emissions \propto Δ Concentrations \propto Δ Health Outcomes

- Originally documented in CARB's 2010 Truck and Bus Rule
- Performed for all CARB regulations and programs
- Simplified methodology at air basin level when air quality data (in concentrations) are not available



Quantifies **several PM2.5 health endpoints**

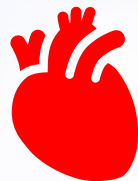
Air Pollution and Health Impacts



Other important outcomes:
Birth outcomes
Metabolic effects
Neurological effects

Expanded PM_{2.5} Health Endpoints

New/Updated List
Mortality
Cardiovascular Hospital Admissions
Cardiovascular ED Visits
Acute Myocardial Infarction, Nonfatal
Respiratory Hospital Admissions
Respiratory ED Visits
Asthma Onset
Asthma Symptoms / Exacerbation
Lung Cancer Incidence
Lost Work-Days
Alzheimer's Disease
Parkinson's Disease



Overview of CARB's 2022 Scoping Plan

\$200 Billion in health cost savings from decreased fuel combustion

**-\$200 Billion
In 2045**

**CALIFORNIA'S CLIMATE PLAN
LAYS THE ROADMAP TO 2045**

-  **CUT AIR POLLUTION 71%**
-  **SLASH GREENHOUSE GAS EMISSIONS 85%**
-  **DROP GAS CONSUMPTION 94%**
-  **CREATE 4 MILLION NEW JOBS**
-  **SAVE CALIFORNIANS \$200 BILLION IN HEALTH COSTS DUE TO POLLUTION**



Health Analysis for the Scoping Plan

- AB32 GHG Inventory Sector Analysis¹
 - Reductions and benefits were calculated for the entire scenario
- **AB197 Measure Analysis²**
 - Reductions and benefits were calculated for each measure
 - Each measure includes actions grouped by sectors where several policies and programs could overlap
- Qualitative Public Health Analysis³

Comparison of the Scoping Plan Health Analyses

GHG Sectors (AB 32)

Pollutants/Scale:

- Ozone and PM 2.5
- 4km x 4km
- Entire Scenario

Methods:

- Emissions: SMOKE
- Air Quality: CMAQ
- Health: BenMAP

GHG Measures (AB 197)

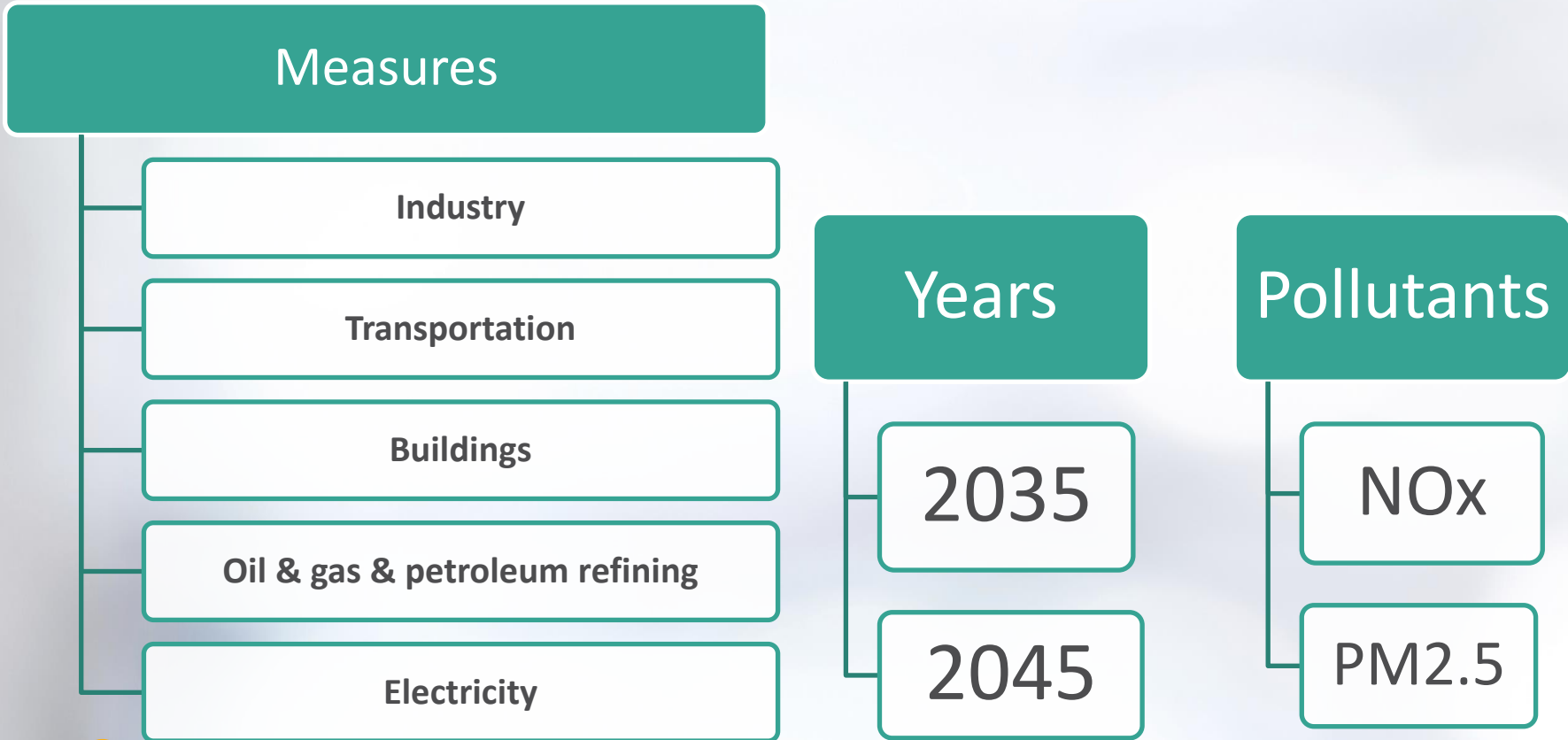
Pollutants/Scale:

- PM 2.5
- Statewide
- Five Measures

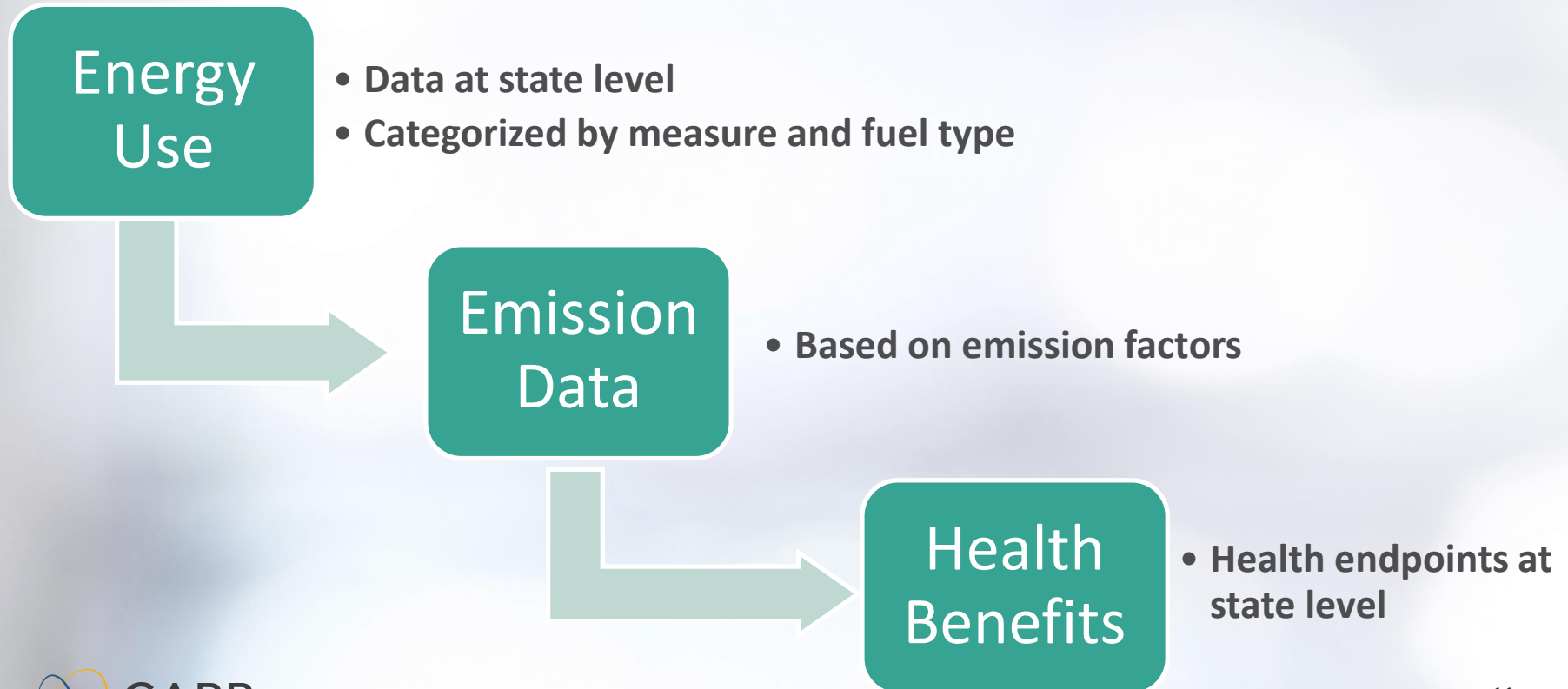
Methods:

- Statewide Emissions
- Health: IPT

GHG Measures for AB 197 Analysis



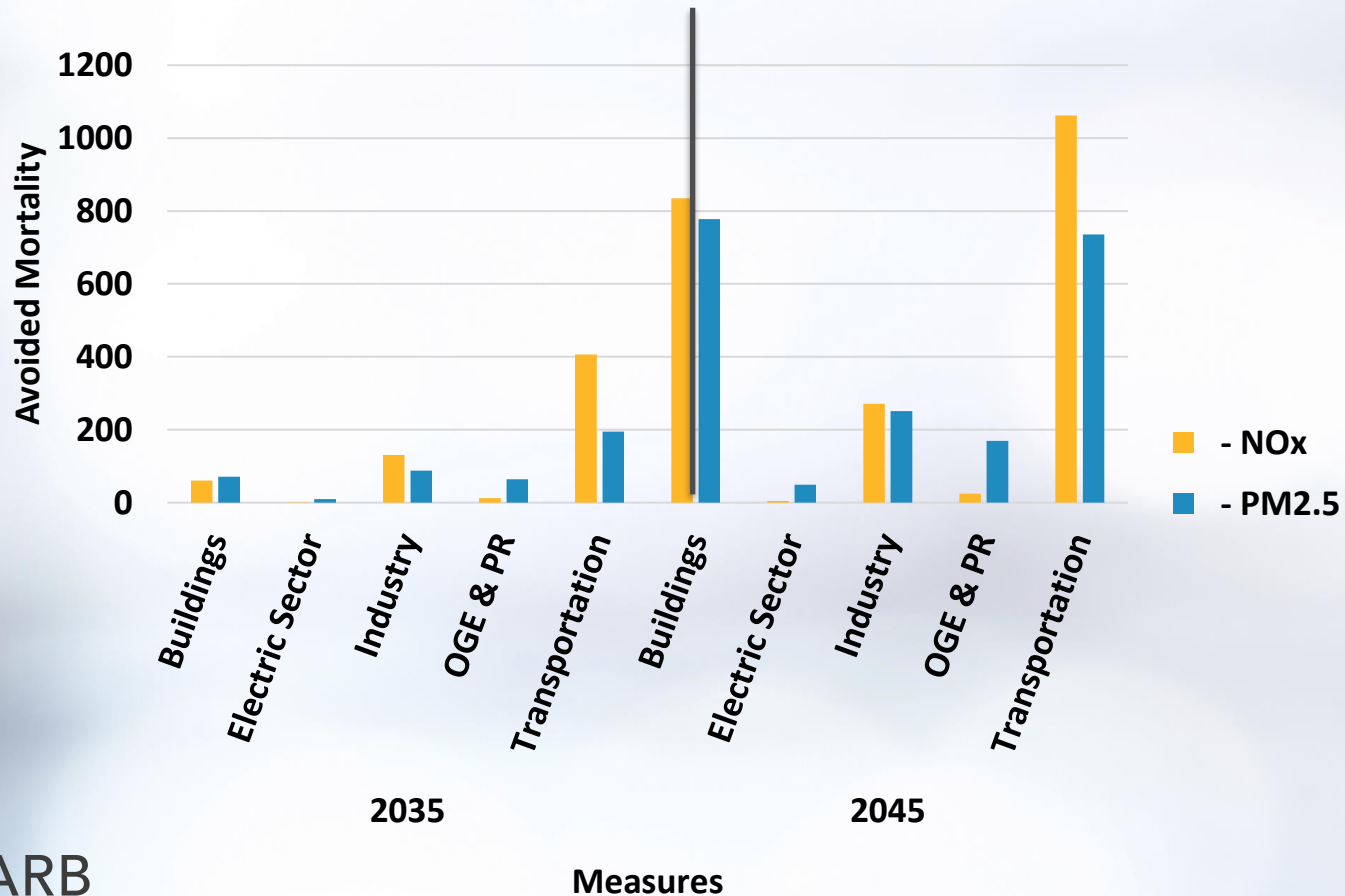
Overview of GHG Reductions to Health Benefits



GHG Transportation Measures 2045 Statewide Health Benefits

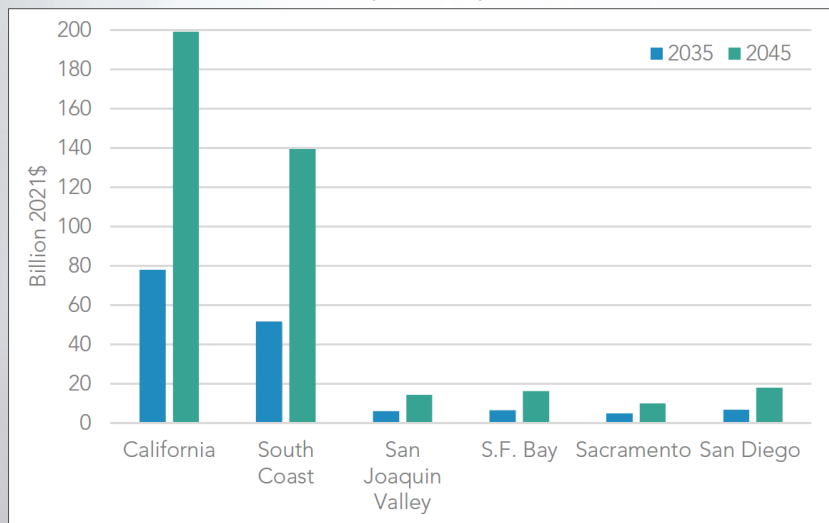
- Avoided Mortality: 1820
- Avoided Hospital Admissions: 1515
- Avoided Emergency Visits: 1590
- Reduced Cardiopulmonary Diseases: 4330
- Reduced Work Loss Days: ~255,000
- Reduced Asthma Symptoms: ~340,000

Health Benefits Comparison: 2035 vs. 2045

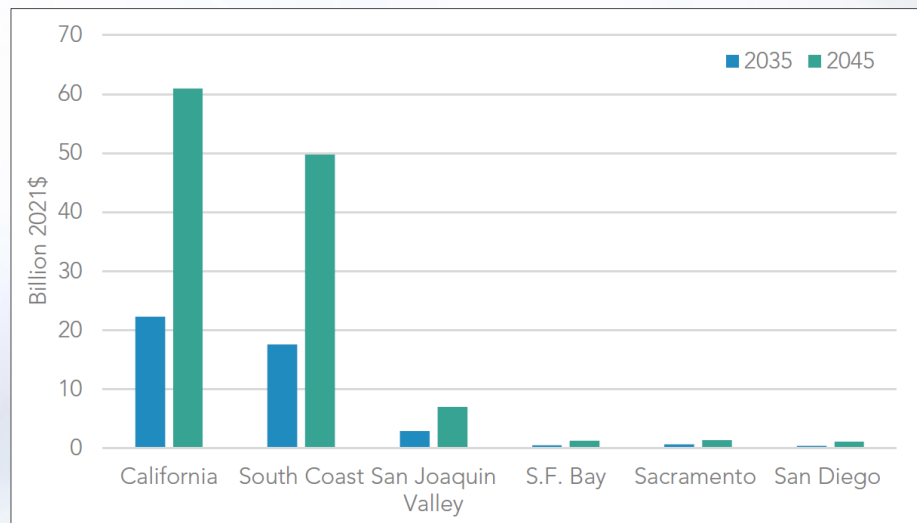


GHG Sector-wide Health Analysis

\$199 Billion Total Health Benefits
(2045)



\$61 Billion Health Benefits within
DACs (2045)



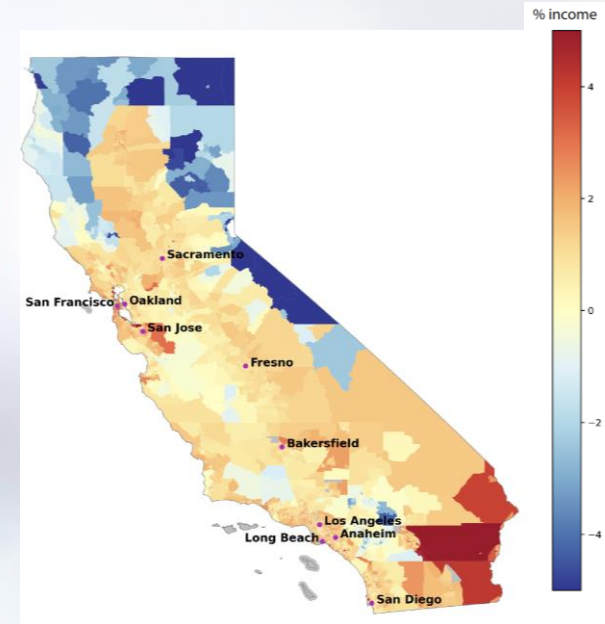
Summary of Health Benefits

- GHG sector-wide and measures analysis both demonstrated vast health benefits for the preferred Scoping Plan Scenario
- Integrated modeling and analysis approaches used – advanced modeling for GHG sectors and reduced form IPT analysis for GHG measures
- Health results at statewide scale for sectors and measures
- Advanced analysis allowed quantification of benefits in disadvantaged vs. non-disadvantaged communities (SB 535)

Closing the Gaps on the Social Cost of Carbon: Climate Vulnerability Metric (CVM)

- Not all communities face same impacts from climate change, nor are equal in resiliency
- CVM identifies additional economic costs due to climate impacts that can be currently quantified at the census tract level
 - Hours worked, household energy costs, human mortality, flood-related property damage
 - Reported as the aggregate monetized impact of climate change as a percentage of census tract-specific incomes*
- Does not set a threshold for vulnerability but shows relative impacts across census tracts
- Assists in identifying where and how to avoid disparate economic impacts of climate change

* CVM value of 3 implies by 2050 a census tract is projected to experience human welfare climate change impacts amounting to 3% of annual income in that tract



Economic Metrics for Climate Action: Social Cost of Greenhouse Gases

- Social cost of greenhouse gases (SC-GHG)* estimates the present value of costs associated with the emission of GHGs in future years (value of avoided damages)
 - Many of the damages from GHGs today will affect economic outcomes in the next several centuries
- AB 197 requires consideration of social costs of GHG emissions, including evaluating avoided social costs for measures in the Scoping Plan
- 2022 Scoping Plan Update included estimates of social cost of carbon and social cost of methane using February 2021 Biden Administration values
- One of several key metrics considered in the 2022 Scoping Plan Update process for selecting a Proposed Scenario

* Including but not limited to, changes in net agricultural productivity, human health effects, property damage from increased flood risk/other natural disasters, disruption of energy systems, risk of conflict, environmental migration, and value of ecosystem services

CARB Health Exposure and Assessment Branch

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