Advisory Council's Comments on the Health Effects Analysis

Advisory Council – STMPR Joint Meeting

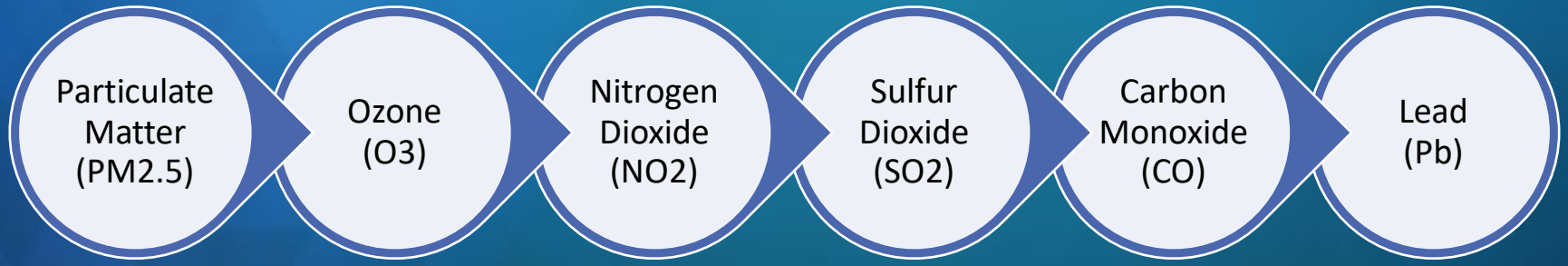
October 5, 2022

Agenda Item 5

South Coast Air Quality Management District

Advisory Council Meeting #1

- First Advisory Council meeting on August 10, 2022
- Staff presented on:
  - The Advisory Council mechanics and objectives
  - U.S. Environmental Protection Agency (U.S. EPA)'s recent review on fine particulate matter and ozone National Ambient Air Quality Standards (NAAQS)
  - Health effects analysis of six criteria air pollutants



Key Stakeholder Comments

- Received six comment letters for Appendix I, Health Effects Analysis

- Request to review socioeconomic analysis and health benefits associated with the 2022 AQMP
- Air quality and health impacts differentiated by race, ethnicity, and geographic location

- Request to assess the dual impacts of heat waves on air pollution and health effects

- Discuss limitations of studies used for health impacts of COVID-19

- Evaluate the health effects of cumulative exposure to multiple pollutants

Key Stakeholder Comments (cont'd)

- Utilize satellite data in health effects and air quality analysis

- Analyze railyard emissions and associated health impacts
- Address vulnerable populations, including low-income communities and communities of color

- Include recent epidemiological studies:
  - Conducted in Southern California or California in general
  - Published since USEPA's Integrated Science Assessments for Ozone and Particulate Matter[1]
- Comment on health effects of ozone below the current 70 ppb ozone standard

[1] 85 FR 4655, 85 FR 21849, and 87 FR 22207

South Coast AQMD

Draft Socioeconomic Report for the Revised Draft 2022 AQMP

Updated Draft Public Health Benefits and Incremental Costs

South Coast Air Quality Management District

October 5, 2022

Current Status

- Revised Draft 2022 Air Quality Management Plan (AQMP) released September 2
  - Available at: http://www.aqmd.gov/2022aqmp
- Draft Socioeconomic Report released October 1
  - Analyzes benefits, costs, economic, and environmental justice impacts of the Revised Draft 2022 AQMP
    - Preliminary costs and health benefits of Draft 2022 AQMP discussed at the May 31st STMPR Meeting
  - Available at: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/socioeconomic-analysis

Updated Draft
Public Health Benefits

IEc

Public Health Benefits of South Coast AQMD 2022 AQMP: Updated Draft Estimates

Presented by:
Industrial Economics, Inc.
Henry Roman

October 5, 2022

Updates to Benefits Estimates

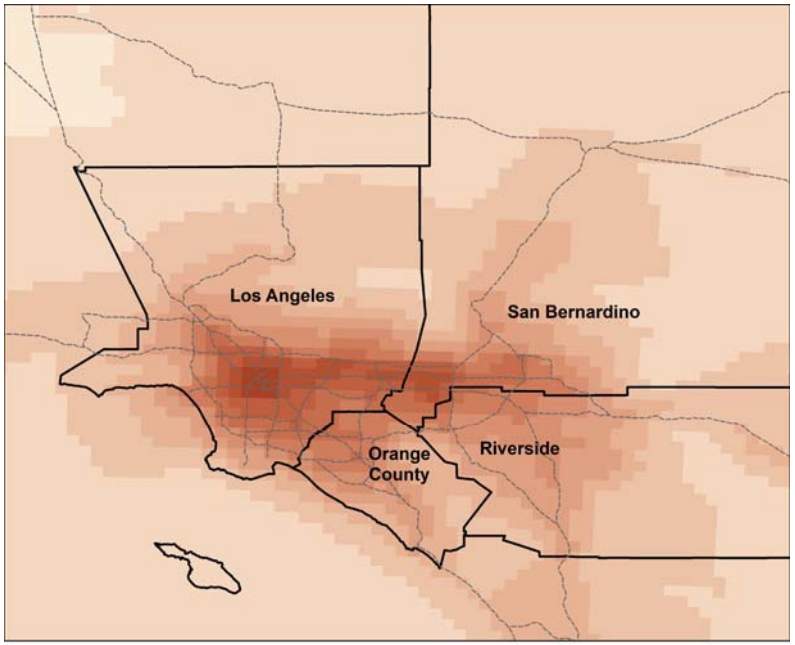
- Ozone and PM2.5 projections
  - Revised baseline emissions inventory to be consistent with AQMP and State Implementation Plan (SIP)
  - Updated emissions reductions to reflect revised baseline
  - Revised region's carrying capacity* to 60 tpd NOx
- Added 2032 estimate
- Interpolation of benefits in intervening years
- Incorporation of local datasets
  - California-specific zip code level morbidity incidence data from HCAI
  - California income growth data
  - California inflation data

* Maximum emissions permissible to still attain clean air standards by 2037

Updates to Benefits Estimates

- Additional IEc changes
  - Restricted the age-range of AMI to 65+
  - Expanded long-term Ozone impacts to reflect a full-year of exposure, rather than seasonal
  - Restricted the Ozone season assessed to May – Sept (previously BenMAP-CE analyzed April – September)

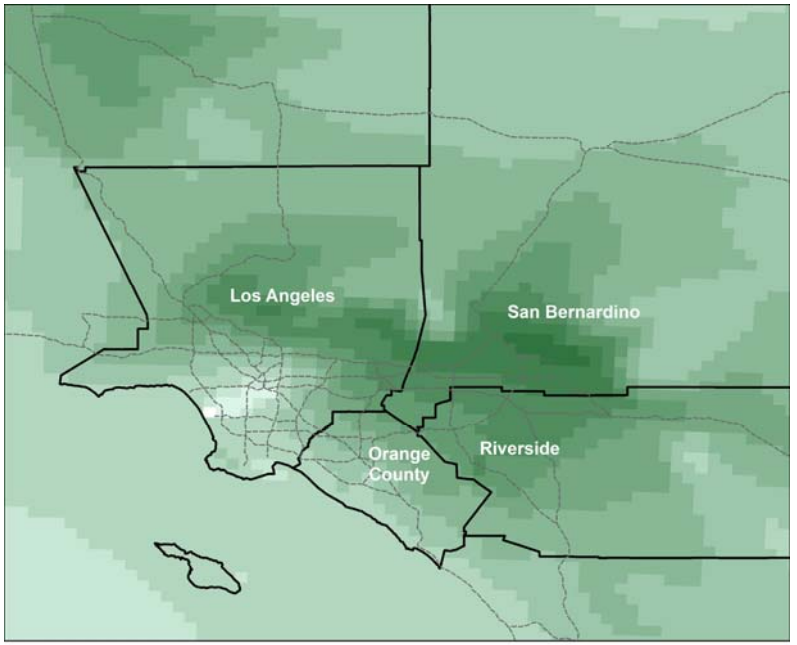
Updated Projected Air Quality Changes in 2037



Major Highways

Reduction in Average Daily PM2.5 Concentration (ug/m3)

<0 | 0.1 - 0.2 | 0.3 - 0.4 | 0.5 - 0.6 | 0.7 - 0.8 | 0.9 - 1.0 | 1.1 - 1.2 | 1.3 - 1.4 | 1.5 - 1.6 | 1.7 - 1.8 | 1.9 - 2.0

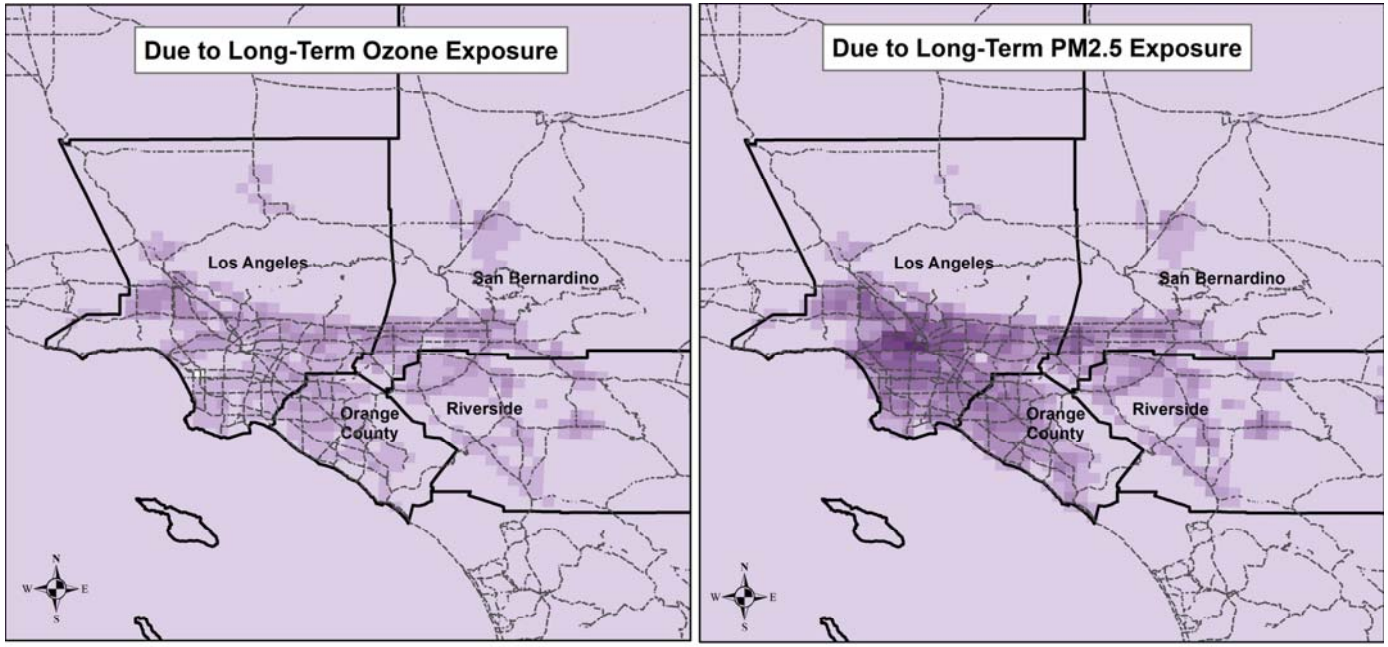


Major Highways

Reduction in Average Daily 8-hour Max Ozone Concetration (ppb)

<0 | 0.1 - 2.0 | 2.1 - 4.0 | 4.1 - 6.0 | 6.1 - 8.0 | 8.1 - 10.0 | 10.1 - 12.0 | 12.1 - 14.0 | 14.1 - 16.0 | 16.1 - 18.0 | 18.1 - 20.0

Updated Draft Health Impacts – Mortality



Updated Draft Health Impacts – Mortality (cont'd)

Avoided Premature Mortality		
	2032	**2037**
Mortality, Respiratory / Mortality, All Cause	**1,619**	**3,031**
Ozone	**339**	**744**
Los Angeles	124	309
Orange	48	85
Riverside	84	164
San Bernardino	83	186
PM	**1,280**	**2,287**
Los Angeles	821	1,471
Orange	184	300
Riverside	128	236
San Bernardino	146	279

Note: Confidence intervals provided on supplementary handout.

Updated Draft Health Impacts – Morbidity

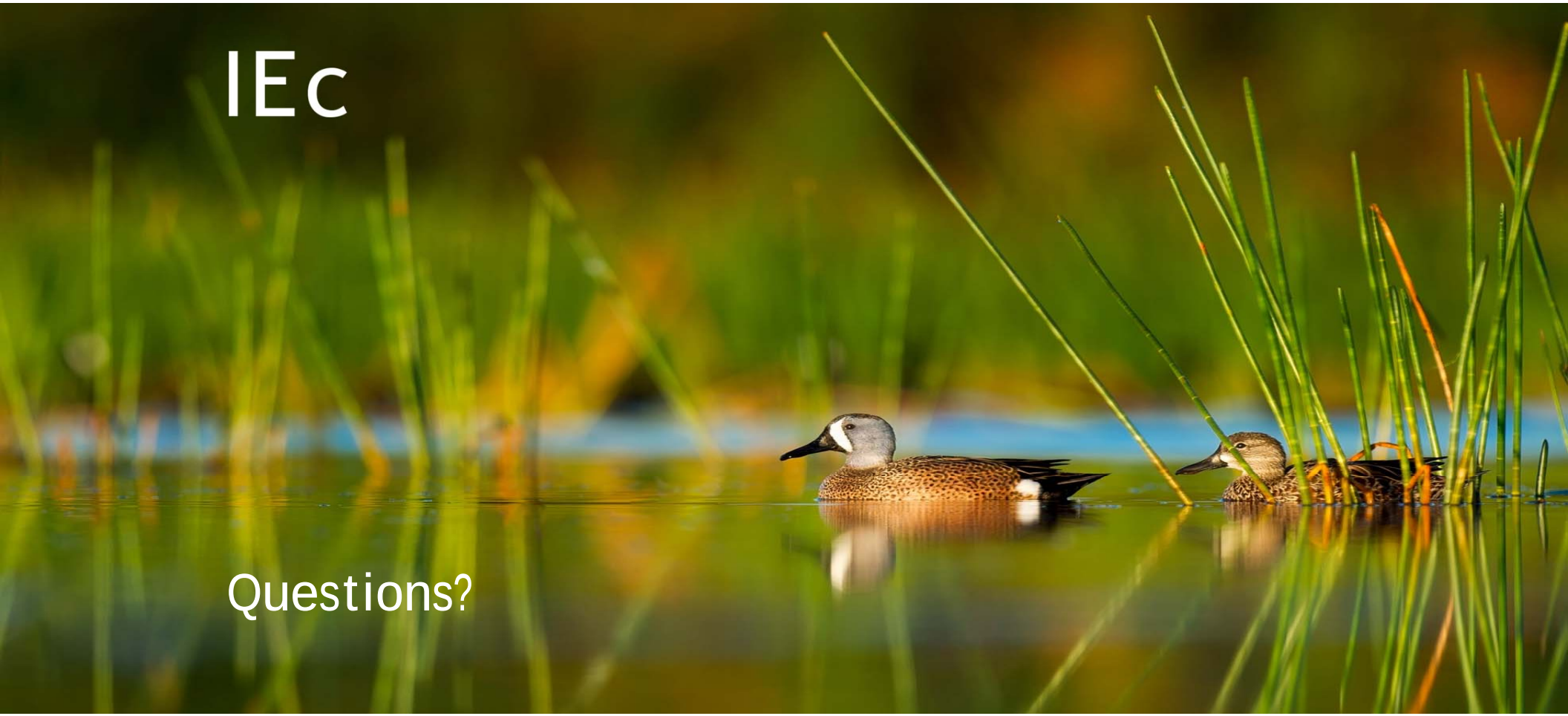
Reduced Morbidity Incidence	2032	2037
Long-Term Ozone Exposure		
Asthma, New Onset	4,506	9,501
Short-Term Ozone Exposure		
Asthma Symptoms (Chest Tightness, Cough, Shortness of Breath, Wheeze)	795,164	1,741,652
ED Visits, Asthma	286	649
ED Visits, All Respiratory	655	1,501
HA, Asthma	8,244	18,292
Minor Restricted Activity Days	318,008	710,412
School Loss Days, All Cause	96,176	208,938

Reduced Morbidity Incidence	2032	2037
Long-Term PM2.5 Exposure		
Asthma, New Onset	1,903	3,280
HA, Alzheimer's Disease	131	239
HA, Parkinson's Disease	54	100
Incidence, Hay Fever/Rhinitis	9,024	15,726
Incidence, Lung Cancer (non-fatal)	107	191
Short-Term PM2.5 Exposure		
Acute Myocardial Infarction, Nonfatal	18	35
Asthma Symptoms, Albuterol use	316,362	554,968
ED Visits, Asthma	66	117
ED Visits, All Cardiac Outcomes	138	255
ED Visits, All Respiratory	325	582
EHA, Asthma	3	6
HA, All Cardiac Outcomes	47	87
HA, All Respiratory	132	245
Incidence, Ischemic Stroke	73	138
Incidence, Out-of-Hospital Cardiac Arrest	13	23
Minor Restricted Activity Days	430,241	755,830
Work Loss Days	73,341	129,022

Updated Draft Health Benefits - Total

- The draft total value of quantified public health benefits:
  - $20.0 Billion in 2032
  - $40.5 Billion in 2037
  - $134.3 Billion total from 2025 – 2037 in 2022 present value ($2021) using a 4% DR

	Monetized Public Health Benefits (Billions of $2021)			
	2032	**2037**	**Annual Average (2025-2037)**	**Present Value (2025-2037)**
Mortality-related benefits	$19.3	$39.1	$18.7	$129.6
Long-Term Ozone Exposure	$4.0	$9.6	$4.2	$29.4
Long-Term PM2.5 Exposure	$15.3	$29.5	$14.4	$100.2
Morbidity-related benefits	$0.7	$1.4	$0.7	$4.7
Grand Total	**$20.0**	**$40.5**	**$19.4**	**$134.3**



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Updated Draft Incremental Costs

Summary of Draft Updated Incremental Costs*

Measures	Annual Amortized Average 2023-2037** (Billions of 2021 dollars)					Percent of Total Annualized Cost
	Remaining Incremental Cost		Incentives		Total Incremental Cost	
Stationary and Area Sources	$1.12	+	$0.12	=	$1.24	43.5%
Mobile Sources	$1.44	+	$0.17	=	$1.61	56.5%
All Sources	$2.56	+	$0.29	=	$2.85	100%

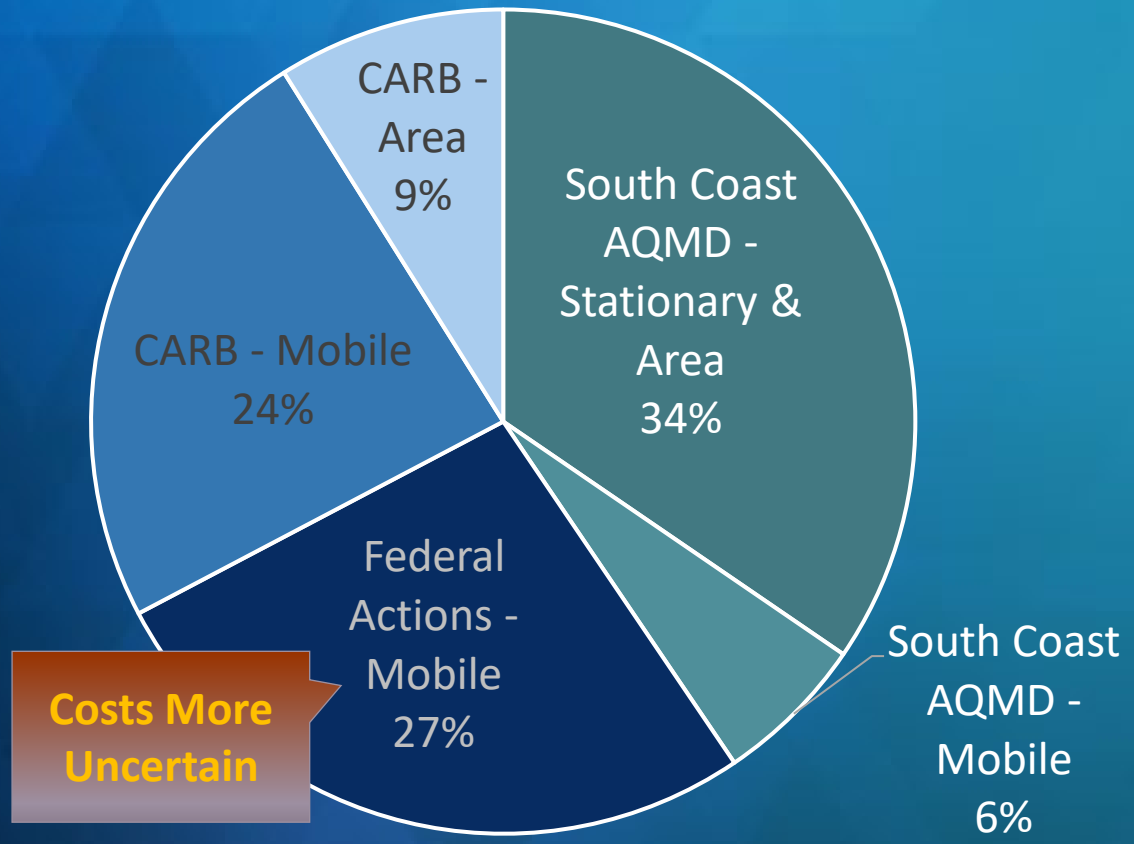
** Costs are incremental to the business-as-usual scenario without the Revised Draft 2022 AQMP. Incremental costs were quantified for control measures with quantified emission reductions only.*

*** Costs associated with deployed controls may continue to be incurred beyond 2037.*

Costs and NOx Reductions Breakdown

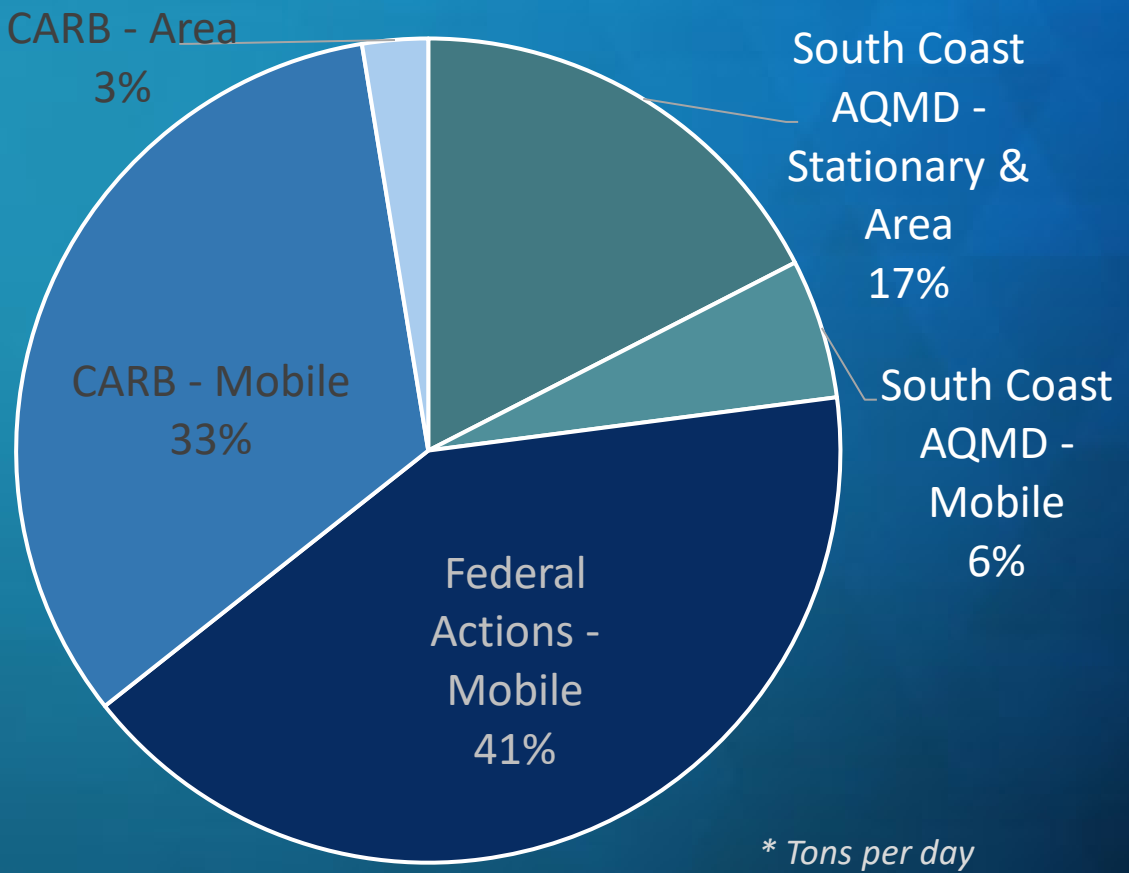
$2.85 B in Annual Costs

(annual amortized average 2023-37)



124 TPD* of NOx Reductions

(2037)



** Tons per day*

Costs by Industry

South Coast AQMD Measures

Sector	Present Value of Incremental Cost (Millions of 2021 Dollars)	Amortized Annual Average, 2023-2037 (Millions of 2021 Dollars)
Oil and Gas Extraction	$248.6	$6.9
Utilities	$9,565.0	$286.7
Construction	$99.4	$6.1
Manufacturing	$4,127.4	$126.9
Wholesale trade	$110.4	$3.5
Retail trade	$57.3	$1.7
Transportation & Warehousing	$96.6	$2.5
Real Estate & Rentals	$153.2	$4.4
Administrative and Waste Management Services	$459.8	$14.4
Health Care and Social Assistance	$564.4	$15.9
Restaurants & Accommodation	$2,069.3	$75.2
Subtotal of All Industries with Specific Costs	$18,122.3	$560.9
Subtotal of Private Industries with Across-the-Board costs	$7,469.7	$153.3
Consumers	$2,960.5	$144.8
Government Spending	$5,777.4	$296.1
Total	**$34,329.9**	**$1,155.1**

http://www.aqmd.gov/docs/default-source/clean-air-plans/draft-socioeconomic-report.pdf

CARB Measures & Fed. Actions

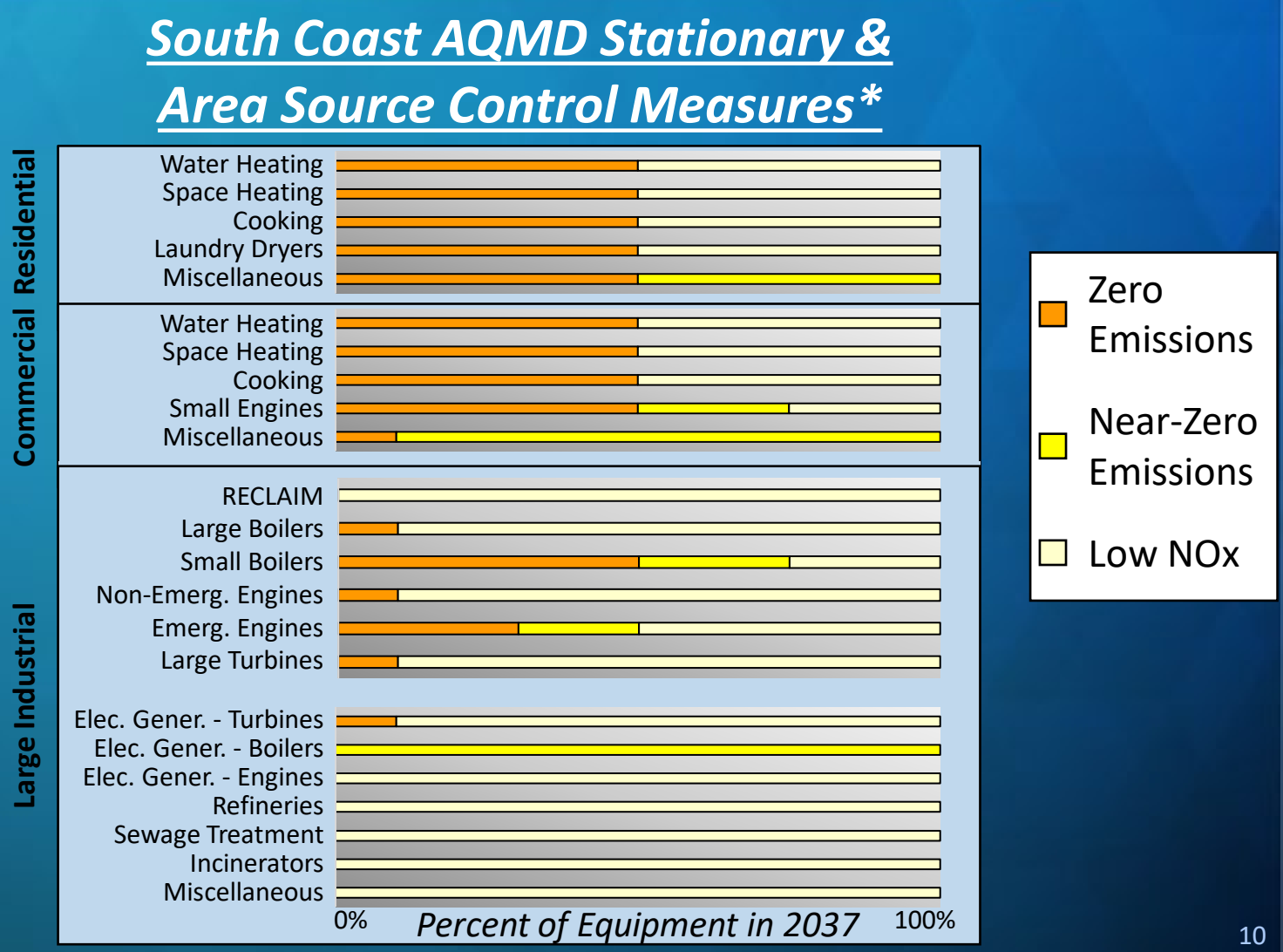
Industry or Sector[213]	Cumulative Change in Production Costs ($2020M)[214]
Air transportation (Industry)	$14,756
Transportation and Public Utilities (Sector)	$13,876
Truck transportation (Industry)	$9,119
Construction (Sector)	$4,458
Retail and Wholesale (Sector)	$4,251
Services (Sector)	$3,893
Increased prices for commodities in motor vehicles and parts, furnishings and durable household equipment, recreational goods and vehicles and other durable goods, clothing and footwear, and other nondurable goods[215]	$3,618
Aggregation of Forestry, Mining, Utilities, Construction, and Manufacturing (Industry)	$3,450
Transit and ground passenger transportation (Industry)	$2,953
Scenic and sightseeing transportation and support activities for transportation (Industry)	$2,802
Personal and laundry services[216] (Industry)	$2,158

https://ww2.arb.ca.gov/sites/default/files/2022-09/2022_State_SIP_Strategy_App_A.pdf

Follow-up Discussion on Zero Emission Technologies

ZE Technology in Revised Draft 2022 AQMP

- 100% ZE technology pursued broadly in all sectors
  - However, it does not exist and/or isn't feasible for all applications
  - ZE technology will continue to be pursued during rulemaking, even if not identified as currently feasible in AQMP
- Current cost of ZE technologies are higher than conventional combustion in nearly all applications



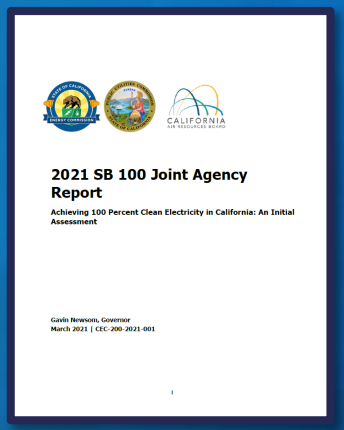
Costs of ZE Technology

ZE Equipment	Energy Systems	'Soft' Costs
• Hardware • Installation • Operations and maintenance • Building electrification • Stationary source ZE equipment	• Energy supply (e.g., power plants, microgrids) • Regional transmission • Local distribution	• Land use (e.g., site acquisition, site re-design, easements, etc.) • Opportunity costs (e.g., permitting delays, new technology malfunctions) • Marketing • Employee training • Future-proofing (e.g., overbuilding infrastructure to prepare for future changes) • Stranded assets (e.g., new plug technology replacing older plugs) • Climate resiliency

Increasingly Challenging to Quantify

One of Many Challenges – Energy Supply

- CEC, CPUC, and CARB studied impacts to grid from statewide policies focused on decarbonization
- Electric generation capacity *needs to approximately double* in next two decades (SB100 report)
  - Average of 6 to 7 GW of new generation every year statewide
    - 8 to 9 GW per year for 100% electricity generation with no combustion
  - In past decade, the average new solar + wind addition is 1.3 GW per year, with a max annual increase of 3.7 GW
- Electrification will play significant role with zero emissions, but hydrogen's role is still emerging
  - Fuel cell vehicles, stationary applications, electrical grid support


2021 SB 100 Joint Agency Report

Achieving 100 Percent Clean Electricity in California: An Initial Assessment

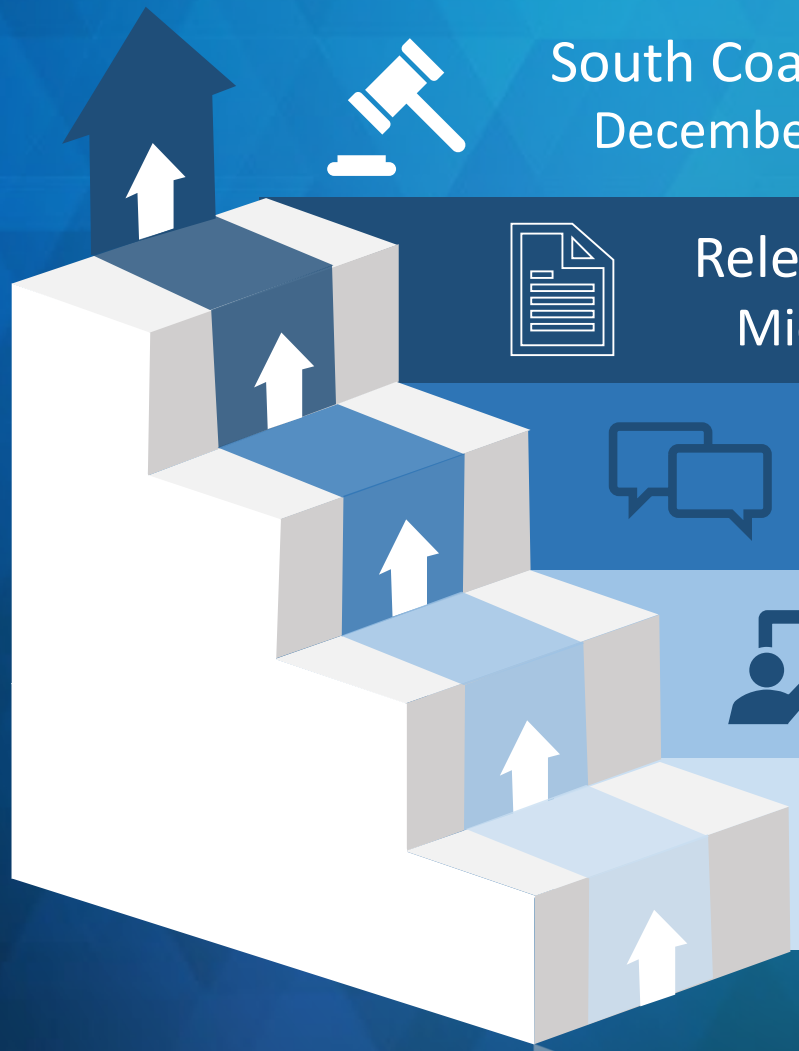
Gavin Newsom, Governor
March 2021 | CEC-200-2021-001

https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity

South Coast AQMD will continue to support state efforts to estimate costs from this transition

Next Steps

Next Steps for AQMP Socioeconomic Report



South Coast AQMD Public Hearing
December 2, 2022

Release Draft Final Socioeconomic Report
Mid-November, 2022

Public Comment Period for Draft Socioeconomic Report
October 2 - November 2, 2022

South Coast AQMD Regional Public Hearings
October – November, 2022

Released Draft Socioeconomic Report
October 1, 2022

Staff Contacts

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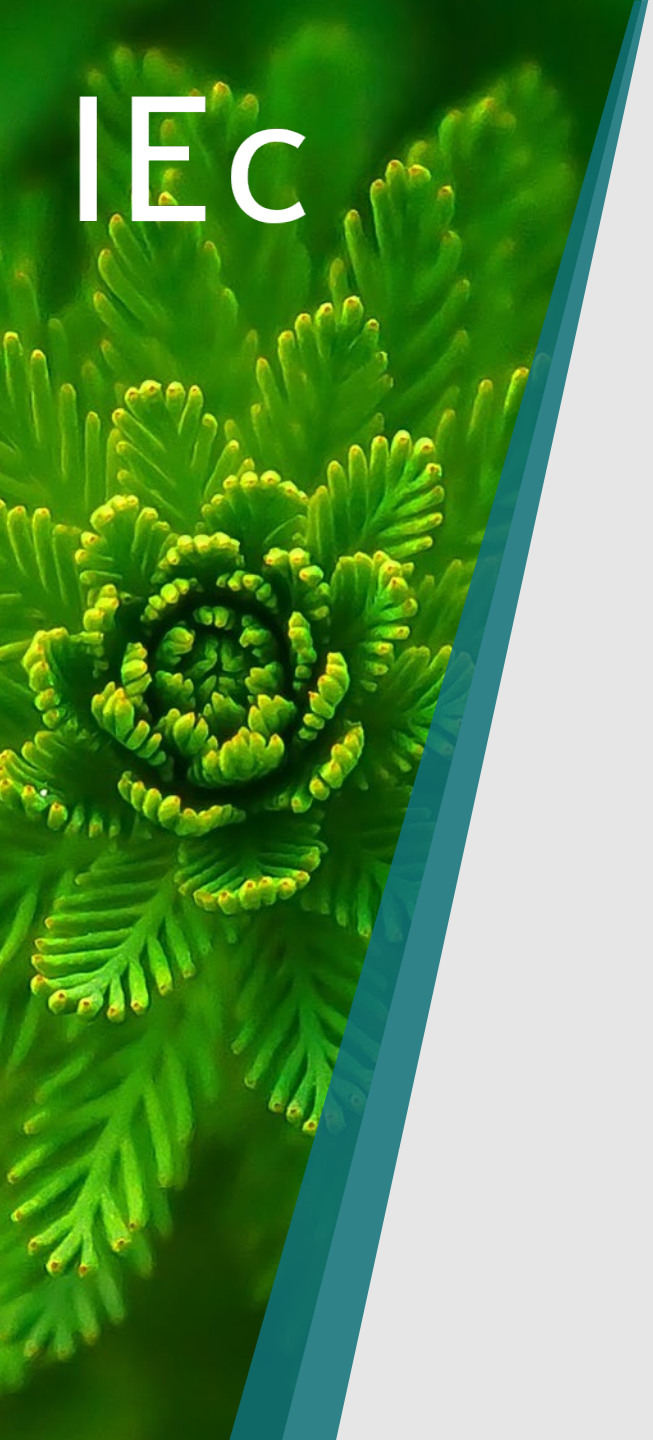
Elaine Shen, Ph.D. Planning & Rules Manager eshen@aqmd.gov 909.396.2715	Ian MacMillan Assistant Deputy Executive Officer Planning, Rule Development & Implementation imacmillan@aqmd.gov 909.396.3244
Comments or questions on Draft Socioeconomic Report? Visit us at: www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/socioeconomic-analysis or email us at: SocioEcon@aqmd.gov	



Draft Environmental Justice and Distributional Analysis

PRESENTED BY:
STEFANI PENN, PHD
INDUSTRIAL ECONOMICS, INC. (IEC)

October 5, 2022

IEc

Outline

- Environmental Justice Community Screening
- Public Health Benefits of 2022 AQMP in 2037
- Draft Distributional Analysis and Inequality Assessment

Introduction

IEc

Introduction

- South Coast AQMD implemented its first environmental justice (EJ) area screening and distributional analysis of air quality policies as part of the 2016 AQMP Socioeconomic Assessment, based on methodology provided by IEc
- We provide an update to these analyses for the Draft 2022 AQMP Socioeconomic Assessment

IEc

2022 AQMP EJ and Distributional Analysis

- Review and sensitivity analysis of alternative EJ screening and designation methods in the South Coast Air Basin
- Analyze public health impacts across “EJ” and “non-EJ” communities by alternative EJ definitions
- Perform distributional analysis of public health impacts in “EJ” and “non-EJ” communities using inequality indicators to understand the 2022 AQMP’s impact on the variance in health risks between and within communities

Environmental Justice Area Screening

IEc

SB 535 Definition for EJ Communities

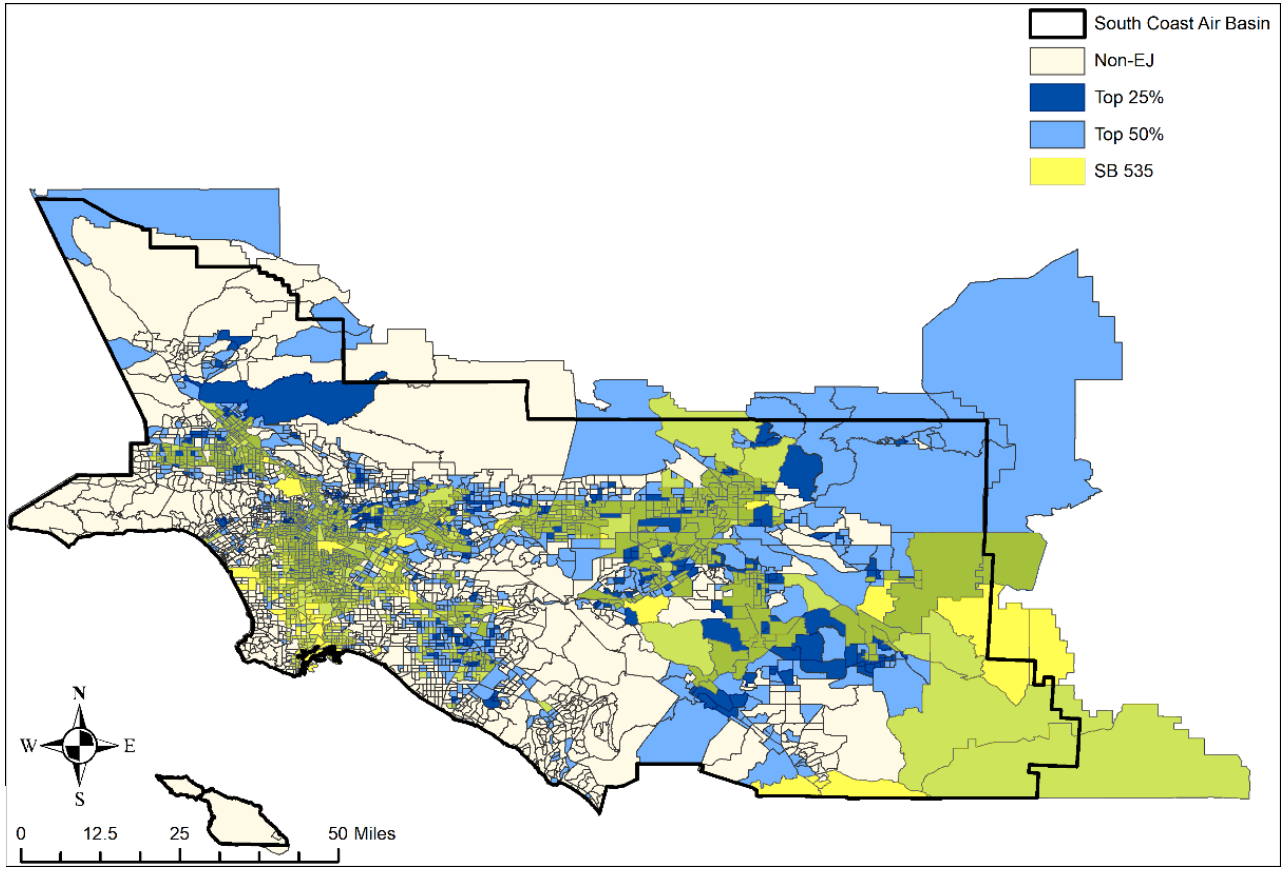
- In May 2022, CalEPA updated its designation of disadvantaged communities (DACs) for CA Senate Bill (SB) 535, including:
  - Census tracts receiving the highest 25 percent of overall scores in CalEnviroScreen4.0 (CES4.0),
  - Census tracts lacking *overall* scores in CES4.0 due to data gaps, but ranking among the highest five percent of the cumulative pollution burden scores,
  - Census tracts identified in the 2017 DAC designation as disadvantaged, regardless of their CES4.0 score, and
  - Lands under control of federally recognized Tribes

IEc

Alternative Definition	Population Characteristics Indicators		Pollution Burden Indicators	
	Socioeconomic	Sensitive	Exposure	Environmental Effects
1 (Poverty and air quality)	Poverty	-	PM2.5, ozone	-
2 (Socioeconomic and air quality)	Education, housing burden, linguistic isolation, poverty, unemployment	Asthma, cardiovascular disease (CVD), low birth weight	PM2.5, ozone, diesel PM, traffic impacts	-
3 SB 535 Definition (Socioeconomic, health, environmental, and air quality)	Education, housing burden, linguistic isolation, poverty, unemployment	Asthma, CVD, low birth weight	Ozone, PM2.5, diesel PM, traffic impacts, drinking water contaminants, children's lead risk from housing, pesticide use, toxic releases from facilities	Cleanup sites, groundwater threats, hazardous waste, impaired waters, solid waste sites

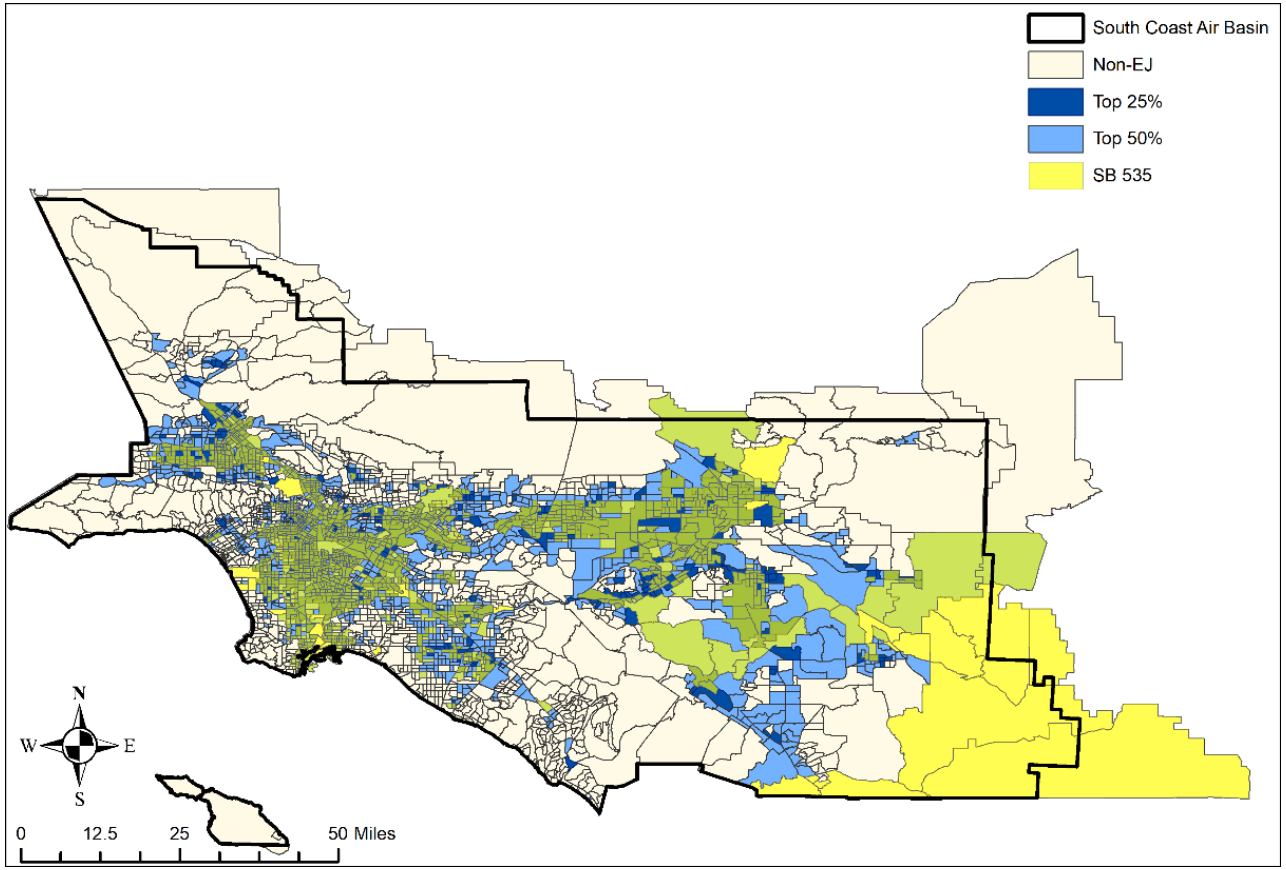
IEc

Definition 1 EJ Areas v. SB 535 EJ Areas



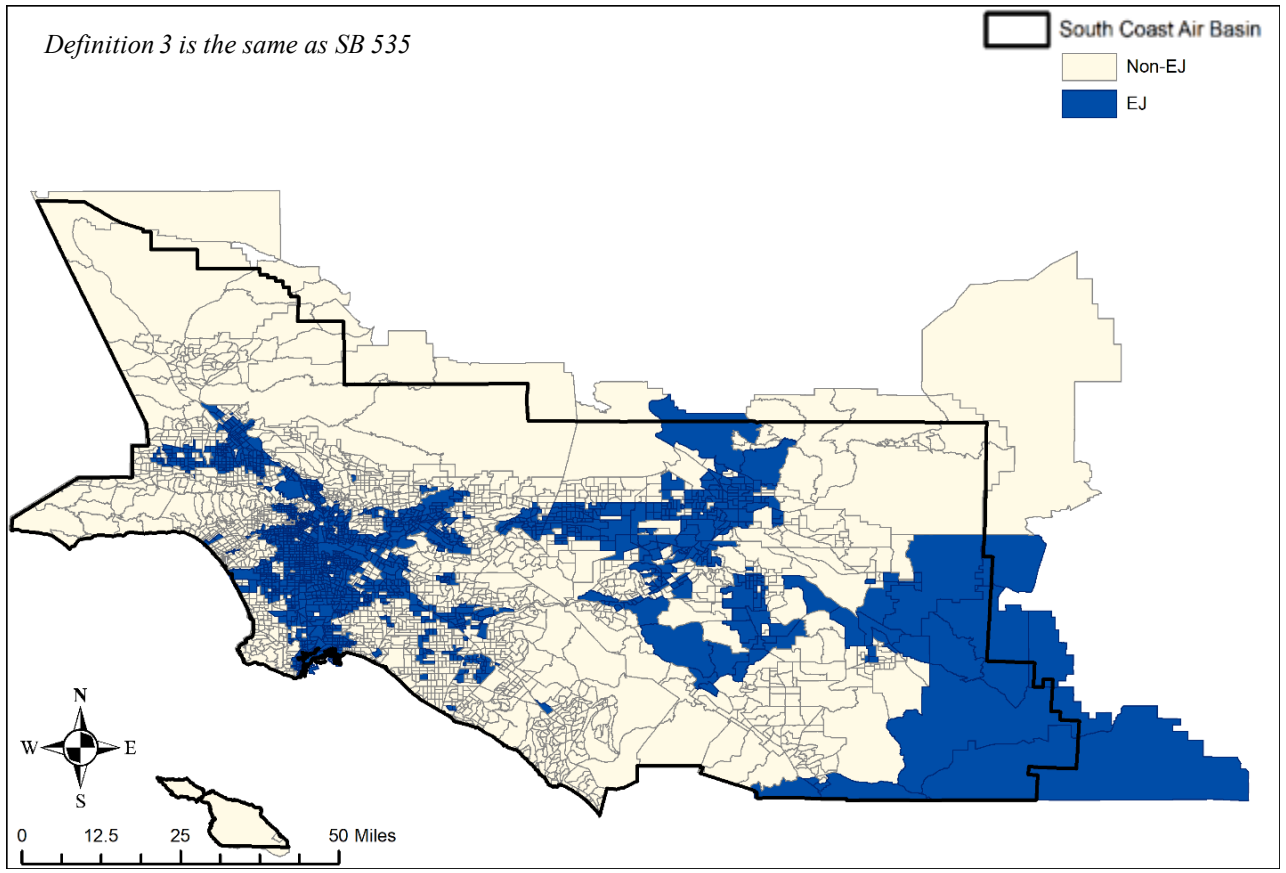
Definition 1:
Poverty, PM2.5, and ozone.

Definition 2 EJ areas v. SB 535 EJ Areas



Definition 2:
Poverty, PM2.5, ozone, diesel PM, traffic impacts, education, housing burden, linguistic isolation, unemployment, asthma, cardiovascular disease, low birth weight

SB 535 EJ Areas



Public Health Benefits of 2022 AQMP (Year 2037)

IEc

Avoided Premature Mortality (Age 30+): $PM_{2.5}$ and Ozone

EJ Designation	EJ Communities	Non-EJ Communities	Difference
Definition 1 (Top 50 to Top 25 %)	262 to 274	211 to 228	51 to 45
Definition 2 (Top 50 to Top 25 %)	262 to 268	209 to 229	53 to 39
Definition 3 (Top 25% and additional SB 535 DAC)	260	232	29

Decrease per million residents Age 30+

IEc

Avoided Asthma-Related ED Visits (All Ages): $PM_{2.5}$ and Ozone

EJ Designation	EJ Communities	Non-EJ Communities	Difference
Definition 1 (Top 50 to Top 25 %)	42 to 47	24 to 30	18
Definition 2 (Top 50 to Top 25 %)	41 to 45	25 to 30	17 to 15
Definition 3 (Top 25% and additional SB 535 DAC)	43	31	12

Decrease per million residents all ages

IEc

Avoided Asthma Incidence (Age 0-17): $PM_{2.5}$ and Ozone

EJ Designation	EJ Communities	Non-EJ Communities	Difference
Definition 1 (Top 50 to Top 25 %)	2,923 to 3,008	2,485 to 2,638	438 to 370
Definition 2 (Top 50 to Top 25 %)	2,880 to 2,878	2,548 to 2,715	332 to 163
Definition 3 (Top 25% and additional SB 535 DAC)	2,752	2,812	-60

Decrease per million residents Age 0 - 17

Distributional Analysis

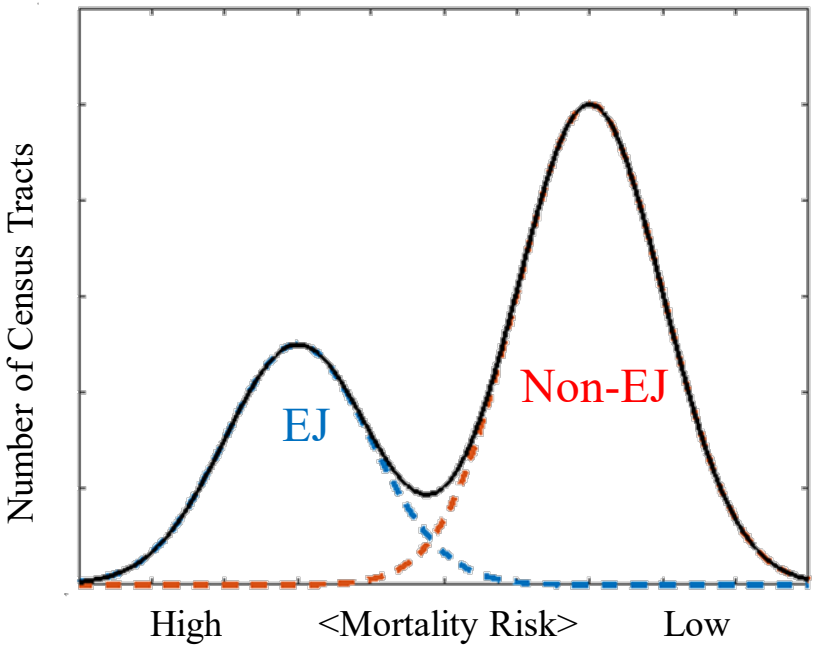
IEc

Methodology

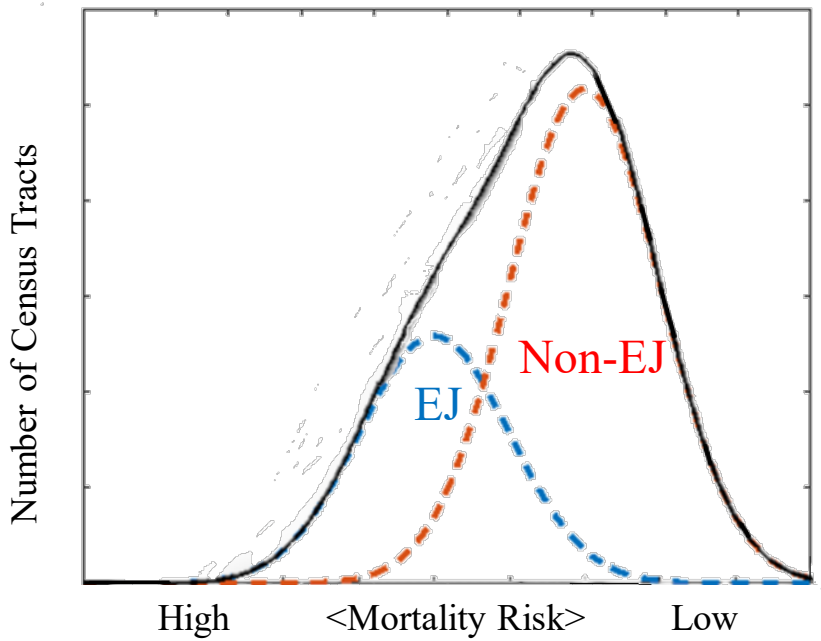
- Estimate health risk associated with *baseline* and 2022 AQMP *policy* scenario using BenMAP-CE
- Calculate inequality index values for baseline and policy scenarios
  - Inequality indices summarize the distribution of exposure-related health risk among all census tracts (or communities) in the Basin
- Analyze between and within EJ group inequality

Distributive Analysis: Illustrative Example

Baseline Distribution



Post-AQMP Distribution



- Between group inequality *decreases* from baseline to policy scenario
- Within group inequality *remains the same* from baseline to policy scenario

IEc

Distribution of Health Risks Across Communities

	PM2.5 and Ozone Exposure Related Mortality Risk		PM2.5 and Ozone Exposure Related Asthma ED Visits for Asthma		PM2.5 and Ozone Exposure Related Asthma Incidence	
	(Among Residents 30 Years or Older)		(Among Residents of All Ages)		(Among Residents Age 0-17)	
	Relative Inequality Index	Absolute Inequality Index	Relative Inequality Index	Absolute Inequality Index	Relative Inequality Index	Absolute Inequality Index
% Change	-23%	-23%	-16%	-16%	-14%	-14%
Change	↓	↓	↓	↓	↓	↓

Relative Inequality

	PM2.5 and Ozone Exposure Related Mortality Risk				PM2.5 and Ozone Exposure Related Asthma ED Visits for Asthma				PM2.5 and Ozone Exposure Related Asthma Incidence			
	(Among Residents 30 Years or Older)				(Among Residents of All Ages)				(Among Residents 0 to 17 Years Old)			
	Top 50%		Top 25%		Top 50%		Top 25%		Top 50%		Top 25%	
	Between	Within	Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Def. 1 % Change	-44%	-23%	-51%	-23%	-21%	-15%	-21%	-15%	-26%	-12%	-25%	-12%
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Def. 2 % Change	-39%	-23%	-42%	-23%	-19%	-15%	-17%	-16%	-26%	-13%	-12%	-15%
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Def. 3 % Change			-31%	-23%			-13%	-18%			4%	-18%
			↓	↓			↓	↓			↑	↓

IEc

Absolute Inequality

	PM2.5 and Ozone Exposure Related Mortality Risk				PM2.5 and Ozone Exposure Related Asthma ED Visits for Asthma				PM2.5 and Ozone Exposure Related Asthma Incidence			
	(Among Residents 30 Years or Older)				(Among Residents of All Ages)				(Among Residents 0 to 17 Years Old)			
	Top 50%		Top 25%		Top 50%		Top 25%		Top 50%		Top 25%	
	Between	Within	Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Def. 1 % Change	-44%	-23%	-51%	-23%	-21%	-15%	-21%	-15%	-25%	-12%	-25%	-12%
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Def. 2 % Change	-39%	-23%	-42%	-23%	-19%	-15%	-17%	-16%	-21%	-13%	-11%	-15%
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Def. 3 % Change			-31%	-23%			-13%	-18%			4%	-18%
			↓	↓			↓	↓			↑	↓

Questions?

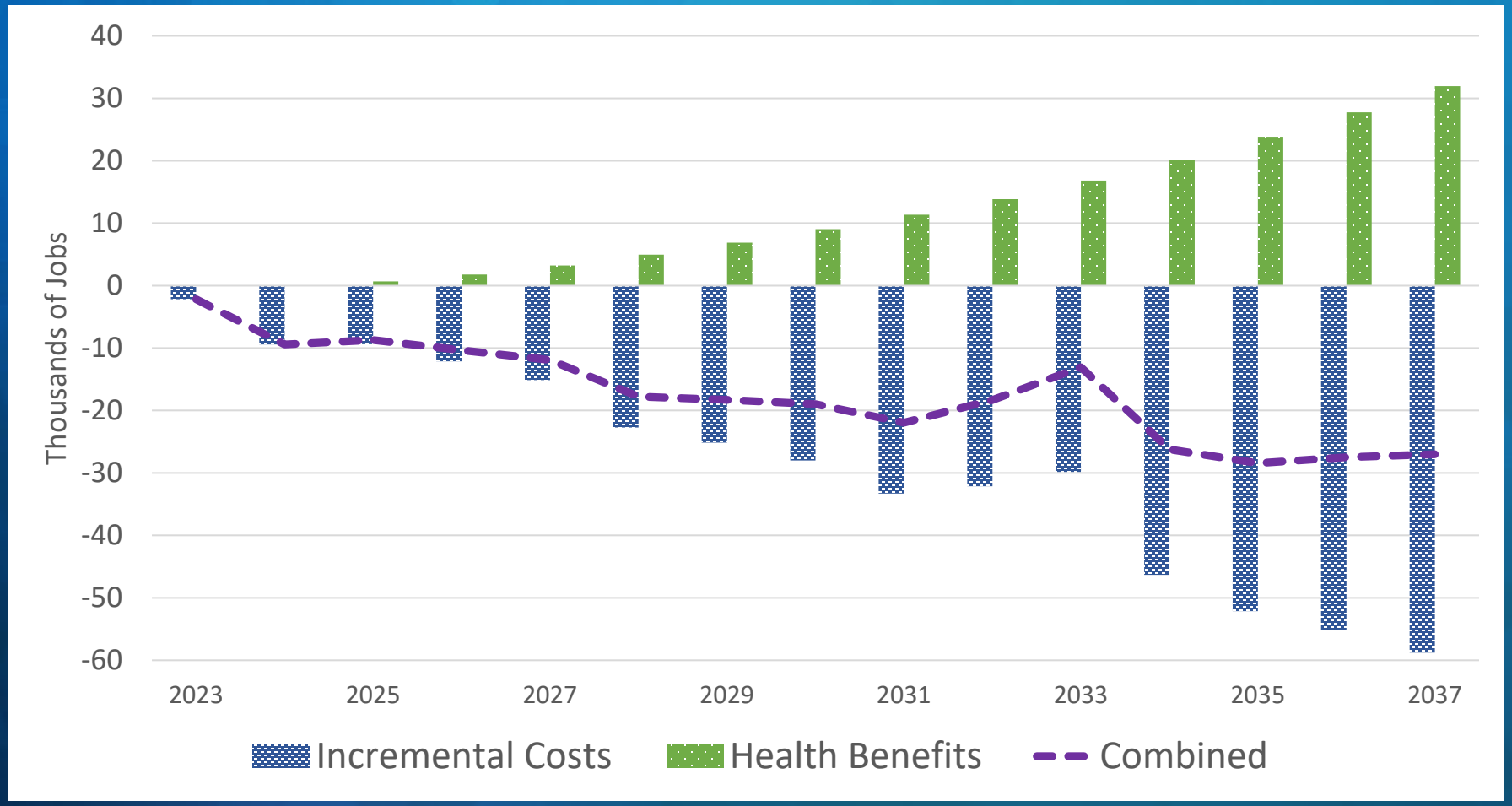
Draft Socioeconomic Report for the Revised Draft 2022 AQMP

Job Impacts

South Coast Air Quality Management District

October 5, 2022

Summary of Projected Job Impacts



Job impacts of benefits and costs combined

- ***0.27%*** annualized job growth *v.s.* baseline growth of 0.44% between 2023-37
- An annual average of ***17,000 jobs*** foregone in an economy with over 10 million jobs

Model for Impacts Simulation

REMI

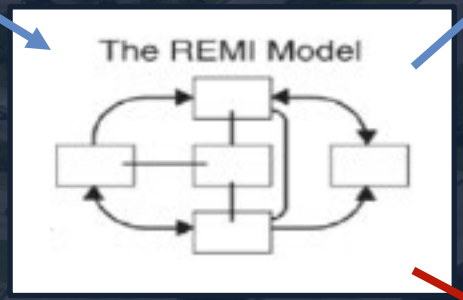
- The Regional Economic Models, Inc. (**REMI**) Model is a regional economic forecasting model that has been continually operated since 1980.

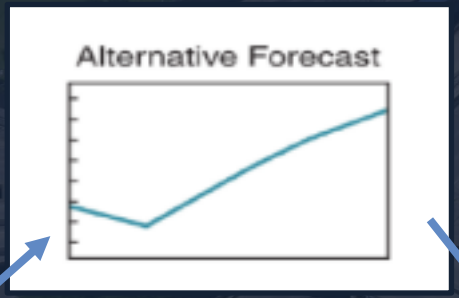
  It is built for the region using available government data:
  - **Type:** Population, employment, wages, tax rates, GDP
  - **Sources:** Bureau of Labor Statistics, Bureau of Economic Analysis, US Census Bureau
- REMI takes this historical data and creates a **baseline** or **control forecast** out to 2080.
- REMI can then run an **alternative** forecast or **"What if?" simulation** on top of the control to simulate a change in the regional economy.
  - These data are then compared to baseline data, giving a difference (as a level or %) that shows the **economic impact of the given policy**.

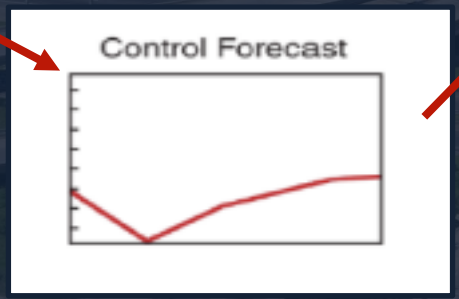
Forecast

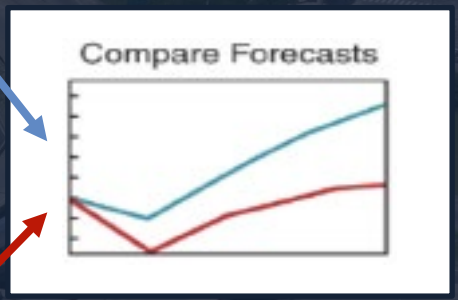
What effect would Measure X have?

Change in policy variables associated with Measure X



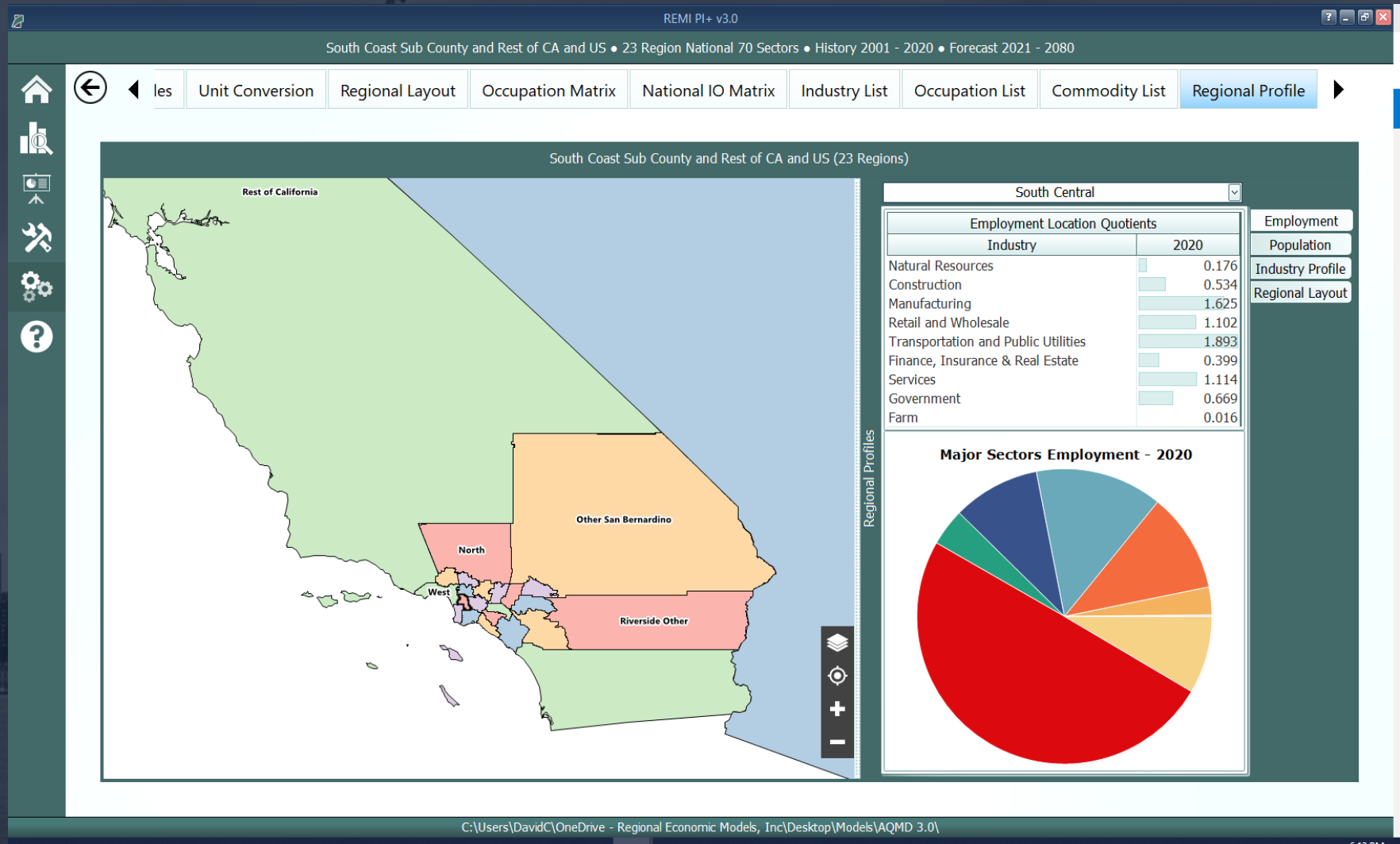






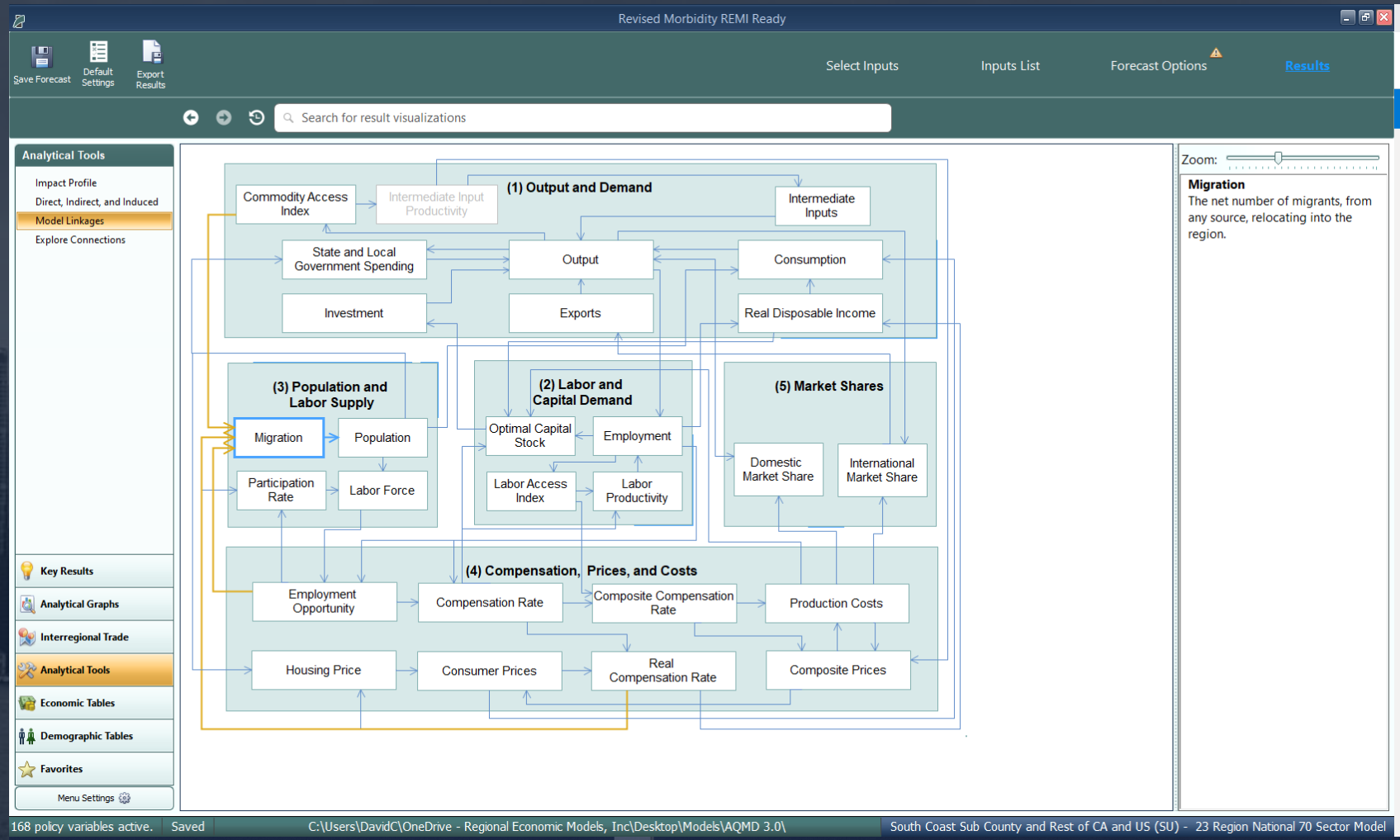
Model Layout

- The model's underling principles of **economic geography** reflect spatial constraints and positions of the regions
- Each region is assigned values corresponding to input data, and may interact with one another via migration, competition, and trade



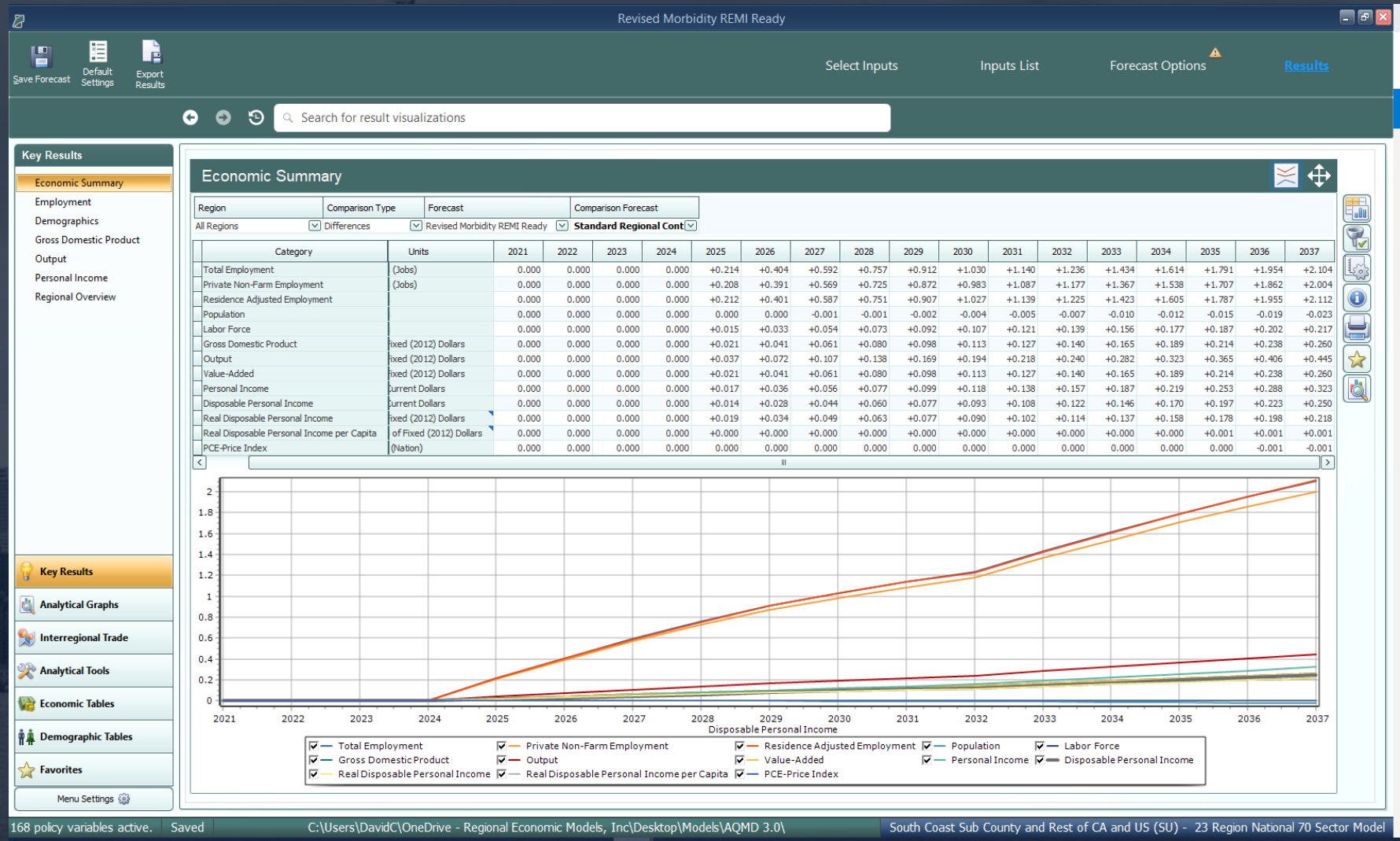
Model Structure

- Components of the economy interact with one another by way of:
  - **Econometrics** express building blocks of an economy, shown here
  - **Input-output modeling** shows how firms and industries consume and produce for one another
- The model also follows principles of **economic equilibrium** to model market behavior in areas such as investment



REMI Results

- **Direct**, **indirect**, and **induced** impacts may finally be analyzed and visualized.



Modeling Discussion

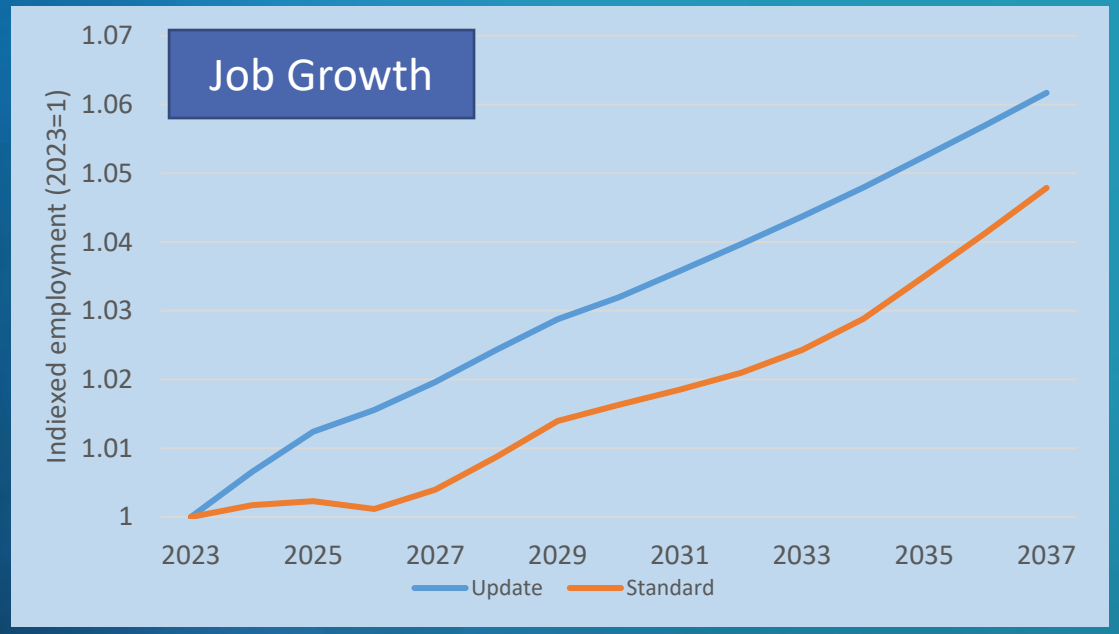
Custom-Built Model for South Coast AQMD

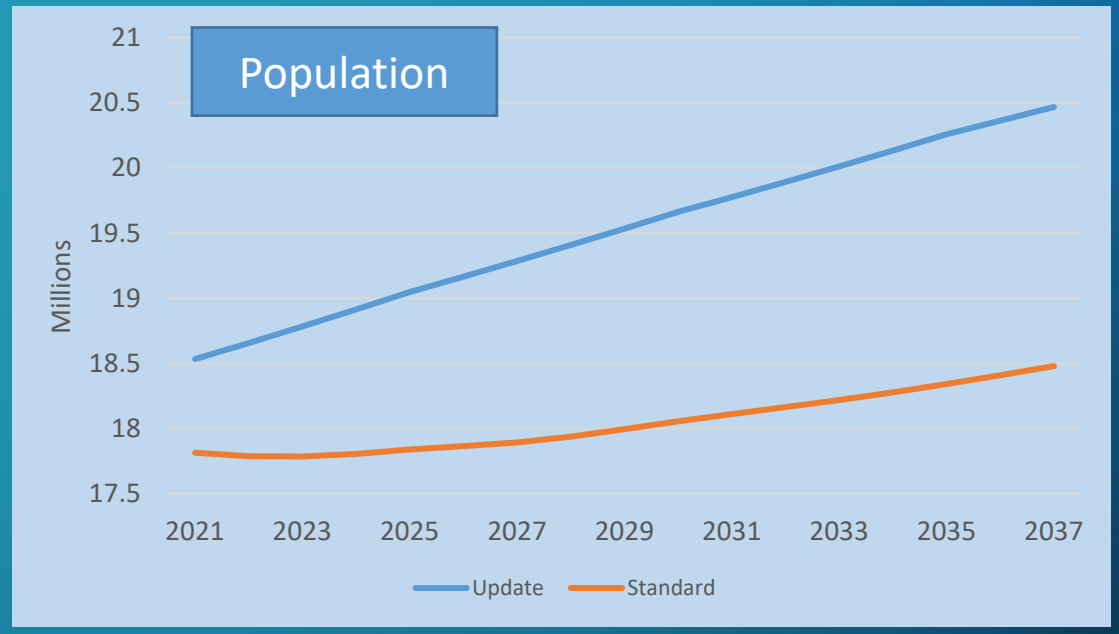
- REMI Policy Insight Plus (PI+) Version 3.0.0
- 23-region model
  - 21 sub-counties within South Coast AQMD jurisdiction (see map)
  - Rest of California
  - Rest of U.S.

Note: For readability, this map does not show the entire subregions of North (of the Los Angeles County), Other San Bernardino, Riverside Southwest, and Riverside Other.

Baseline Adjustments

- REMI baseline adjusted based on the 2020 Growth Forecast by Southern California Association of Governments (SCAG)
  - California Health and Safety Code requirements for AQMP
  - Consistency throughout AQMP





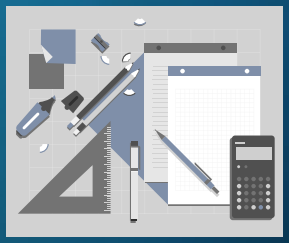
Update = Adjusted REMI; Standard = Default REMI

Modeling of Incremental Costs

- Direct impacts from increased spending on clean air controls & technologies:

Private Industries	Consumer & Households	State and Local Governments
• Increased cost of doing business (or "production cost")	• Less in the budget to spend on other goods and services (or "budget reallocation")	• Less in the budget to provide public services (assuming no increase in tax and other revenues)

- Direct impacts from increased demand for clean air controls & technologies:
  - More research, development, and output from businesses and industries supporting the clean air economy ("exogenous final demand")
  - Encourages job creation but opportunities not necessarily in the region

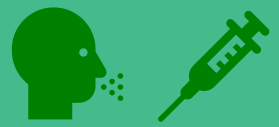


Modeling of Health Benefits

Avoided Premature Deaths

- Monetized health benefits based on individual's willingness-to-pay for reduced mortality risk
- Used 25% of estimated benefits as increased "regional amenity" in REMI
  - Reflecting REMI modeling rationale
  - Unresolved uncertainty based on the 2014 Abt Associates review
  - Sensitivity tests with 50% and 100%

Avoided Morbidity Incidence



- More in the budget to spend on other goods and services
  - Less spending on healthcare products and services
- Higher worker productivity
  - Avoided work absences due to own or dependents' illness and symptoms

Staff Contacts

Socioeconomic Analysis	AQMP Questions and Inquiries
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Comments or questions on Draft Socioeconomic Report? Visit us at: www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/socioeconomic-analysis or email us at: SocioEcon@aqmd.gov	

Draft Socioeconomic Report for the Revised Draft 2022 AQMP

Cost-Effectiveness

South Coast Air Quality Management District

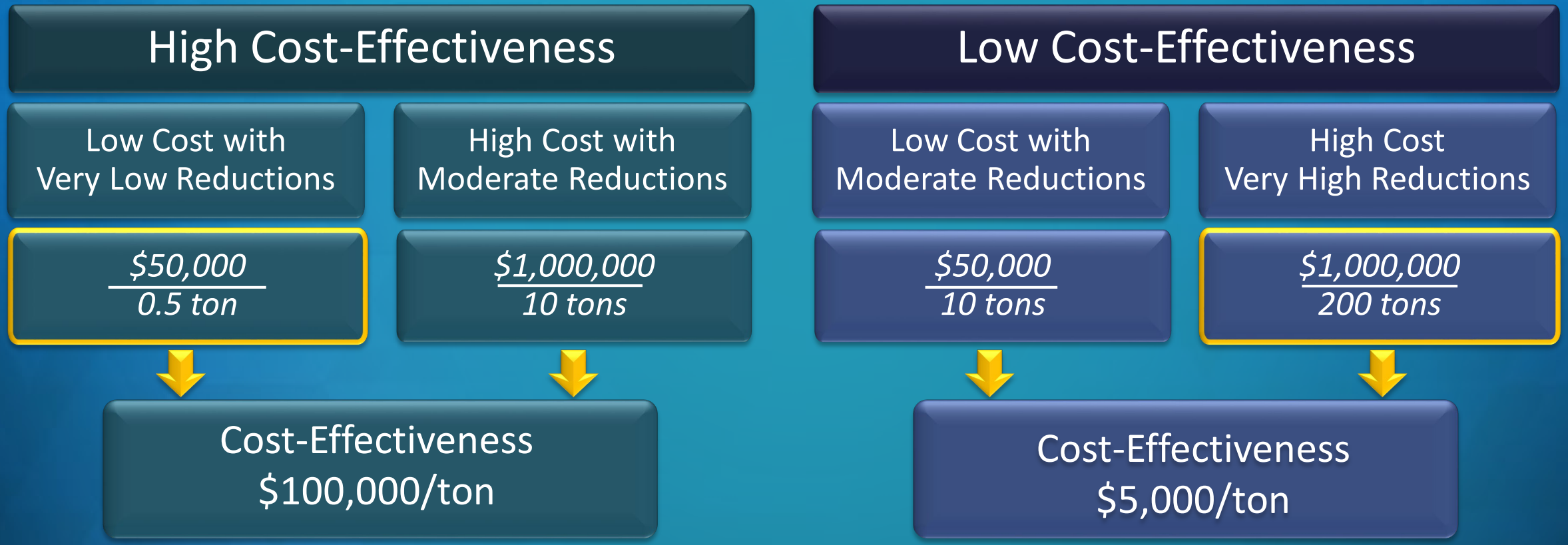
October 5, 2022

Background

- California Health & Safety Code requires consideration of cost-effectiveness of control measures in the AQMP
  - Must evaluate cost-effectiveness of each control measure to the greatest extent possible
  - Control measures must be ranked by cost-effectiveness
- Cost-Effectiveness is the total cost (capital and annual operating costs) to achieve a standard over the emission reductions for the life of the equipment *compared to a business-as-usual scenario*

$$\textit{Cost-Effectiveness} = \frac{Total\ Costs}{Tons\ of\ Emissions\ Reduced}$$

High and Low Cost-Effectiveness Scenarios



High cost-effectiveness does not necessarily mean high cost

Low cost-effectiveness does not necessarily mean low cost

Requirements for Cost Effectiveness Under the Health and Safety Code

2022 AQMP

- Requires cost-effectiveness analysis of each control measure to the greatest extent possible
- Requires that control measures are ranked by cost-effectiveness

Rulemaking

- Must account for economic impacts when establishing BARCT standards
- Requires cost-effectiveness analysis when establishing BARCT

AQMP Control Measure
Initial cost-effectiveness estimate

Proposed Rule
Comprehensive cost-effectiveness analysis

Cost-Effectiveness Analysis in Rulemaking

Comprehensive cost-effectiveness analysis conducted when establishing BARCT standards during rulemaking

Capital Costs (One-Time Costs)

- Equipment costs
- Installation costs
- Permitting fees

Annual Costs (Recurring Costs)

- Labor and maintenance
- Fuel, Electricity, etc.
- Source Testing
- Monitoring, Reporting, and Recordkeeping
- Catalyst, filters or other materials for pollution controls

Bottom-Up Approach

- Facility-specific information where available
- Use actual cost data where available from affected facilities and equipment vendors

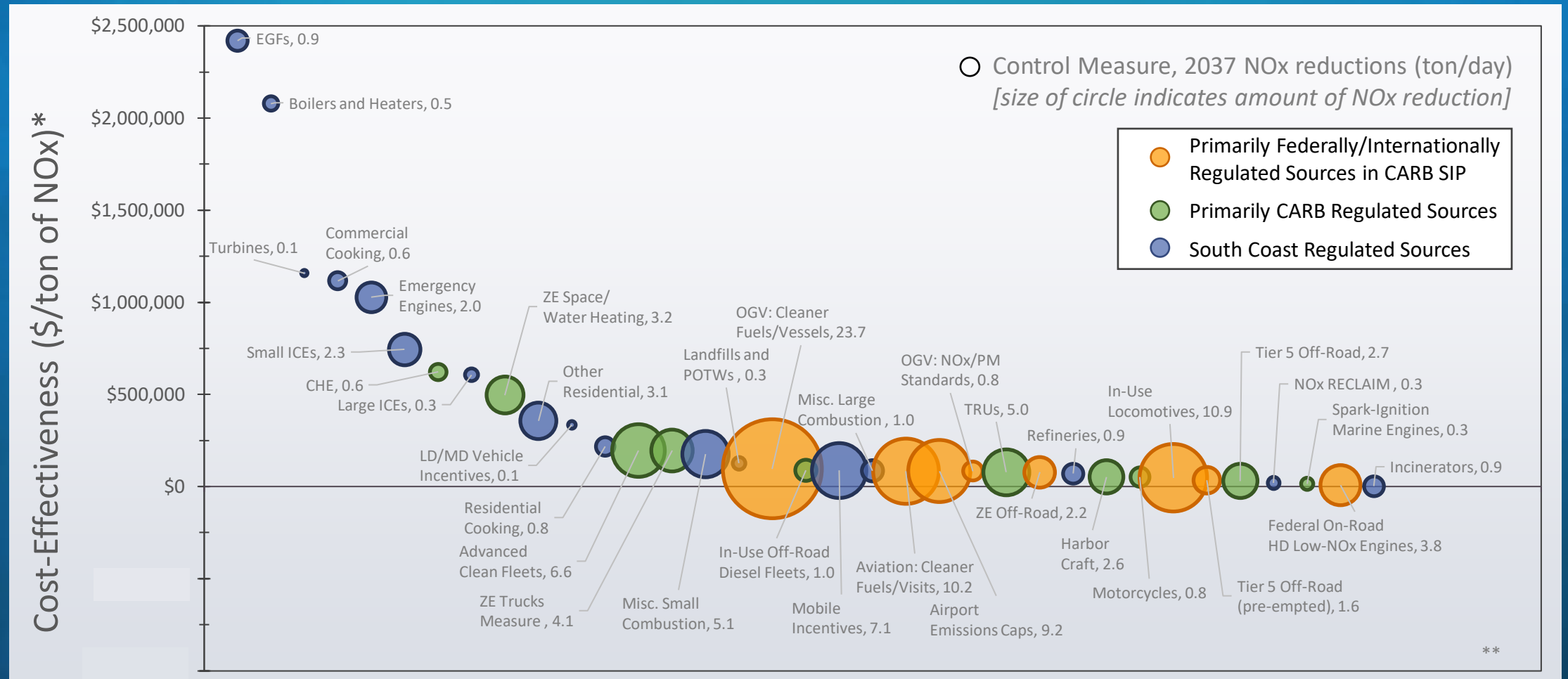
Other Considerations

- Stranded assets
- Cost savings
- Equipment life

Cost-Effectiveness Threshold for Rulemaking

- Comprehensive cost-effectiveness analysis will continue to be conducted during rulemaking
- To guide rulemaking efforts, previous AQMPs included cost-effectiveness thresholds to assess the cost-effectiveness of a proposed rule
- If the average cost-effectiveness exceeded the threshold, previous AQMPs suggested that the rulemaking include:
  - A more rigorous cost-effectiveness analysis
  - Alternatives to lower the cost
  - Additional public meetings
- Draft 2022 AQMP proposed a cost-effectiveness threshold of $59,000/ton of NOx reduced, which is based on past AQMP costs adjusted to inflation
- Some Board members expressed concern that $59,000/ton may be too low
  - Particularly when considering the cost-effectiveness of measures in the 2022 AQMP

Control Measure Cost-Effectiveness and NOx Emission Reductions



*Using Levelized Cash Flow Method (modified for costs incurred through 2037)
**Clean Miles Standard, [0.1 tpd] (not shown) has a cost savings

Control Measures Ranked by Cost-Effectiveness

Alternative Cost-Effectiveness Threshold

- Staff is proposing an alternative cost-effectiveness threshold based on public health benefits instead of cost of pollution controls
- Public health benefits threshold monetizes public health impacts associated with specific air contaminants such as:
  - Premature deaths, lost school and work days, hospital admissions, respiratory and cardiovascular symptoms
- Public health benefits threshold:
  - Accounts for health impacts and overall benefit to society from improved air quality
  - Used by U.S. EPA and CARB for rulemaking

Alternative Cost-Effectiveness Threshold (cont.)

- Revised Draft 2022 AQMP proposed an alternative public health benefit screening threshold of:
  - $325,000/ton of NOx reduced
  - Based on U.S. EPA studies and 2016 AQMP
- Threshold would be used as a guide for evaluating the:
  - Cost-effectiveness and incremental cost-effectiveness for stationary and mobile source rulemakings
  - If cost-effectiveness or incremental cost-effectiveness of the proposed rule exceeds the threshold, public meeting would be required
  - Public meeting would identify alternatives to reduce the cost-effectiveness
- Public hearing for proposed rules includes cost-effectiveness analysis and will be presented to the Board for their consideration