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

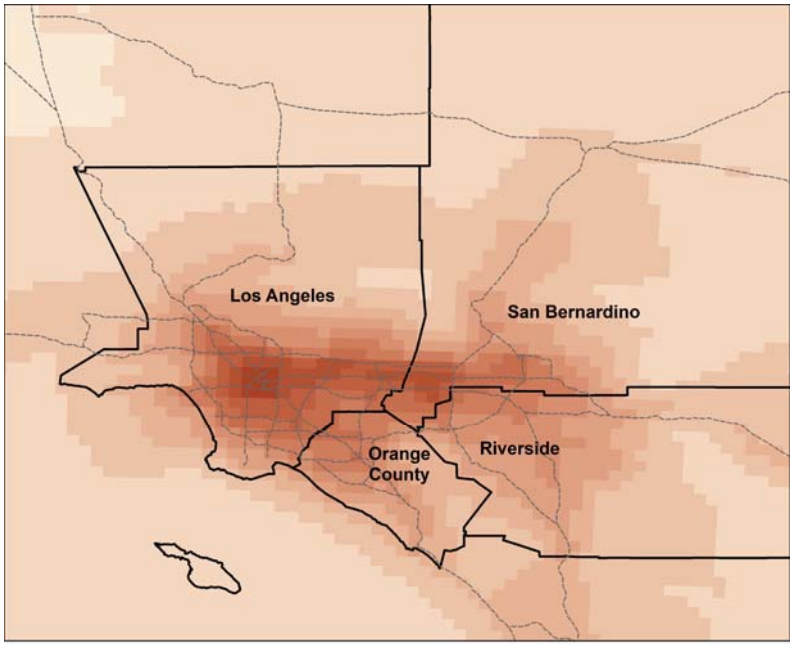
- Ozone and PM2.5 projections
  - Revised baseline emissions inventory to be consistent with AQMP and State Implementation Plan (SIP)
  - Updated emissions reductions to reflect revised baseline
  - Revised region's carrying capacity* to 60 tpd NOx
- Added 2032 estimate
- Interpolation of benefits in 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)

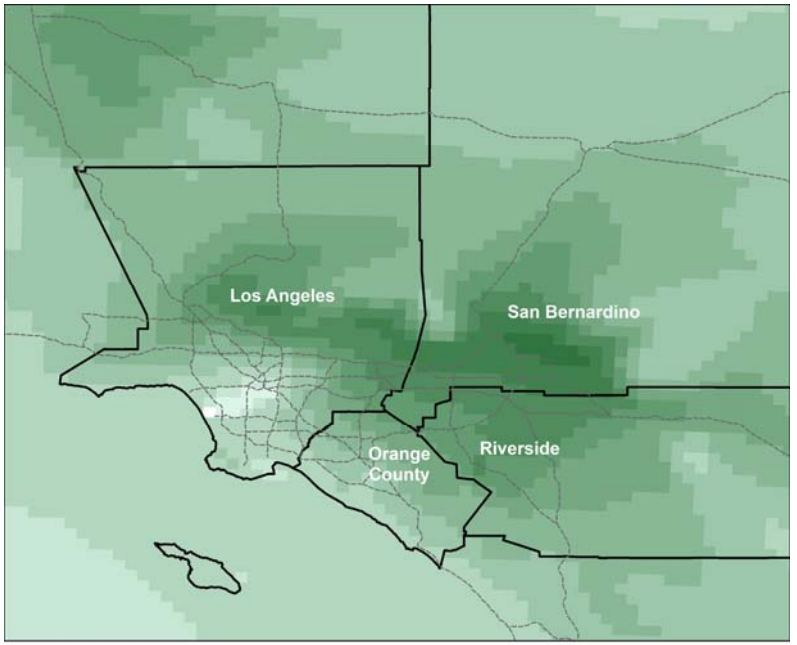
Updated Projected Air Quality Changes in 2037



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

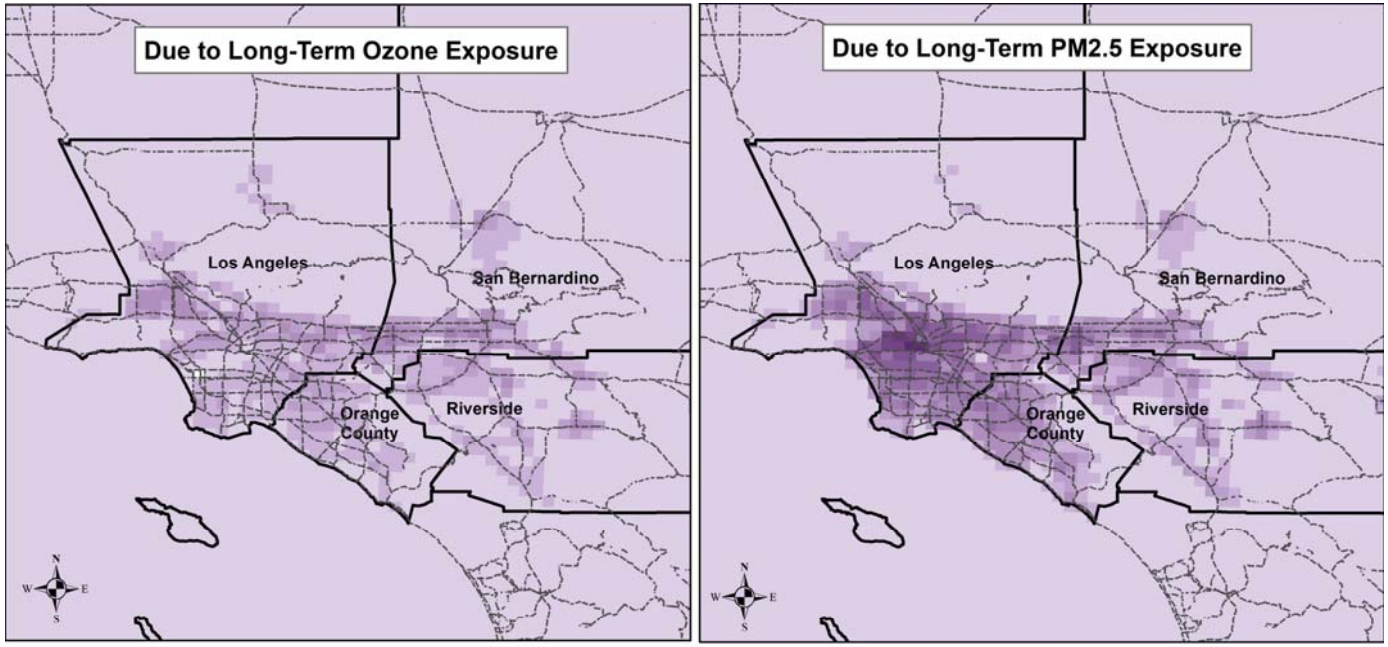


Major Highways

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

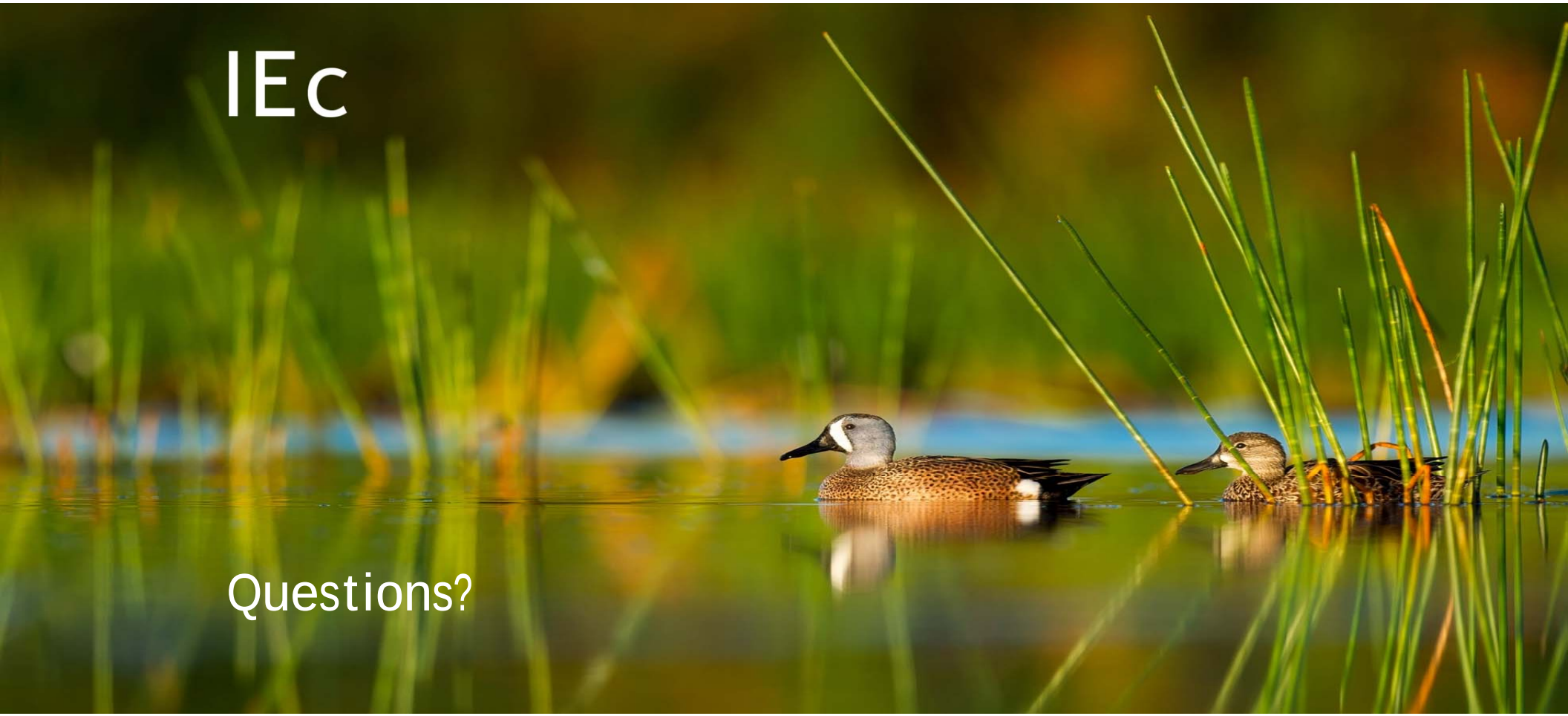
Reduced Morbidity Incidence	2032	2037
Long-Term Ozone Exposure		
Asthma, New Onset	4,506	9,501
Short-Term Ozone Exposure		
Asthma Symptoms (Chest Tightness, Cough, Shortness of Breath, Wheeze)	795,164	1,741,652
ED Visits, Asthma	286	649
ED Visits, All Respiratory	655	1,501
HA, Asthma	8,244	18,292
Minor 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%

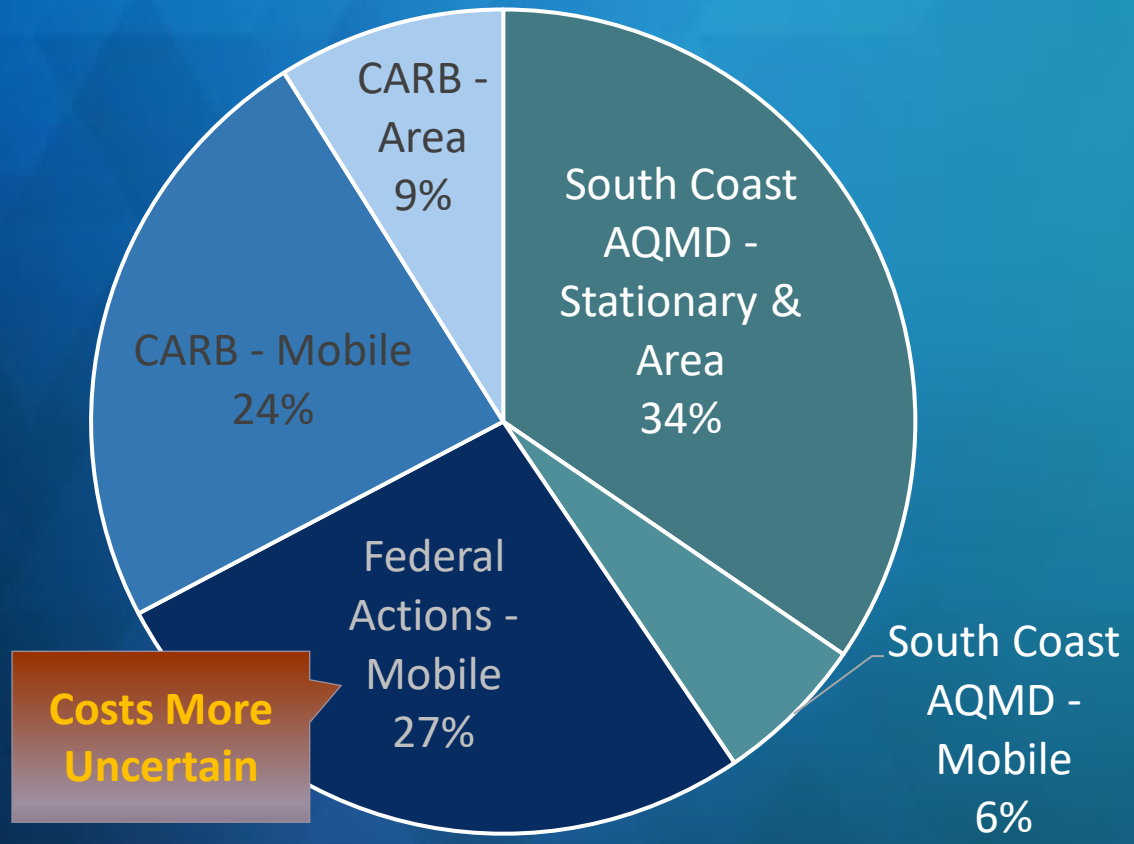
** Costs are incremental to the business-as-usual scenario without the Revised Draft 2022 AQMP. Incremental costs were quantified for control measures with quantified emission reductions only.*

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

Costs and NOx Reductions Breakdown

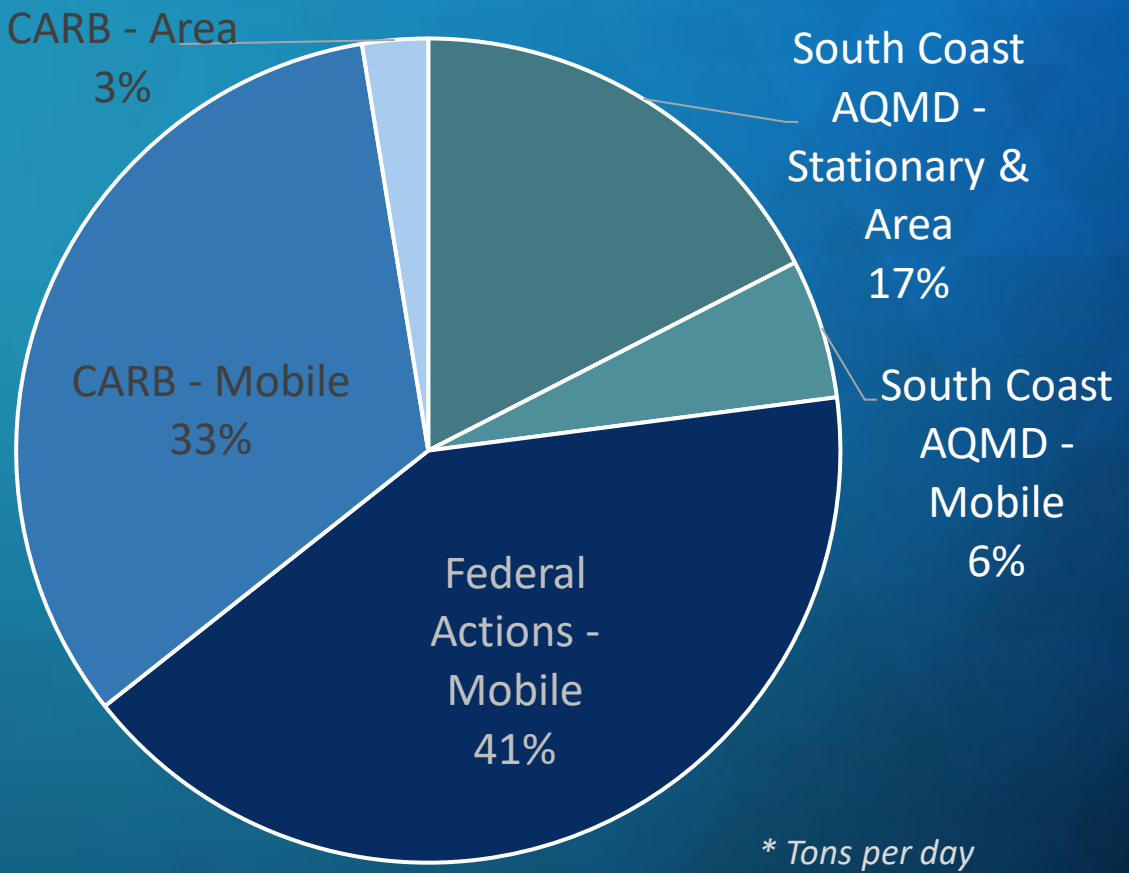
$2.85 B in Annual Costs

(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

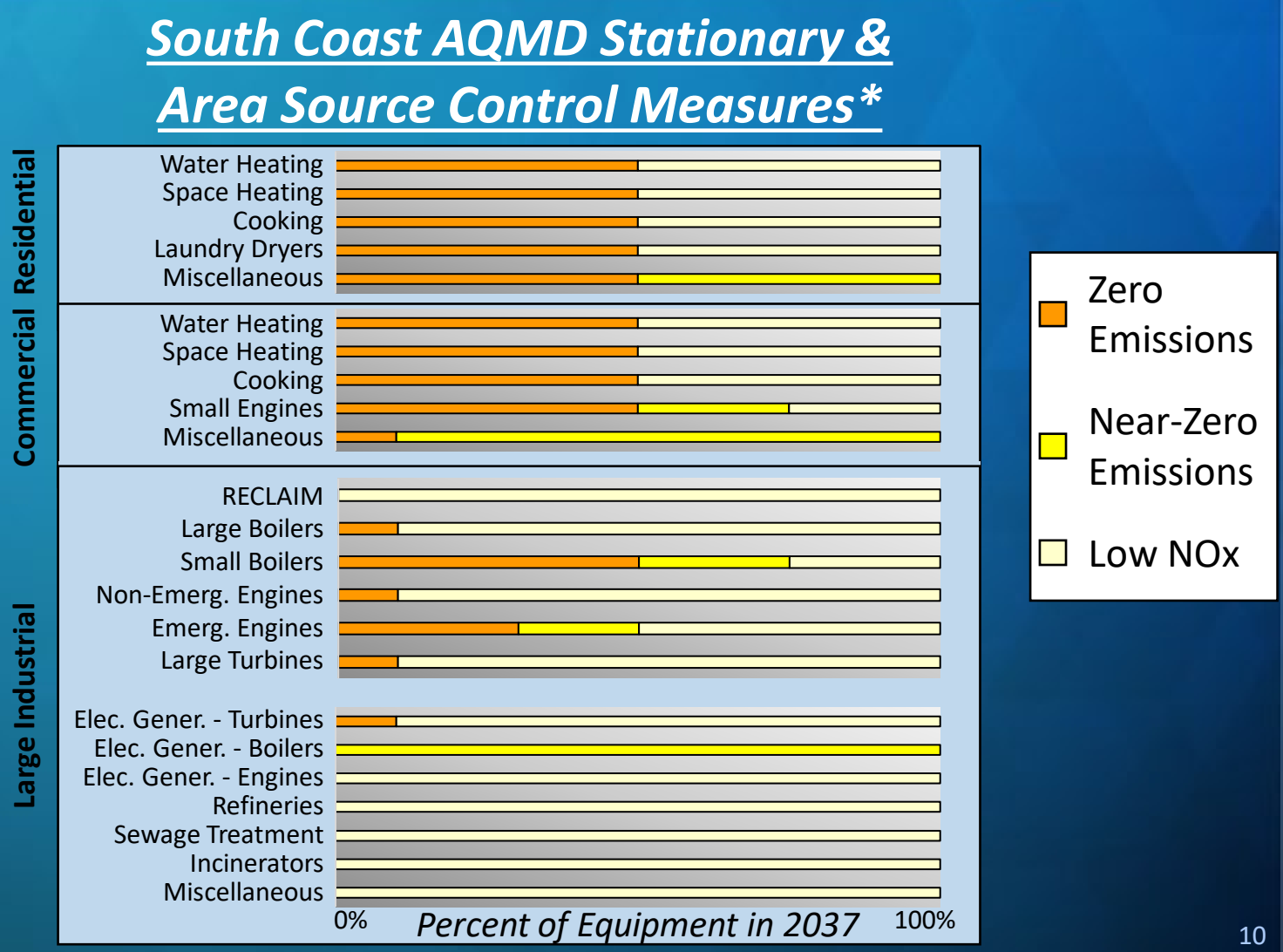
Industry or Sector[213]	Cumulative Change in Production Costs ($2020M)[214]
Air transportation (Industry)	$14,756
Transportation and Public Utilities (Sector)	$13,876
Truck transportation (Industry)	$9,119
Construction (Sector)	$4,458
Retail and Wholesale (Sector)	$4,251
Services (Sector)	$3,893
Increased 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



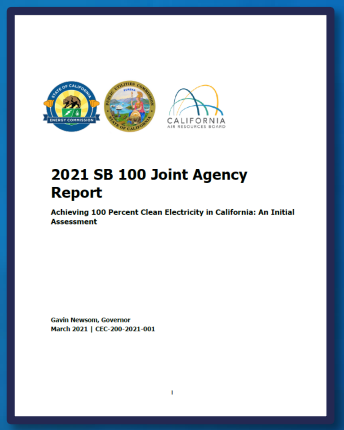
Costs of ZE Technology

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

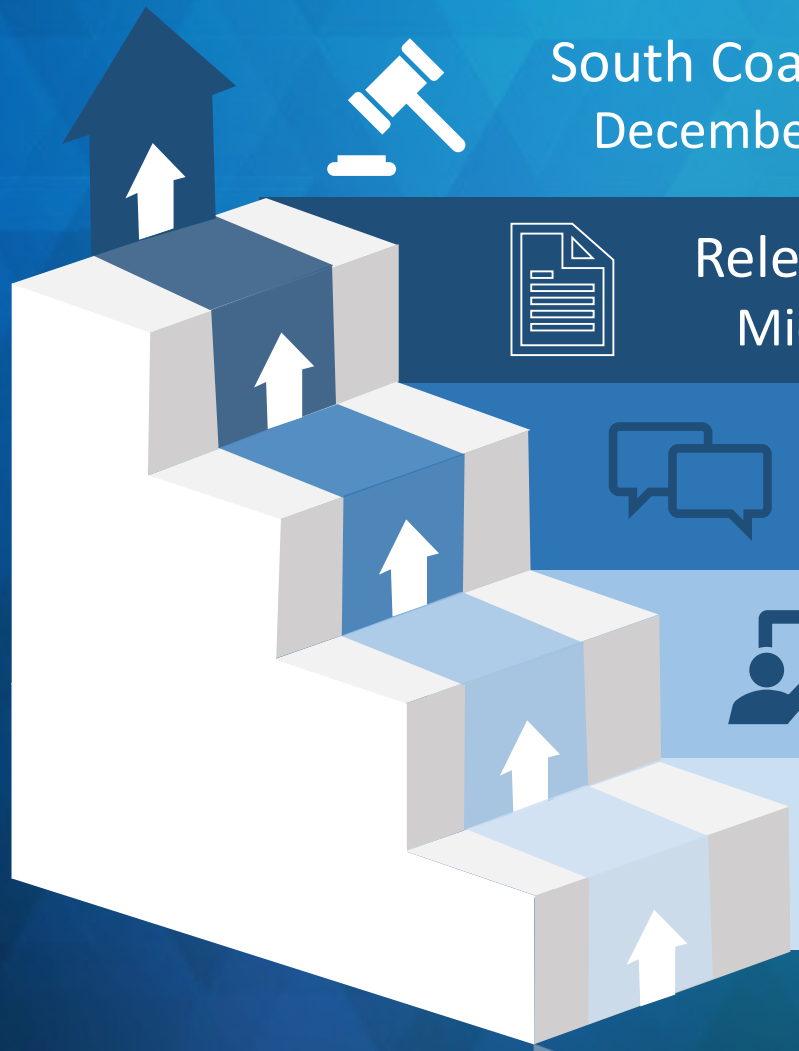
Gavin Newsom, Governor
March 2021 | CEC-200-2021-001

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

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