Updates on 2022 AQMP Emissions Inventory

Item #2

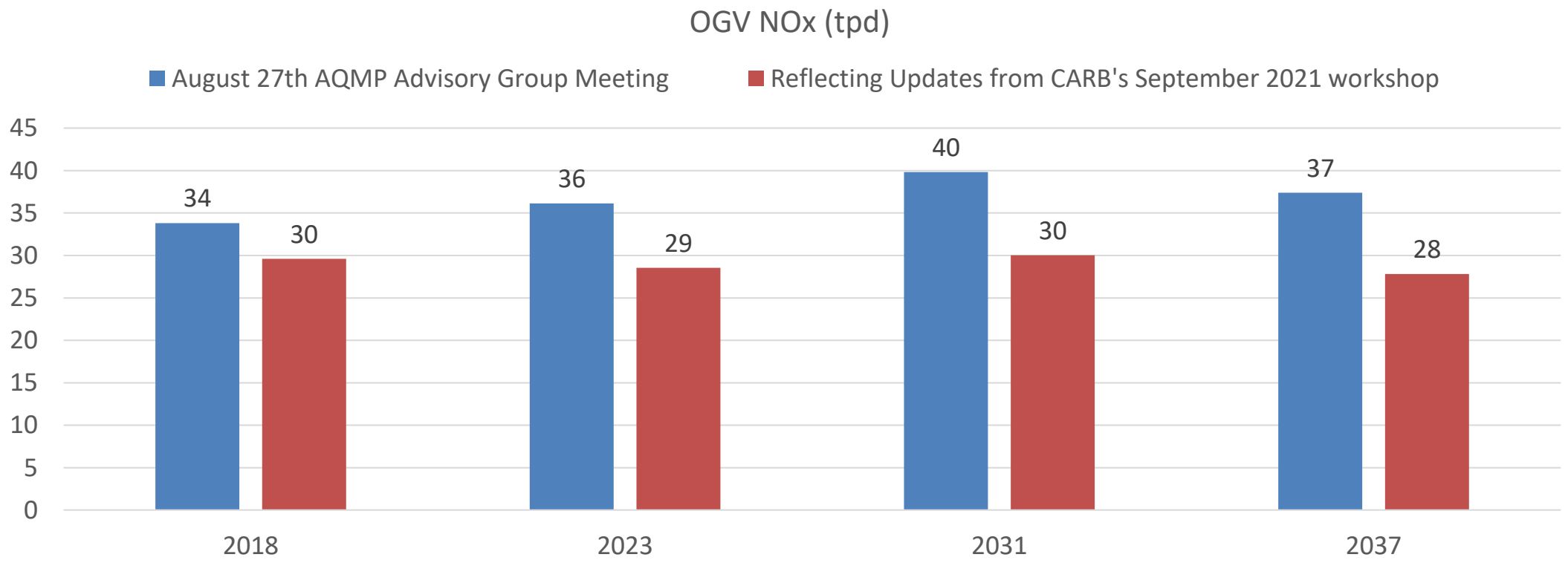
AQMP Advisory Group Meeting

November 9, 2021

South Coast
Air Quality Management District

Updates in Ocean Going Vessels

- CARB updated emissions for Ocean-Going Vessels (OGV)
  - 2021 Off-Road Mobile Sources Public Workshop on September 22, 2021*

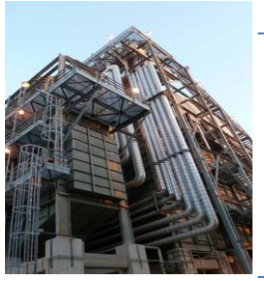


*https://ww2.arb.ca.gov/events/public-workshop-updates-ocean-going-vessels-and-cargo-handling-equipment-emissions

Updates in Stationary Sources

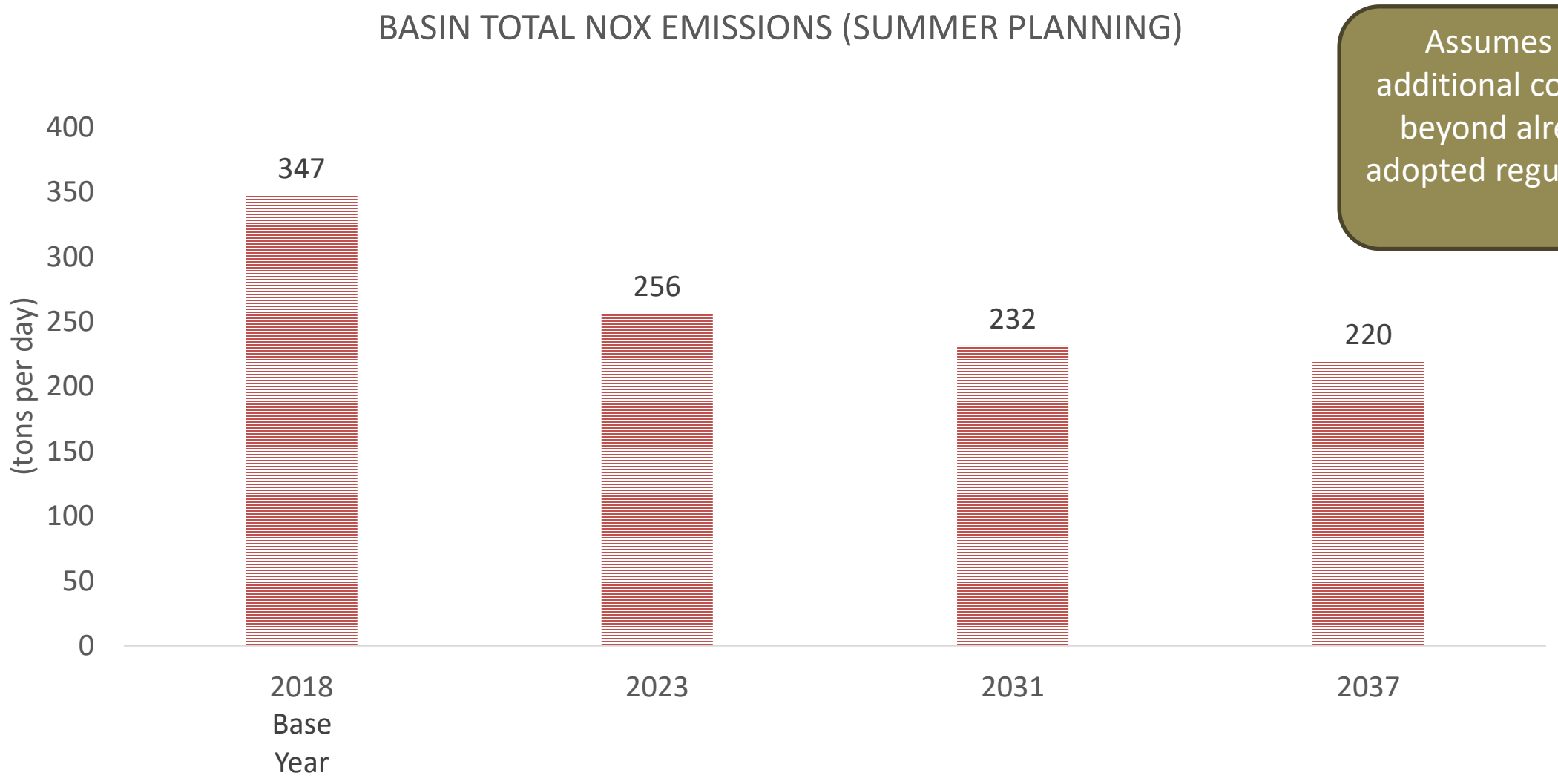
Rule 1109.1, Emissions of Oxides of Nitrogen From Petroleum Refineries and Related Operations, establishes NOx and CO emission limits for combustion equipment at petroleum refineries and facilities with operations related to petroleum refineries

Implementation of Rule 1109.1 is expected to achieve reductions of 7.7 to 7.9 tons per day of NOx



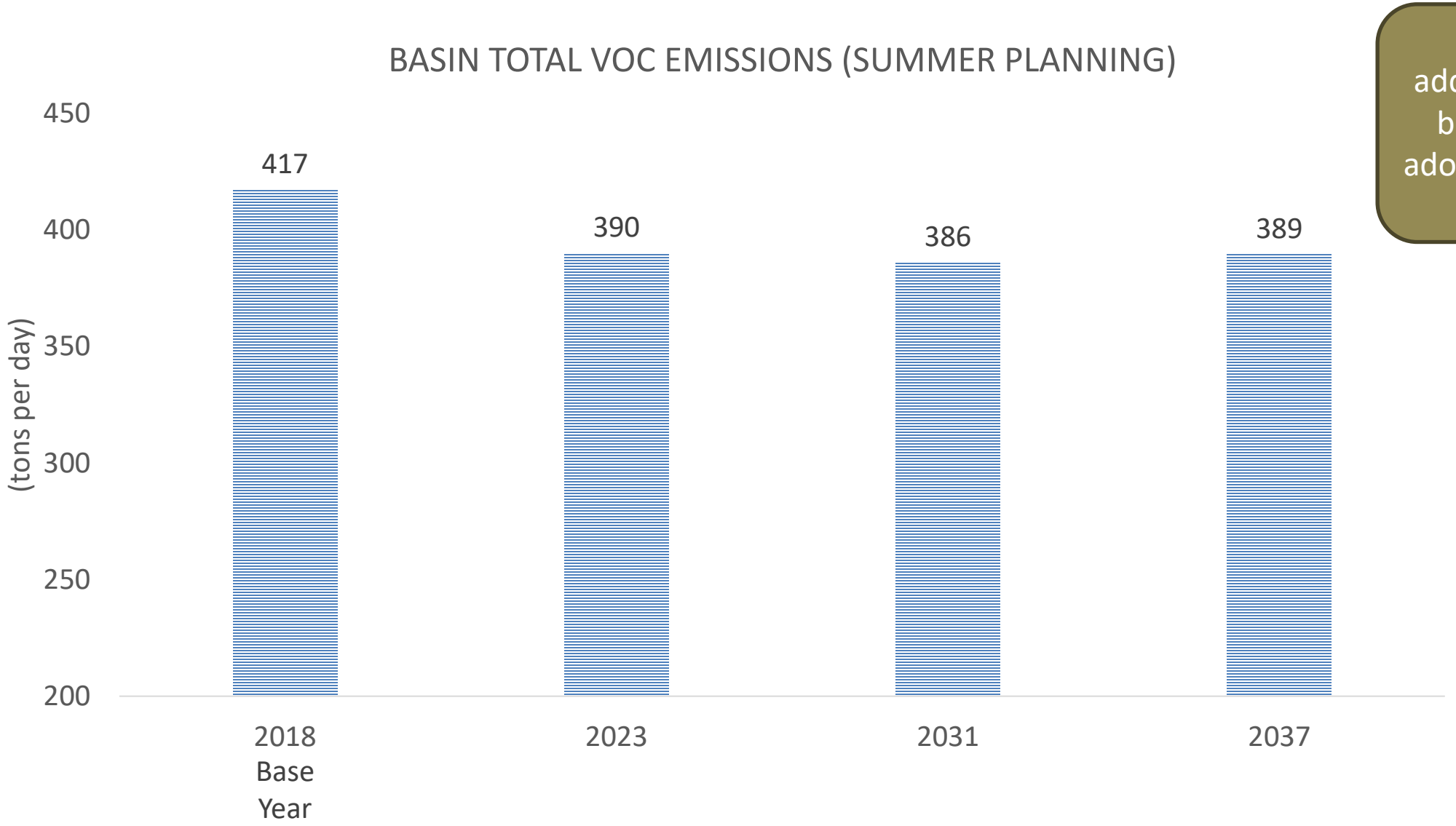
An alternative implementation plan (I-Plan) targets approximately 75% and 90% of the required reductions by 2027 and by 2031, respectively

Base and Future Years Baseline NOx emissions



Assumes no additional controls beyond already adopted regulations

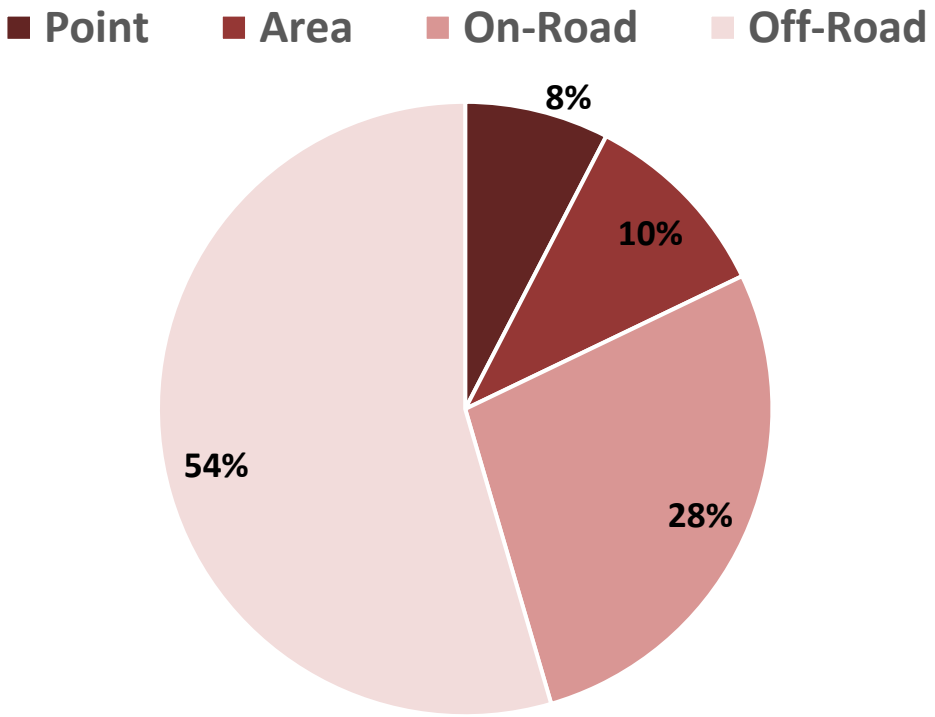
Base and Future Years Baseline VOC emissions



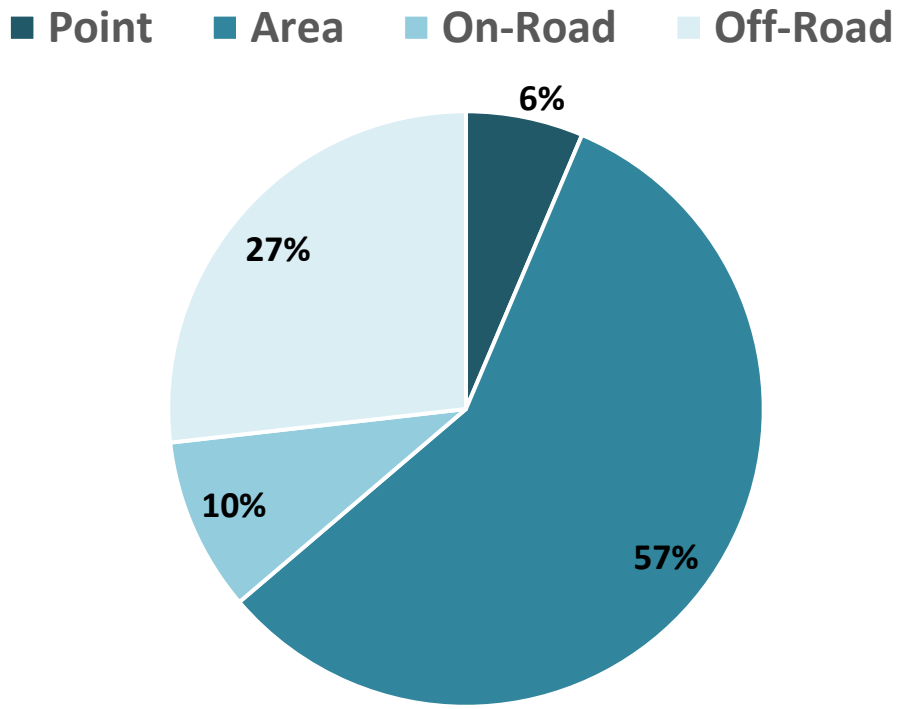
Assumes no additional controls beyond already adopted regulations

Distribution of NOx and VOC emissions in 2037

Preliminary NOx Emissions for 2037



Preliminary VOC Emissions for 2037



Summary

- Emissions for ocean going vessels and NOx reductions expected from Rule 1109.1 were updated
- Preliminary summer planning inventory shows 220 tons per day of NOx for emissions for 2037
- In 2037, offroad mobile sources are the largest contributor to NOx and area sources are the largest contributor to VOC

Updates on Air Quality Modeling - Ozone Isopleths and Preliminary Carrying Capacity Estimates

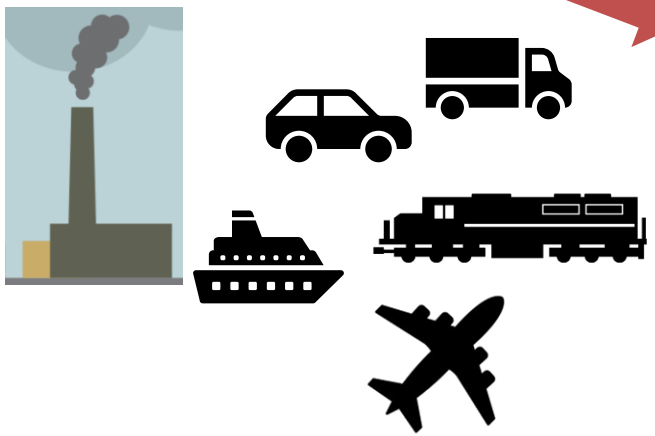
Item #3

AQMP Advisory Group Meeting

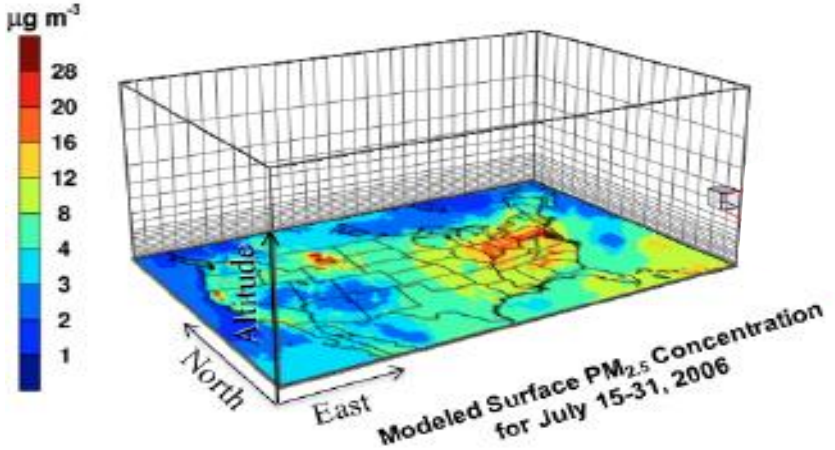
November 9, 2021

Regional Photochemical Modeling Approach

Man-made emissions



Meteorology



Biogenic Emissions

Ozone, PM2.5

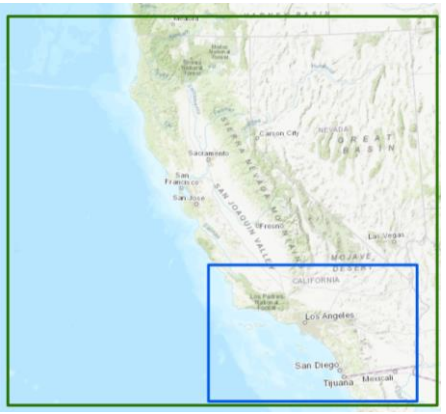
and other pollutants

Development of Ozone Isopleths

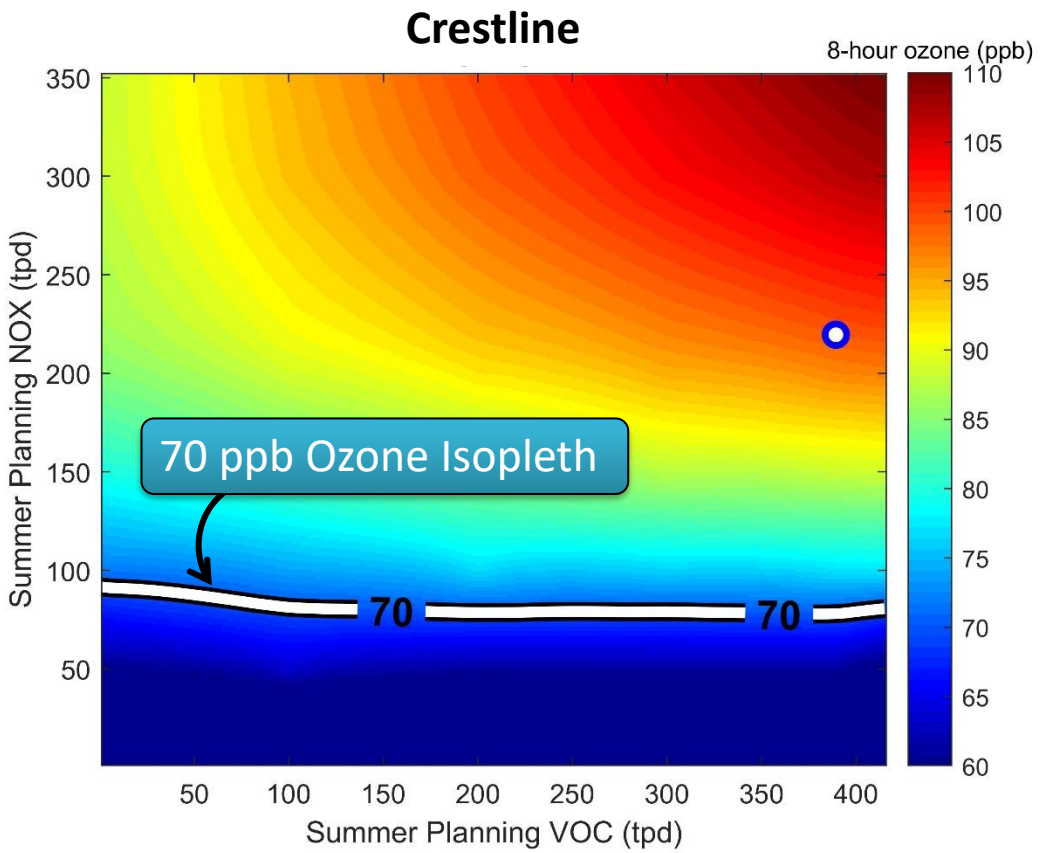
Definition of Ozone Isopleth:
Any line drawn on a graph of NOx and VOC emissions where all ozone concentrations are equal on that line

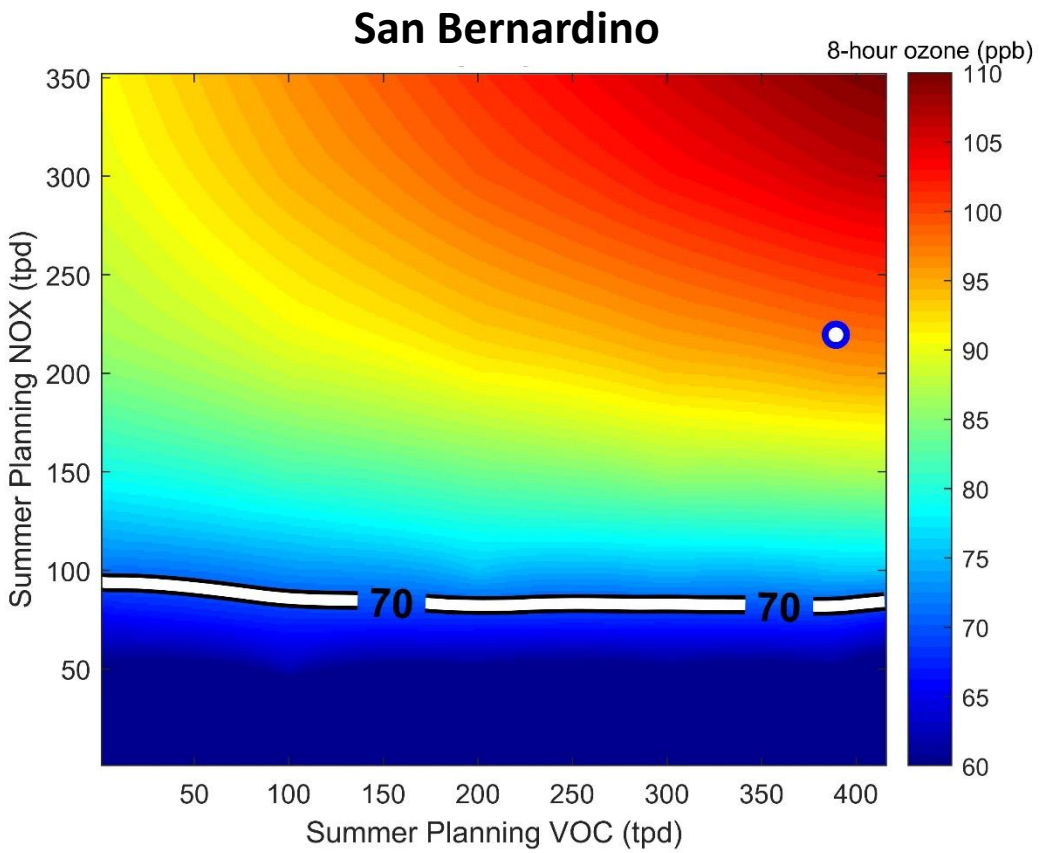
- CMAQ modeling platform used on nested domains
  - 12 km grid including all of California and portions of neighboring states and northern Mexico
  - 4 km grid for the AQMP analysis domain
- Isopleth graphs plot the air basin total man-made VOC and NOx emissions on the x and y axis, respectively
  - Simulations were modeled in increments of 50 tons per day (tpd) for NOx and VOC
    - MatLab spatial interpolation function used to estimate areas between modeled increments
    - Preliminary analysis assumes emission reductions occur equally across the entire modeling domain
- Preliminary basin total summer planning emissions

Year	VOC (tpd)	NOx (tpd)
2018	417	347
2037	389	220



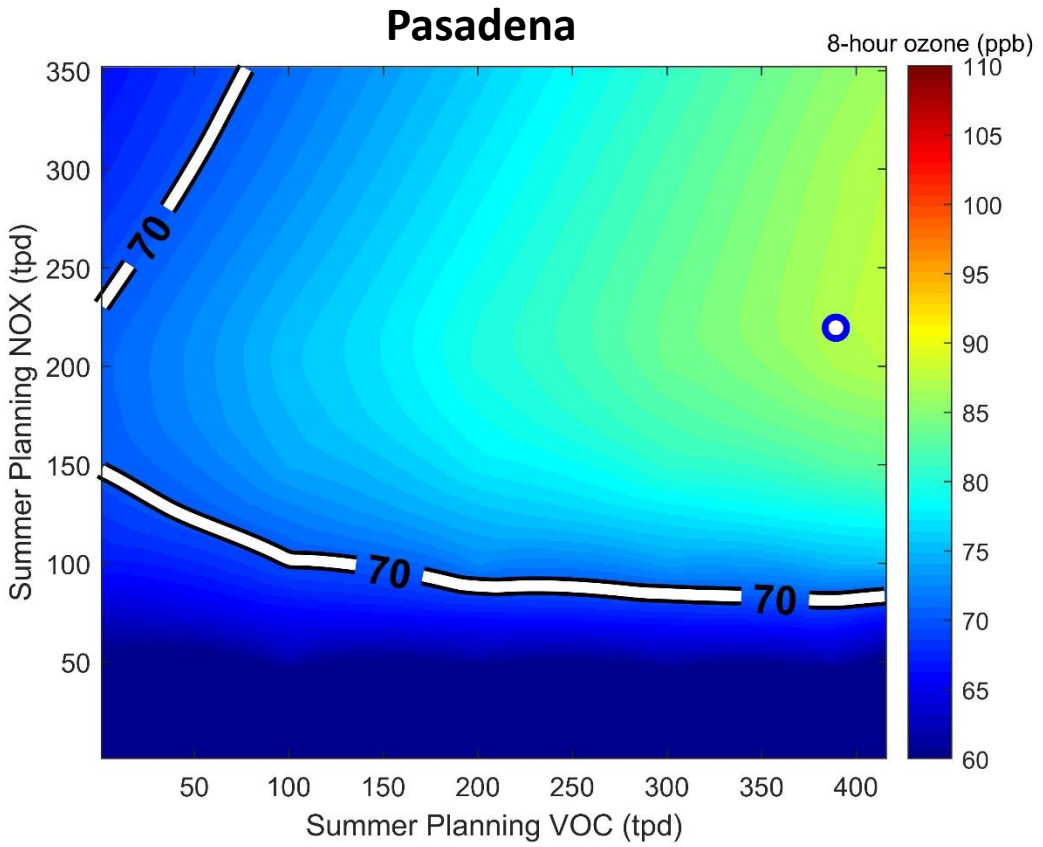
Ozone Isopleths – Inland San Bernardino

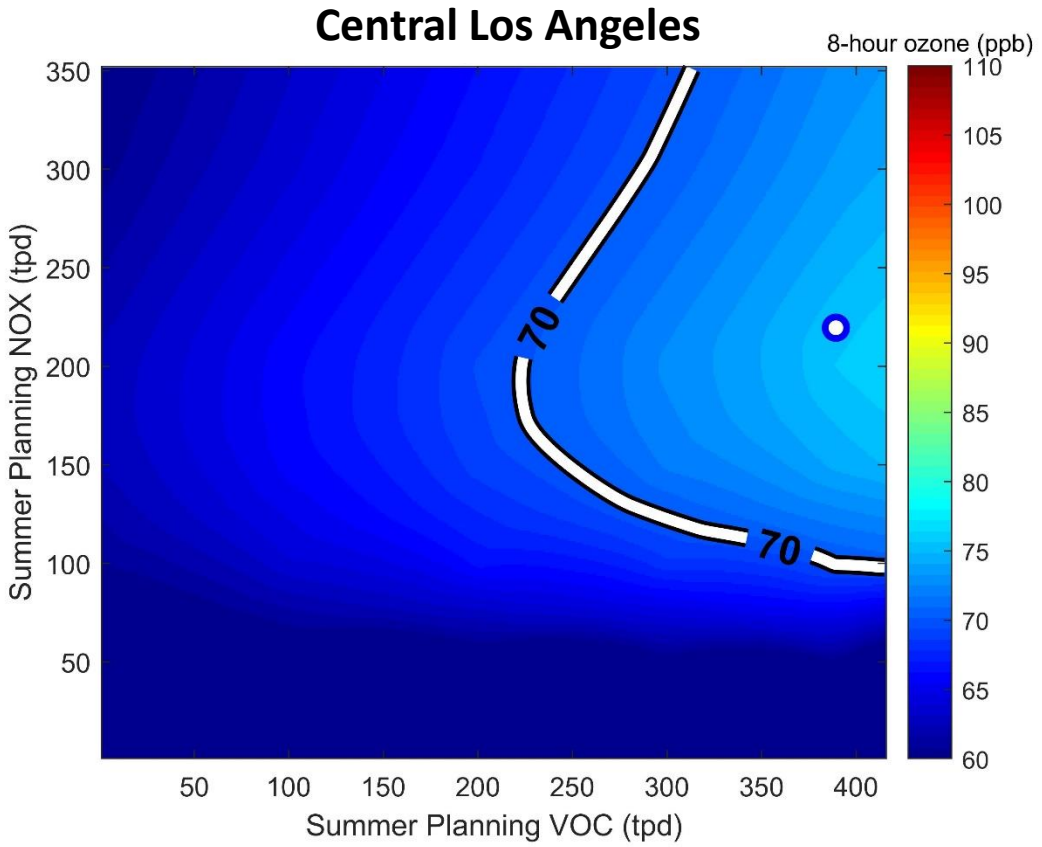




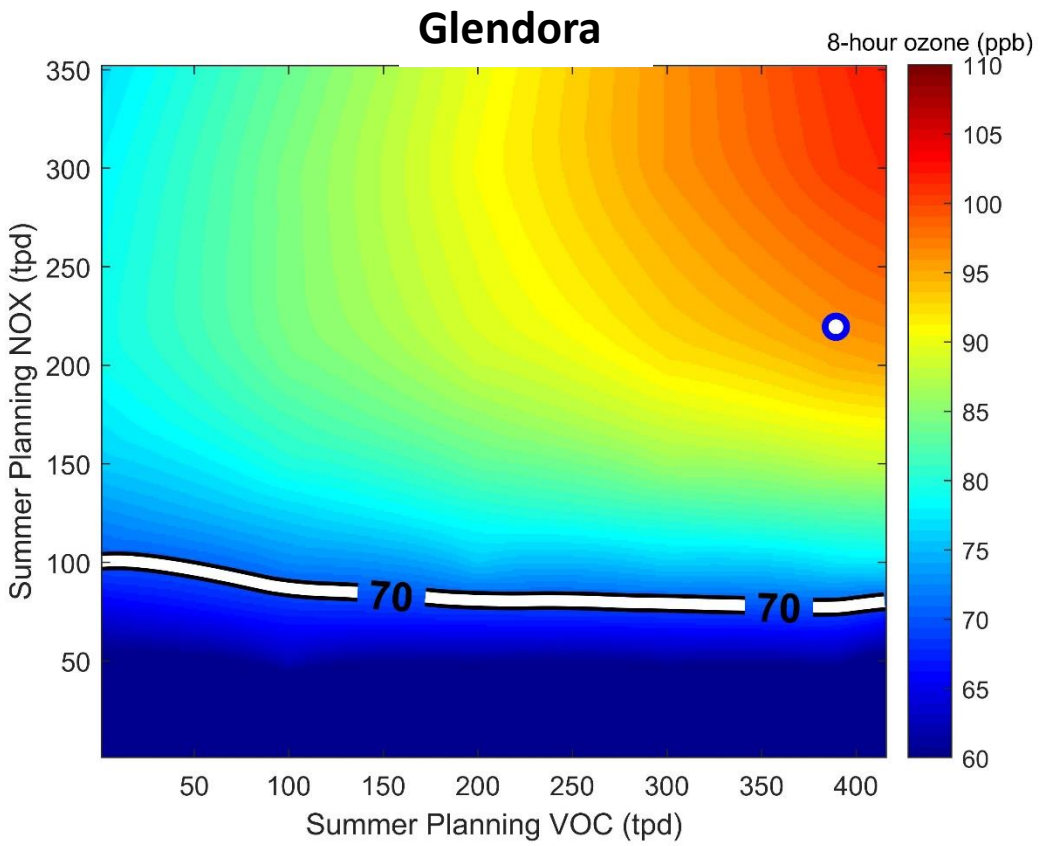
- **Upper right corner represents 2018 condition**
  - **Previous years with higher emissions would be located off the chart, to the top and right**
- **Blue dot represents 2037 business-as-usual (i.e. baseline)**

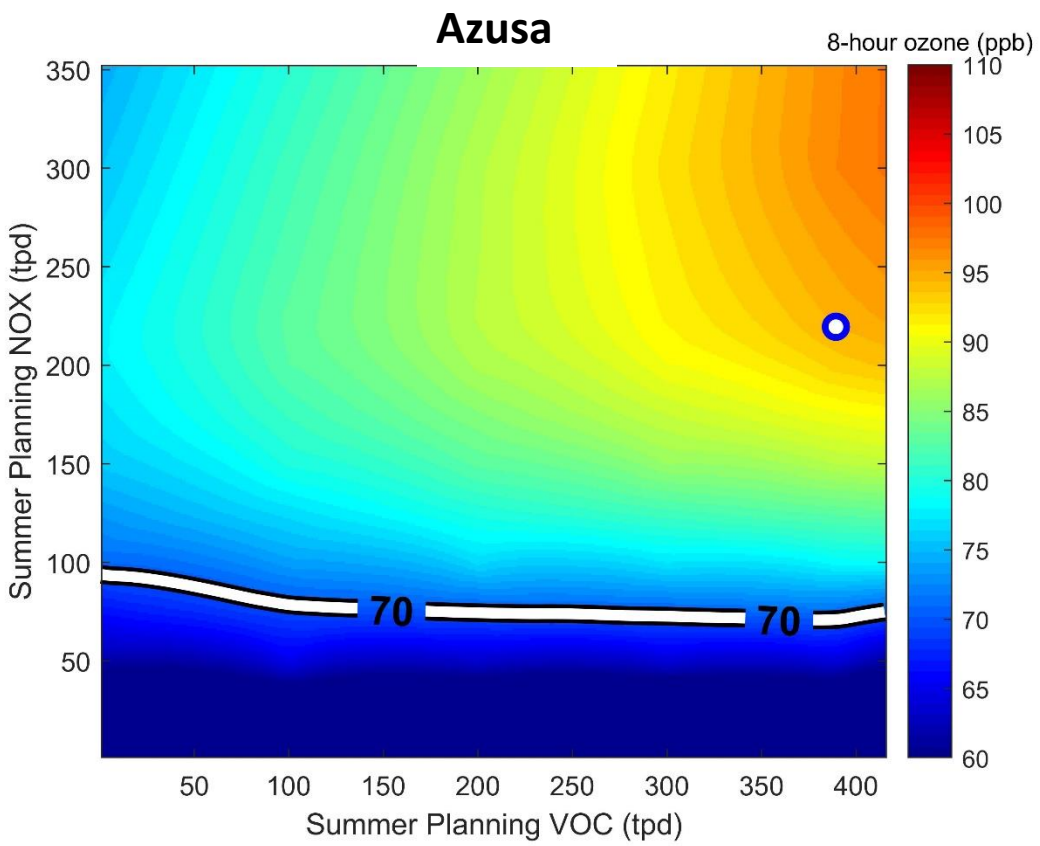
Ozone Isopleths – Western Basin



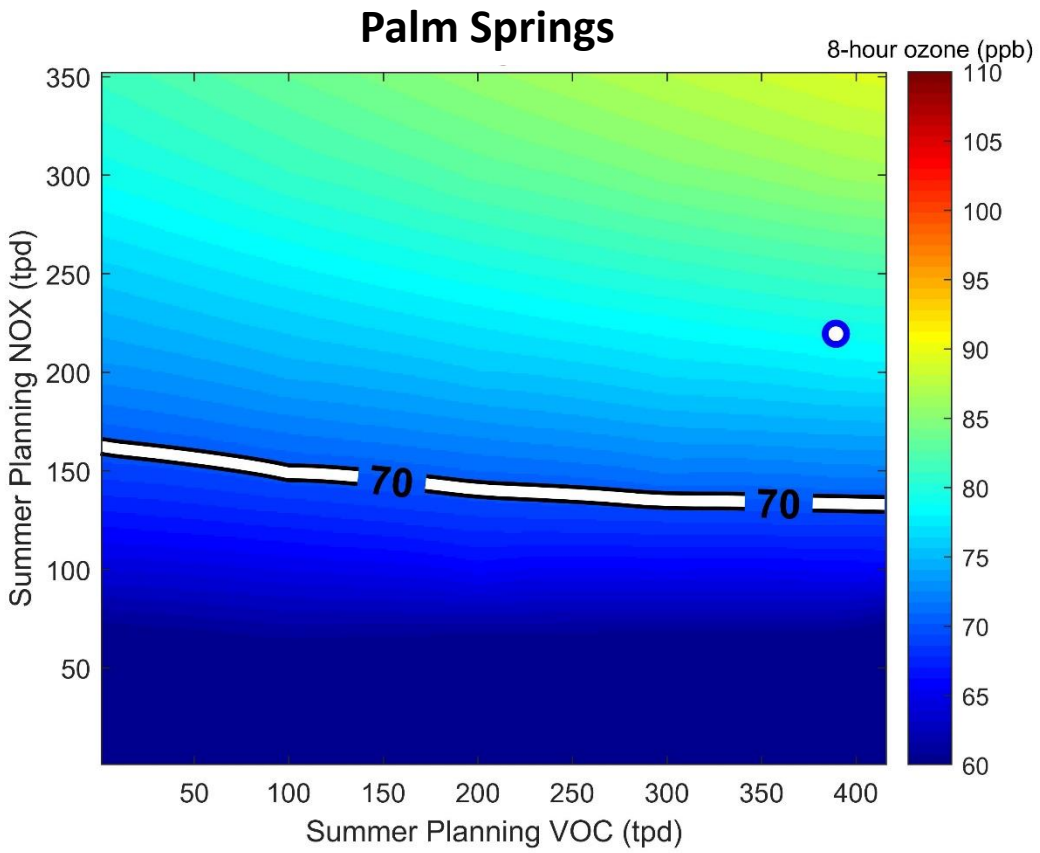


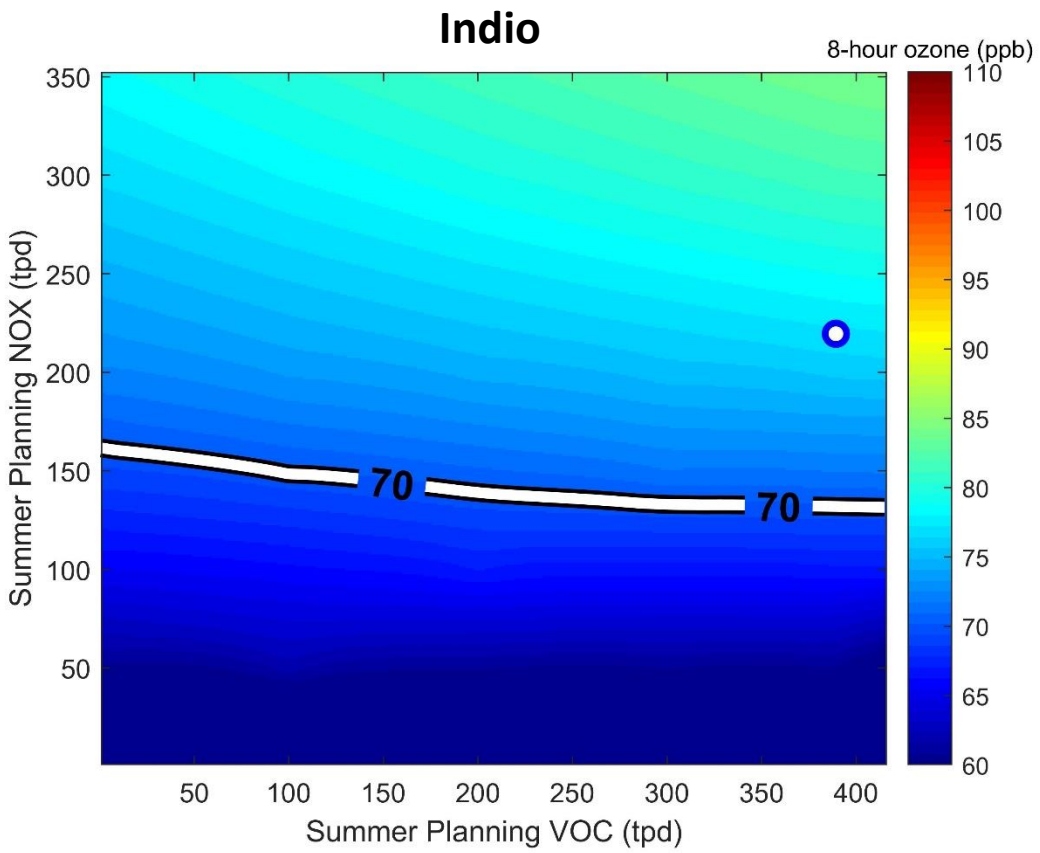
Ozone Isopleths – Foothill Area





Ozone Isopleths – Coachella Valley





Additional Factors Influencing Carrying Capacity

Lateral boundary values

- Transport from the central valley and Mexico
- If all of CA, neighboring states, and Mexico also reduced emissions by 70% beyond future baseline conditions, the 2037 design value will be reduced by up to another **7** ppb

Controls in adjacent air basins

- Kern, Ventura, Santa Barbara, and San Diego
- The same level of controls in adjacent air basins can lower the design value by up to **5** ppb

Not additive

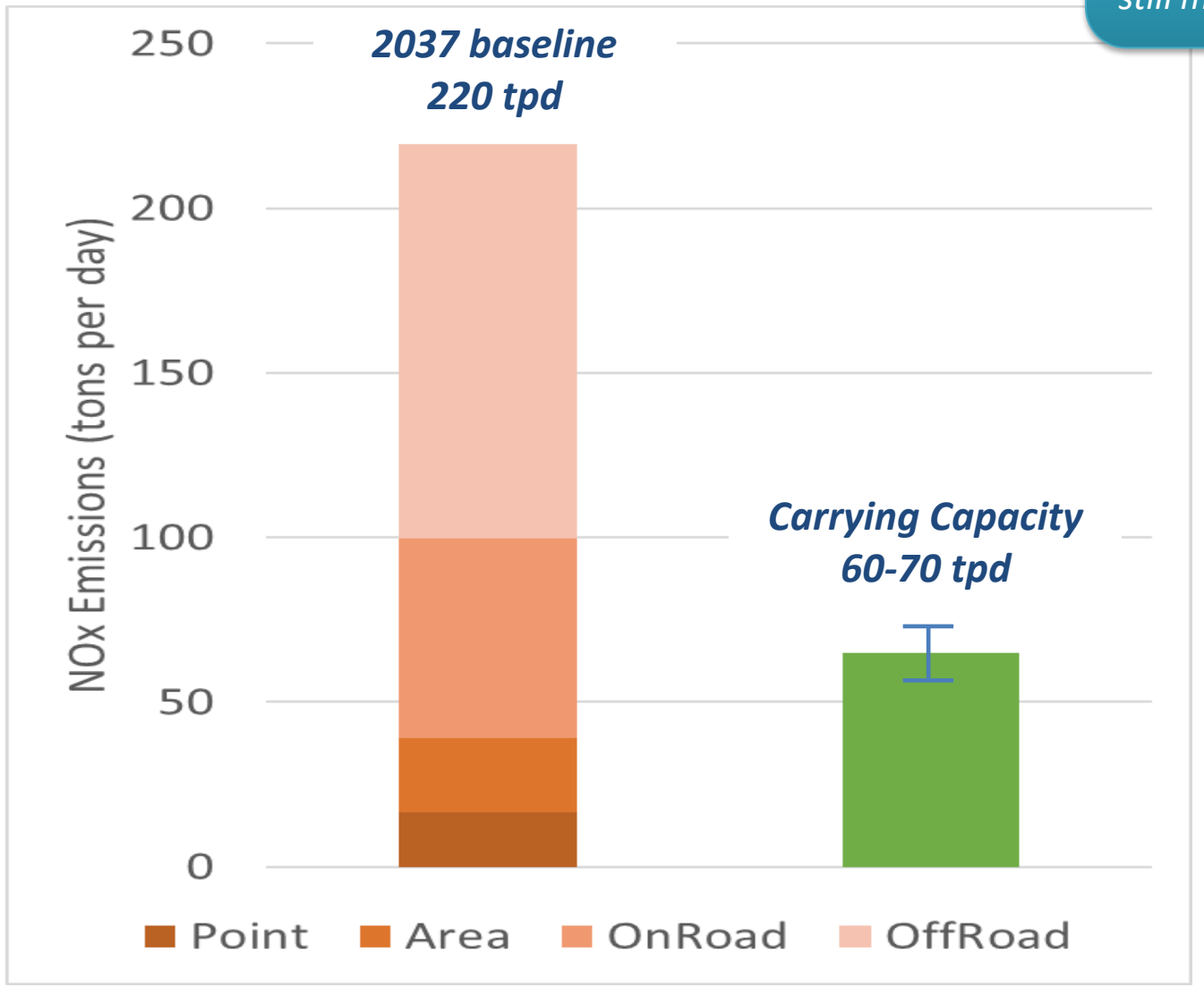
Category specific vs. across-the-board reductions

- Final attainment scenario relies on control factors developed for individual source category
- Emission reductions from specific control measures may differ across the air basin due to where sources are located geographically

Isopleth graphs would not fundamentally change when considered factors above

Preliminary Carrying Capacity for the 70ppb Ozone Standard

Definition of Carrying Capacity:
The total amount of NOx emissions allowable across the air basin while still meeting air quality standards



Summary

- The **only** path to achieve 70 ppb ozone standard requires a strategy primarily focused on NOx reductions
- Current analysis shows that attaining the 70 ppb standard will require about a 70% reduction in NOx beyond baseline conditions
  - South Coast Air Basin's (SCAB) attainment – 2037
  - Coachella Valley's attainment – 2032
- Glendora and San Bernardino are expected to have the highest ozone level in 2037
  - Emission reductions needed for Coachella Valley are still being evaluated with its earlier attainment date
- Greater emission reductions will be required in South Coast if neighboring air basins/states/countries do not also substantially reduce their emissions

Updates on 2022 AQMP Control Measures

AQMP Advisory Group Meeting
Agenda Item #4
November 9, 2021

Summary of Recent AQMP Working Group Meetings

2022 AQMP Working Group - Residential and Commercial Buildings

- Five working group meetings in Dec 2020, Feb, May, June and Sep 2021:
  - ❑ Emission inventory for sources in residential and commercial buildings
  - ❑ 2016 AQMP control measures (CMB-02 and CMB-04) and existing area source rules
  - ❑ South Coast AQMD funded technology demonstration projects and programs
  - ❑ Federal, state, and other local agency programs
  - ❑ Four organizations presented various aspects of building decarbonization
  - ❑ General approaches for 2022 AQMP residential and commercial building control measures

General approaches Presented at the September 2021 Working Group Meeting

- Created individual control measures by commercial and residential sources, by equipment type, and by existing and new buildings
  - More robust analysis for each category
  - Recognizes status of technology and implementation approaches that are unique to each category
- Staff also proposed regulatory and incentive-based approaches for each individual category

CMB-02

- Residential Space Heating in Existing Buildings
- Residential Space Heating in New Buildings
- Commercial Space Heating in Existing Buildings
- Commercial Space Heating in New Buildings
- Residential Water Heaters in Existing Buildings
- Residential Water Heaters in New Buildings
- Large Water Heaters in Existing Buildings
- Large Water Heaters in New Buildings
- Laundry Dryers and Other Appliances

CMB-04

- Residential Cooking Devices in Existing Buildings
- Residential Cooking Devices in New Buildings
- Commercial Cooking Devices in Existing Buildings
- Commercial Cooking Devices in New Buildings

Next Steps

- Continue to identify low-emission and zero-emission technologies and implementation approaches
- Continue technology assessment of various types of devices
- Estimate preliminary emissions reductions for future years
- Continue preliminary write up of residential/commercial building control measures for 2022 AQMP and provide to Working Group for input

2022 AQMP Working Group - Aircraft

- Fourth working group meeting held on August 18
- Topics Covered
  - ❑ Revised draft aircraft emissions inventory (South Coast AQMD)
    - Reflecting FAA's updated operations forecast and recommended future fleet mix
  - ❑ Aircraft emissions impact on high ozone episodes (South Coast AQMD)

Aircraft Working Group Meeting #4 – Key Discussion/Comments

- Impact of newer aircraft on fuel consumptions and emissions
- Need to consider all of the standards (i.e., safety standards)
- Potential strategies to reduce aircraft emissions through new engine standards, and operational improvements and operation of cleaner aircraft at Basin airports
- Significant impact of aircraft operations on the Basin's emissions and ozone air quality
  - Baseline aircraft NOx emissions are about 40% of the air basin's carrying capacity

2022 AQMP Working Group - Ocean-Going Vessels

- Fourth working group meeting held on August 24
- Topics Covered:
  - ❑ Draft update to OGVs emissions inventory (CARB)
  - ❑ OGV retrofit water-in-fuel project update (South Coast AQMD)

OGV Working Group Meeting #4 - Key Discussion/Comments

- Potential reduced benefits of Tier III vessels at low loads and need for additional analysis
- Uncertainty in 2020 OGV emissions as a predictor for future emissions due to COVID impact
- Need to incorporate decarbonization efforts (e.g., IMO EEXI) in future fleet compositions and deployment scenarios
- Significant Tier III penetration not expected until 2030+
- Potential benefits of Water-in-Fuel retrofit technology and need for additional retrofit technology demonstrations

2022 AQMP Working Group - Zero Emission Infrastructure

- First working group meeting held on September 24
- Topics Covered
  - ❑ Regulatory and Infrastructure Landscape (CARB)
  - ❑ Zero-Emission Infrastructure (CEC)
  - ❑ Role of Electric Utilities in MD/HD Transportation Electrification (CPUC)
  - ❑ ZEV Market Development (GO-Biz)

- Goal of Working Group is to develop AQMP Control Measure to study and support ZE infrastructure policymaking and deployment

ZE Infrastructure Meeting #1 Takeaways

- Knowledge and funding gaps exist for ZE Infrastructure, particularly so for MD/HD and Off-Road transportation sectors
- Scale and scope of challenges ahead for ZE Infrastructure transition requires further exploration
- Both fleets and utilities are exploring financial models that best support ZE Infrastructure transition
- Some longer-term statewide transportation electrification planning is underway, but significant additional effort is needed
- What is the role for air districts like South Coast AQMD in this transition to ZE?

2022 AQMP Working Group - ZE Infrastructure Meeting #2

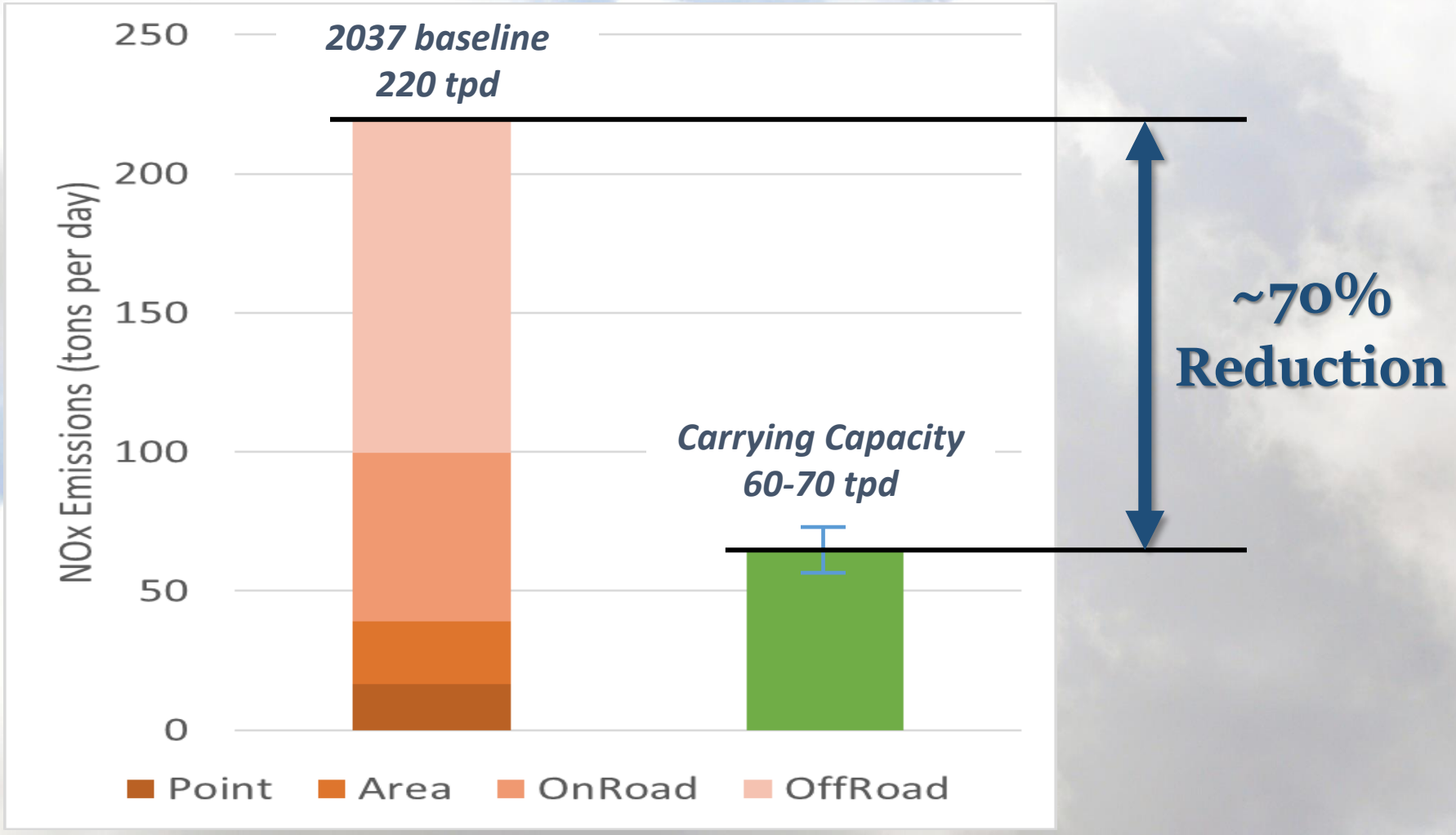
- **Next meeting anticipated in December 2021 – potential focus on the role of utilities**
  - ❑ **What are their planning efforts around the ZE transition specific to the MD/HD, Off-Road sectors along with Commercial/Industrial sectors?**
  - ❑ **Where are the specific funding or informational gaps for utilities that need exploration to better plan for the transition to widespread ZE?**
  - ❑ **What are the near-term and long-term challenges and opportunities for utilities related to MD/HD ZE infrastructure deployments?**

Next Steps

- Next series of Mobile Source Working Group meetings in December/January
  - Aircraft
  - Construction and Industrial Equipment
  - Heavy-Duty Trucks
  - Ocean-Going Vessels
  - Zero Emission Infrastructure

Overview of Upcoming South Coast AQMD Control Measures Workshop

The Challenge



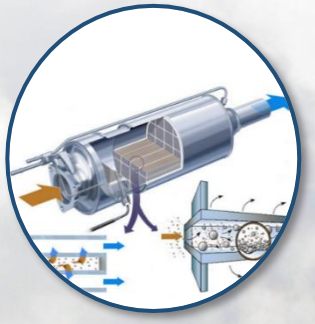
Additional Hurdles

Percent of Carrying Capacity	Example Emission Sources
Millions of appliances & significant regulations already in place	~67% Stationary & Area
Primarily regulated at federal and international level	~40% Aircraft
	~40% Ocean Going Vessels

Some emission sources are difficult to identify new control measures using traditional approaches, yet they make up a substantial part of the inventory

Additional Hurdles – cont'd

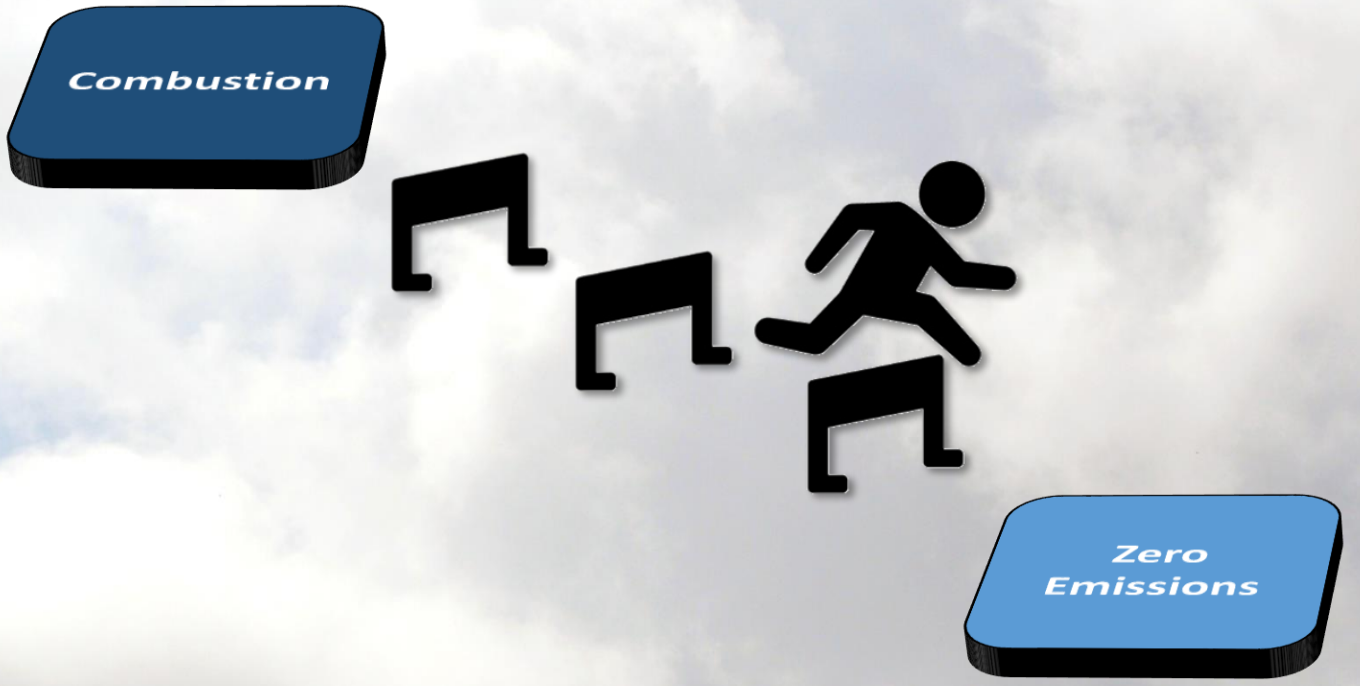
Air quality regulation and planning traditionally relies on additional *tailpipe/exhaust stack controls*, *new engines technology*, or *fuel improvements* tailored to individual use cases



It is not clear how this traditional approach can result in additional ~70% control in South Coast

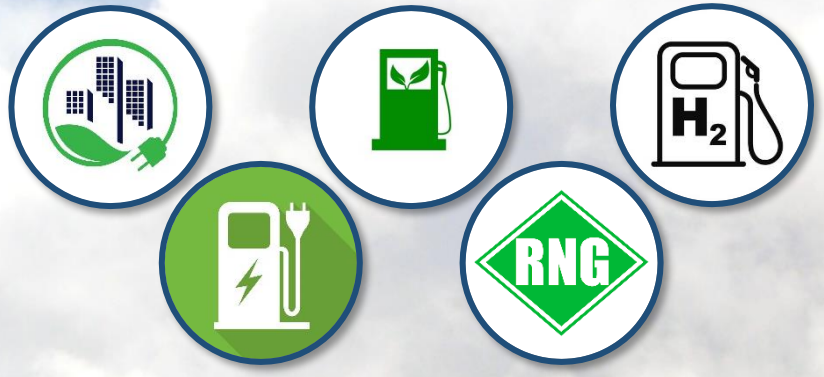
Overcoming the Hurdles

- Only viable solution to achieving 70 ppb ozone standard requires significant push to zero emissions technology
- This approach requires economy-wide transition to different fuels



Key Questions on a Zero Emissions Approach

- Which fuels for which applications?



- What does the pathway look like through time?

- How can this be made most affordable?
  - Ensures adoption at scale, and available equitably across society

Potential Approach for 2022 AQMP

Traditional control measure development

- Maximize implementation of *existing* zero and low NOx technologies
- *New* zero emissions and ultra-low NOx technologies still need to be invented for many use cases (stationary and mobile)

Use flexibility provided by Clean Air Act 182(e)(5)

New analyses and processes needed

- Technology development
  - New funding and programs needed for research, development demonstration, and deployment
- Analysis of fuels switch broadly across sectors
  - Costs of different fuel mixes
  - Identification of new regulations, policies, incentives

Include preliminary analysis in 2022 AQMP and establish future workplans

South Coast AQMD
Control Measures Development

- Ideas developed from many sources:
  - ✓ AQMP Working Groups
  - ✓ Public input
  - ✓ Adopted and proposed measures from previous AQMPs
  - ✓ RACT/RACM analysis
  - ✓ South Coast AQMD staff from several divisions

Control Measures Workshop Overview

- To be held virtually on November 10, 2021
- South Coast AQMD Proposed Control Measures
  - Stationary Sources ← Morning Session
  - Mobile Sources ← Afternoon Session
- CARB's Draft 2022 SIP State Strategy
  - Mobile Sources ← Afternoon Session
  - Area Sources ← Afternoon Session

Workshop - Key Agenda Items

Morning Session

- Overview of 2022 AQMP
- Zero Emissions Technology for Stationary and Mobile Sources
- South Coast AQMD's Proposed Draft NOx Stationary Source Measures
- South Coast AQMD's Proposed Draft VOC Stationary Sources Measures and Other Measures
- Discussion and public comments followed by each agenda item

Afternoon Session

- Overview of 2022 AQMP
- CARB State Strategy for State Implementation Plan Draft Measures
- South Coast AQMD's Proposed Draft Mobile Source Measures
- Discussion and public comments followed by each agenda item

Public Comments / Input

AQMP Advisory Groups

- Q&A and discussion after each agenda item

Control Measures Workshop

- Rescheduled to November 10, 2021; Q&A and discussion after each agenda item

Individual Meetings

- Send requests to AQMPTeam@aqmd.gov

Comment Letters

- Send letters to: AQMPTeam@aqmd.gov by November 30, 2021

Idea Submission Form

- Available at www.aqmd.gov/2022AQMP; Submit your ideas by November 30, 2021