Stationary Source BACM/MSM Control Strategy Analyses

Item #2

AQMP Advisory Group

November 8, 2023

Background

South Coast Air Basin is a “serious” nonattainment area for the 2012 annual PM2.5 standard

Staff initiated development of a new plan to demonstrate attainment of the annual PM2.5 standard by 2030 with a 5-year extension

Staff conducted Best Available Control Measures/Most Stringent Measures (BACM/MSM) analyses consistent with EPA’s guidelines

Five measures were identified to satisfy MSM requirements

Best Available Control Measures (BACM) and Most Stringent Measures (MSM)

BACM

- Required for all “serious” areas
- The maximum degree of emissions reduction achievable from a source or source category
- Must be implemented within 4 years of reclassification (December 9, 2024)
- If cannot be implemented by the due date due to technological and economic infeasibility, no longer BACM

MSM

- Required for “serious” areas that request up to 5 year extension for attainment
- The maximum degree of emissions reduction that has been **required or achieved** from a source or source category in any other attainment plans or in any other states
- Must be implemented no later than 1 year prior to attainment date (December 31, 2029)
- If cannot be implemented by the due date due to technological and economic infeasibility, no longer MSM

Overall Process to Demonstrate BACM/MSM

Step 1

Develop a comprehensive emissions inventory

Step 2

Compare existing rule requirements with those in other districts' rules, guidance documents, etc

Step 3

Identify PCMs where opportunities for further reductions exist

Step 4

Evaluate the technological and economic feasibility of PCMs

Step 5

Determine the earliest date by which a control measure or technology can be implemented in whole or in part

Step 6

Analyze a control measure as potential BACM or MSM

Identification of BACM/MSM

- Staff did not identify any BACM because the measures cannot be feasibly implemented by the December 2024 deadline
- Five measures were identified to satisfy MSM requirements. These measures need to be implemented by December 2029

Measures Meeting MSM Criteria	Target Pollutant
Residential and Commercial Zero NOx Space and Water Heaters	NOx
Commercial Cooking - Charbroilers	PM2.5
Wood-Burning Fireplaces and Wood Stoves	PM2.5
Livestock Waste at Confined Animal Facilities (CAFs)	NH3
Chipped and Ground Greenwaste	NH3

Space and Water Heating Control Measure

- BAAQMD Rules 9-4 and 9-6 require newly sold or installed units to be zero emission

Category	South Coast AQMD Rules 1111, 1121, and 1146.2	BAAQMD Rules 9-4 and 9-6
Residential Space Heating (< 175,000 Btu/hr)	14 ng/J	0 ng/J by 1/1/2029
Residential Water Heating (< 75,000 Btu/hr)	10 ng/J	0 ng/J by 1/1/2027
Commercial Water Heating (≥75,000 Btu/hr and ≤2 MMBtu/hr)	14 ng/J	0 ng/J by 1/1/2031

- PM2.5 Plan includes two measures for residential space and water heaters
  - Zero NOx limit where feasible, low NOx where infeasible for newly sold/installed units
  - Incentives to facilitate deployment of zero emission appliances
- CARB commits to implement this measure as MSM by requiring all space and water heaters sold in California to be zero emission by the beginning of 2030

Technological Feasibility	Economic Feasibility	Emission Reductions*
√	√	2.6 tpd NOx 0.41 tpd PM2.5

* Emission reductions based on CARB's commitment to implement the Zero Emission Space and Water Heaters Measure

Commercial Cooking Control Measure

- Control measure would lower rule applicability threshold for chain-driven charbroilers to match with SJVAPCD Rule 4692

	South Coast AQMD Rule 1138	SJVAPCD Rule 4692
Meat cooked throughput	875 lbs/week	400 lbs/week or 10,800 lbs/year

- The measure also seeks to improve the accuracy of the emissions inventory and evaluate control technology for under-fired charbroilers

Technological Feasibility	Economic Feasibility	Emission Reductions
√	√	TBD

Wood Burning Devices Control Measure

- Staff identified provisions in SJVAPCD Rule 4901 that are potentially more stringent than those in Rule 445
- Rule 445, including PM2.5 contingency measure, was approved by U.S. EPA*
- Control measure is still being evaluated
  - Staff is revisiting exemptions and requirements for U.S. EPA certified stoves and inserts

Technological Feasibility	Economic Feasibility	Emission Reductions
Under evaluation	Under evaluation	TBD

* 87 FR 12866

Livestock Waste Control Measure

- Staff identified more stringent permitting thresholds for dairies and poultry farms in SJVAPCD Rule 4570

	South Coast AQMD Rule 223	SJVAPCD Rule 4570
Applicability Thresholds	1,000 milk cows 650,000 birds	500 milk cows 400,000 birds

- Independent of MSM, this control measure also seeks to introduce mitigation measures to reduce ammonia emissions at CAFs
  - High disturbance soil incorporation of manure within 24 hours
  - Acidifying amendments for poultry litter

Technological Feasibility	Economic Feasibility	Emission Reductions
√	√	TBD

Greenwaste Control Measure

- Control measure seeks NH3 emission reductions from greenwaste applied to lands for groundcover, erosion control, or other landscaping purposes
- Control requires composting of greenwaste in accordance with Best Management Practices (BMPs) in Rule 1133.3 prior to land application
  - Composting in accordance with BMPs results in lower NH3 emissions compared to natural decomposition

Technological Feasibility	Economic Feasibility	Emission Reductions
√	√	TBD

Conclusion

Staff conducted a control strategy analysis consistent with EPA's guidelines

No measures identified as BACM since the measures cannot be feasibly implemented by December 2024

South Coast AQMD is seeking a 5-year extension of the attainment date

- As part of the extension request, South Coast AQMD must demonstrate the implementation of MSM
- Five measures, covering NOx, direct PM2.5, and ammonia sources, were identified to satisfy MSM requirements
- Control measures to pursue emission reductions are under development

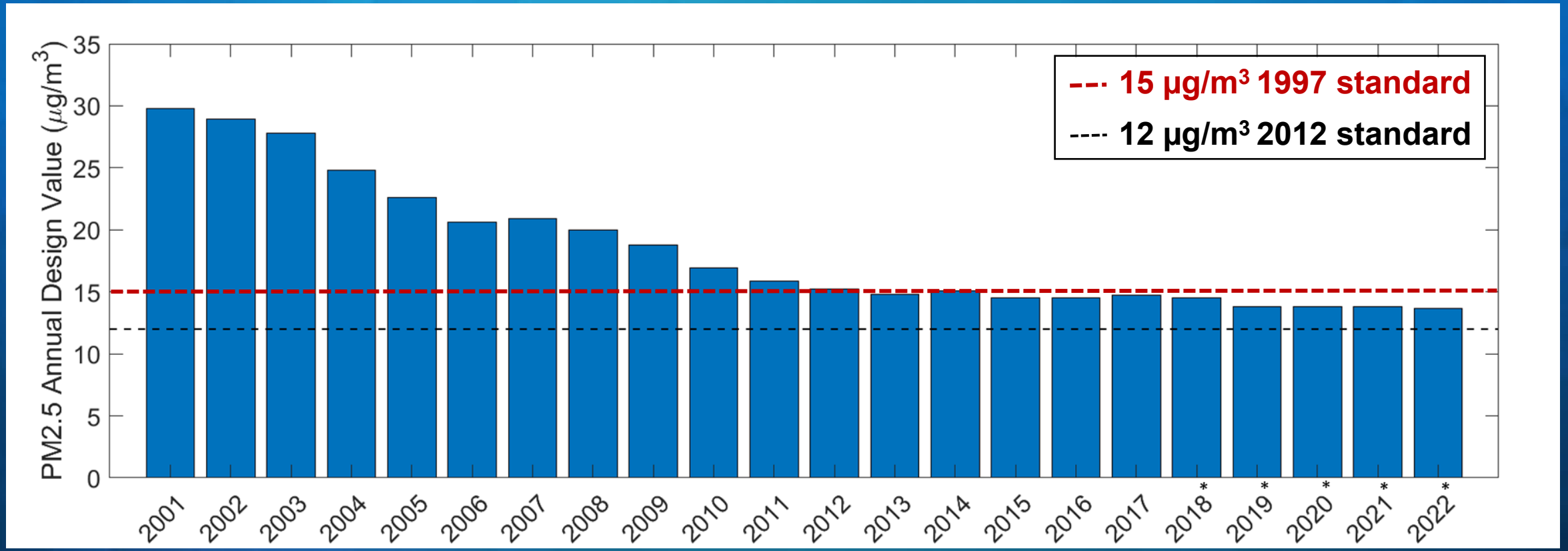
South Coast AQMD's Control Strategy

Item #3

AQMP Advisory Group

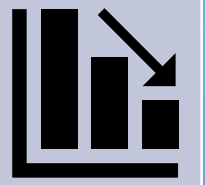
November 8, 2023

Annual PM2.5 Trend in the South Coast Air Basin



*Data likely to be approved as exceptional events by U.S. EPA were removed.

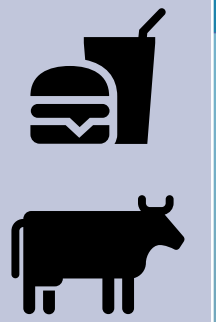
Strategy to Attain Annual PM2.5 Standard



Baseline Reductions

Measures from the 2022 AQMP/SIP that can be implemented by 2030

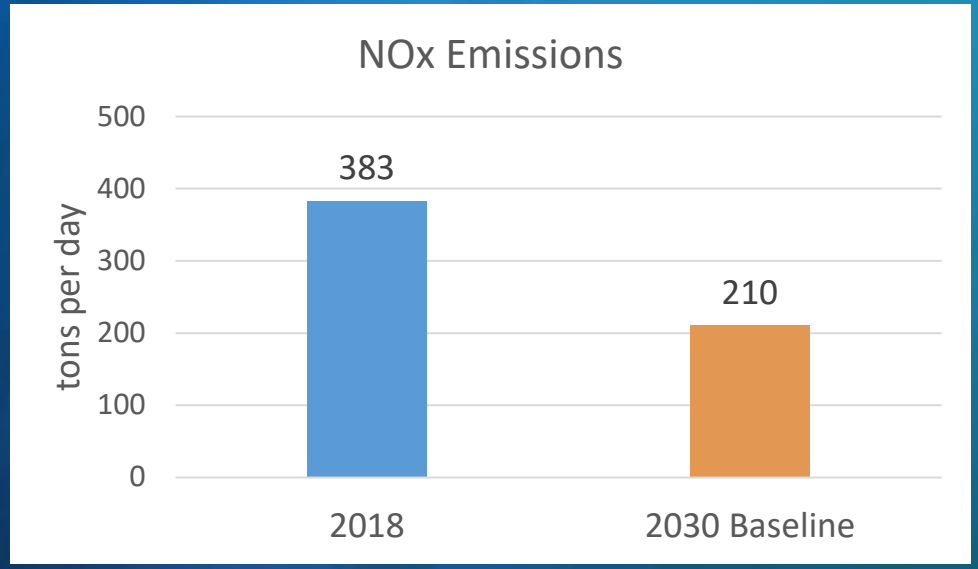
PM co-benefits from adopted NOx regulations

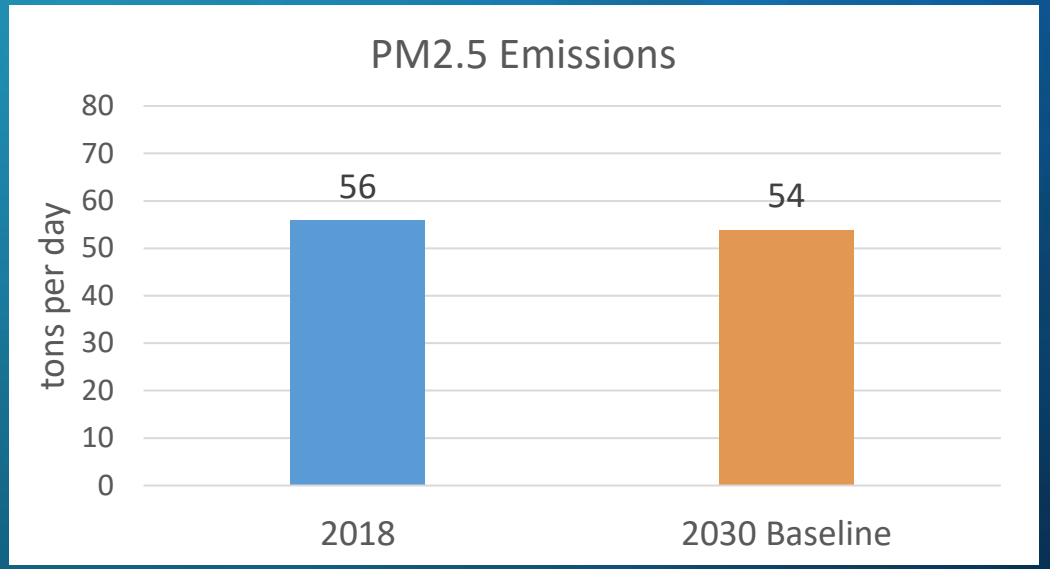


Limited PM2.5 and NH3 measures due to MSM requirements

Baseline (Business-As-Usual) Reductions

- Baseline emissions continue to decrease due to ongoing implementation of existing regulations
- The baseline reflects:
  - South Coast AQMD regulations adopted by October 2020 and Rule 1109.1
  - CARB's regulations adopted by December 2021 such as Heavy-Duty Vehicle Inspection/Maintenance and Small Off-Road Equipment regulations





Applicable Measures From The 2022 AQMP/SIP That Are Expected to Reduce Emissions by 2030

South Coast AQMD Stationary Sources

- Zero emission building measures*
- Transition to zero and low NOx in large combustion sources, including reductions from Emergency Standby Engines and others

South Coast AQMD Mobile Sources

- Incentive programs for mobile sources
- On-going implementation of facility-based measures

* Residential space and water heating measures are overlapped with CARB's commitments

Stationary Source Control Measures

- Seven NOx measures with implementation by 2030

Emission Reductions from Residential Water Heating*

- Based on 2022 AQMP control measure R-CMB-01
- NOx reductions from residential water heaters that are subject to Rule 1121
- Zero NOx limit where feasible, low NOx where infeasible

Emission Reductions from Residential Space Heating*

- Based on 2022 AQMP control measure R-CMB-02
- NOx reductions from residential space heaters regulated by Rule 1111
- Zero NOx limit where feasible, low NOx where infeasible

* CARB commits to implement these measures as MSM by December 2029 as well
Emission reductions are based on CARB's commitment to implement the Zero Emission Space and Water Heaters Measure

Stationary Source Control Measures (cont'd)

Emission Reductions from Residential Cooking Devices

- Based on 2022 AQMP control measure R-CMB-03
- Replace existing gas burners with electric cooking devices or low NOx gas burners

Emission Reductions from Residential Other Combustion Sources

- Based on 2022 AQMP control measure R-CMB-04
- NOx reductions from other residential combustion sources (e.g., laundry dryer, BBQ grill, swimming pool pump, etc.)

Stationary Source Control Measures (cont'd)

Emission Reductions from Emergency Standby Engines

- Based on 2022 AQMP control measure L-CMB-04
- Maximize PM2.5 and NOx emission reductions by requiring the use of renewable diesel as a drop-in replacement for CARB diesel fuel for all emergency ICEs not equipped with Tier 4 Final controls

Emission Reductions from Diesel Electricity Generating Facilities

- Based on 2022 AQMP control measure L-CMB-06
- Implement near-zero and zero emission technologies and require the use of renewable diesel in engines used for backup power

Emission Reductions from Incinerators

- Based on 2022 AQMP control measure L-CMB-09
- Reduce NOx emissions by replacement or retrofits with zero emission and low NOx technologies on incinerators as well as better control of NH3 injection used to control NOx

South Coast AQMD Mobile Source Measures

- Total emission reductions potentially applicable to this PM2.5 Plan from 2022 AQMP are in development

Emission Reductions From Incentive Programs

- Based on 2022 AQMP control measures (e.g., MOB-05 and MOB-11)
- Incentivizes vehicle/equipment replacements, installation of retrofit units, and engine repowers using various funding programs

Facility-Based Mobile Source Measures

- Based on 2022 AQMP control measures (MOB-01, 02, 03, 04)
- Includes regulatory and non-regulatory approaches for different goods movement facility categories

Other Measures

PM co-benefits from adopted NOx regulations

- Shutdown or improved efficiency from facilities subject to NOx regulations

Limited PM2.5 and NH3 measures

- Identified as MSM
- Required to implement by U.S. EPA

Preliminary Control Measure Reduction Summary

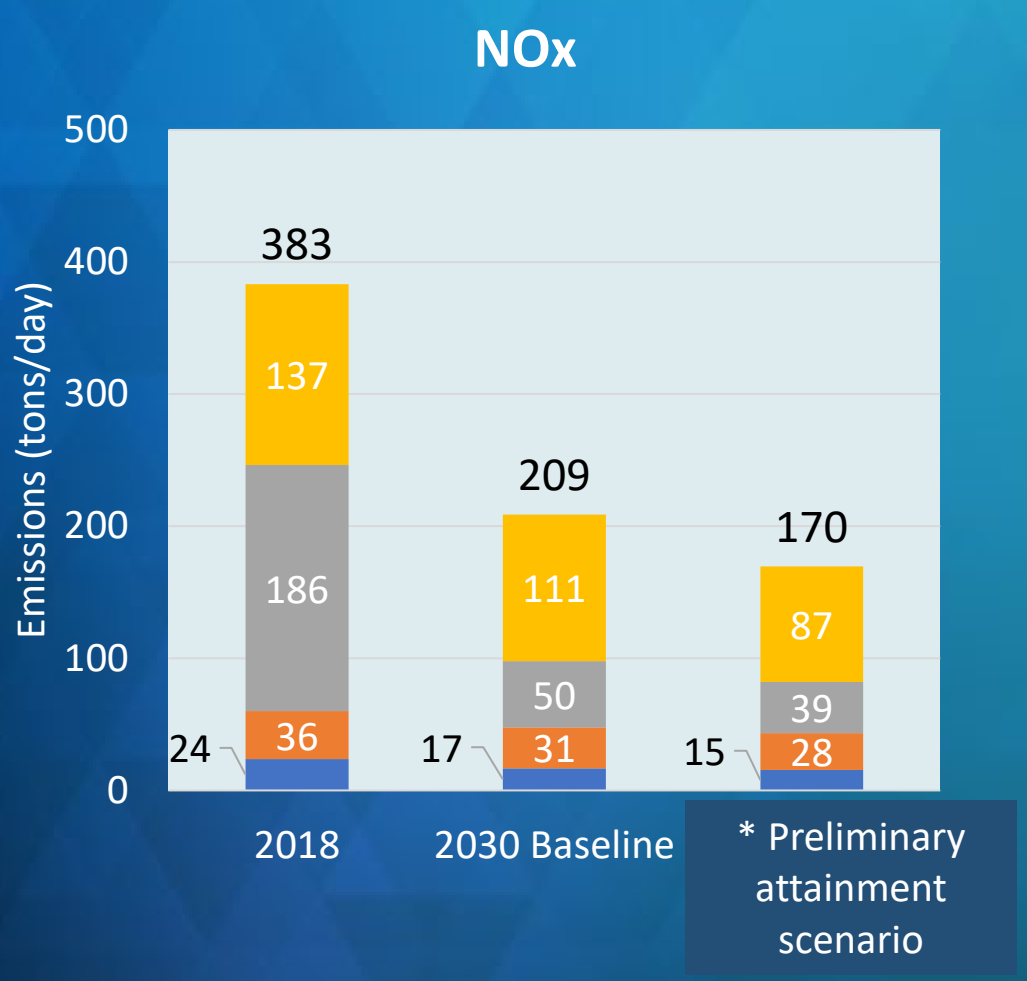
- South Coast AQMD and CARB commit to achieve the emission reductions in aggregate by 2030
- The reductions are estimates and subject to revision

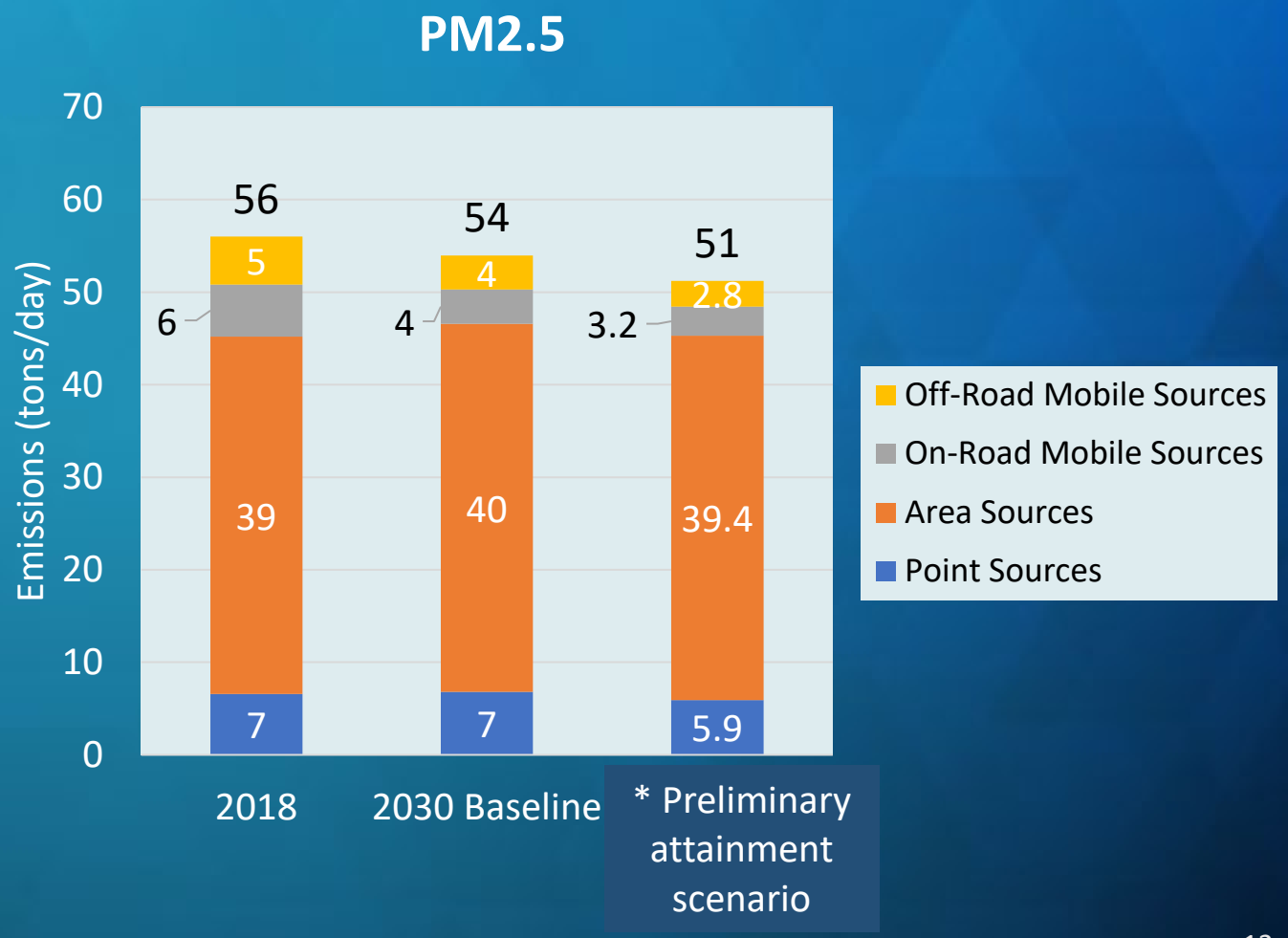
	NOx (tpd)	PM2.5 (tpd)
South Coast AQMD Stationary Sources^	1.8	0.9
South Coast AQMD Mobile Sources	7.2	0.2
CARB Stationary Sources	2.5	0.4
CARB Mobile Sources*	27.1*	1.0*
U.S. EPA's Clean Trucks Plan	0.6	-
Total Reductions (All Measures)	**39.2**	**2.5**

^ Stationary source control strategy reductions include 0.86 tpd of PM2.5 co-benefits associated with adopted NOx regulations

* Includes recently adopted measures such as CARB's ACC II, TRU I and Locomotive regulations

Draft Emission Changes from 2018 to Attainment Scenario





Looking Forward – U.S. EPA's Proposed Annual PM2.5 NAAQS

- In January 2023, the U.S. EPA proposed a stronger annual PM2.5 standard, aiming for 9 and 10 µg/m^3. This rule is still pending finalization.
- South Coast Air Basin is expected to be designated as nonattainment with this new standard, with attainment likely by the mid-2030s
- Neither this PM2.5 Plan not the 2022 AQMP strategy will be sufficient for a tighter standard. Achieving the new standard will require a new plan with direct PM2.5 reductions alongside continued NOx reduction efforts.

SIP Development Public Process

Spring-Fall 2023
- AQMP & STMPR Advisory Group Meetings

Early 2024
- Release of a Draft Plan for Public Review and Comments

Early 2024
- Regional Public Hearings

Spring 2024
- Public Hearing for South Coast AQMD Board consideration

Summer 2024
- CARB consideration and submittal to EPA

Conclusion

- Staff is continuing to develop the Plan to attain the 2012 annual PM2.5 national air quality standard by 2030
- Recent analysis has refined staff's approach to control measures for this Plan
  - Previously adopted control measures in the 2022 AQMP are anticipated to provide sufficient reductions to attain the standard by 2030
  - Some limited new control measures will still be required to satisfy U.S. EPA requirements to be no less stringent than other areas
- Work on the PM2.5 Plan will continue and a draft will be released early next year with opportunity for public participation

CALIFORNIA
AIR RESOURCES BOARD

CARB Control Strategy and MSM Analysis for the South Coast 12 µg/m³ PM2.5 SIP

South Coast AQMD Advisory Group
November 8, 2023

2022 State SIP Strategy

- Adopted on September 22, 2022
- Includes unprecedented variety of new State measures to reduce emissions using all mechanisms available
- Identifies the level of action needed to meet air quality standards and protect public health
- Drives pace and scale of CARB rulemakings
- Includes measures applicable for annual PM2.5 standard attainment

2022 State SIP Strategy PM2.5 Commitment

On-Road
Advanced Clean Fleets Regulation*
Zero-Emissions Trucks Measure
On-Road Motorcycles New Emissions Standards
Clean Miles Standard*

Off-Road
Tier 5 Off-Road Engine Standard
Amendments to In-Use Diesel-Fueled Fleets Regulation*
Zero-Emission TRU (Part II)
Commercial Harbor Craft Amendments*
Cargo Handling Equipment Amendments

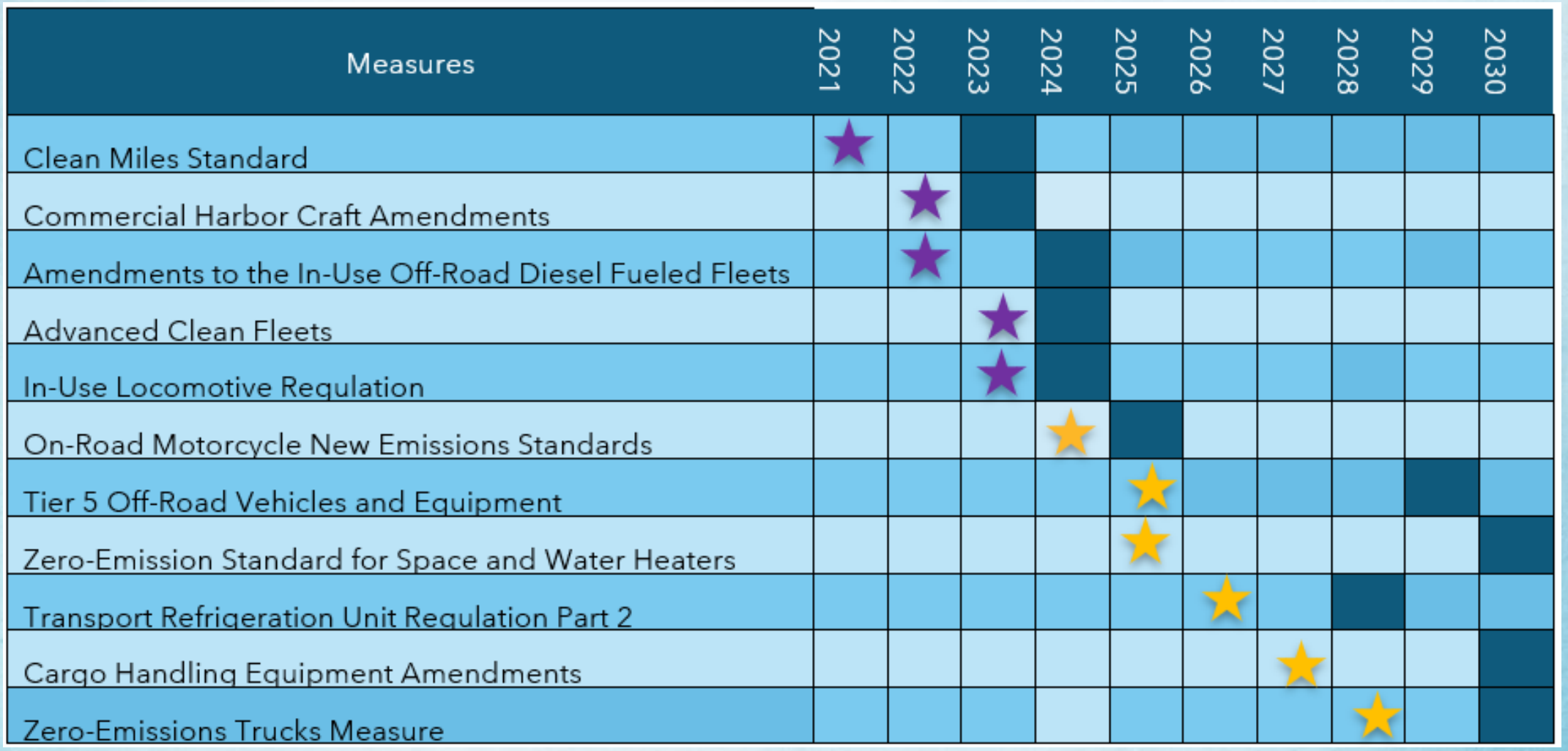
Primarily Federally-Regulated
In-Use Locomotive Regulation*

Other
Zero-Emission Standard for Space and Water Heaters

CARB

* Regulations already adopted

Measure Schedule



Preliminary 2030 South Coast Emissions Reductions Estimates

2016 State SIP Strategy Measures	2030 NOx (tpd)	2030 PM2.5 (tpd)
Advanced Clean Cars II	1.4	0.1
Transport Refrigeration Unit Part I	0.3	0.1
Zero-Emission Forklift	0.8	>0,1
Emissions Reductions	2.6	0.2

2022 State SIP Strategy Measures	2030 NOx (tpd)	2030 PM2.5 (tpd)
On-Road Heavy-Duty		
Advanced Clean Fleets Regulation	4.7	<0.1
Zero-Emissions Trucks Measure	2.9	<0.1
Total On-Road Heavy-Duty Reductions	7.7	0.1
On-Road Light-Duty		
On-Road Motorcycle New Emissions Standards	0.1	<0.1
Clean Miles Standard	<0.1	<0.1
Total On-Road Light-Duty Reductions	0.2	<0.1
Off-Road Equipment		
Tier 5 Off-Road Vehicles and Equipment	0.2	<0.1
Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation	1.9	0.1
Transport Refrigeration Unit Regulation Part 2	1.7	<0.1
Commercial Harbor Craft Amendments	2.0	<0.1
Cargo Handling Equipment Amendments	0.7	<0.1
Total Off-Road Equipment Reductions	6.7	0.2
Other		
Zero-Emission Standard for Space and Water Heaters[1]	2.5	0.4
Total Other Reductions	2.5	0.4
Primarily-Federally and Internationally Regulated Sources – CARB Measures		
In-Use Locomotive Regulation	9.9	0.2
Total Primarily-Federally and Internationally Regulated Sources – CARB Measures Reductions	9.9	0.2
Emissions Reductions	27.1	1.0

CARB

CARB MSM Analysis

- Analysis of CARB's measures for the Most Stringent Measure (MSM) requirements include
  - Measures currently being implemented in other States
  - Measure suggestions during public process
  - An assessment of stringency and feasibility
- CARB has previously demonstrated MSM
- Complements District MSM Analysis

Preliminary Conclusion

CARB control program meets MSM requirements for the South Coast

Category	Type of Controls	Conclusion
On-road Light-Duty	New Vehicle/Engine Standard	MSM
	In-use Emissions Control (fleet/testing/idling)	MSM
	Fuels	MSM
On-road Medium & Heavy-Duty	New Vehicle/Engine Standard	MSM
	In-use Emissions Control fleet/testing/idling)	MSM
	Fuels	MSM
Off-Road	New Vehicle/Engine Standard	MSM
	In-use Emissions Control (fleet/testing/idling)	MSM
	Fuels	MSM
Space/Water Heaters	Emissions Standard	MSM

Contacts

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- General SIP Questions: SIPplanning@arb.ca.gov

https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy

Attainment Demonstration

Item #5

AQMP Advisory Group

November 8, 2023

SIP Attainment Demonstration Approach

The SIP modeling traditional approach uses a regional chemical transport model such as CMAQ

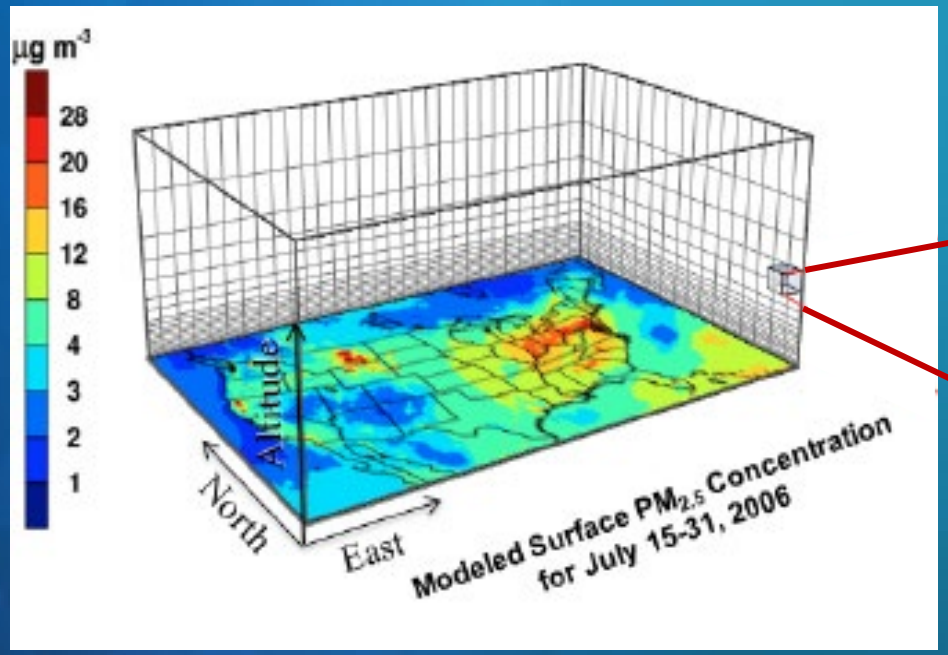
Regional modeling is appropriate to capture neighborhood and regional phenomena

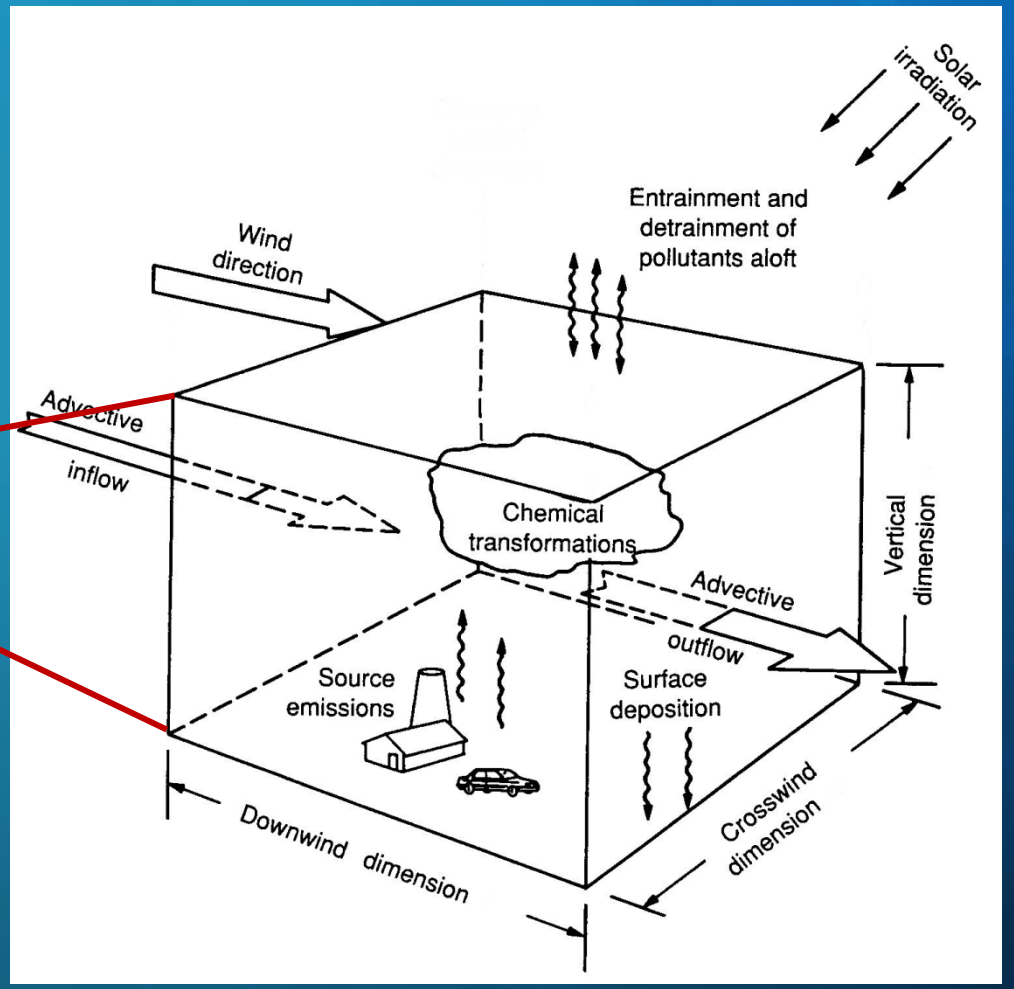
A near-road monitor is largely affected by nearby road sources

Dispersion modeling is more appropriate to simulate near-source impact

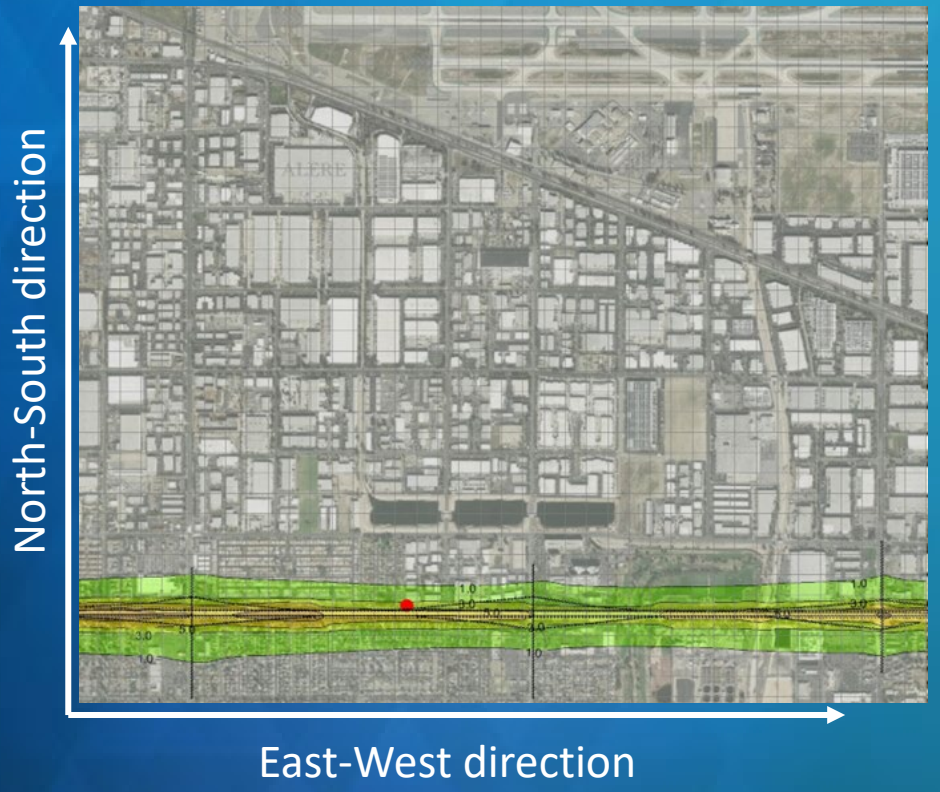
Chemical Transport Modeling

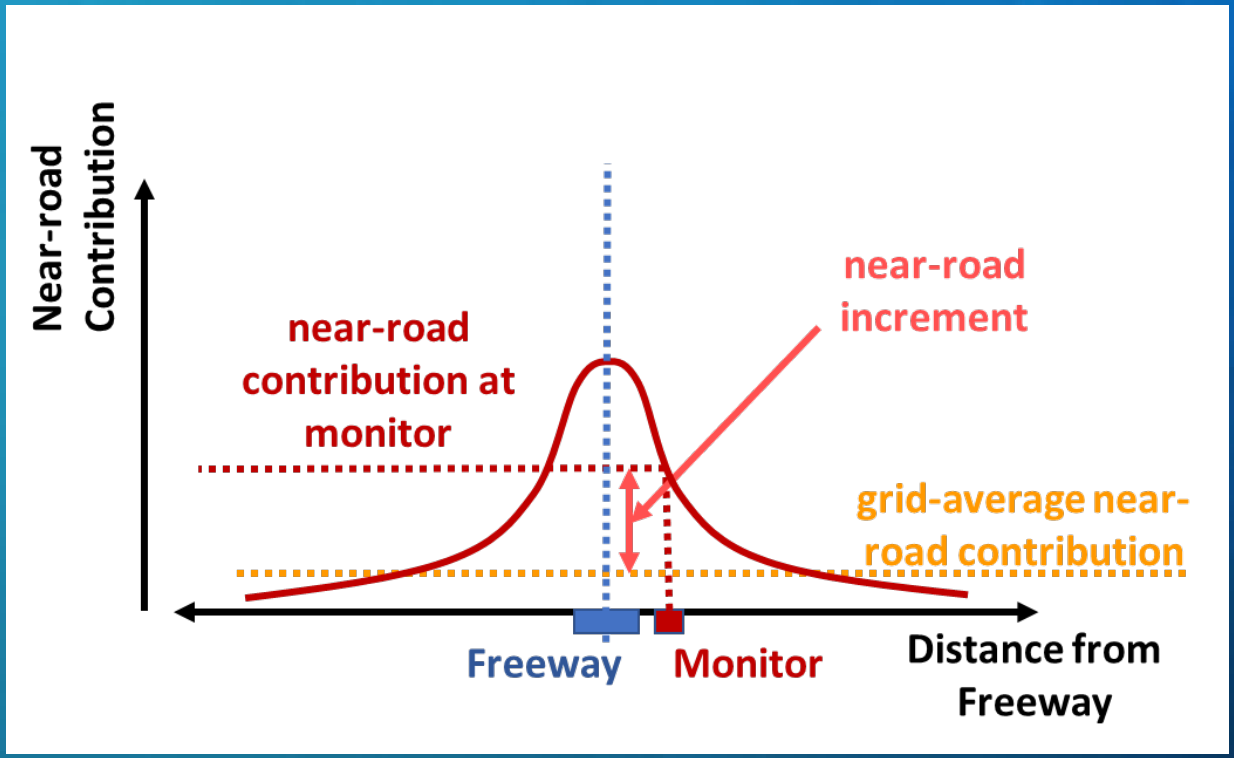
- Computer models are used to simulate meteorology, emissions and air pollutant transformation and transport





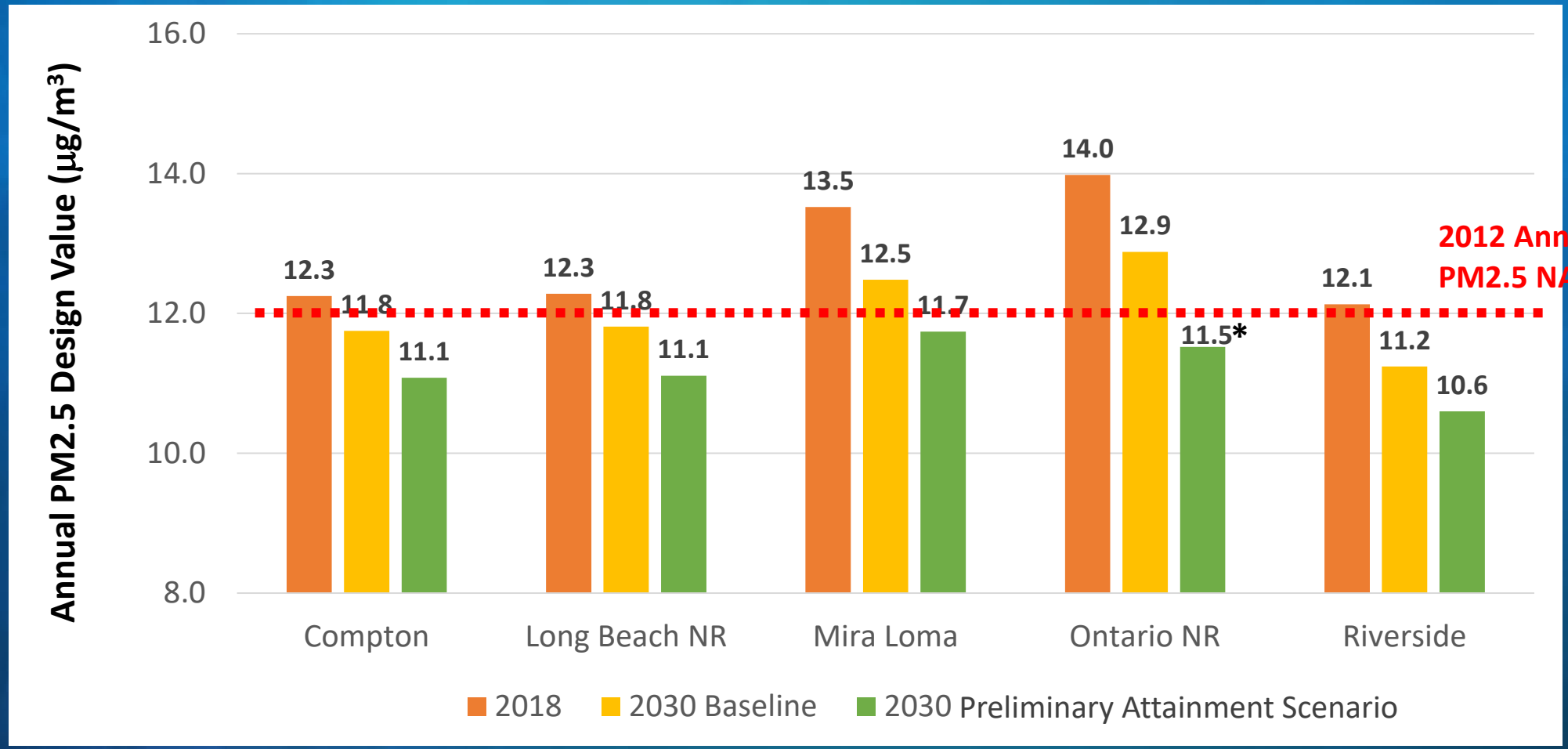
Design Value Calculation using Hybrid Approach





- AERMOD dispersion modeling was employed for the near-road increment portion
- CMAQ regional chemical transport modeling was employed for the grid average portion

Preliminary Future Annual PM2.5 Concentrations



* DV calculated using a hybrid modeling approach

Summary

- Regional photochemical modeling system was employed to demonstrate attainment of the 2012 annual PM2.5 standard for the Basin except Ontario CA-60 location
- A hybrid modeling approach using the regional model and a dispersion model was developed and applied to the Ontario CA-60 location
- Our traditional SIP regional modeling and a hybrid approach indicate that all locations in the South Coast Air Basin will meet the 2012 annual PM2.5 standard in 2030 with the controls proposed in this Plan