Emissions Inventory and Air Quality Modeling

Item #2

AQMP Advisory Group

July 13, 2023

Emissions Inventory

- Emission inventory based on the 2022 Air Quality Management Plan
- The only update is the switch in the on-road mobile sources from EMFAC2017 to EMFAC2021

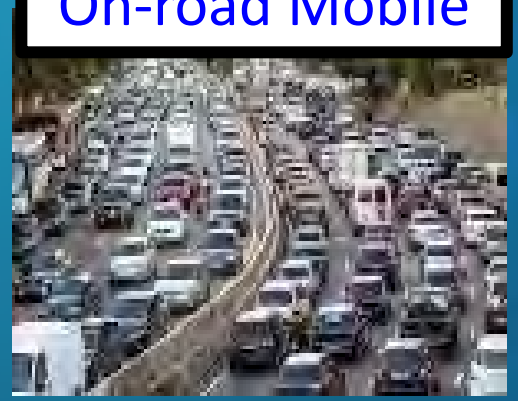
Area

Same as 2022 AQMP

Point

Same as 2022 AQMP

On-road Mobile



Updated with EMFAC2021

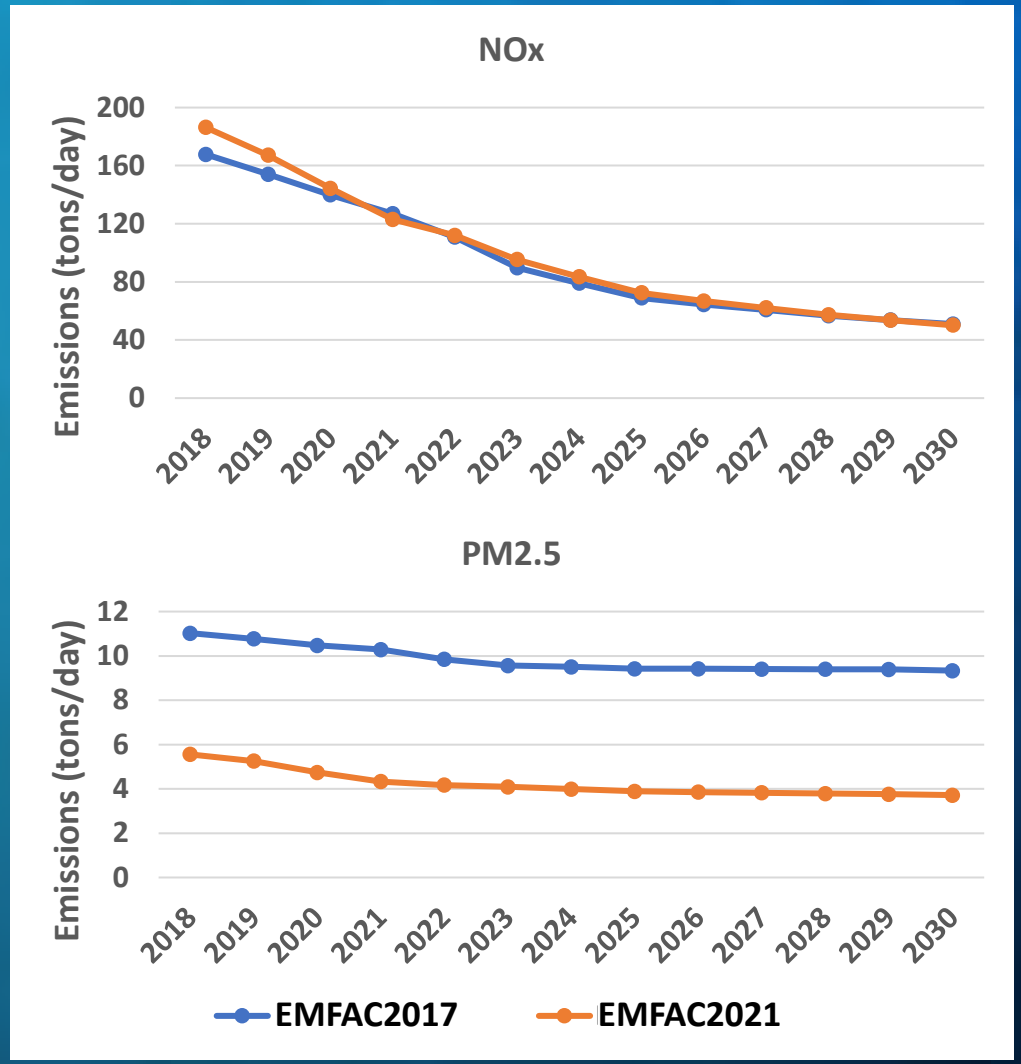
Off-road Mobile

Minor Correction in Offroad Equipment

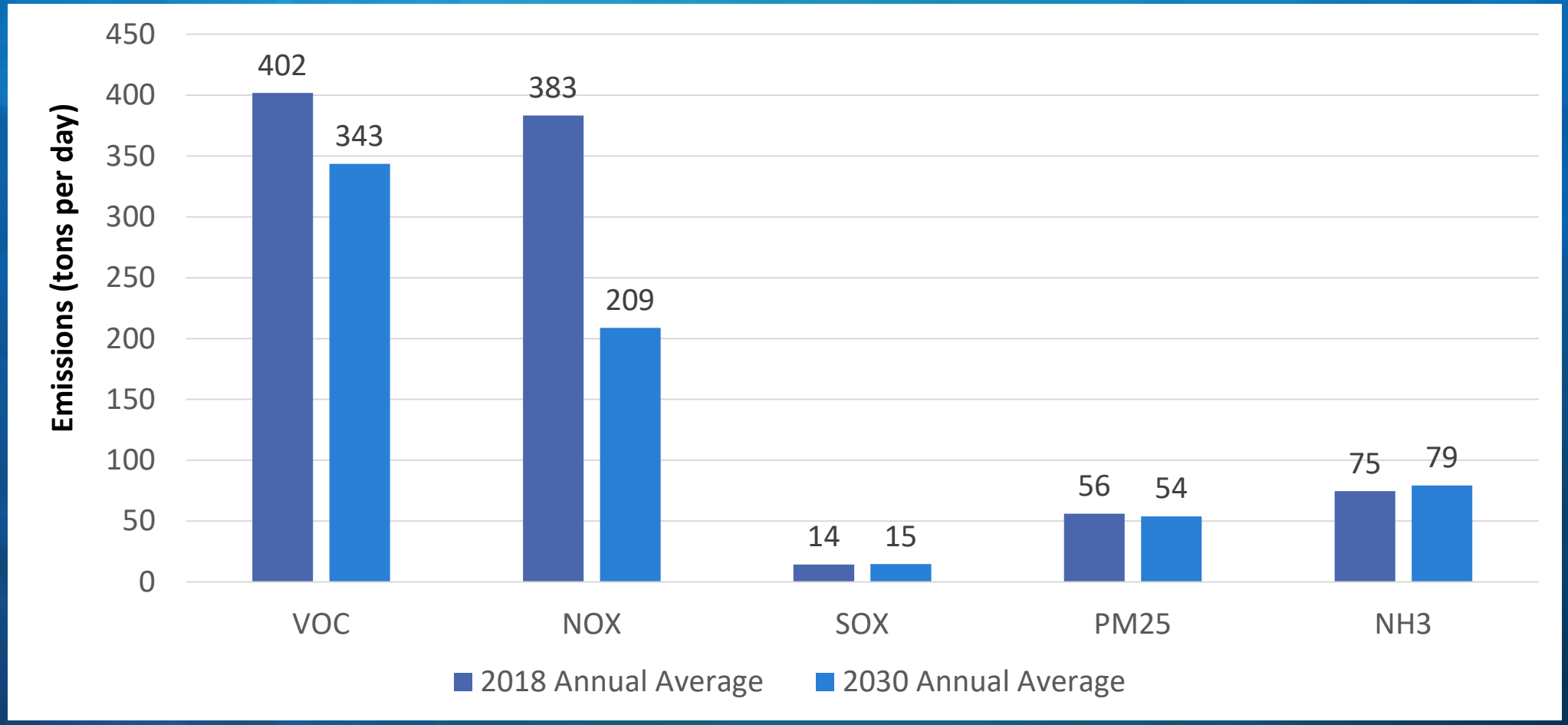
EMFAC2021 Updates

Updates that have a high impact on emissions:

- Medium heavy-duty trucks are older than what was assumed in EMFAC2017, based on DMV data
- Light-duty vehicles have higher exhaust emissions, based on new vehicle test data
- PM brake-wear emissions substantially reduced based on new updated data and speed correction factors

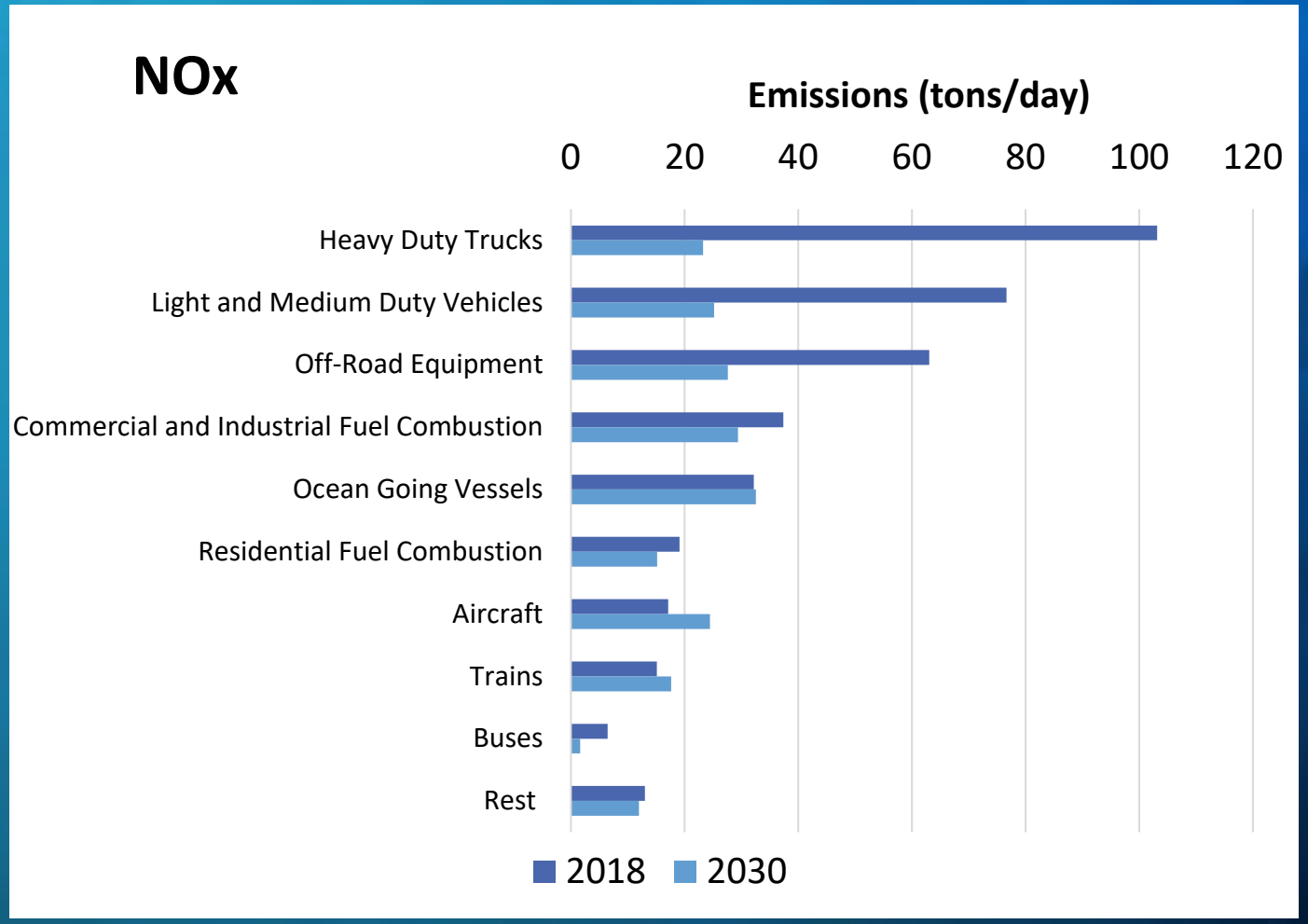


Baseline Basin-Wide Emissions



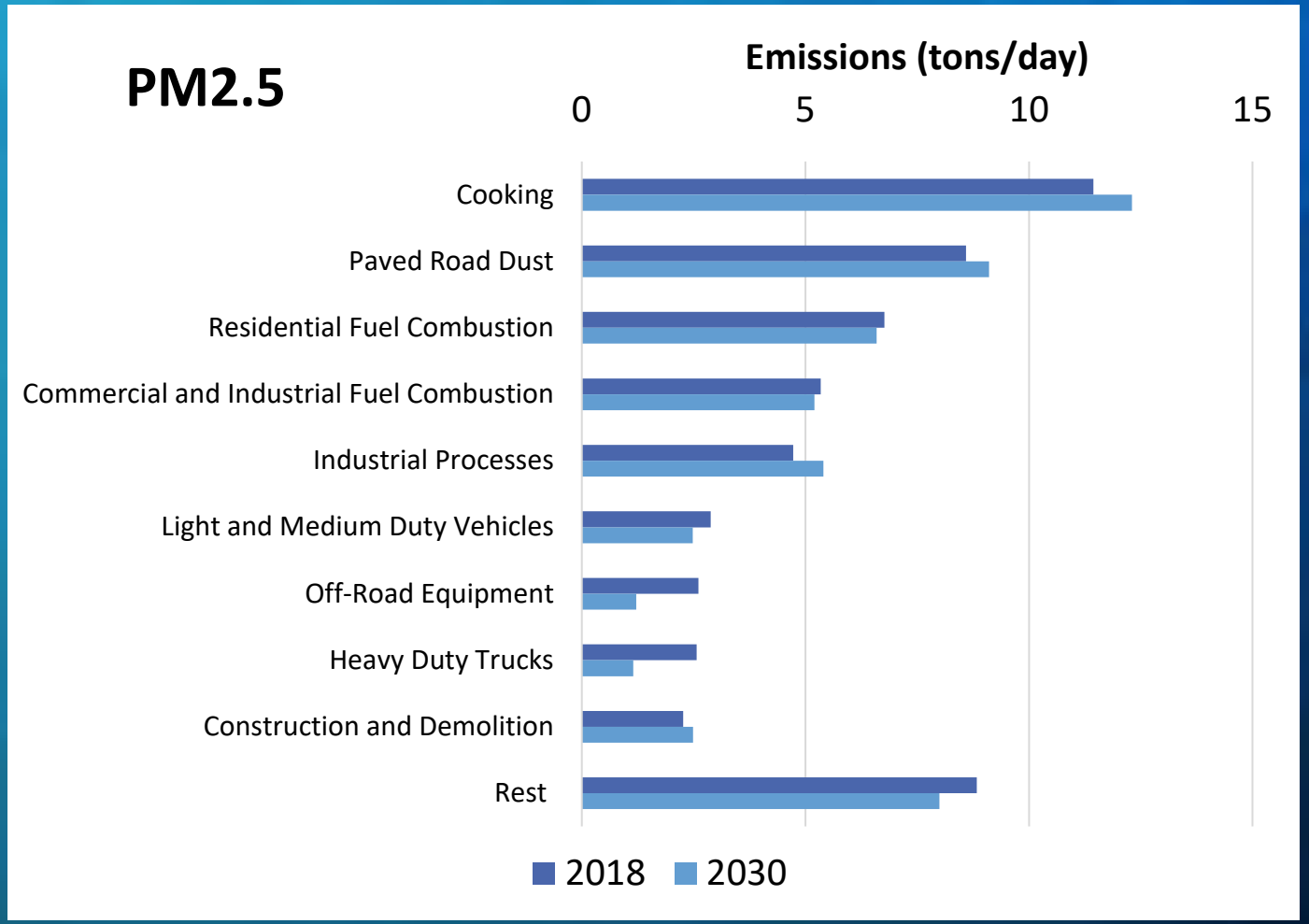
Top Sources of Emissions

- NOx emissions are dominated by mobile sources
- NOx emissions projected to decrease significantly due to ongoing implementation of adopted regulations and programs



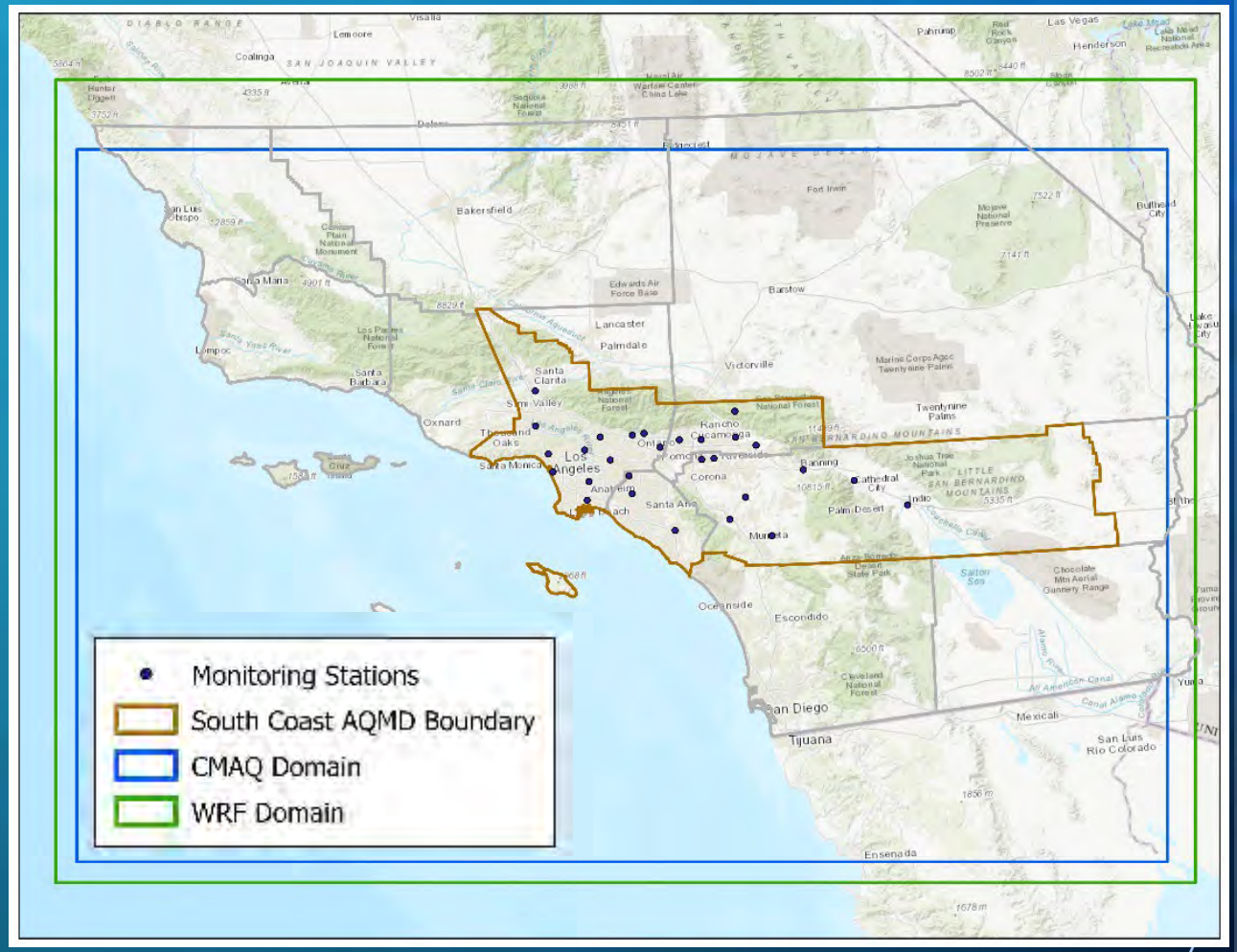
Top Sources of Emissions

- Direct PM2.5 emissions are dominated by area sources
  - Emissions from area sources are not expected to change drastically from 2018 to 2030
  - Emissions from cooking and paved road dust are expected to increase proportionally to population and VMT growth



Air Quality Modeling Framework

- Base and Future attainment years are 2018 and 2030
- Modeling domain size and spatial resolution are the same as the 2022 AQMP modeling framework
- Updated to a newer version of models
  - Meteorological model, WRF version 4.4.2 with Pleim-Xiu land-surface model
  - Chemical transport model, CMAQ version 5.3.3
- Biogenic emissions were adjusted to the updated meteorological simulations



Stationary Source BACM/MSM Control Strategy Analyses

Item #3

AQMP Advisory Group

July 13, 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

EPA recommends that plan development begin with control strategy analysis known as Best Available Control Measures (BACM) based on a comprehensive Emissions Inventory (EI)

* 88 FR 34093

BACM and MSM

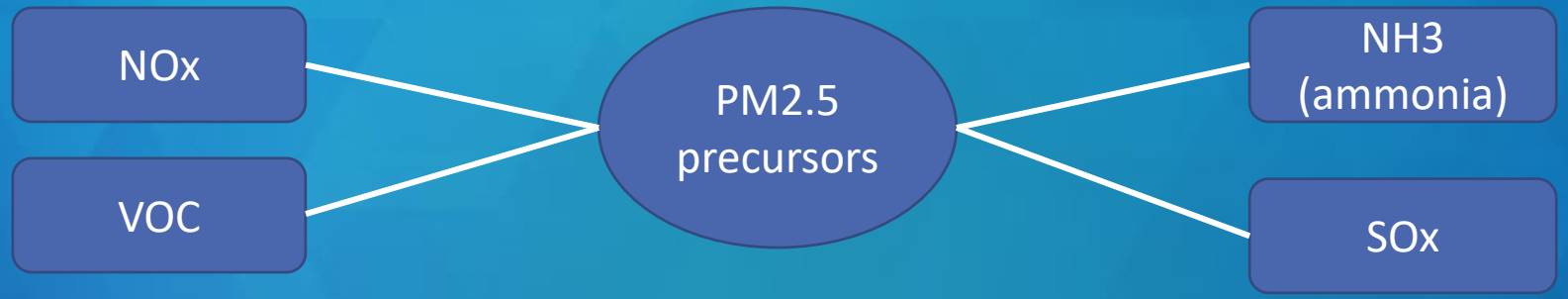
Best Available Control Measures (BACM)

- BACM required for all “serious” areas
- Requires application of stringent criteria for assessing feasibility
- Must be implemented within 4 years of reclassification

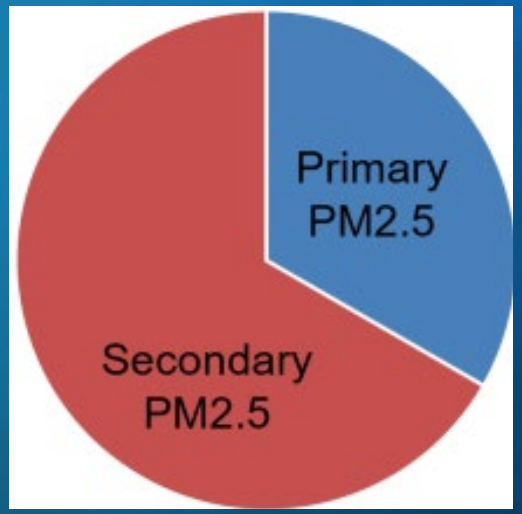
Most Stringent Measures (MSM)

- MSM required for “serious” areas that request up to 5 year extension for attainment
- Most stringent criteria applied for assessing feasibility
- Must be implemented no later than 1 year prior to attainment date

PM2.5 Precursors and Composition



- PM2.5 is both directly emitted and formed secondarily via reactions of precursors in the atmosphere
- Approximately 1/3 of the PM2.5 in the Basin is directly emitted while the remainder is secondary



South Coast Air Basin PM2.5 Composition

Precursor Demonstration

Precursor demonstration can be used to exclude PM2.5 precursors from control measures, RFP, contingency and other planning requirements

- Must demonstrate that precursor's contribution to PM2.5 is insignificant

BACM/MSM only needs to consider precursors with significant contribution to PM2.5

Preliminary results show that VOC and SOx have less contribution to PM2.5 than NOx and NH3

- Therefore, current analysis evaluated potential control measures for NOx, NH3 and direct PM2.5

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 Potential Control Measures (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

The process to identify potential BACM and MSM is similar. Distinction lies in the criteria for assessing feasibility

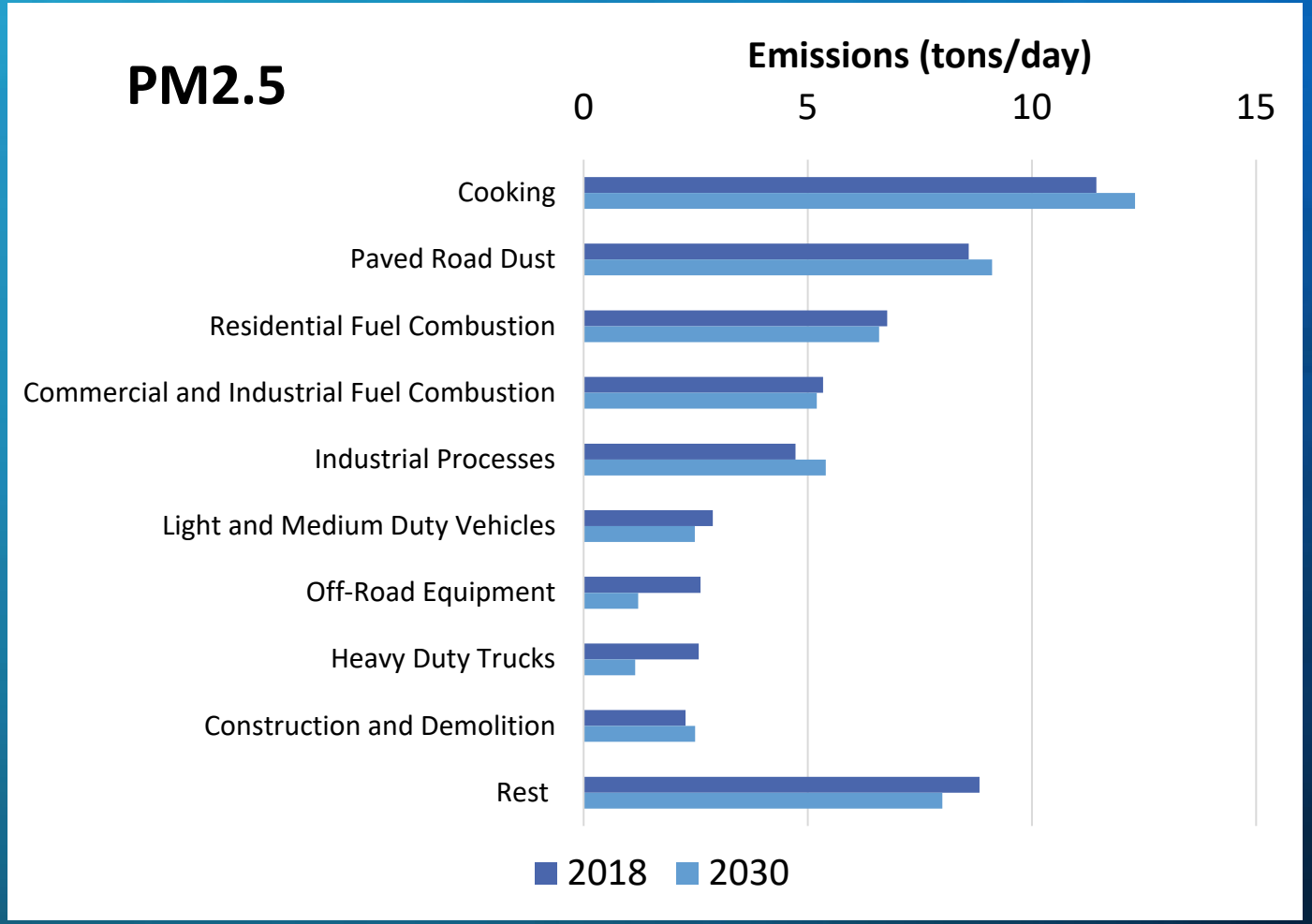
Feasibility Assessment

- Each measure will be assessed for technological and economic feasibility consistent with EPA's criteria

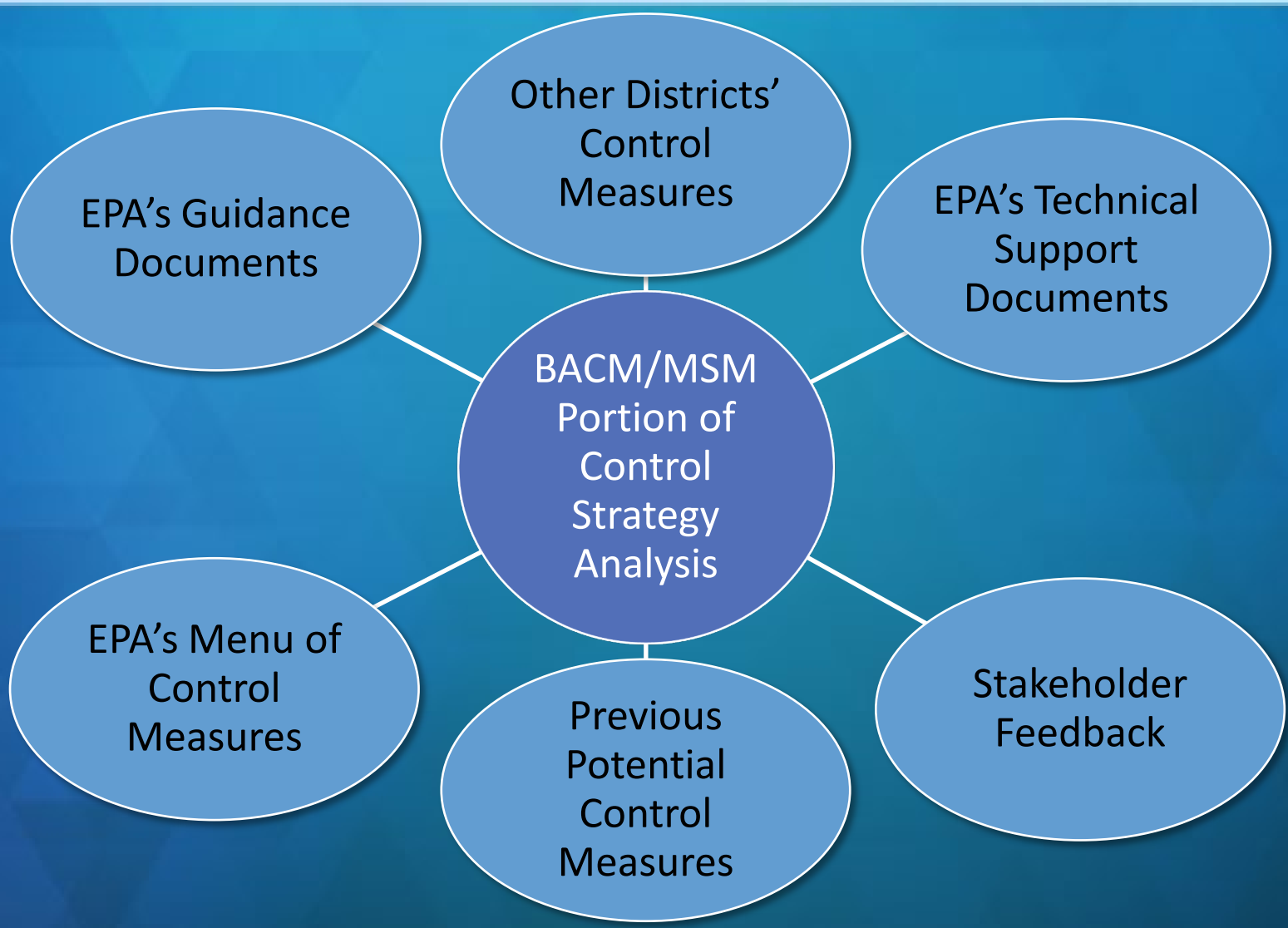
Technological Feasibility	Economic Feasibility
• Determine if a potential opportunity to reduce emissions is viable for facilities given operating needs and restrictions	• Cost analysis conducted to evaluate the economic reasonableness of an air pollution control measure or technology, considering factors beyond cost-effectiveness

Key Stationary Source Categories for PM2.5 Emissions

- Direct PM2.5 emissions have the significant impact on ambient PM2.5 levels
  - Other PM2.5 precursors such as NOx chemically react to PM2.5 and contribute to ambient PM2.5 too
- Emissions inventory indicates that commercial cooking, paved road dust, and residential fuel combustion are major sources of direct PM2.5
- While these source categories were identified for in-depth analysis, BACM/MSM must analyze all source categories



Identification of BACM and MSM



Other Districts' Control Measures

- Staff analyzed other air districts' rule requirements and attainment plans to identify provisions that are more stringent than South Coast AQMD rules
- Resulted in identification of five PCMs

PCM #	Potential Control Measure (PCM)	Target Pollutant	Description	South Coast AQMD Applicable Rule
1	Further Emission Reductions from Wood Burning Fireplaces and Wood Stoves	PM2.5	Revisit low-income exemption and incorporate remodel and resale provisions to match the stringency in Bay Area AQMD (BAAQMD) and San Joaquin Valley APCD (SJVAPCD) rules	Rule 445
2	Emission Reductions from Replacement with Zero NOx Appliances in Commercial and Residential Applications	NOx	Require zero NOx emission limits to align with BAAQMD Regulation 9, Rules 6 and 8	Rules 1111 and 1121

Other Districts' Control Measures (cont'd)

PCM #	Potential Control Measure (PCM)	Target Pollutant	Description	South Coast AQMD Applicable Rule
3	Emission Reductions from Confined Animal Facilities (CAFs)	NH3	Lower the threshold to require a permit to match that in SJVAPCD Rule 4570; explore mitigation measures to further lower ammonia emissions at Confined Animal Facilities	Rules 223 and 1127
4	Glass Melting/Sodium Silicate Furnaces	PM2.5	Enforce PM10 emission limits to align with SJVAPCD Rule 4353	Rule 1117
5	Further Emission Reductions from Commercial Cooking - Charbroilers	PM2.5	Specify minimum control efficiency requirements and lower applicability threshold for chain-driven charbroilers; require controls for high use under-fired charbroilers	Rule 1138

U.S. EPA's Menu of Control Measures

- Staff analyzed the September 2022 version of U.S. EPA's Menu of Control Measures (MCM)
  - MCM is compiled based on reports from contractors, state air agencies, and other federal agencies
  - MCM provides information on stationary source control measures
- Resulted in identification of two PCMs

PCM #	Potential Control Measure (PCM)	Target Pollutant	Description	South Coast AQMD Applicable Rule
1	Paving Unpaved Lots, Roads, and Shoulders	PM2.5	Pave parking lots/road shoulders and prohibit new unpaved roads in urban areas; renew mitigation measures for unpaved roads in Rule 1186 which phased out in 2006	Rule 1186
2	PM controls from Industrial and Commercial Fuel Combustion	PM2.5	Require filters, electrostatic precipitators, cyclones, or other controls for multiple categories of industrial/commercial combustion equipment	N/A

Previous Potential Control Measures

- Staff analyzed the 2016 AQMP BACM and 2022 AQMP RACM demonstrations
  - Analysis focused on measures that were deemed infeasible or were otherwise not included in plan commitments
- Resulted in identification of nine PCMs

PCM #	Potential Control Measure (PCM)	Target Pollutant	Description	South Coast AQMD Applicable Rule
1	Emission Reduction through Reformulation and Process Modification for Cutback Asphalt	NOx	Reformulation and process modification to reduce natural gas use 20-25% from reduced processing and transportation temperatures	Rule 1108
2	Emission reduction from Asphalt Manufacturing	PM2.5	Require enclosures and/or bag houses at all transfer and processing points	Rule 1157

Previous Potential Control Measures (cont'd)

PCM #	Potential Control Measure (PCM)	Target Pollutant	Description	South Coast AQMD Applicable Rule
3	Emission Reductions from Organic Waste Composting	NH3	Require composting of chipped or ground greenwaste; promoting anaerobic digestion of foodwaste prior to composting	Rules 1133.2 and 1133.3
4	Emission Reduction of PM from Wood Pulp and Paper	PM2.5	Require electrostatic precipitators with 95% control efficiency	N/A
5	Lowering Curtailment Threshold in Rule 445	PM2.5	Lower the Basin-wide wood burning curtailment threshold from its current level of 29 $\mu g/m^3$	Rule 445
6	Lowering Emission Limits for Boilers, Steam Generators, and Process Heaters	NOx	Examine feasibility of lowering NOx limits for units ≥5 MMBtu/hr	Rule 1146

Previous Potential Control Measures (cont'd)

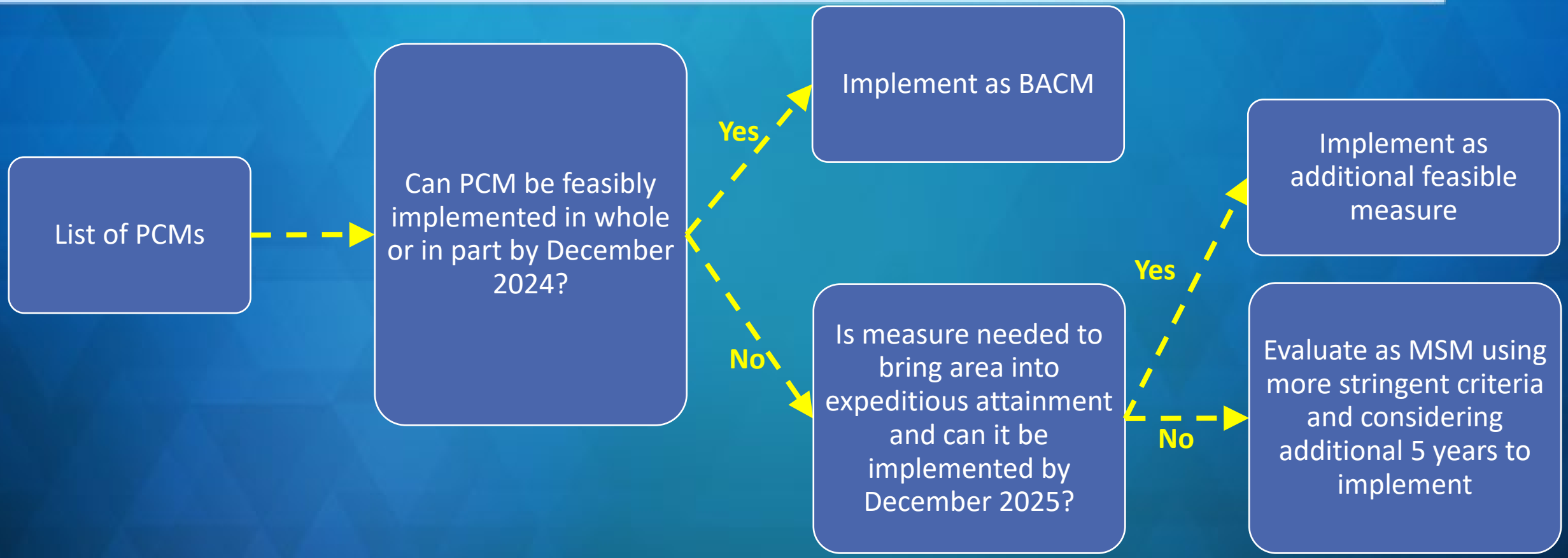
PCM #	Potential Control Measure (PCM)	Target Pollutant	Description	South Coast AQMD Applicable Rule
7	Further Emission Reduction from Paved Road Dust	PM2.5	Require the most efficient street sweepers; introduce more stringent certification requirements for sweepers; increase sweeping frequency on freeways	Rule 1186
8	Emission Reductions from Cooling Towers	PM2.5	Require drift eliminators or routine maintenance of existing drift eliminators	N/A
9	Further Emission Reductions from Agricultural, Prescribed, and Training Burning	PM2.5	Incentivize chipping/grinding instead of agricultural burning; increase fuel moisture for prescribed burns	N/A

Requirements on Implementation Timeline

EPA considers “implementation” to mean that the controls have been installed and/or otherwise physically manifested, thereby achieving the intended emission reductions

BACM	Additional Feasible Measure	MSM
• To be implemented within four years of reclassification • December 9, 2024	• To be implemented by the statutory “serious” area attainment date • December 31, 2025	• To be implemented no later than 1 year prior to the attainment date • December 31, 2029

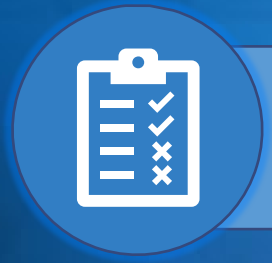
Feasibility of Implementation



Feasibility assessments for the identified measures are ongoing and will be finalized soon

Next Steps

Solicit input from stakeholders



Continue technological and economic feasibility assessment of potential BACM/MSM

Release Draft BACM/MSM Demonstration as part of Draft Plan

CALIFORNIA
AIR RESOURCES BOARD

CARB MSM Analysis

South Coast AQMP Advisory Group Meeting
July 13, 2023

Shared Responsibility

FEDERAL

US EPA

Sets & enforces national air quality standards.
Regulates interstate transportation.

Approves State Implementation Plans.

STATE

CALIFORNIA AIR RESOURCES BOARD

Regulates mobile sources of air pollution, greenhouse gases & consumer products.

Develops State SIP Strategy, and works with local air districts to develop & adopt SIPs for all nonattainment areas.

LOCAL

Local Air Districts

Regulates stationary & local sources of air pollution.

Develops & adopts State Implementation Plans for nonattainment areas within their District.

CARB

State Control Measure Analysis

- Analysis of CARB's measures for the Most Stringent Measure (MSM) requirements
  - Currently being implemented in other States
  - Includes measure suggestions during public process
  - Assesses stringency and feasibility of control measures
- CARB has previously demonstrated MSM
- Complements District MSM Analysis

California's Unique Authority

- The Clean Air Act gives CARB unique authority to regulate mobile sources beyond EPA
- Other states can elect to adopt California standards
- CARB continues to adopt more stringent rules
- California's mobile emissions standards and overall mobile source program are MSM

MSM Requirements

Step 1
- Identify the sources of direct PM2.5 emissions and PM2.5 precursor emissions (emissions inventory)

Step 2
- Identify all potential control measures for the sources identified in Step 1 (CARB current/proposed measures & measures in other States)

Step 3
- Assess the stringency and feasibility of the potential control measures identified in Step 2, and public measure suggestions

Step 4
- Adopt and implement feasible control measures identified in Step 3 to satisfy MSM requirements

Requirements per 40 CFR § 51.1010

Step 1: Identify Sources

Mobile Source Emissions Inventory	2018			2030		
	NOx (tpd)	Direct PM2.5 (tpd)	Ammonia (tpd)	NOx (tpd)	Direct PM2.5 (tpd)	Ammonia (tpd)
On-Road Light-Duty Vehicles	56.5	2.4	10.4	19.7	2.1	12.3
On-Road Heavy-Duty Vehicles	129.8	3.2	6.0	30.4	1.6	8.8
Off-Road Vehicles/Equipment	72.6	3.6	0.1	37.9	2.0	0.1
Primarily Federal and International	64.4	1.7	0.0	74.7	1.8	0.0
Aircraft	17.1	0.7	0.0	24.5	0.7	0.0
Railroad	15.1	0.3	0.0	17.7	0.4	0.0
Ocean-Going Vessels	32.2	0.6	0.0	32.6	0.7	0.0
Mobile Source Total	**323.3**	**10.8**	**16.5**	**162.6**	**7.4**	**21.3**

CARB

Step 2: Identify Control Measures

Example: On-Road Heavy-Duty Vehicles

	Most Stringent Program	Summary of Findings	Other Jurisdictions Analyzed
In-Use Controls - Fleet Rules	CARB Truck & Bus	MSM: Most comprehensive and stringent mandatory heavy-duty fleet turnover rule in the nation	No other state requires diesel particulate filters (DPF) and MY 2010+ equivalent engines
	CARB Advanced Clean Fleets	MSM: Accelerates ZEV adoption by setting zero-emission requirements for fleets	No other state has zero-emission requirements for HD vehicle fleets
	CARB Zero-Emission Trucks	MSM: Would accelerate the number of ZE trucks beyond existing measures (including the ACF regulation)	No other state has zero-emission requirements for HD vehicle fleets
	CARB Solid Waste Collection Vehicle	MSM: Limits PM emissions at appx the same level of stringency. CARB is overall more stringent because SWCV's with 2007-2009 engines were also subject to 2010 engine requirements under Truck and Bus	NYC requires that at least 90% of the ~8,300 SWCVs meet EPA's 2007 diesel standard for PM

Step 3(a): Evaluate Stringency

Example: On-Road Heavy-Duty Vehicles

	Measure	Implementation Begins	Conclusion
In-Use Controls - Fleet Rules	CARB Truck & Bus	Ongoing	MSM
	CARB Advanced Clean Fleets	2024	MSM
	CARB Zero-Emissions Truck (Future measure)	2030	MSM
	CARB Solid Waste Collection Vehicle	Ongoing	MSM
	CARB Public Agency/Utility	Ongoing	MSM
	CARB Innovative Clean Transit	2023	MSM
	CARB ZE Airport Shuttle	2027	MSM

Step 3(b): Evaluate Feasibility

Example: On-Road Heavy-Duty Vehicles

Measure	Summary of Feasibility
On-Road Heavy-Duty Vehicle Useful Life Regulation (Public Measure Suggestion)	Developed into Zero Emission Trucks measure, which would similarly target the increase in the number of heavy-duty ZEVs and cleaner engines as soon as possible, and reduce emissions from fleets not affected by ACF
Additional Incentive Programs: Zero-Emissions Trucks (Public Measure Suggestion)	Developed into a potential element of the Zero Emission Trucks measure (incentive programs such as supporting local zero-emission zones and/or differentiated registration fees)
Indirect Source Rule (Public Measure Suggestion)	CARB staff have included as a potential element of the Zero Emission Trucks measure

Step 4: Adopt & Implement Controls

CARB's control program includes all measures identified as MSM

- Most measures are adopted and being implemented, or will soon begin implementation
- Remaining measures were included in the 2022 State SIP Strategy with commitments to propose to CARB Board for consideration prior to 2030

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

Next Steps on State Analysis

- CARB continues to seek comments
  - Contact information: SIPPlanning@arb.ca.gov
- Incorporate comments received
- Release draft MSM analysis for review

AQMP Advisory Group Membership

Item #5

AQMP Advisory Group

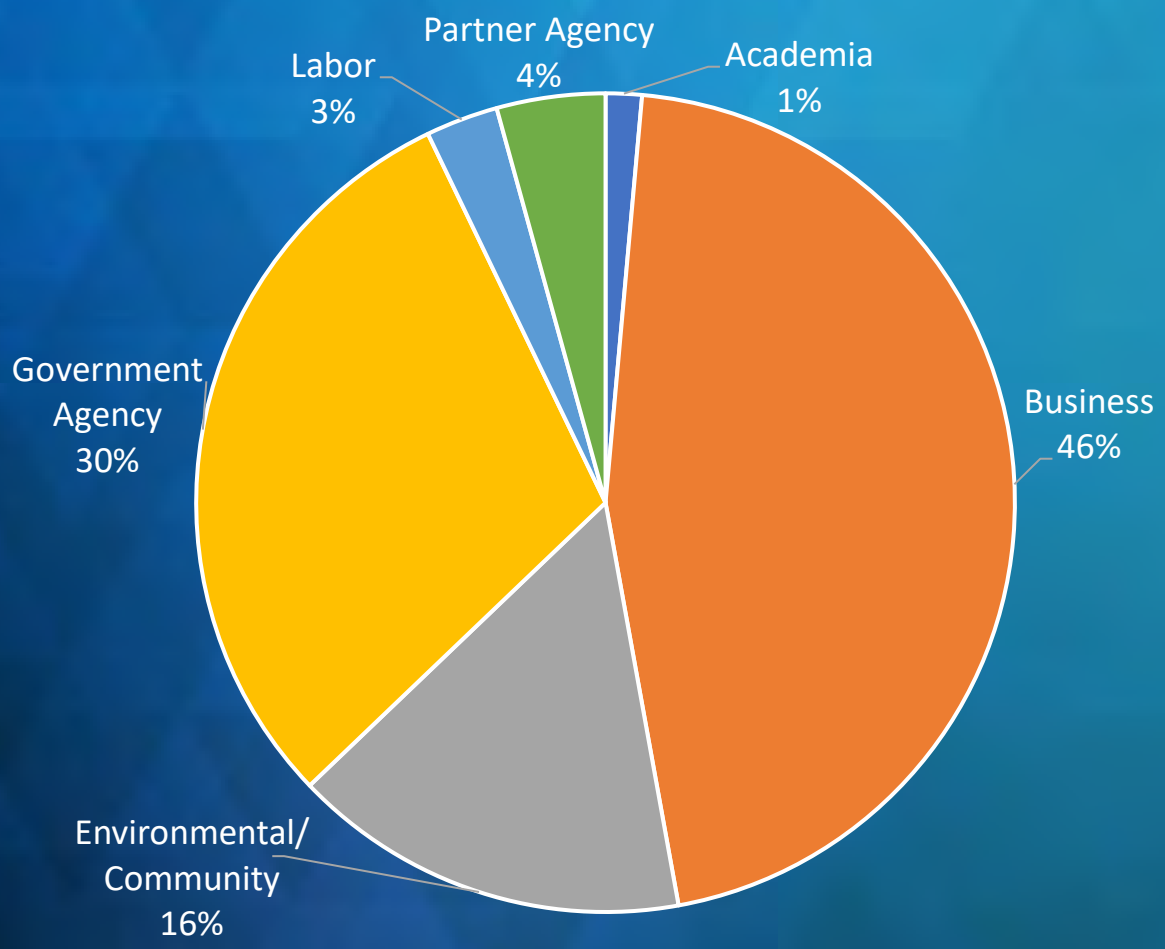
July 13, 2023

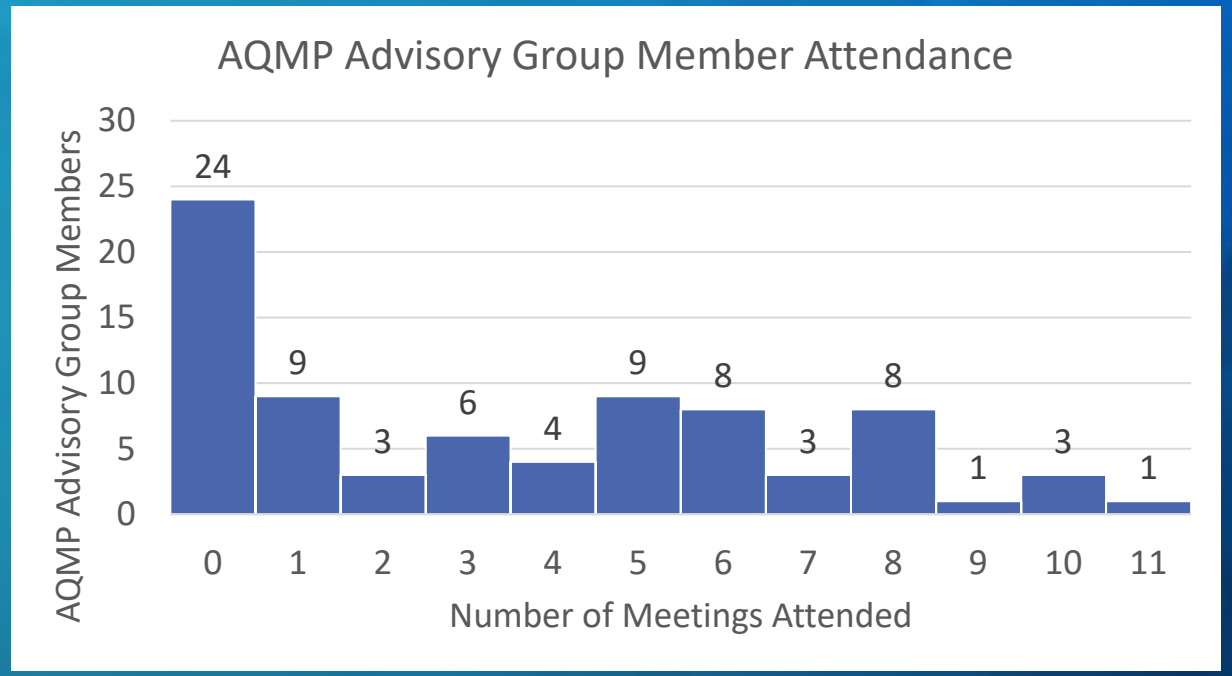
Background

- The current Advisory Group membership will expire in September 2023
- Staff solicited requests and nominations seeking to renew AQMP Advisory Group membership
  - 24 responses were received from individuals and organizations expressing interest in serving on the AQMP Advisory Group
- The Advisory Group charter calls for approximately 40 members drawn from cross-section of the community representing businesses, local governments, ethnic interests, environmental groups, and government agencies
  - Members appointed by the Governing Board

Current Advisory Group Statistics

Member Affiliation

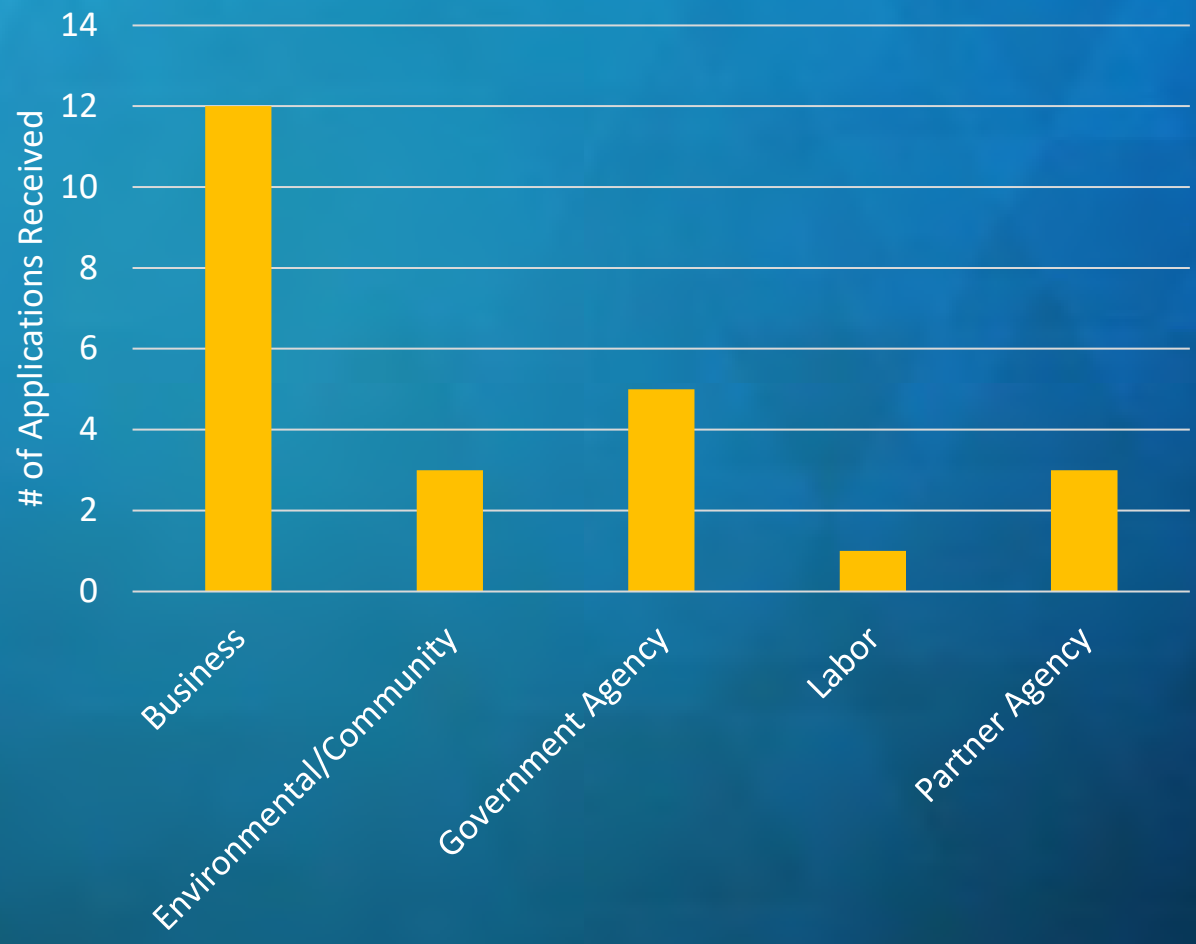




A total of 11 Advisory Group meetings have been held since 2019

Organizations Indicating Interest in Serving

- High interest among business community in serving on the Advisory Group
- Staff is seeking to form a diverse advisory group representing various stakeholder groups



Timeline and Next Steps