2018 PM2.5 Attainment Plan

July 31, 2018

webcast@valleyair.org

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

CALIFORNIA
AIR RESOURCES BOARD

HEALTHY AIR LIVING™
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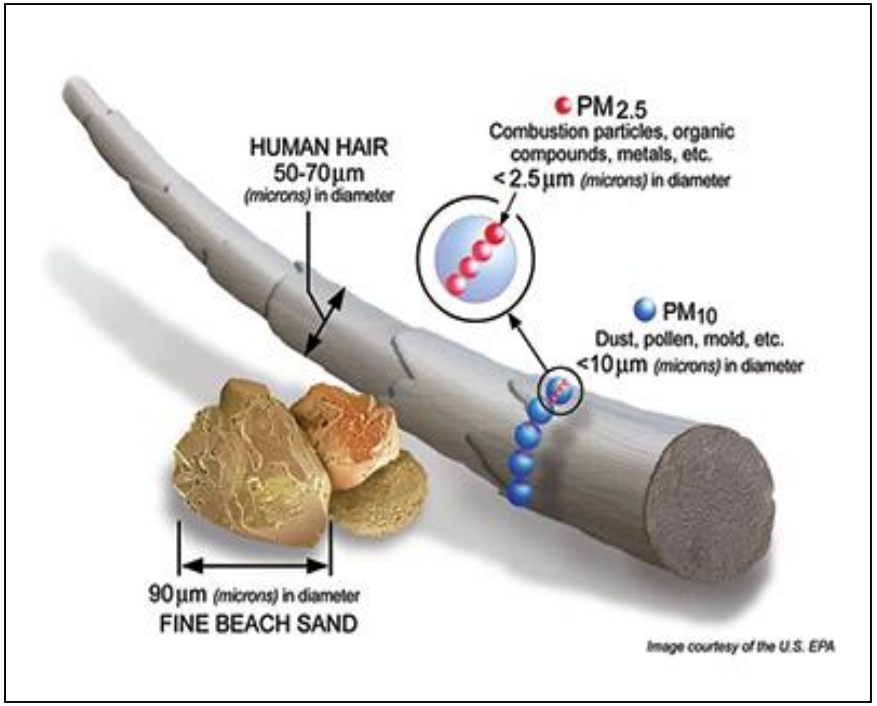
Overview

- San Joaquin Valley faces unmatched challenge in meeting federal PM2.5 standards
- District is preparing a single integrated plan to address multiple PM2.5 standards instead of three separate plans
  - Provides path for developing a much stronger plan
  - More efficient use of resources
  - More robust public process
- Meeting the new standards requires significant new reductions in emissions, particularly from mobile sources
- Plan includes comprehensive suite of regulatory and incentive-based measures to achieve the emissions reductions necessary from stationary and mobile sources to bring Valley into attainment
  - Local District measures
  - State CARB measures

What is PM2.5?

- Particles with a diameter of 2.5 microns and smaller
- A mixture of solid particles and liquid droplets in the air
- Emitted directly or formed indirectly through chemical reactions between gases
- Significant health effects associated with PM2.5



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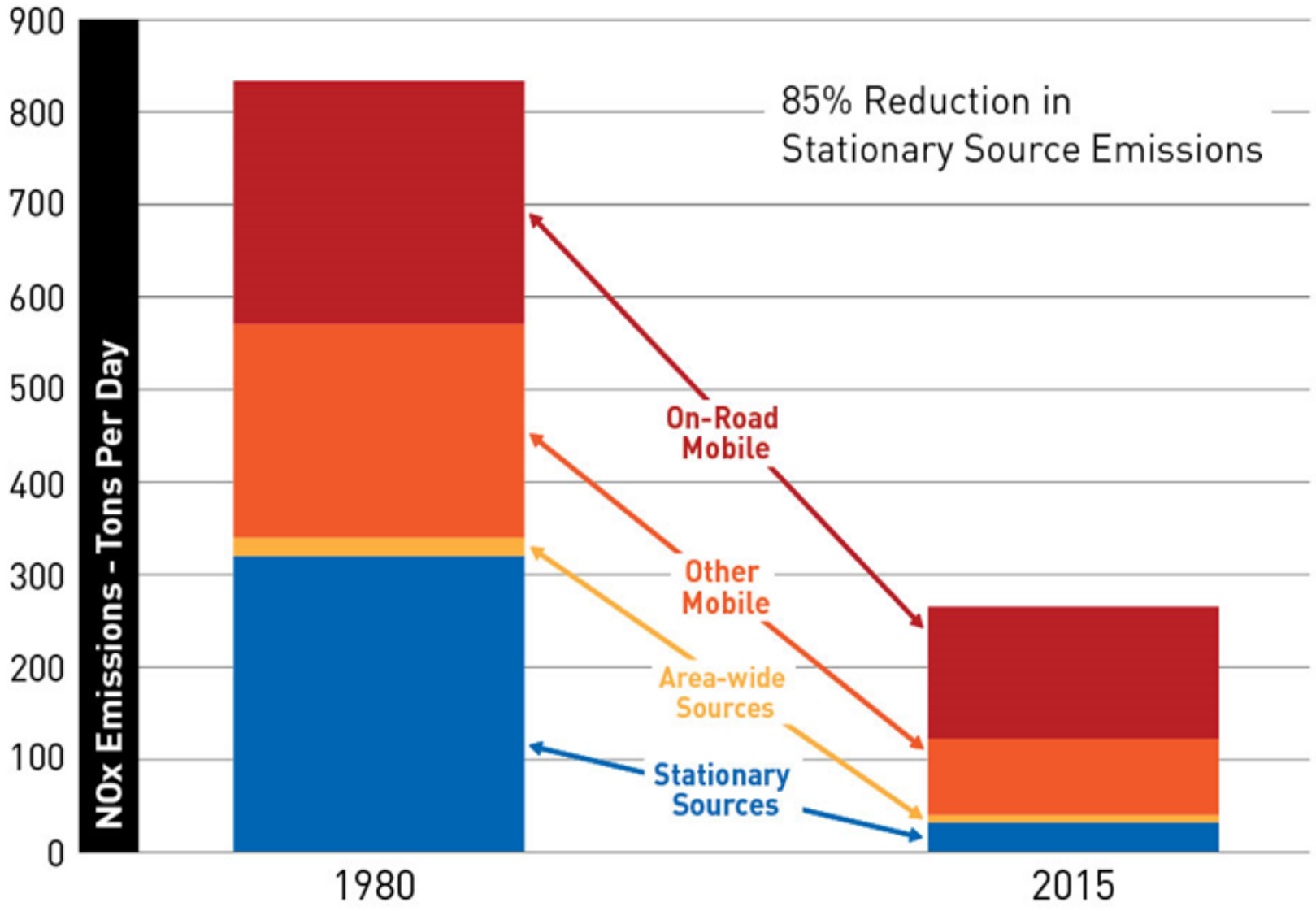
Significant Improvement of Air Quality in the Valley

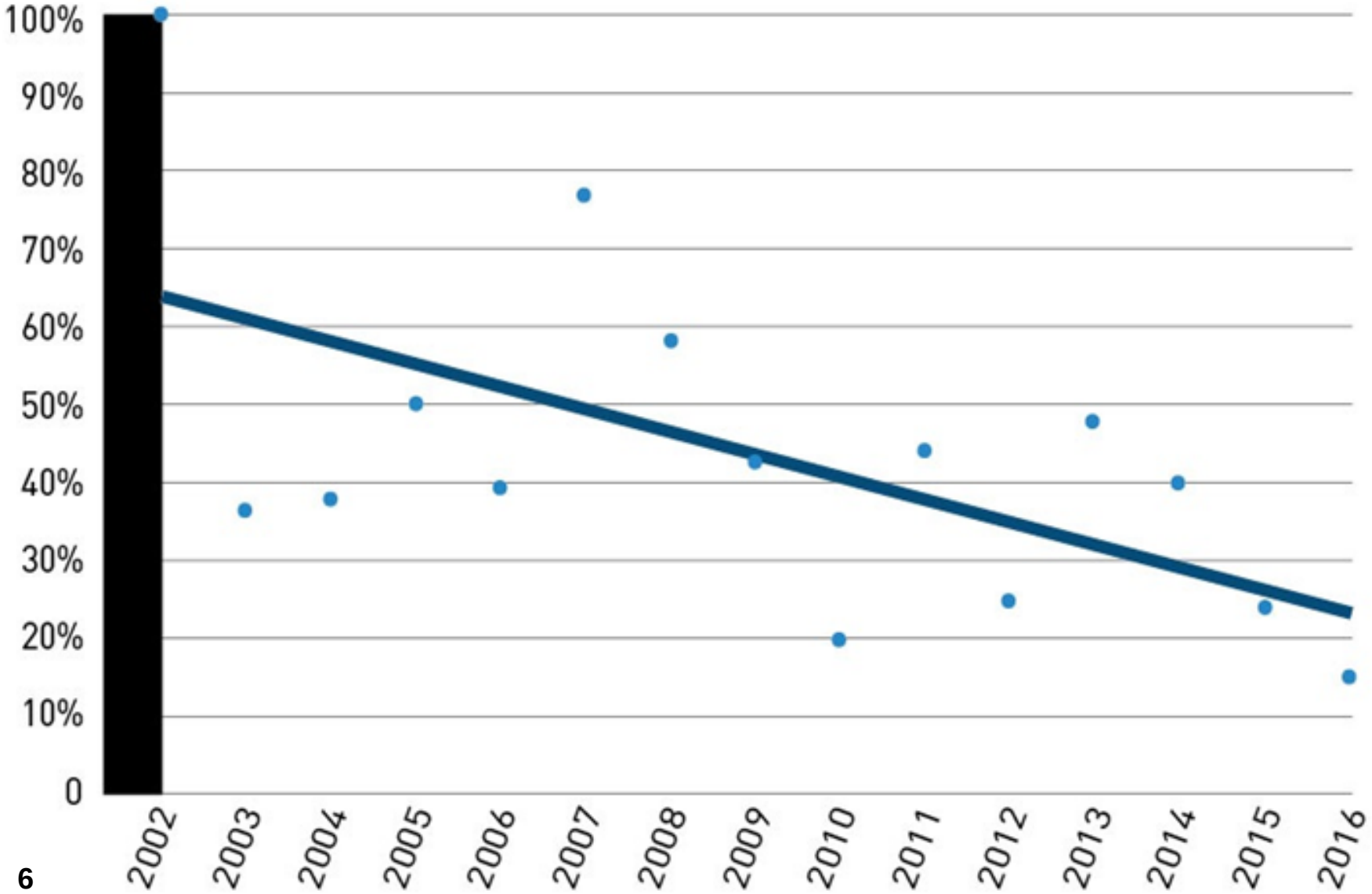
- District/ARB have adopted numerous attainment plans
  - Toughest stationary/mobile air regulations in the nation
  - Adopted over 600 stringent rules and regulations (over 80% reduction in stationary source emissions)
  - Groundbreaking rules serve as model for others
- $40 billion spent by businesses on clean air
- Strong incentive programs (over $1.9 billion in public and private investment reducing over 140,000 tons of emissions)
- Public education and participation
  - Build public support for tough measures adopted
  - Urge air friendly behavior by public
- Through these combined efforts, Valley's air quality better than any other time on record

Major Reductions in Pollution



Population Exposure to High PM2.5 Days

85% Reduction



Federal PM2.5 Mandates

- Despite progress, Valley still faces significant challenges in meeting latest health-based standards established under the Clean Air Act
- District preparing attainment strategy to address multiple PM2.5 standards under the federal Clean Air Act
- 1997 PM2.5 Standard (24-hour 65 µg/m³ and annual 15 µg/m³)
  - 5% annual reduction in PM2.5 or NOx until attainment of standard
- 2006 PM2.5 Standard (24-hour 35 µg/m³)
  - Attainment deadline of 2024
  - To get 5-year extension to 2024, must demonstrate Most Stringent Measure and expeditious attainment in proposed attainment strategy
- 2012 PM2.5 Standard (annual 12 µg/m³)
  - Attainment deadline 2025
  - Must submit plan requesting reclassification to Serious non-attainment
  - Serious plan to be submitted 5 years ahead of required deadline
- Federal Clean Air Act does not provide for a “black box” for PM2.5 like it does for ozone

Previous Attainment Plans Lay Foundation for 2018 PM2.5 Plan

- Over 174 tons of NOx emission reductions will be achieved through current District/ARB control strategy (2013-2025)
  - 2016 PM2.5 Plan (2012 PM2.5 Standard)
  - 2016 Ozone Plan (2008 8-hour Ozone Standard)
  - 2015 PM2.5 Plan (1997 PM2.5 Standard)
  - 2013 Ozone Plan (1979 1-hour Ozone Standard)
  - 2012 PM2.5 Plan (2006 PM2.5 Standard)
  - 2008 PM2.5 Plan (1997 PM2.5 Standard)
  - 2007 Ozone Plan (1997 8-hour Ozone Standard)
  - 2007 PM10 Maintenance Plan (1987 PM10 standard)
  - 2006 PM10 State Implementation Plan
  - 2003 PM10 State Implementation Plan
  - 1997 PM10 Attainment Demonstration Plan
  - 1991 PM10 Attainment Plan and 1993 Supplement

Scientific Foundation for PM2.5 Planning

- Study Agency dedicated resources and effort to further develop understanding of PM2.5 in the Valley (over $50 million invested)
- Technical projects began in 1993 and continued through 2014
- California Region Particulate Air Quality Study (CRPAQS) occurred from December 1999 through February 2001
  - Study Agency provided $23.5 million for field campaign and research
  - Large regional PM air quality study across Valley and surrounding regions
- CRPAQS study accomplishments:
  - Improved understanding of PM emissions, composition, and the dynamic atmospheric processes surrounding them
  - Established a strong scientific foundation for informed decision making
  - Developed methods to identify the most efficient and cost-effective emission control strategies to achieve the PM10 and PM2.5 standards in Central California

Robust Public Process

- Extensive public engagement process over three year period
- Multiple opportunities for public and stakeholders to provide comments, ask questions, and request information
  - Conducted 9 public workshops
  - Held 5 Public Advisory Workgroup meetings
  - Provide monthly updates at public meetings of the District Governing Board, Citizens Advisory Committee, and Environmental Justice Advisory Group
- Multiple resources to the public including:
  - New web page specific to plan to provide updates, presentations, documents and other information related to the development of this plan http://www.valleyair.org/pmplans/
  - A public mailing list, so members of public can sign up to receive email notifications of activities related to this and future PM2.5 plans http://lists.valleyair.org/mailman/listinfo/pm_plans
  - An email address specifically for this plan for the public to submit comments at their leisure airqualityplans@valleyair.org

Proposed Attainment Strategy

- Includes new stationary and mobile source measures that apply valleywide (regulatory and incentive-based)
- Includes new measures focused on reducing emissions in "hot-spot" regions with most difficult attainment challenge
  - Targeted use of incentive grants
  - Targeted regulations
  - Reduced future regulatory burden for specific regions
  - Reduced overall cost to all regions by achieving attainment of federal standards more expeditiously
  - For regions that may face more stringent future measures, added regulatory cost will be mitigated by added incentives
- Supplemented with proposed Community-Level Targeted Strategy that will focus on reducing public exposure to pollution sources of local concern

Boilers, Steam Generators, & Process Heaters > 5.0 MMBtu/hr (Rules 4306 & 4320)

- Sources in oil/gas, food/agriculture, other industrial processes
- Rules 4306 and 4320 adopted October 2008
  - Establish stringent emissions limits and provide advanced emissions reduction option to address technology feasibility
- NOx emissions reduced 96% from this source category
- Direct PM2.5 emissions relatively small, sources do not significantly contribute to ambient PM2.5 concentrations
- This measure would further reduce NOx emissions to the extent that additional NOx controls are technologically and economically feasible
  - Evaluate feasible ultra low-NOx control technologies (enhanced SCR, etc.) that may be able to achieve as low as 5 ppmv NOx
  - Establish even more stringent technology-forcing Advanced Emission Reduction Option (AERO) emission limits as low as 2 ppmv NOx

Flares (Rule 4311)

- Adopted June 2002, and amended in 2009 to add Flare Minimization Plan requirements to the rule
- District has most stringent rule
  - Rule compared to other regions (North Dakota, Santa Barbara, etc.)
- This measure would further reduce NOx emissions to the extent further controls are technologically achievable and economically feasible
  - Ultra-low NOx flare emission limitations for existing and new flaring activities
  - Additional flare minimization requirements
  - Expand applicability of the rule to minor sources
- Public process for amending rule currently underway

Municipal Solid Waste-fired Boilers (Rule 4352)

- Adopted September 14, 1994
- Amended in 1996, 2006, and 2011
- Applies to any boiler, steam generator or process heater fired on solid fuel
- This measure would further reduce NOx emissions by amending the rule to lower NOx limits for municipal solid waste-fired boilers to the extent that such controls are technologically achievable and economically feasible

Non-Ag IC Engines (Rule 4702)

- Amended 12 times since May 1992
  - Lowered NOx emission limit for lean-burn engines by 98.5% from 740 ppmv to 11 ppmv
  - Lowered NOx emission limit for rich-burn engines by 98.3% from 640 ppmv to 11 ppmv
- Emissions reduced by 19 tons NOx/day since 2000 through extensive retrofits and replacements
- This measure would further reduce NOx emissions by lowering NOx limits to the extent that such controls are technologically achievable and economically feasible
  - Potential more stringent limits as low as 5 ppmv

Ag IC Engines (Rule 4702)

- Ag IC engines regulated under Rule 4702 since 2005
- Emissions reduced over 80% (14.2 tons/day) through significant investments by ag industry to retrofit and replace thousands of irrigation pump engines
- This measure would further reduce NOx emissions through incentive-based/regulatory approach to achieve further reductions as technologically and economically feasible
  - Provide flexibility to achieve additional reductions; promote electrification where feasible

Glass Melting Furnaces (Rule 4354)

- Adopted in 1994 and amended six times
- NOx limit for container glass: 1.5 lb-NOx/ton of glass pulled
- Industry invested millions of dollars; reduced 70-80% NOx
- This measure would further reduce NOx emissions for container glass furnaces to the extent that additional NOx controls are technologically and economically feasible
  - Evaluate feasible ultra low-NOx control technologies (catalytic filtration, oxy-fuel combined with SCR, etc.)
  - Potential limits: 1.0-1.2 lb NOx/ton glass pulled, evaluate even lower levels

Conservation Management Practices (Rule 4550)

- Adopted in 2004, first rule of its kind
  - Reduces emissions from over 3.2 million acres of Valley farmland
  - PM10 emissions reduced by 35.3 tons per day
  - Helped Valley reach attainment of federal PM10 standard
  - Received EPA Region IX “2005 Environmental Award for Outstanding Achievement”
- This measure would achieve additional reductions of fugitive dust (directly emitted PM) through new/enhanced conservation management practices
  - Land preparation/conservation tillage
  - Fallow lands

Residential Wood Burning Strategy

- District's residential wood burning curtailment strategy currently most stringent in the state
  - Stringent curtailment levels, incentives for clean devices, strong public education and enforcement
- Measure would further reduce emissions through more stringent wood burning curtailment program in hot-spot areas
  - Lower burn prohibitions for non-registered units from 20 $\mu g/m^3$ to 12 $\mu g/m^3$
  - Lower burn prohibitions for all devices from 65 $\mu g/m^3$ to 35 $\mu g/m^3$
- Measure suggested for Valley floor locations
  - Kern County, Fresno County, City of Visalia, City of Madera, and City of Corcoran
- New curtailments coupled with significant incentive funding for Valley residents through enhanced Burn Cleaner program

Burn Cleaner Program Enhancements

- Enhanced levels of incentives provided in hot-spot areas
  - Replace wood burning devices with only natural gas or propane units in hot-spot areas
  - Kern County, Fresno County, City of Visalia, City of Madera, and City of Corcoran
- Program would continue to offer current level of incentives Valleywide
- $80 million estimated total cost, with $60 million dedicated to hot-spot areas
- Exact funding levels and incentive program details to be finalized pending results of residential wood burning survey currently under way

Underfired Charbroiler Hot-Spot Strategy

- Provide incentives for installation of controls and related modifications for existing underfired charbroilers within urban boundaries of hot-spots
  - Kern County, Fresno County, cities of Visalia, Madera, and Corcoran
  - Provide funding to deploy controls at 40% of underfired charbroilers
  - Average cost estimated at $150,000 (capital plus 1st yr maintenance)
  - Incentive cost estimated at $30 million (covering 100% of costs)
  - To ensure early and robust use of incentives, measure may need to be supplemented with regulatory backstop to encourage participation
- Provide incentives for installation of controls on large new charbroilers within urban boundaries of hot-spots
  - Require installation of control technologies at new larger restaurants
  - Incentive cost estimated at $5 million (50% of costs)
- Facilitate efficient and cost-effective expenditure of resources
  - To achieve same design value benefits possible through $35 million investment in charbroiler PM reductions, businesses would have to incur $14 billion in cost for NOx reductions

Funding Imperative for Valley's Efforts to Achieve Expedited Reductions in Emissions

- Robust incentive-based emission reduction strategy necessary to achieve enormous reductions needed within 2024/2025 timeframe
  - Need significant reductions from mobile sources under state and federal jurisdiction
  - Incentive-based measures can achieve more reductions, more expeditiously
- Developing aggressive incentive-based measures to achieve the needed emissions reductions will require significant funding
  - Dollars needed are well in excess of current or prospectively scheduled future appropriations from local, state, and federal sources
  - Requires state and federal governments to supplement local funds
  - Build upon recent success by San Joaquin Valley in bringing significant new state incentive funding to the Valley for clean air projects (e.g., AB 134, FARMER)
- District's grant programs provide foundation for significantly expanded incentive-based strategy needed for attainment
  - Over $2 billion invested in clean air projects through incentive grant programs
  - Over 140,000 tons of emissions reduced
  - State audits commend District as "shining example" for effectiveness and efficiency
  - High demand due to reputation and established relationships with local agencies, businesses, and other stakeholders

District Incentive Strategy

- In addition to significant state/federal funding for incentive-based emissions reductions required for attainment, District will utilize locally generated funds to deploy comprehensive incentive strategy:
  - Local funding for replacement of agricultural tractors
  - Local funding for replacement of heavy duty trucks
  - Local funding for replacement of locomotives
  - Local funding for replacement of light-duty vehicles
  - Local funding for replacement of construction/other off-road equipment
  - Local funding for replacement of residential wood burning devices
  - Local funding for grant program to deploy clean ag harvesting technology with focus on areas impacting peak sites in Valley
  - Local funding for demonstration of advanced emission reduction technologies through the District's Technology Advancement Program

District Emission Reduction Measures

Rule #	Rule Name	PM2.5 (tpd)	NOx (tpd)
4311	Flares	TBD	0.05
4306	Boilers, Steam Generators, and Process Heaters - Phase 3	TBD	1.83
4320	Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr		
4702	Internal Combustion Engines		
4354	Glass Plants		
4352	Solid Fuel-Fired Boilers, Steam Generators And Process Heaters		
4550	Conservation Management Practices	0.647	TBD
4692	Commercial Charbroiling	0.57	-
4901	Wood Burning Fireplaces and Wood Burning Heaters	2.23	TBD
	Total Emission Reductions	3.447	1.88

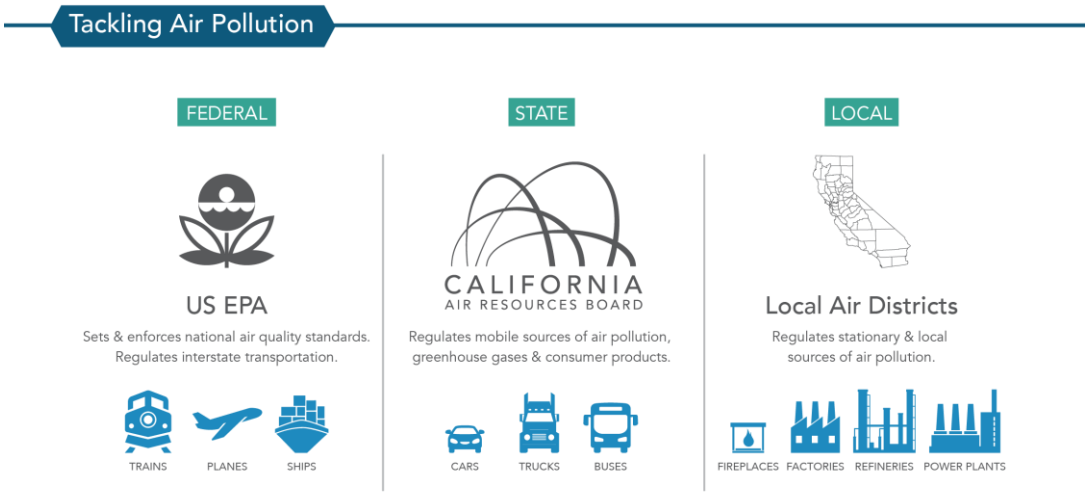
VALLEY STATE SIP STRATEGY

July 31, 2018

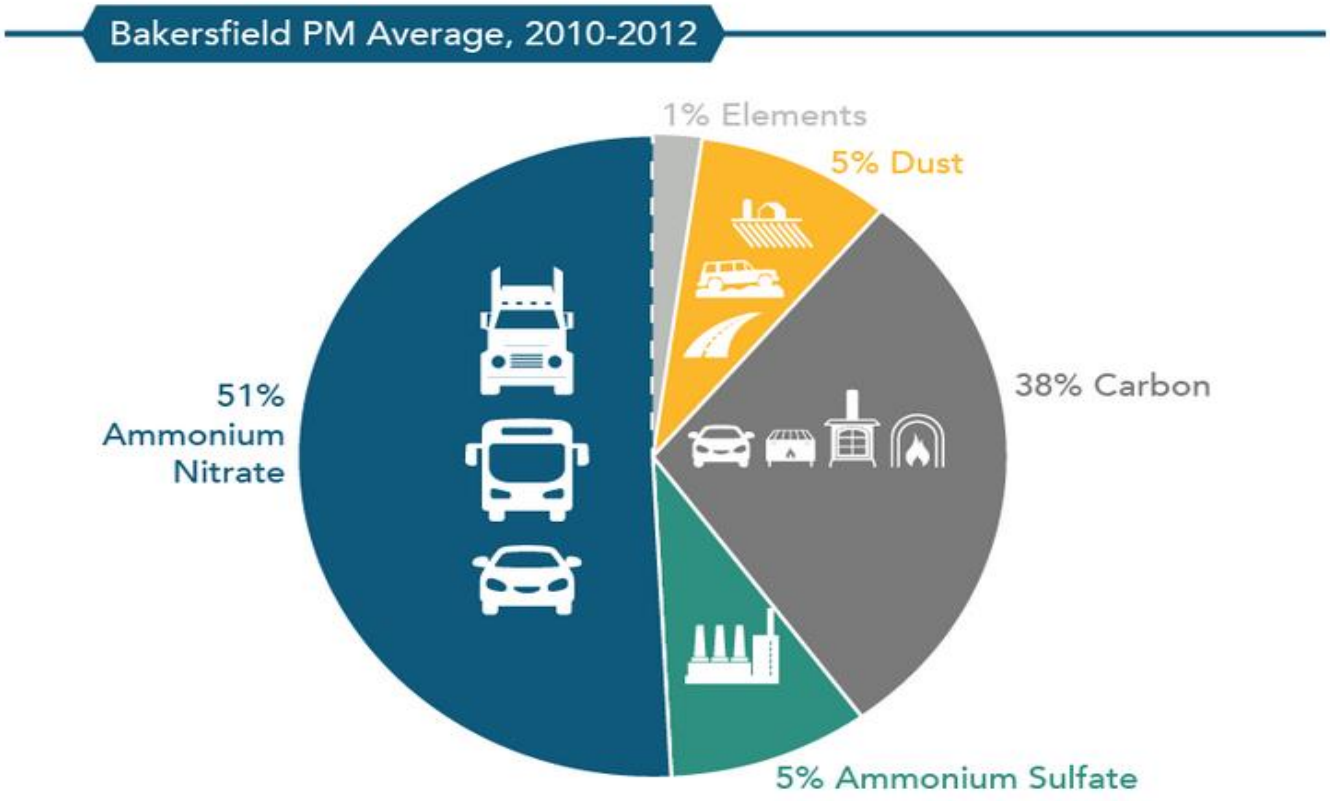
San Joaquin Valley
2018 PM2.5 Plan
Workshop

CALIFORNIA
AIR RESOURCES BOARD

Clean Air Shared Responsibilities



PM2.5 in the Valley



Valley State SIP Strategy for Mobile

Builds on CARB Adopted State SIP Strategy

New Valley Measures

Valley Strategy Commitment

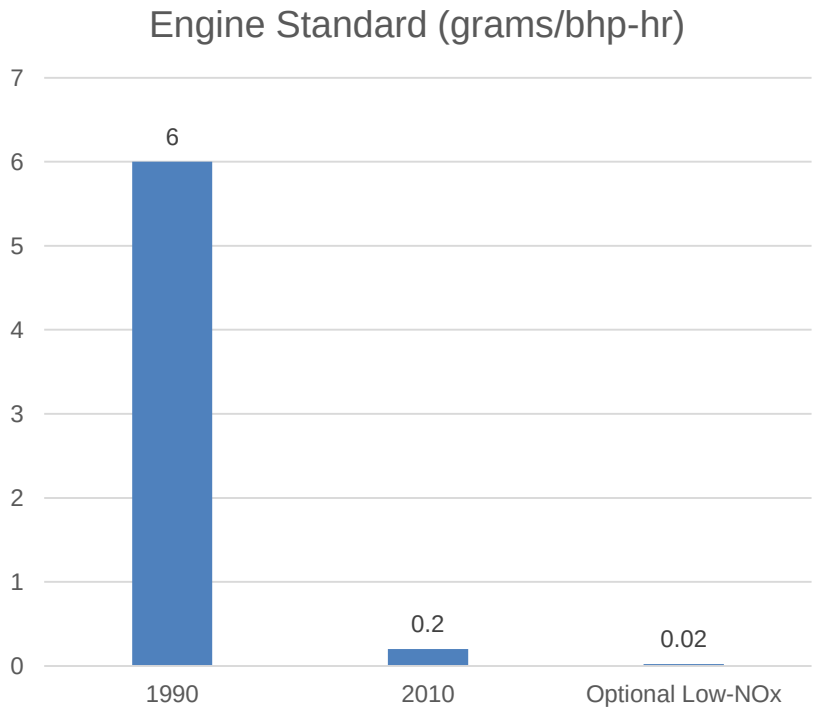
Adopted State SIP Strategy

- Current mobile program will reduce NOx in the Valley over 162 tpd from 2013
- State SIP Measures
  - Ensuring existing trucks stay clean
  - Continued ag equipment turnover
  - Low-NOx engine standards
  - Zero emission mobile equipment
  - Low emission diesel fuel

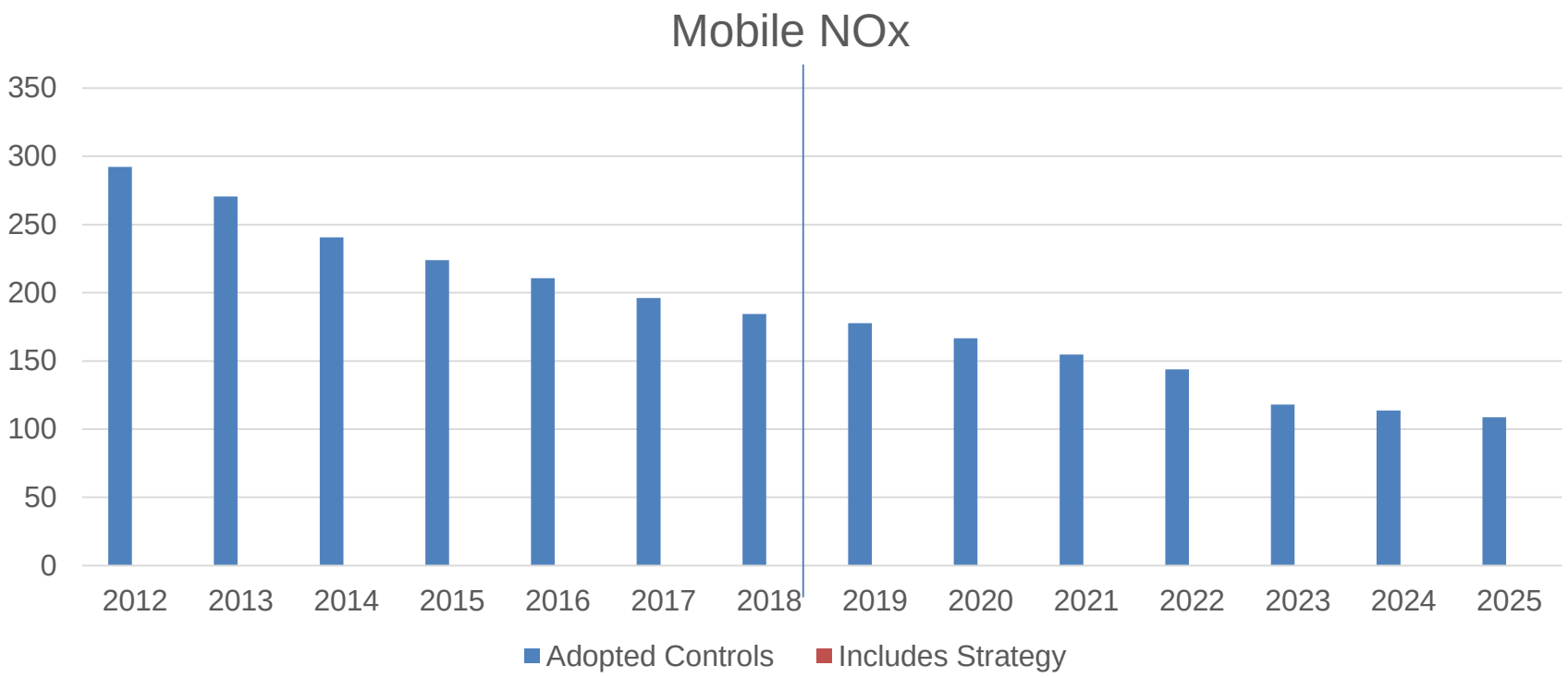
Cleaner Trucks

Key to Valley Strategy

- 2010 standard engines 97 percent cleaner than 1990
- Optional Low-NOx engines are 90 percent cleaner than 2010 standard
- Truck and Bus Rule accelerated truck turnover
- Need new lower federal engine standard



Mobile Program Reduces NOx Emissions each Year through Attainment in the San Joaquin Valley



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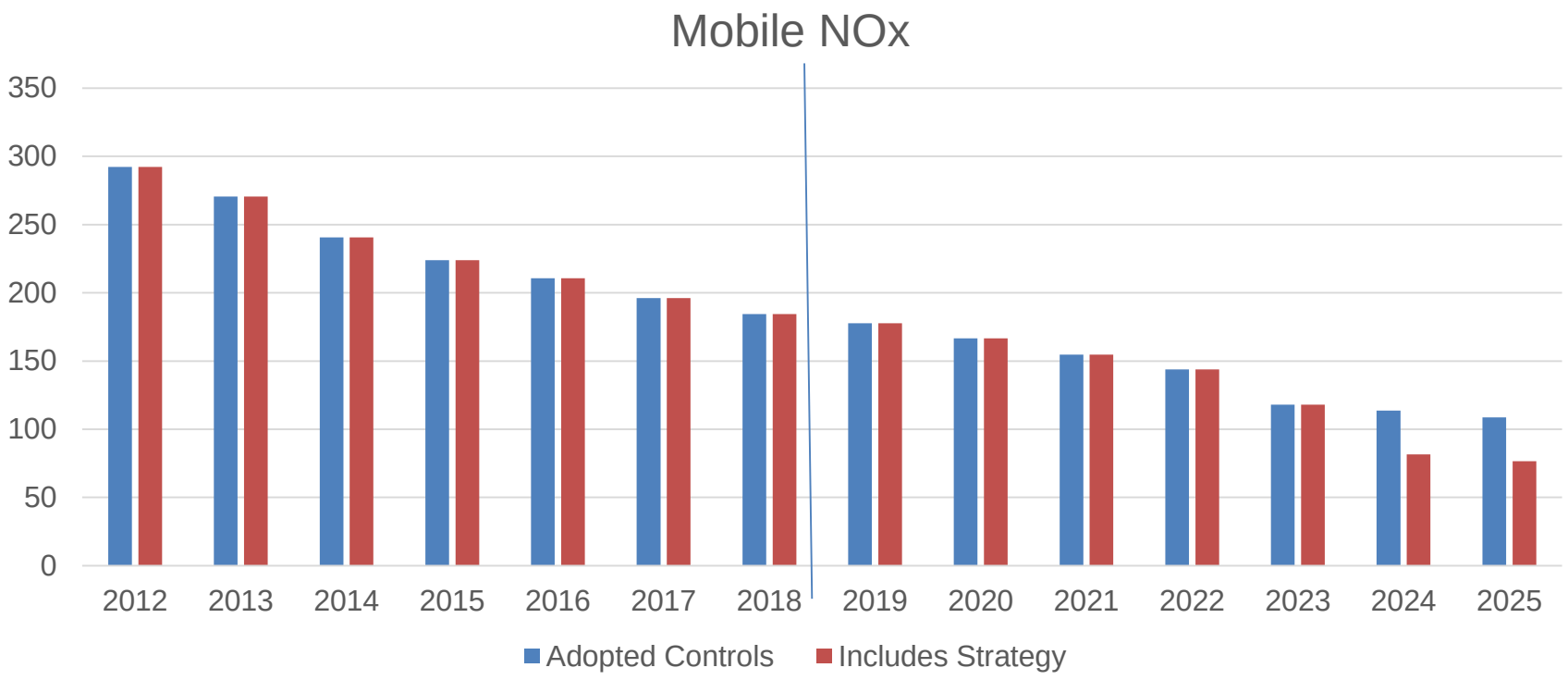
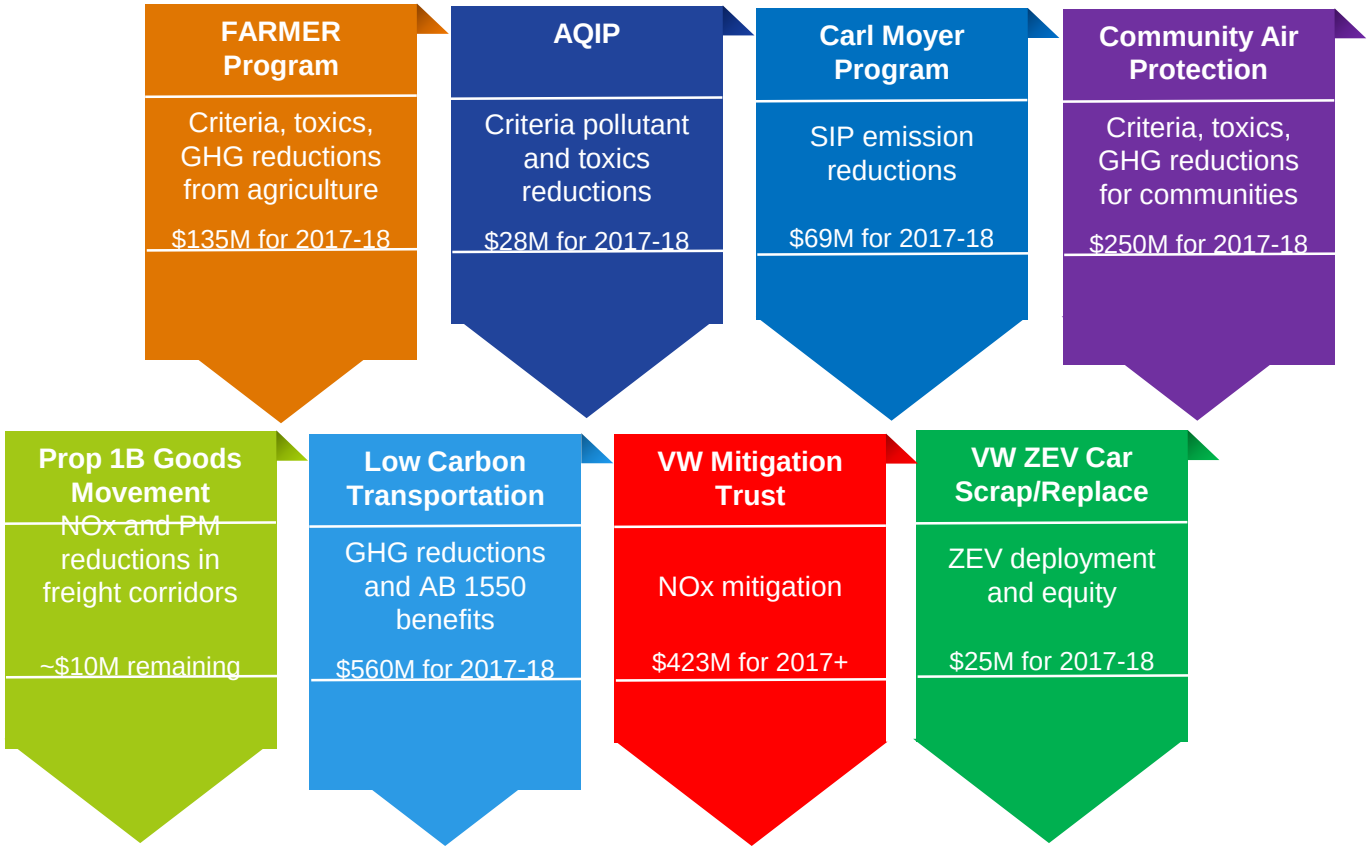


New Valley Mobile Measures

- Accelerated Turnover Incentive Measures
  - Trucks and Buses
  - Off-Road Equipment
  - Agricultural Tractors
- Cleaner In-Use Agricultural Equipment Measure

Statewide Incentive Funding Secured



State SIP Measures for Ag Equipment

- Accelerating turnover of older equipment
  - Incentive measure
  - Significant new State funds for agricultural equipment: $108M FARMER dedicated to the Valley last fiscal year
- Regulatory measure to ensure tractor clean up

CARB Valley SIP Strategy Commitment

- Addresses reductions from mobile sources
- Commitment to achieve emission levels needed for attainment
  - Aggregate emission reductions by specific dates
  - Action on new measures according to implementation schedule
- Becomes enforceable upon EPA approval

Aggregate Mobile Commitment

	2024		2025	
	NOx (tpd)	**PM2.5** (tpd)	**NOx** (tpd)	**PM2.5** (tpd)
Current Control Program	157	4.6	162	4.7
Valley PM2.5 Commitment	32	0.9	32	0.9
2016 State SIP Strategy Measures	*9*	*0.1*	*12*	*0.1*
Proposed State Measures for the Valley	*23*	*0.8*	*20*	*0.8*
Total Reductions	189	5.5	194	5.6

State Measure Schedule for the San Joaquin Valley

Measures	Agency	Action	Implementation Begins
2016 State SIP Strategy Measures			
Advanced Clean Cars 2	CARB	2020 – 2021	2026
Reduced ZEV Brake and Tire Wear			
Lower In-Use Emission Performance Level:	CARB	2017 – 2020	2018 +
Lower Opacity Limits for Heavy-Duty Vehicles	CARB	2018	2018 – 2024
Amended Warranty Requirements for Heavy-Duty Vehicles	CARB	2018	2022
Heavy-Duty Vehicle Inspection and Maintenance Program	CARB	2020	2022 +
Low-NOx Engine Standard – California Action	CARB	2019	2023
Low-NOx Engine Standard – Federal Action	U.S. EPA	2019	2024
Innovative Clean Transit	CARB	2018 – 2019	2020
Advanced Clean Local Trucks (Last Mile Delivery)	CARB	2019	2020
Zero-Emission Airport Shuttle Buses	CARB	2018	2023
More Stringent National Locomotive Emission Standards	U.S. EPA	2017	2023 +
Zero-Emission Off-Road Forklift Regulation Phase 1	CARB	2020	2023
Zero-Emission Airport Ground Support Equipment	CARB	2019	2023
Small Off-Road Engines	CARB	2018 – 2020	2022
Transport Refrigeration Units Used for Cold Storage	CARB	2018 – 2019	2020 +
Low-Emission Diesel Fuel Requirement	CARB	by 2020	2023
Proposed State Measures for the Valley			
Accelerated Turnover of Trucks and Buses			
Existing Incentive Projects	CARB / SJVAPCD	by 2021	ongoing
New Incentive Projects			
Accelerated Turnover of Agricultural Tractors			
Existing Incentive Projects	CARB / SJVAPCD	by 2020	ongoing
New Incentive Projects			
Cleaner In-Use Agricultural Equipment	CARB	2025	2030
Accelerated Turnover of Off-Road Equipment			
New Incentive Projects	CARB / SJVAPCD	by 2021	ongoing

Next Steps on Valley State SIP Strategy

- CARB will hold community meeting on August 28th in Fresno to solicit feedback on the 2018 PM2.5 SIP
- CARB will release the San Joaquin Valley Supplement to the State SIP Strategy
- CARB staff will update draft elements in response to public comments
- CARB plans to consider the 2018 PM2.5 SIP at a Board meeting in Fresno this November

CARB MODELING

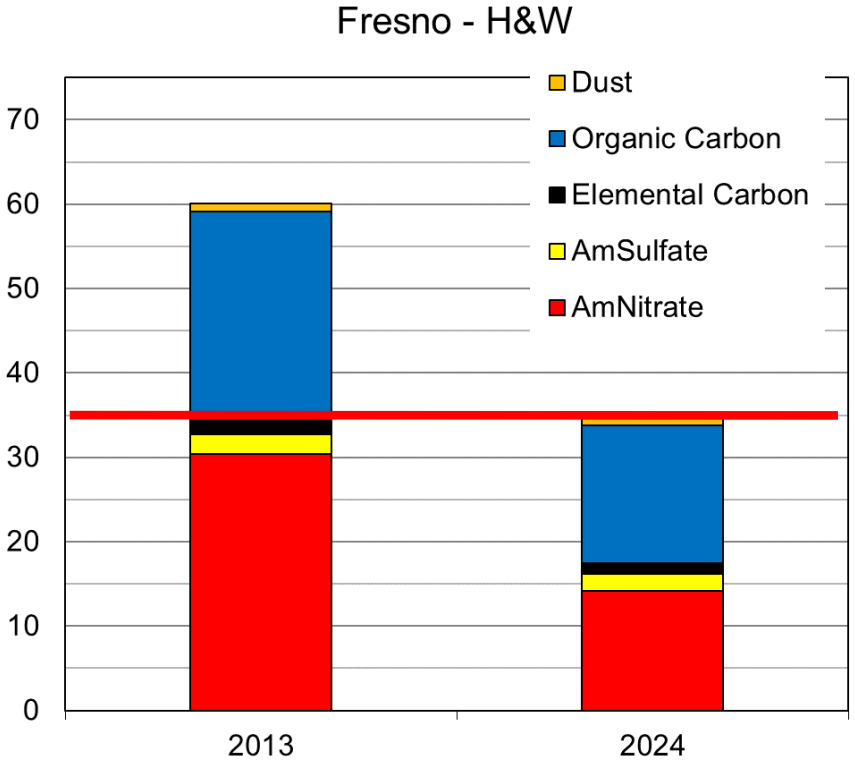
Valley PM2.5 Plan

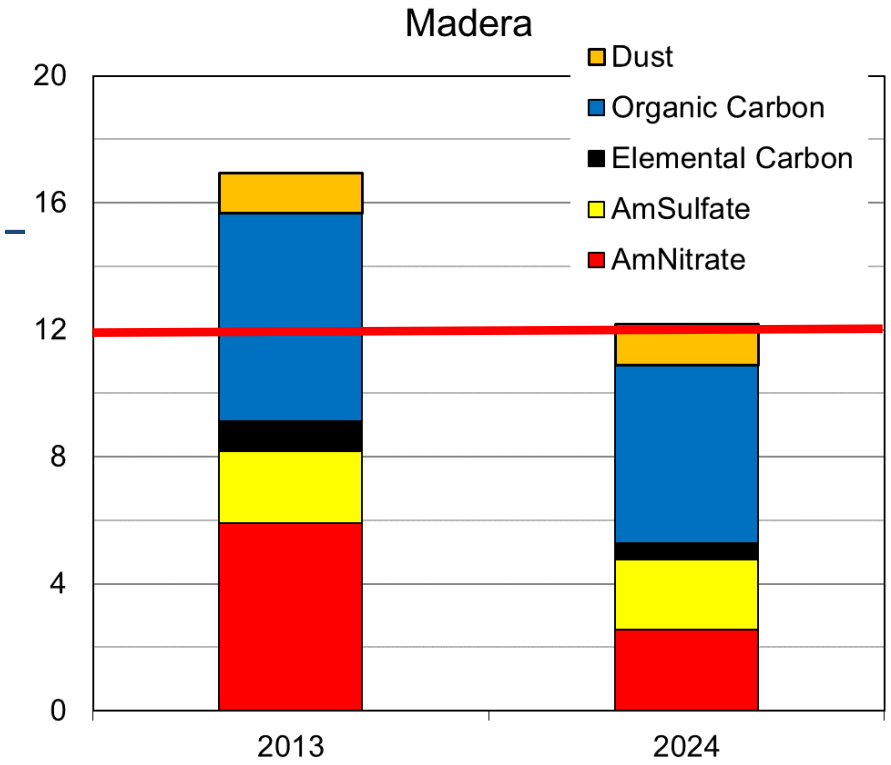
Attainment Demonstration Modeling

- Where did things stand last time we met (November 2017)?
- Plan to get SJV to attainment
- Final modeling results

Previous Attainment Modeling (from November 2017)

- Demonstrated that attainment was possible
- Attainment of the 24-hour standard (i.e., ≤35.4 µg/m3), but slightly exceeded the annual standard (i.e., Madera design value (DV) > 12.04 µg/m^3)





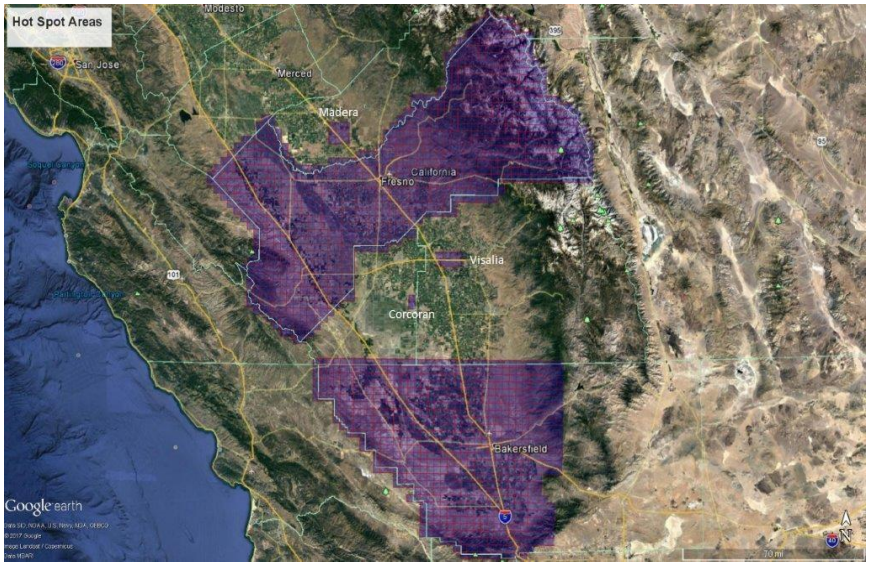
Latest Attainment Modeling

- >60% existing NO_x emission reductions from 2013 to 2024
- Incorporated additional NO_x emission reductions from the following categories (on top of the baseline reductions)
  - Heavy-duty diesel truck emissions (~ 18 tons/day)
  - Off-road equipment emissions (~ 2 tons/day)
  - Agricultural equipment emissions (~ 11 tons/day)
  - Electrify Ag pumps (~ 1 ton/day)
  - Locomotive emissions (~ 1 ton/day)
  - Stationary source fuel combustion emissions (~ 1 ton/day)

Latest Attainment Modeling

District's hot spot strategy for direct PM controls

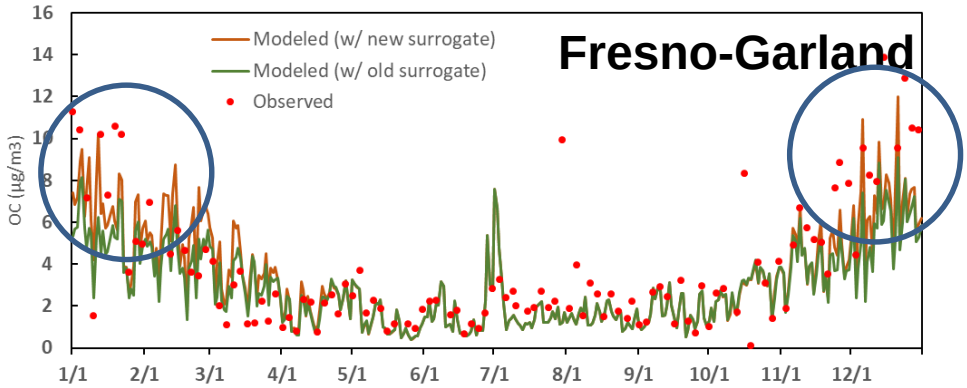
- Hot spot map shown below
- Applies to Fresno and Kern counties, and the cities of Madera, Corcoran, and Visalia

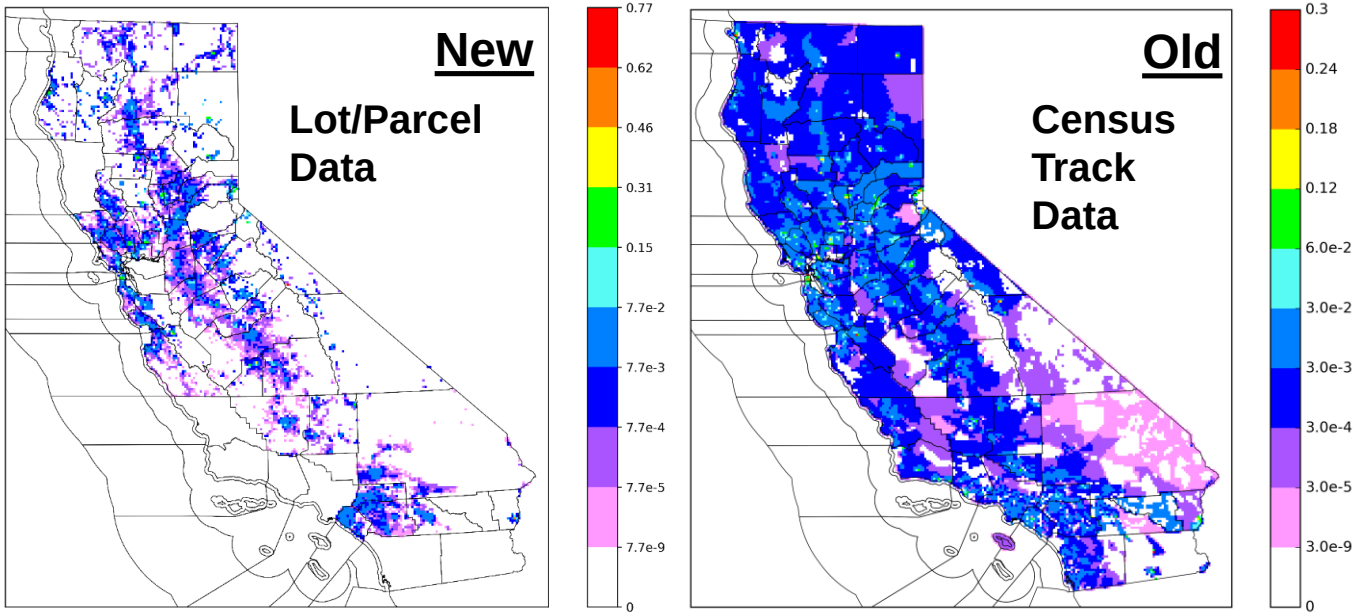


- Enhanced Burn Cleaner program and more stringent residential wood burning curtailments (12 µg/m^3 and 35 µg/m^3) in hot-spot areas
- Underfired charbroiler hot-spot strategy (achieves > 30% reduction in charbroiling emissions in hot-spot areas)
- Electrification of agricultural combustion engines and reduce agricultural equipment emissions
- Enhanced conservation management practices (tillage and fallow land)
- Woodchips in Bakersfield

Improved spatial surrogate for residential wood combustion

- The new surrogate leads to better prediction of peak wintertime organic carbon (OC) (see Fresno – Garland data)





2020 Annual and 24-hour Design Values (Attainment ≤ 15 µg/m^3 and ≤ 65 µg/m^3)

Baseline modeling demonstrates attainment, so no additional emission reductions needed

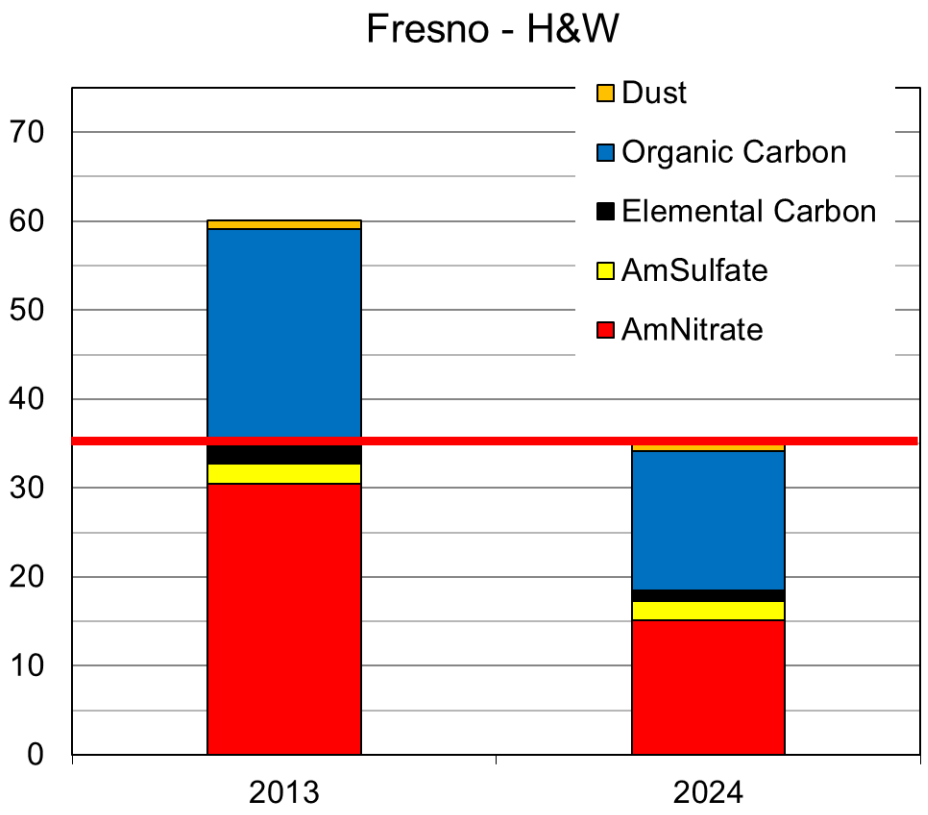
Sites	Base DV (µg/m^3)	2020 Annual DV (µg/m^3)
Bakersfield - Planz	17.2	14.6
Madera	16.9	14.2
Hanford	16.5	13.3
Visalia	16.2	13.5
Clovis	16.1	13.4
Bakersfield - California	16.0	13.5
Fresno-Garland	15.0	12.4
Turlock	14.9	12.5
Fresno - Hamilton & Winery	14.2	11.9
Stockton	13.1	11.4
Merced - S Coffee	13.1	10.9
Modesto	13.0	11.0
Merced - Main Street	11.0	9.3
Manteca	10.1	8.7
Tranquility	7.7	6.4

Sites	Base DV (µg/m^3)	2020 24-hour DV (µg/m^3)
Bakersfield – California	64.1	47.6
Fresno – Garland	60.0	44.3
Hanford	60.0	43.7
Fresno – Hamilton & Winery	59.3	45.6
Clovis	55.8	41.1
Visalia	55.5	42.8
Bakersfield – Planz	55.5	41.2
Madera	51.0	38.9
Turlock	50.7	37.8
Modesto	47.9	35.8
Merced – Main Street	46.9	32.9
Stockton	42.0	33.5
Merced – S Coffee	41.1	30.0
Manteca	36.9	30.1
Tranquility	29.5	21.5

2024 24-hr Design Values (Attainment ≤ 35.4 µg/m^3)

Baseline modeling + SJV hot spot strategy and state obligations demonstrates attainment

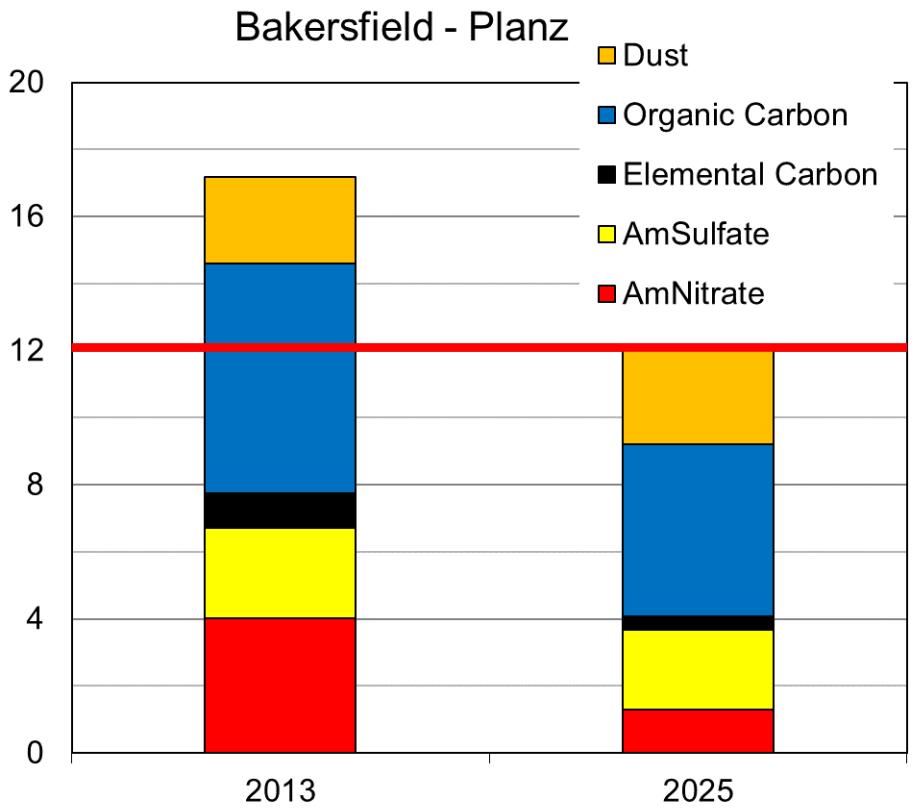
Sites	Base DV (µg/m^3)	2024 24-hour DV (µg/m^3)
Bakersfield – California	64.1	33.3
Fresno – Garland	60.0	32.8
Hanford	60.0	30.1
Fresno – Hamilton & Winery	59.3	35.1
Clovis	55.8	30.7
Visalia	55.5	30.2
Bakersfield – Planz	55.5	30.0
Madera	51.0	30.2
Turlock	50.7	30.2
Modesto	47.9	29.1
Merced – Main Street	46.9	27.4
Stockton	42.0	28.6
Merced – S Coffee	41.1	24.2
Manteca	36.9	25.8
Tranquility	29.5	16.2



2025 Annual Design Values (Attainment ≤ 12.04 µg/m^3)

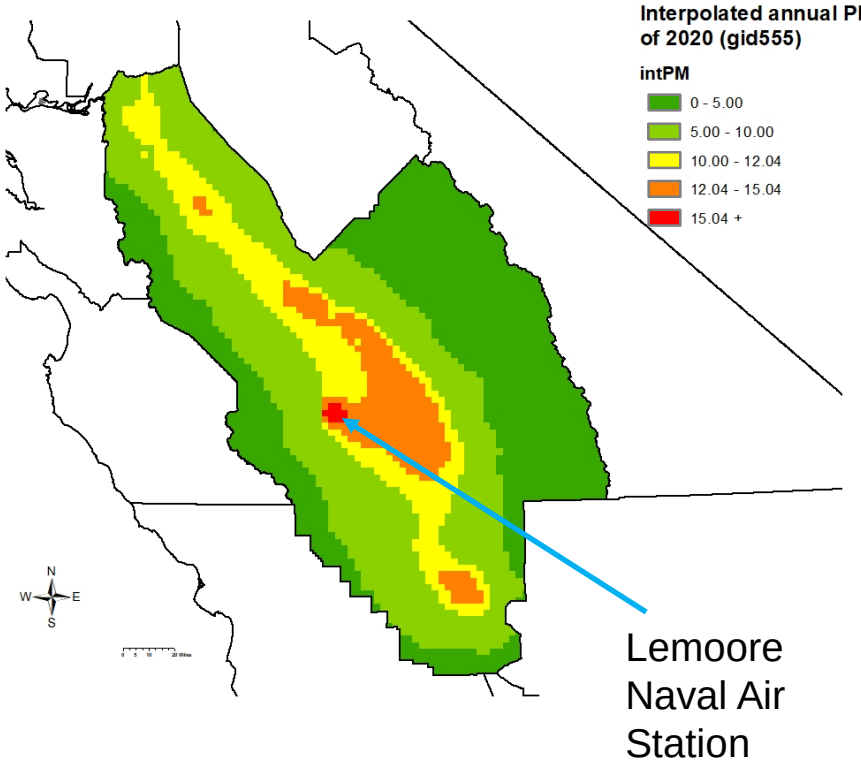
Baseline modeling + SJV hot spot strategy and state obligations demonstrates attainment

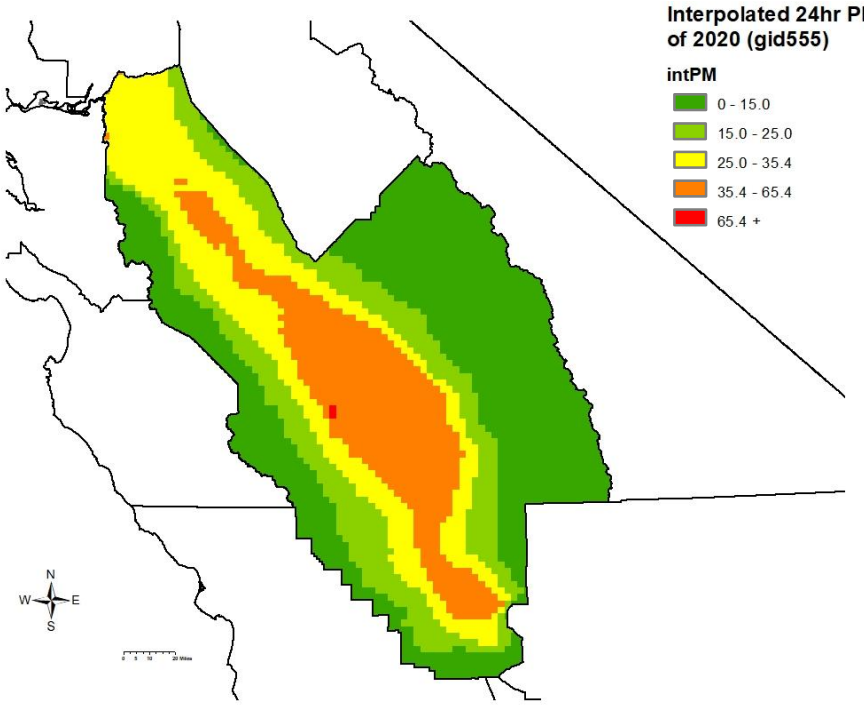
Sites	Base DV (µg/m^3)	2025 Annual DV (µg/m^3)
Bakersfield - Planz	17.2	12.0
Madera	16.9	11.9
Hanford	16.5	10.4
Visalia	16.2	11.1
Clovis	16.1	11.4
Bakersfield - California	16.0	11.0
Fresno-Garland	15.0	10.4
Turlock	14.9	11.1
Fresno - Hamilton & Winery	14.2	10.0
Stockton	13.1	10.6
Merced - S Coffee	13.1	9.6
Modesto	13.0	9.9
Merced - Main Street	11.0	8.6
Manteca	10.1	7.9
Tranquility	7.7	5.5



2020 Unmonitored Area Analysis

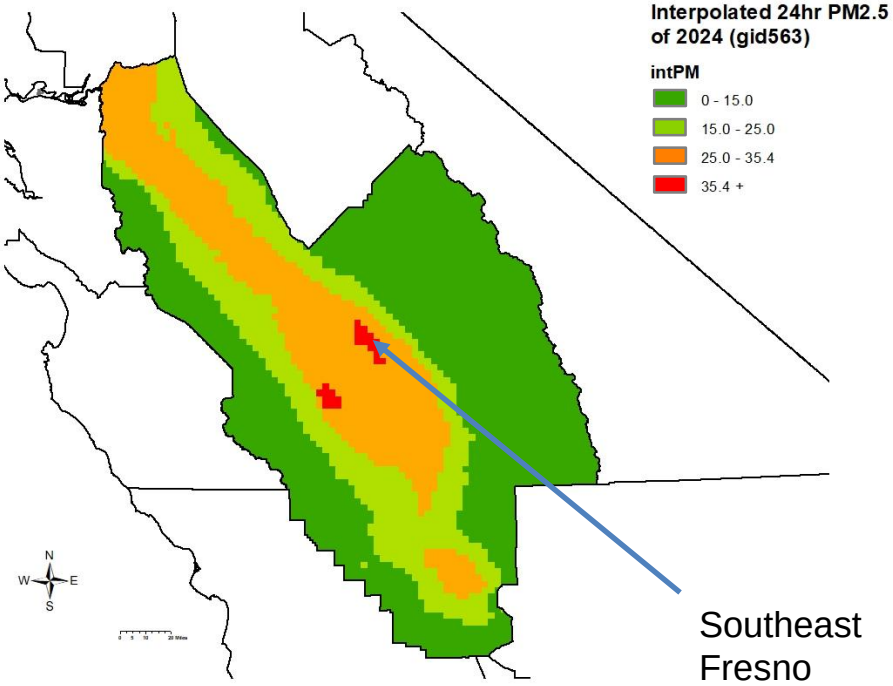
- Every modeling grid cell within SJV meets the 15 µg/m^3 annual standard and 65 µg/m^3 24-hour standard except a few cells surrounding Lemoore military facility (due to its localized emissions)

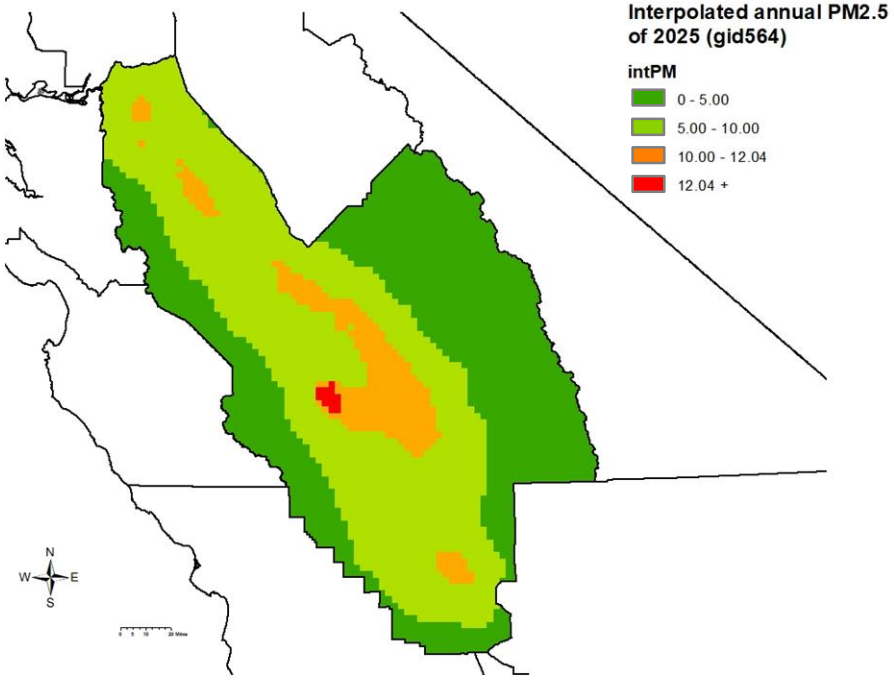




2024 & 2025 Unmonitored Area Analysis

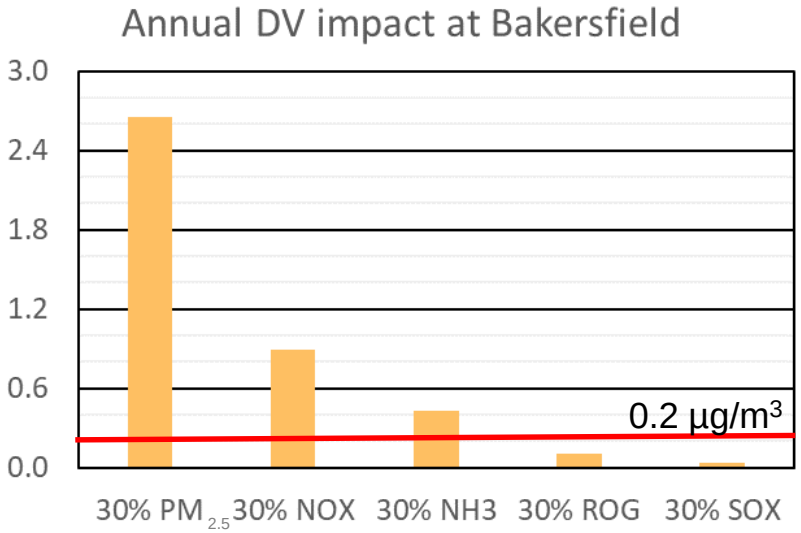
- In 2024, every modeling grid cell meets the 35 µg/m^3 24-hour standard except for an area surrounding the Lemoore military facility and the region to the southeast of the Fresno metropolitan area (will be addressed by AB617)
- In 2025, every modeling grid cell meets the 12 µg/m^3 annual standard except for an area surrounding the Lemoore military facility

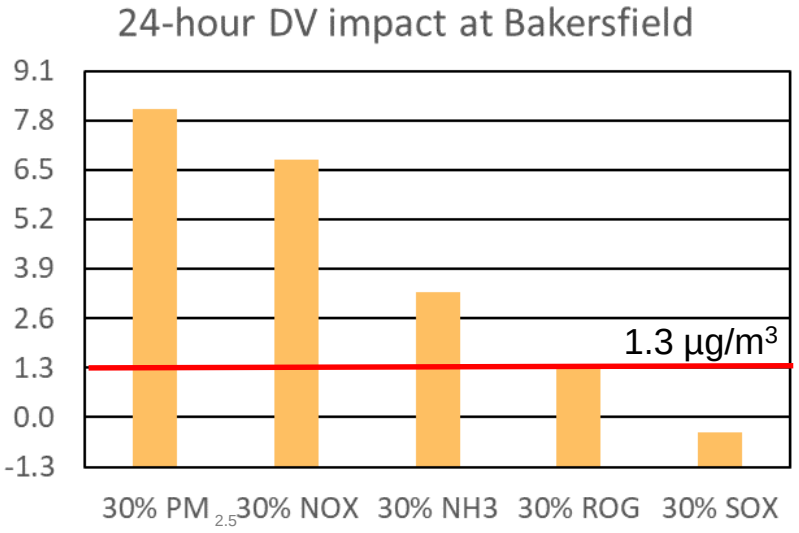




$PM_{2.5}$ Precursor Analysis (2013)

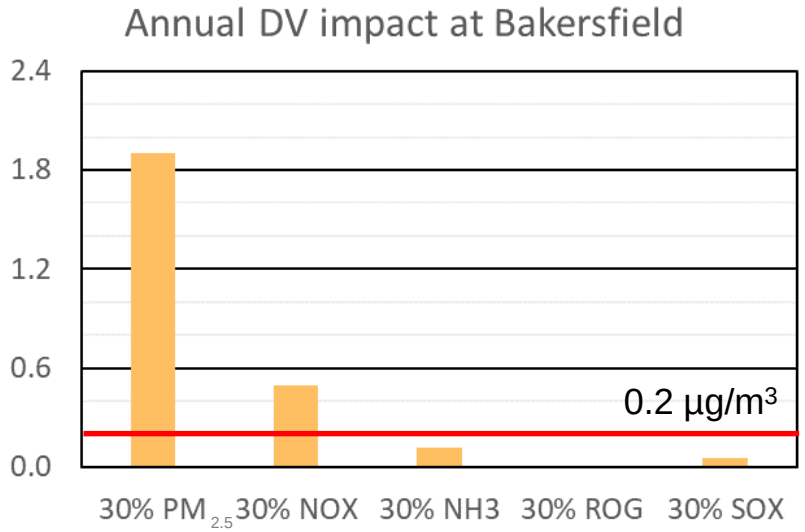
- Based on 30% sensitivity analysis (emissions reduced by 30%), primary $PM_{2.5}$ and NO_x emission reductions have the largest impacts on $PM_{2.5}$ DVs
- Ammonia impact is above EPA's significance thresholds. However, ammonia control is much less effective than $PM_{2.5}$ and NO_x
- Reactive organic gases (ROG) impacts are generally below the significance threshold at most monitoring sites
- SO_x impacts are below the significance threshold

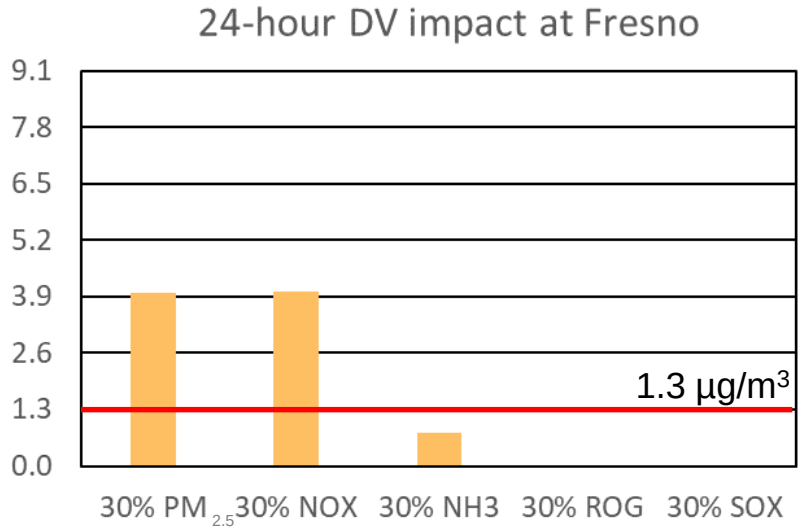




$PM_{2.5}$ Precursor Analysis (2024)

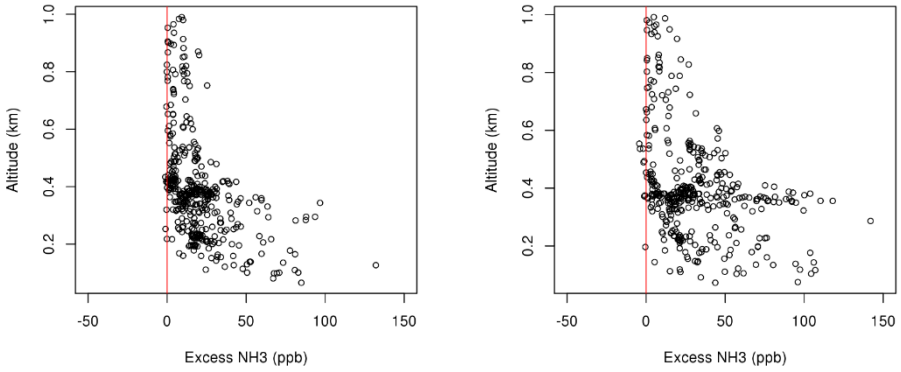
- Given the time that it takes to implement new controls and the large NOx reductions already "on the books" it makes sense to focus the sensitivity analysis on the future attainment year
- Primary $PM_{2.5}$ and NO_x emission reductions continue to have largest impacts on the $PM_{2.5}$ DV
- Ammonia impact is generally below the US EPA thresholds
- In the SJV, ammonium nitrate formation is limited by the availability of nitric acid (formed from NO_x), not by ammonia. So, controls on NO_x are more effective at reducing ammonium nitrate than are controls on ammonia
- ROG and SO_x impacts are below the US EPA thresholds

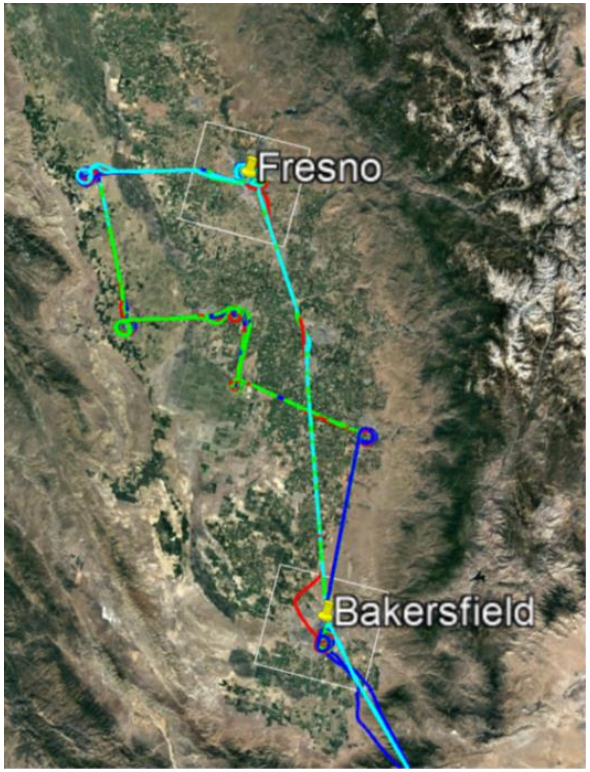




Ammonia as a Precursor

- Field study measurements in the SJV indicate that ammonia is in great excess in the SJV
- From 2013 to 2024, NO_x emissions in the SJV are projected to drop by more than 60%, while ammonia emissions do not appreciably change, which means ammonia will be in even greater excess in 2024
- The chemistry governing the formation of ammonium nitrate dictates that as ammonia excess increases relative to NO_x, ammonia reductions will have a smaller and smaller impact on ammonium nitrate formation
- In 2024, ammonia control become far less effective at reducing ammonium nitrate formation



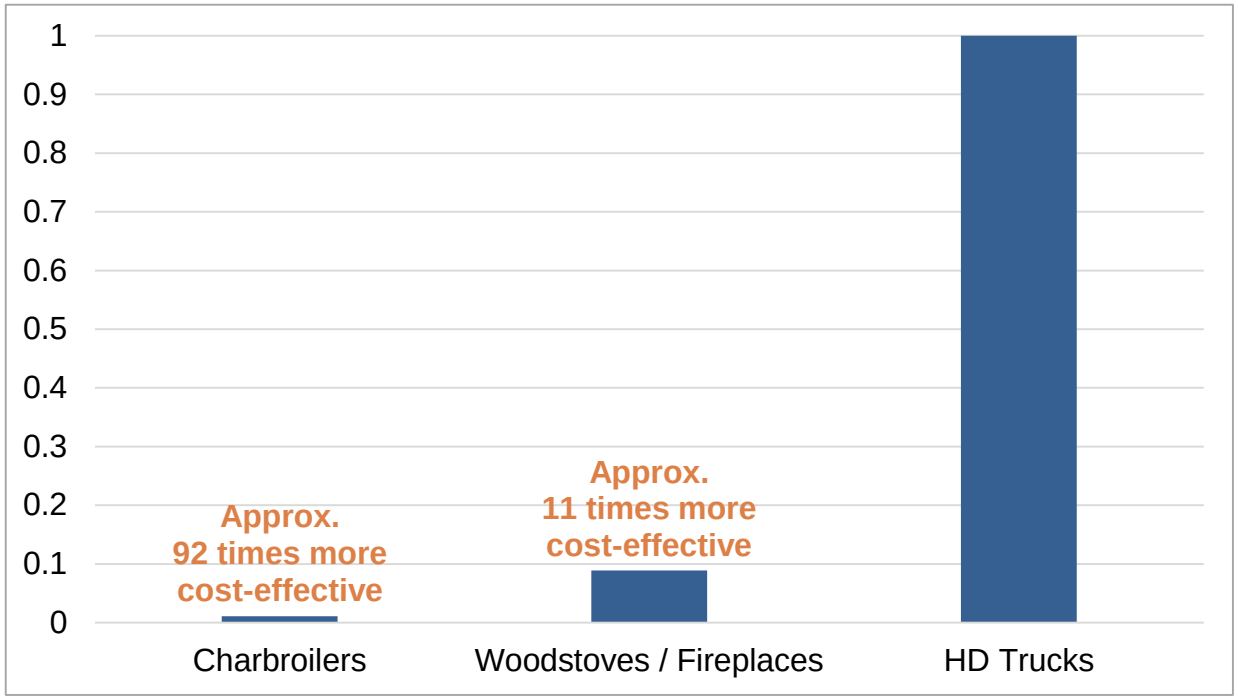


Excess NH_3 in the SJV on Jan 18 and Jan 20 (left) based on NASA aircraft (top) measurements in 2013

Conclusions from the Attainment Demonstration Modeling

- No additional controls are needed to attain the annual (15 µg/m^3) and 24-hr (65 µg/m^3) standards in 2020
- The District's hot spot strategy along with State commitments were able to demonstrate attainment of the 24-hr standard (35 µg/m^3) in 2024 and annual standard (12 µg/m^3) in 2025
  - Assumes effective implementation and enforcement
- District and CARB will be working together to assess the unmonitored areas
  - Includes deploying an E-BAM monitor for winter 2018/19 in the Fresno unmonitored peak area

Relative Cost of Reducing PM2.5



Next Steps

- Finalize proposed plan with specific regulatory and incentive-based measures for public review
  - Host additional public workshop as necessary
  - 30-day comment period before presenting final draft to Board
- Address other Clean Air Act requirements
  - Reasonable Further Progress, Contingency, Quantitative Milestones
- Present an EPA-approvable plan to Board as soon as possible after robust public process
  - Schedule for adoption depends on completion of preparation of related necessary planning documents for public review

Additional Information

- Up-to-date information available at http://www.valleyair.org/pmplans/
- Receive email updates on the development of this plan and future air quality attainment plans at http://www.valleyair.org/lists/list.htm
- Email comments to airqualityplans@valleyair.org

Public Comments

webcast@valleyair.org