

# Public Advisory Workgroup Meeting #4

April 12, 2017



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# Overview

- District preparing attainment strategy that addresses multiple PM2.5 standards under the federal Clean Air Act
  - 1997 PM2.5 Standard (24-hour 65  $\mu\text{g}/\text{m}^3$  and annual 15  $\mu\text{g}/\text{m}^3$ )
  - 2006 PM2.5 Standard (24-hour 35  $\mu\text{g}/\text{m}^3$ )
  - 2012 PM2.5 Standard (annual 12  $\mu\text{g}/\text{m}^3$ )
- 2006 PM2.5 Standard – Attainment Deadline 2019
- 2012 PM2.5 Standard – Attainment Deadline 2021
- District and ARB agree that integrated ozone/PM2.5 strategy must be pursued to address latest federal standards
  - NOx emission reductions contribute to attainment of both PM2.5 and Ozone
  - Ensure that resources invested to attain PM2.5 standards also advance attainment of new 2015 Ozone Standard
  - Strategy should focus on NOx emission reductions while also leaving no stone unturned for direct PM2.5 emission reductions
- Meeting new standards requires enormous reductions in emissions, particularly from mobile sources that make up 85% of Valley's NOx emissions



# Pursue Expeditious Attainment

- Three PM2.5 plans due between now and Fall 2017
  - 5% Plan due Dec 2016 for 1997 PM2.5 Standard (EPA inaction)
  - Serious plan due Aug 2017 for 2006 PM2.5 Standard
  - Moderate plan due Oct 2016 for 2012 PM2.5 Standard (submitted to ARB Sep 2016)
- District remains committed to leaving no stone unturned to find additional reductions from sources under our jurisdiction
- Work with ARB to ensure that State provides all possible mobile source control strategies that result in additional reductions in emissions
- District will not ask for attainment deadline extension or bump up in classification with delayed attainment unless finding is made by District and ARB that all available and reasonable mobile and stationary control measures are not adequate to achieve attainment by the prescribed deadlines



# Public Engagement Process

- District's public process provides multiple opportunities for public and stakeholders to provide comments, ask questions, and request additional information
  - Conduct public workshops
  - Hold multiple Public Advisory Workgroup meetings
  - Provide monthly updates at public meetings of the District Governing Board, Citizens Advisory Committee, and Environmental Justice Advisory Group
- Public Workshops
  - December 1, 2016 - ARB workshop
  - December 7, 2016 - District Scoping Public Workshop
  - March 9, 2016 - District Public Workshop
- Public Advisory Workgroup Meetings
  - January 11, 2017 - Air Quality Modeling
  - January 25, 2017 - ARB Mobile Source Measures
  - February 9, 2017 - District measures
  - April 12, 2017 - Update on Air Quality Modeling and Measures



# Air Quality Modeling

- Modeling based on foundation of emissions inventories
  - Best available estimates of the amount of pollutants and precursors being emitted from each source type
  - Future-year inventories account for both growth and control
  - Inventories continuously improved
- Plan's inventory is a snapshot reflecting best information at the time for use in modeling & control measures evaluation
- District coordinates closely with ARB to ensure accuracy



# Air Quality Modeling (cont'd)

- Modeling necessary to project future air quality under current control strategy, and under proposed control strategy for attainment of air quality standards
- Modeling informs the attainment planning process on what emissions reductions are needed to attain an air quality standard
  - Provides a target for needed emissions reductions
  - Places a focus on which emissions sources could be targeted for further emissions reductions

# Air Quality Modeling (cont'd)

- Air quality modeling uses highly complex computer programs, sophisticated computer hardware, and large databases to predict ambient pollution concentrations given future emission inventory and meteorological scenarios
- These models simulate air quality concentrations in the Valley in a “computerized laboratory” that brings together:
  - Science of emissions generation through spatial/temporal gridding
  - Dynamics of meteorological transport
  - Atmospheric photochemistry
- Air quality modeling fundamental to understanding the Valley’s complex air quality problems
- Many inputs and algorithms in SJV modeling derived from San Joaquin Valleywide Air Pollution Study Agency research (CRPAQS, CCOS)



# Scientific Foundation for PM2.5 Planning

- Study Agency dedicated resources and effort to further develop understanding of PM2.5 in 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 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



# Scientific Foundation for PM2.5 Planning (cont'd)

- Resulting dataset supports future modeling work and attainment plan strategy development
  - Studied by researchers around the world
  - Hundreds of professional papers published based on analysis of resulting CRPAQS data
- Understanding of PM2.5 developed through CRPAQS used in modeling assumptions for past Valley attainment plan development, including the current development of the *2017 PM2.5 Plan*
- CRPAQS research will continue to inform PM planning for the Valley in the future, along with more recent field campaigns:
  - CalNex (2010) – NOAA and ARB
  - DISCOVER-AQ (2013) – NASA



# Scientific Foundation for PM2.5 Planning (cont'd)

- PM2.5 formation in the Valley is highly complex
- Direct PM2.5, NOx, and SOx are primary contributors to the Valley's PM2.5 levels
  - NOx emissions primarily from mobile sources (85% of emissions)
  - Reductions in directly emitted PM2.5 emissions from various sources do not provide equal benefit in reducing PM2.5 concentrations at the Valley's design value monitoring stations
  - Neighborhood-level direct PM2.5 emissions contribute to PM2.5 levels and have adverse health impacts
- Modeling and studies have demonstrated that ammonia reductions do not achieve significant PM2.5 benefits
  - NOx and directly emitted PM2.5 emissions reductions much more effective in reducing PM2.5 concentrations
  - EPA recently proposed new guidance on November 17, 2016 outlining requirements for evaluating precursor significance



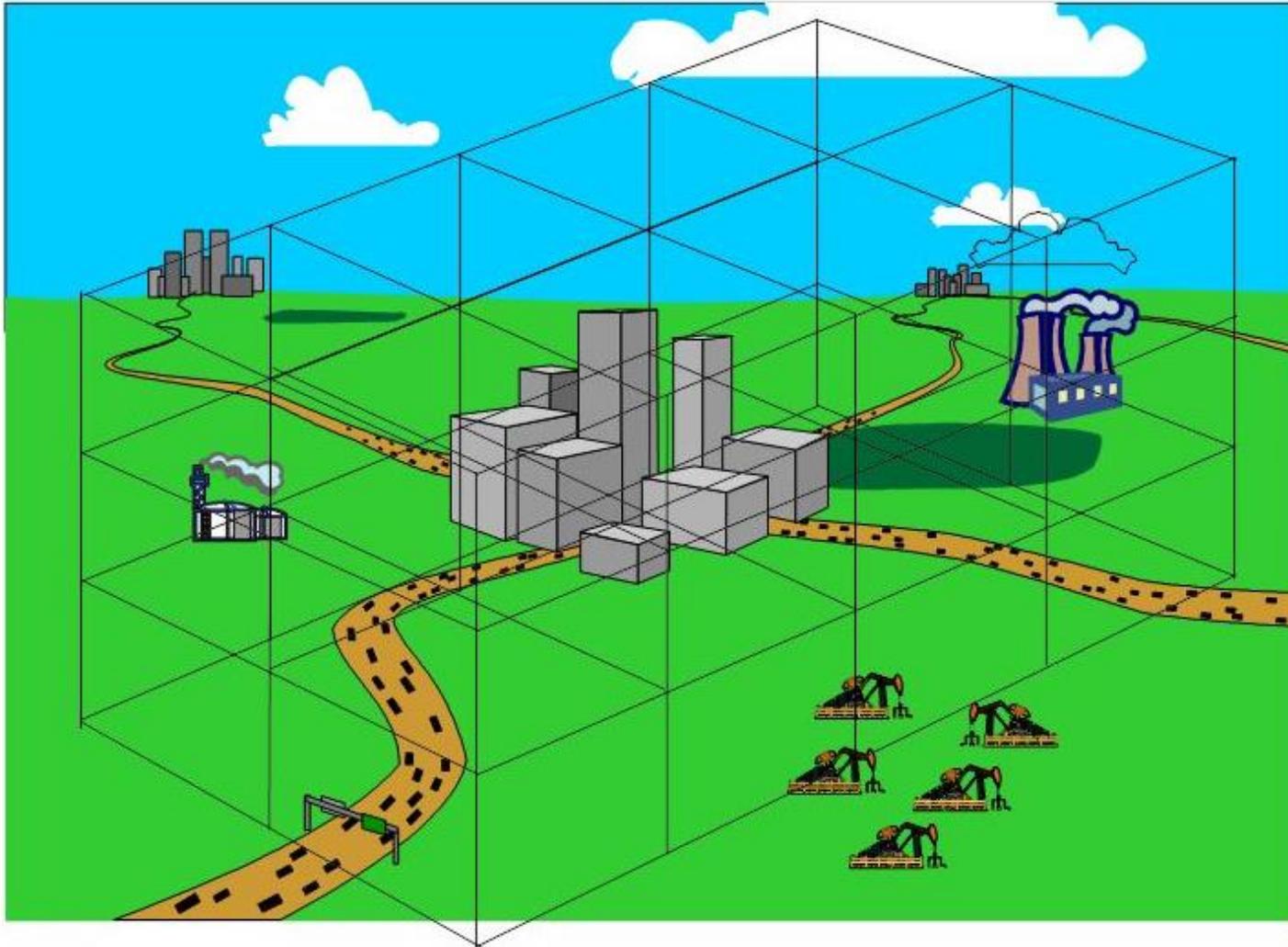
# Grid Modeling for the Valley



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# Grid Modeling for the Valley



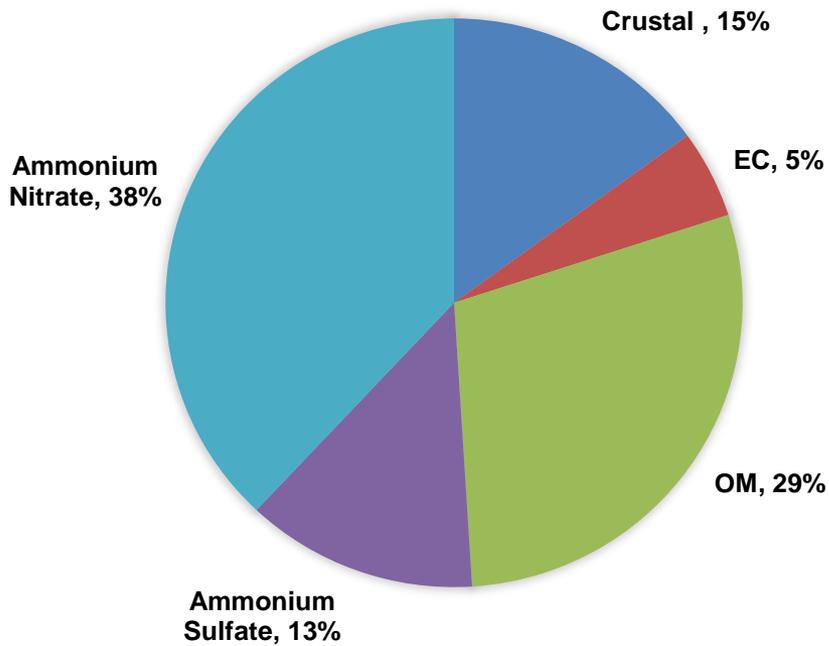
# Composition of PM2.5 in the Valley

- **Organic Matter:** also called combustion carbon or organic carbon (ex: residential wood, agricultural burning, cooking, direct tailpipe)
- **Elemental Carbon:** also called soot or black carbon; incomplete combustion (ex: diesel engines)
- **Geologic:** road dust and soil dust
- **Trace metals:** brake wear, fireworks, etc.
- **Ammonium Nitrate:** reaction of ammonia and nitric acid
- **Ammonium Sulfate:** reaction of ammonia and sulfuric acid

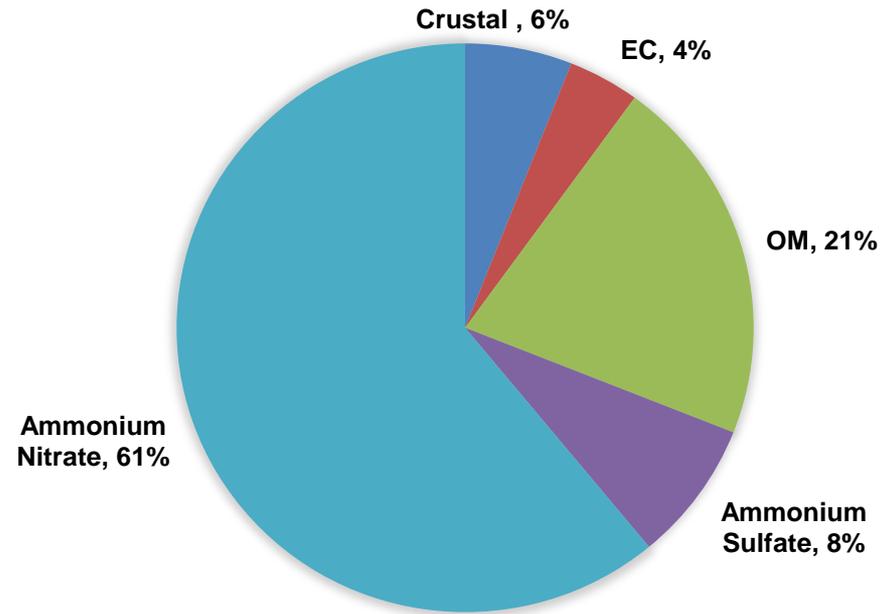


# Bakersfield PM2.5 Speciation (Average of 2011 to 2013)

## Annual Average

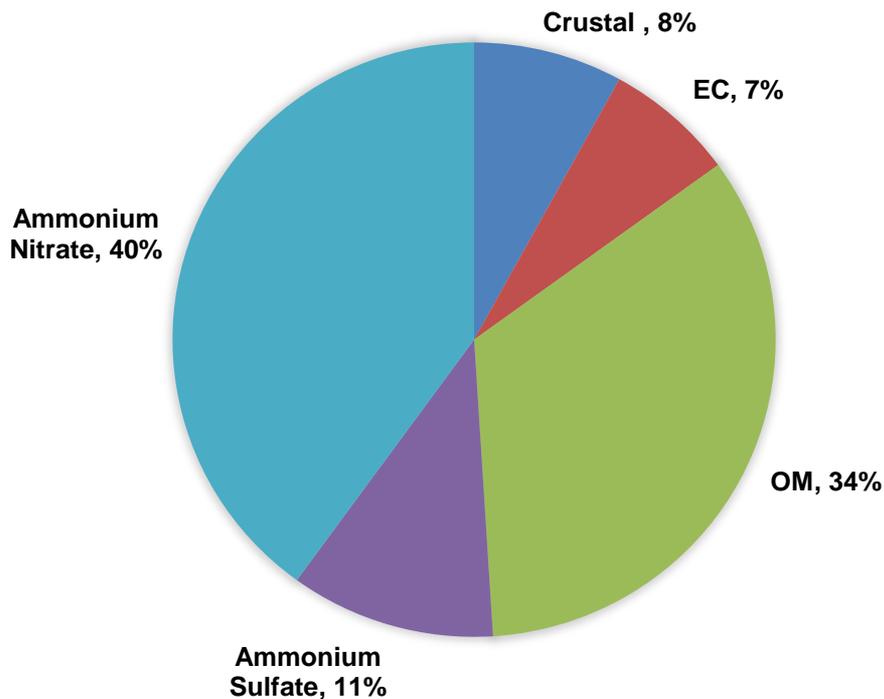


## Average of Top 10% Days

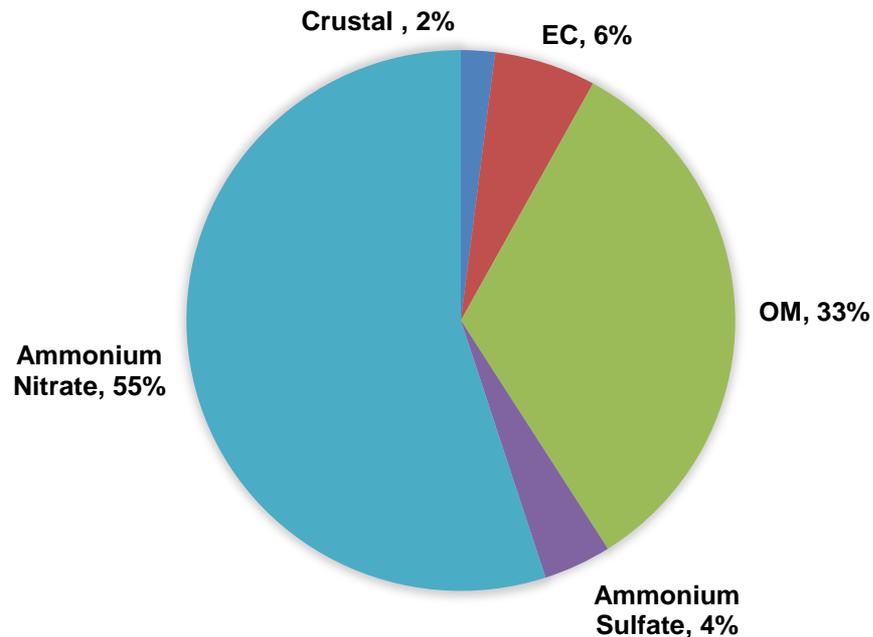


# Fresno PM2.5 Speciation (Average of 2011 to 2013)

## Annual Average

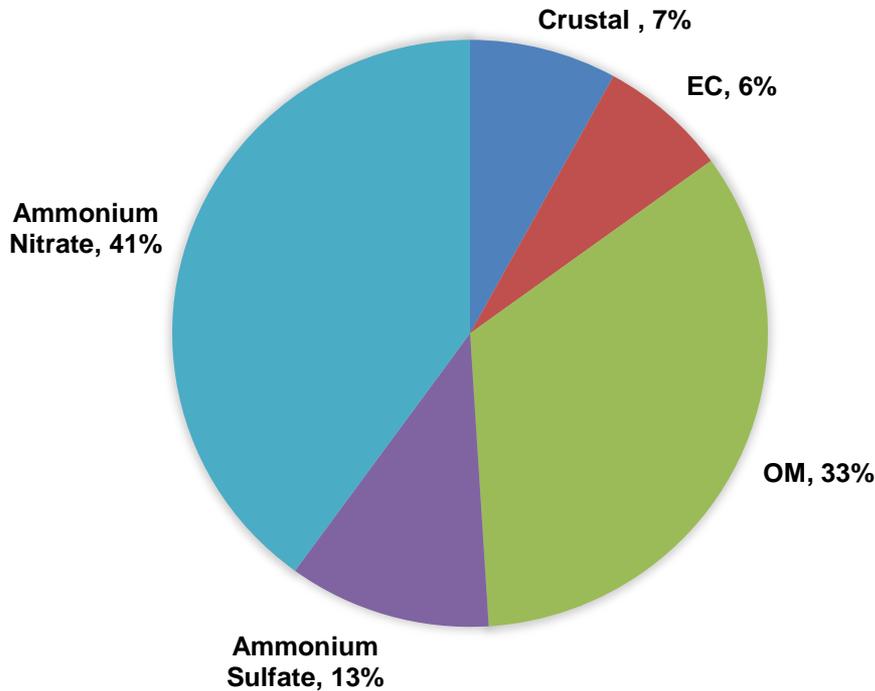


## Average of Top 10% Days

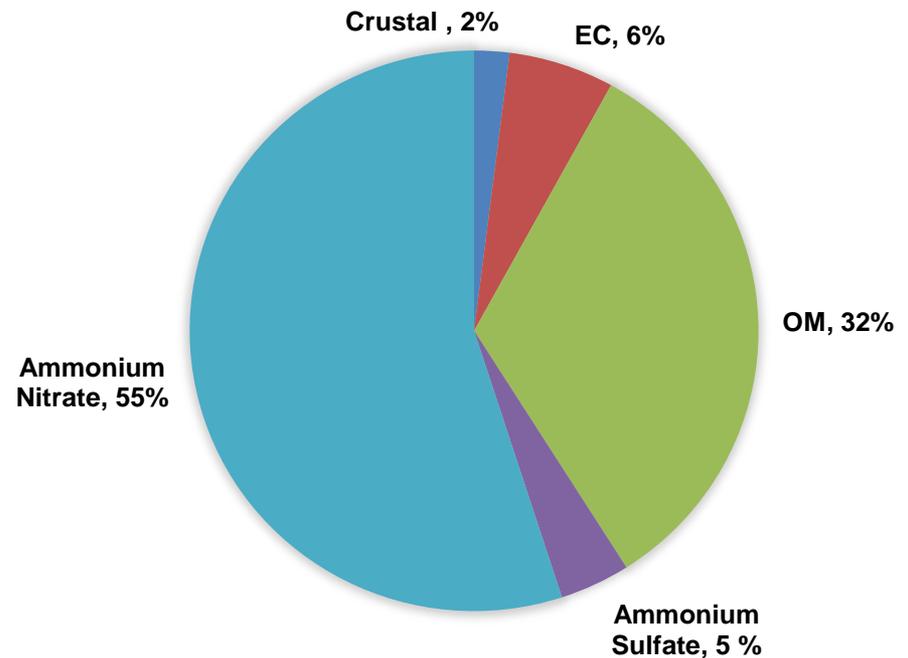


# Modesto PM2.5 Speciation (Average of 2011 to 2013)

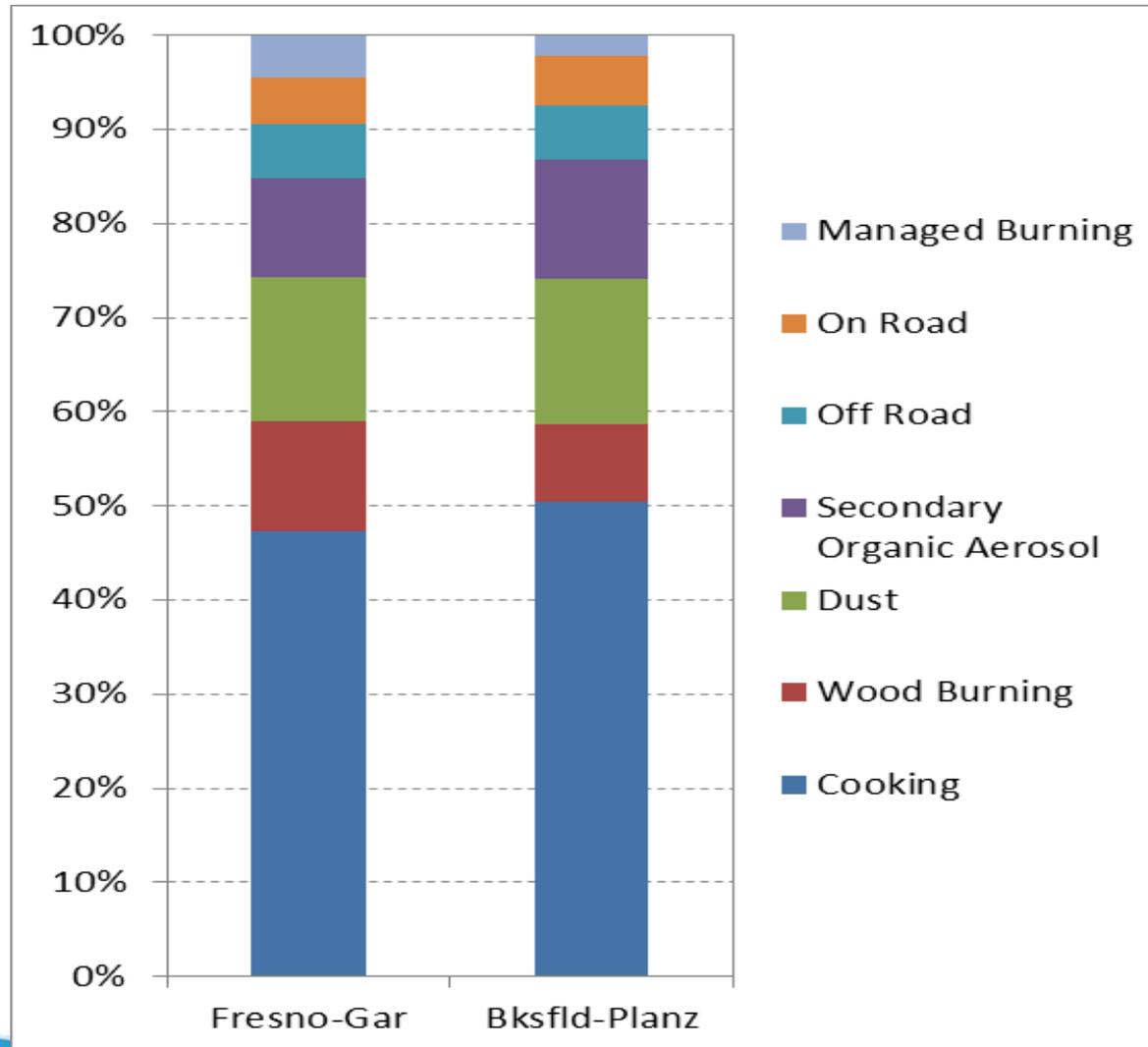
## Annual Average



## Average of Top 10% Days



# OM Source Contributions in 2025 (ARB model)



# More Precise Modeling Underway

- District working closely with ARB to continue sophisticated air quality modeling effort and ensure modeling accounts for the following characteristics:
  - Location of emissions
  - Seasonality and temporal patterns of emissions
  - Particulate matter speciation
  - Current control programs that include episodic curtailment based on meteorological conditions
  - Air quality changes at peak sites due to reductions from sources in remote locations

# More Precise Modeling Underway (cont'd)

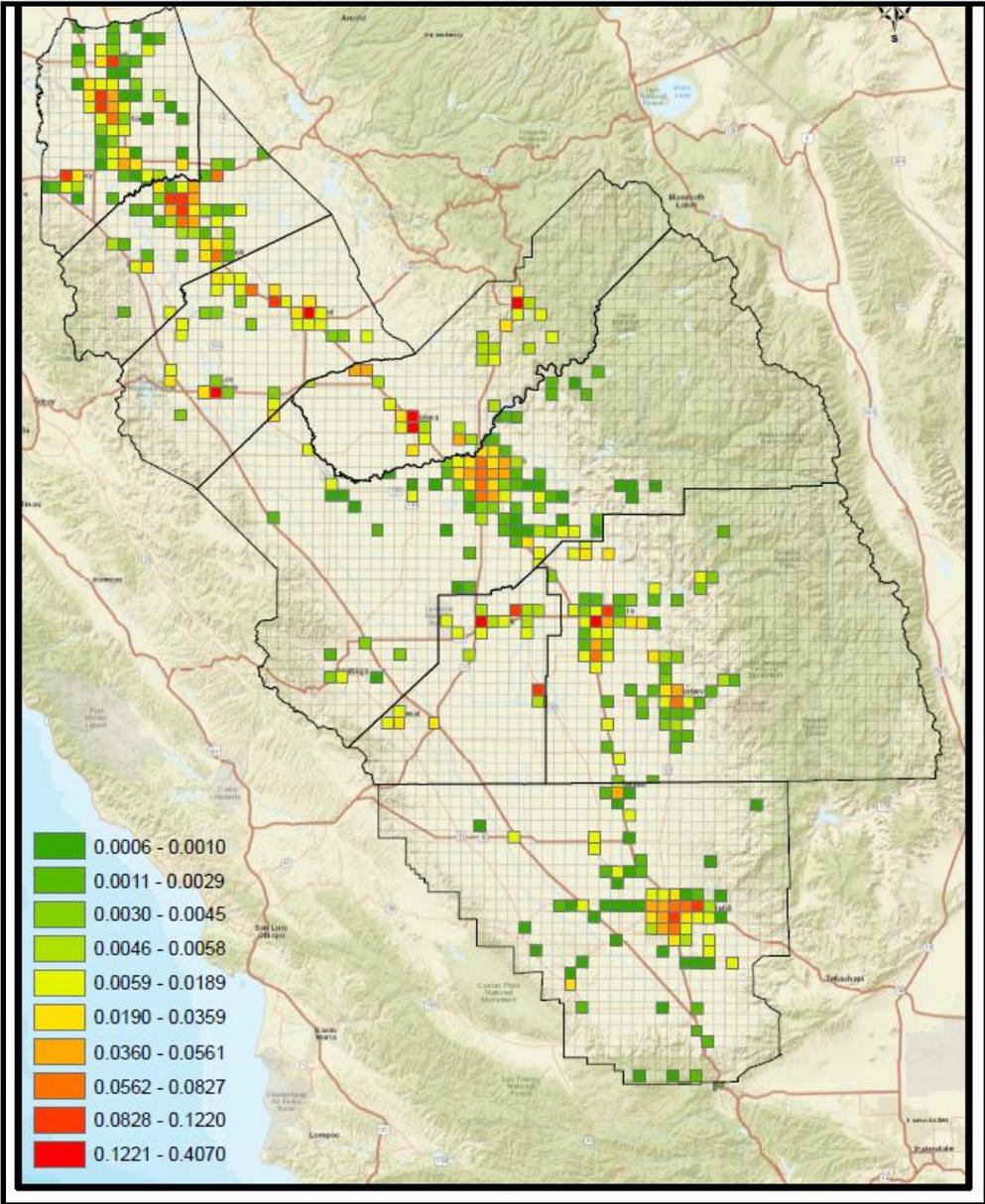
- District has conducted additional modeling analyses to quantify the actual PM<sub>2.5</sub> benefits achieved by direct PM<sub>2.5</sub> emissions reductions from potential ambitious measures
  - Replacement of all almond harvesters in Valley with latest low-emitting harvester technologies
  - Installation of PM control technology on all large under-fired charbroilers installed within last 10-15 years
  - Enhancement of Conservation Management Practices for ag operations to reduce directly emitted PM
  - Dust from unpaved roads and ag lands (non-pasture)
  - Replacement of 23,628 older high emitting residential wood-burning devices with cleaner devices



# More Precise Modeling Underway (cont'd)

- Modeling the effectiveness of direct PM2.5 control measures assists in estimating the needed NOx reductions to attain the federal PM2.5 standards (“NOx Carrying Capacity”)
- District’s modeling analyses indicate that direct PM2.5 reductions from potential ambitious measures do not provide proportional reductions in PM2.5 concentrations at peak Valley sites (most measures provide minimal benefit)
- Significant further reductions in NOx are needed to reach attainment by prescribed deadlines

# Under-fired Charbroilers Modeling Scenario

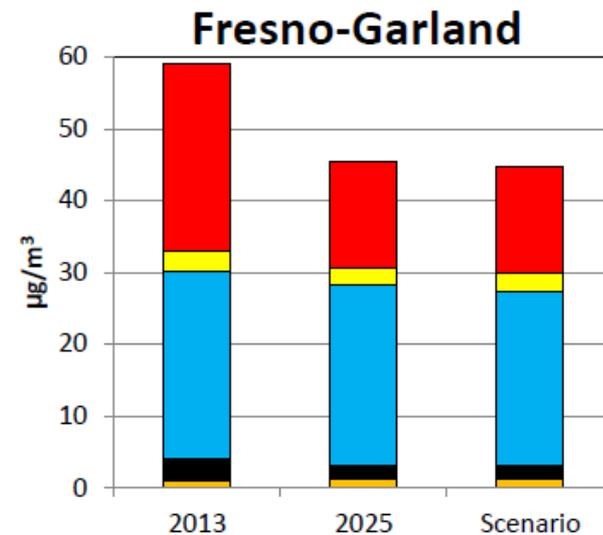
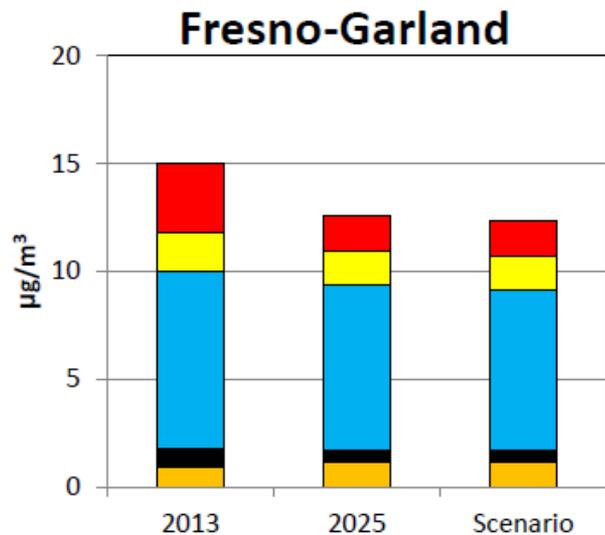
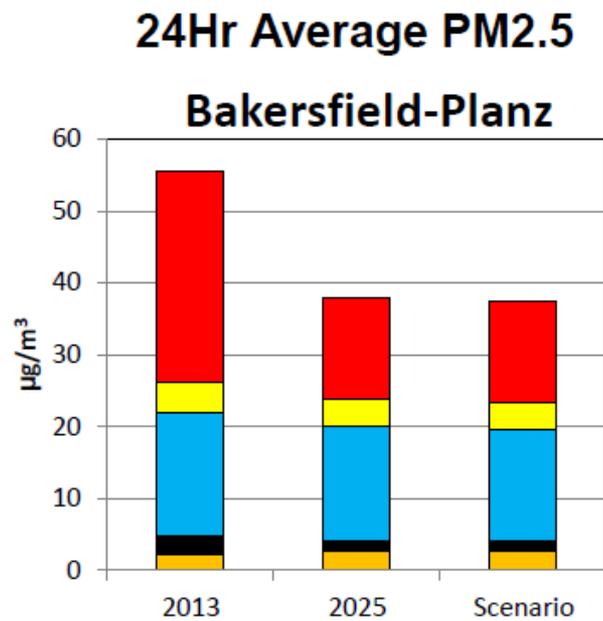
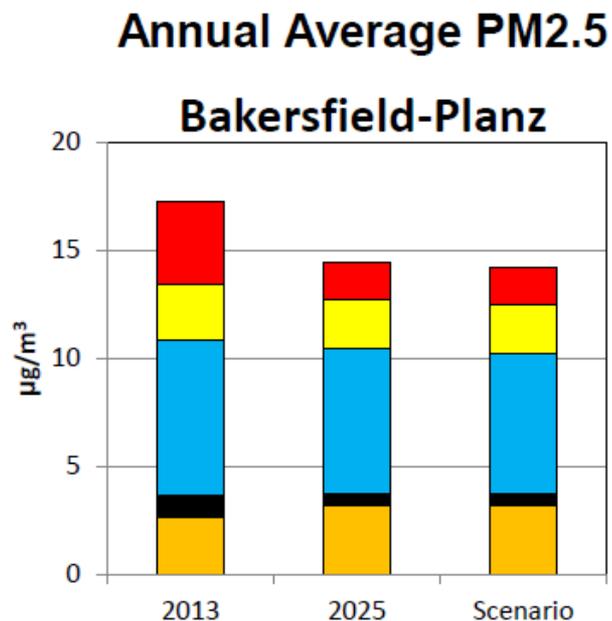


# Under-fired Charbroilers Modeling Scenario (cont'd)

## Change Due to Scenario

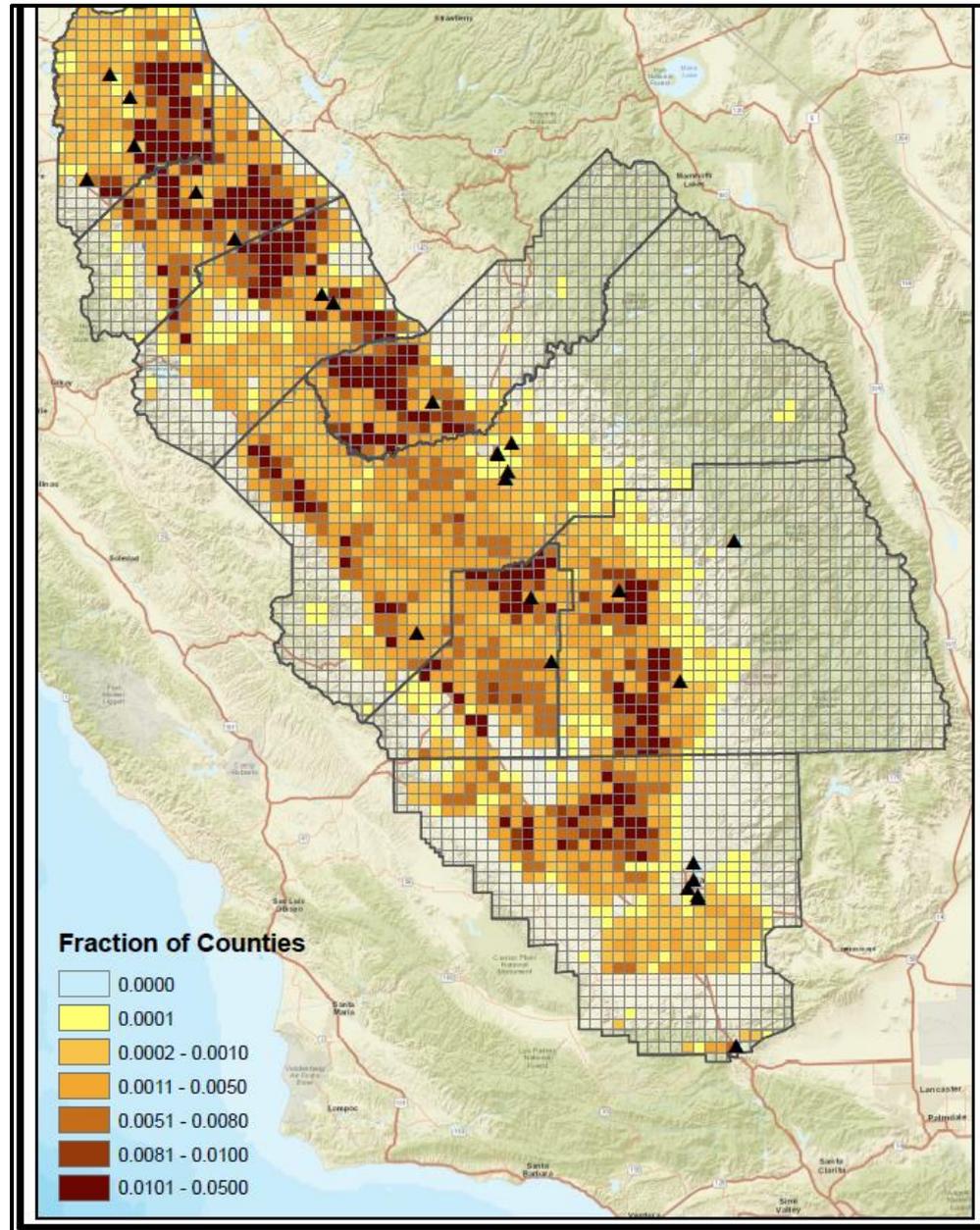
Site	Annual Average		24 Hour Average	
	Change (µg/m3)	Percent Change	Change (µg/m3)	Percent Change
Bksfld-Planz	-0.240	-1.660%	-0.570	-1.5009%
Bksfld-Cal	-0.230	-1.735%	-0.722	-1.7020%
Clovis-NVilla	-0.230	-1.689%	-0.530	-1.3160%
Cocoran-Pat	-0.050	-0.377%	-0.208	-0.6151%
Fresno-HW	-0.240	-2.003%	-0.631	-1.6148%
Hanford-Irwn	-0.040	-0.341%	-0.216	-0.5638%
Merced-MStr	-0.070	-0.749%	-0.282	-0.8546%
Merced-SCoff	-0.070	-0.674%	-0.112	-0.3698%
Modesto-14th	-0.110	-1.043%	-0.262	-0.7494%
Stockton-Haz	-0.080	-0.728%	-0.242	-0.7639%
Turlock-SMin	-0.090	-0.754%	-0.252	-0.6773%
Visalia-NChur	-0.140	-1.084%	-0.370	-0.9451%
Fresno-Gar	-0.240	-1.906%	-0.810	-1.7815%
Madera-28261A	-0.090	-0.675%	-0.263	-0.6924%
Manteca-Fis	-0.030	-0.361%	-0.112	-0.3956%
Tranq-WAA	-0.010	-0.171%	-0.078	-0.3944%
MIN	-0.240	-2.003%	-0.810	-1.7815%
MAX	-0.010	-0.171%	-0.078	-0.3698%
MEAN	-0.123	-0.997%	-0.354	-0.9335%

# Under-fired Charbroilers Modeling Scenario (cont'd)



■ Dust   
 ■ Elemental Carbon   
 ■ Combustion Carbon   
 ■ Ammonium Sulfate   
 ■ Ammonium Nitrate

# Agricultural Harvesting Modeling Scenario (cont'd)

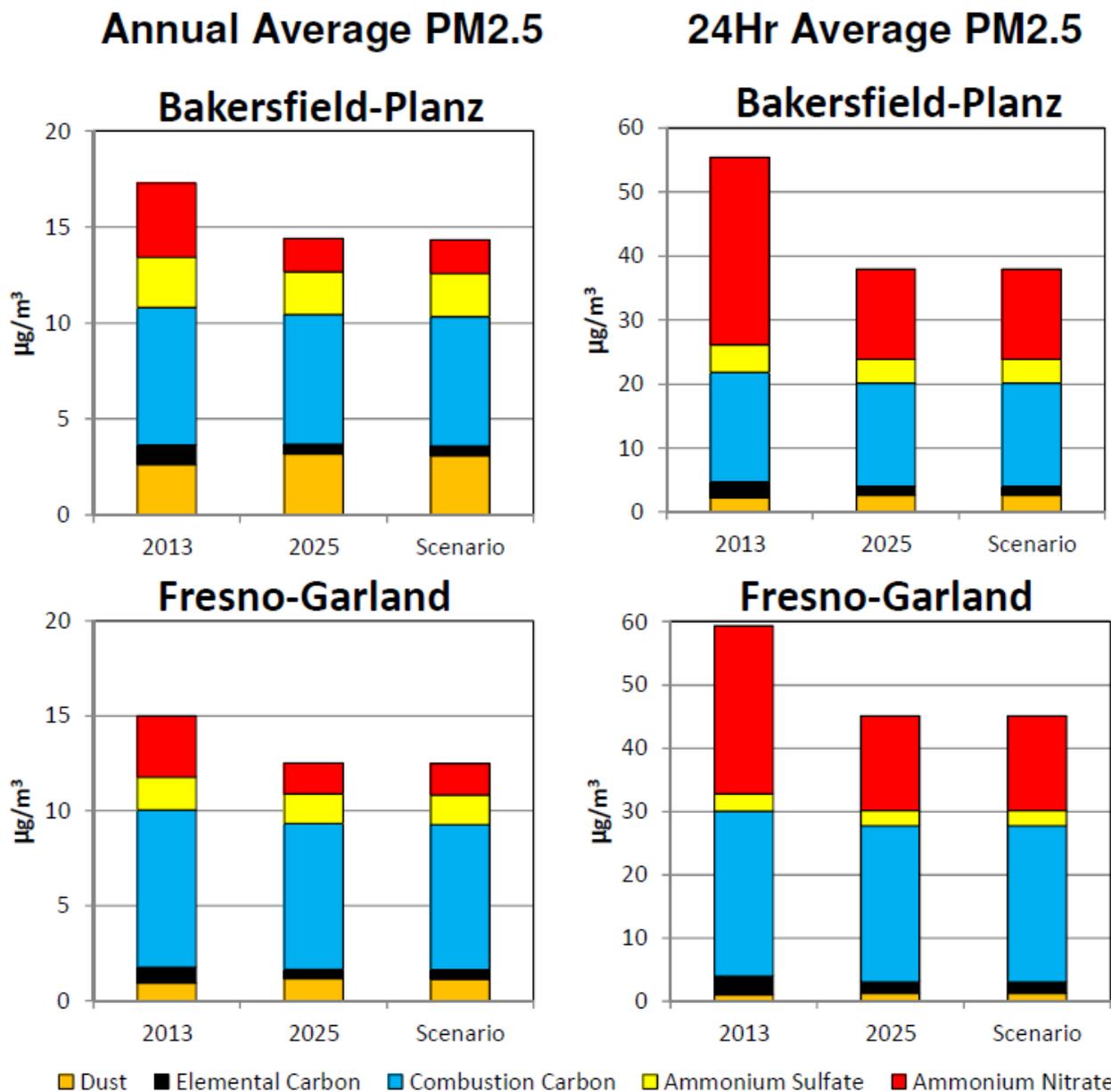


# Agricultural Harvesting Modeling Scenario (cont'd)

## Change Due to Scenario

Site	Annual Average		24 Hour Average	
	Change (µg/m <sup>3</sup> )	Percent Change	Change (µg/m <sup>3</sup> )	Percent Change
Bksfld-Planz	-0.09	-0.62%	0.000	0.0000%
Bksfld-Cal	-0.08	-0.61%	0.000	0.0000%
Clovis-NVilla	-0.04	-0.29%	0.000	0.0000%
Cocoran-Pat	-0.05	-0.38%	0.000	0.0000%
Fresno-HW	-0.03	-0.25%	0.000	-0.0001%
Hanford-Irwn	-0.06	-0.51%	0.000	0.0000%
Merced-MStr	-0.04	-0.43%	0.000	-0.0001%
Merced-SCoff	-0.06	-0.58%	0.000	-0.0001%
Modesto-14th	-0.05	-0.47%	0.000	0.0000%
Stockton-Haz	-0.01	-0.09%	0.000	0.0000%
Turlock-SMin	-0.06	-0.50%	0.000	0.0000%
Visalia-NChur	-0.05	-0.39%	0.000	0.0000%
Fresno-Gar	-0.04	-0.32%	0.000	0.0000%
Madera-28261A	-0.10	-0.75%	0.000	-0.0002%
Manteca-Fis	-0.02	-0.24%	0.000	0.0000%
Tranq-WAA	-0.02	-0.34%	0.000	-0.0005%
MIN	-0.10	-0.75%	0.000	-0.0005%
MAX	-0.01	-0.09%	0.000	0.0000%
MEAN	-0.05	-0.42%	0.000	-0.0001%

# Agricultural Harvesting Modeling Scenario (cont'd)



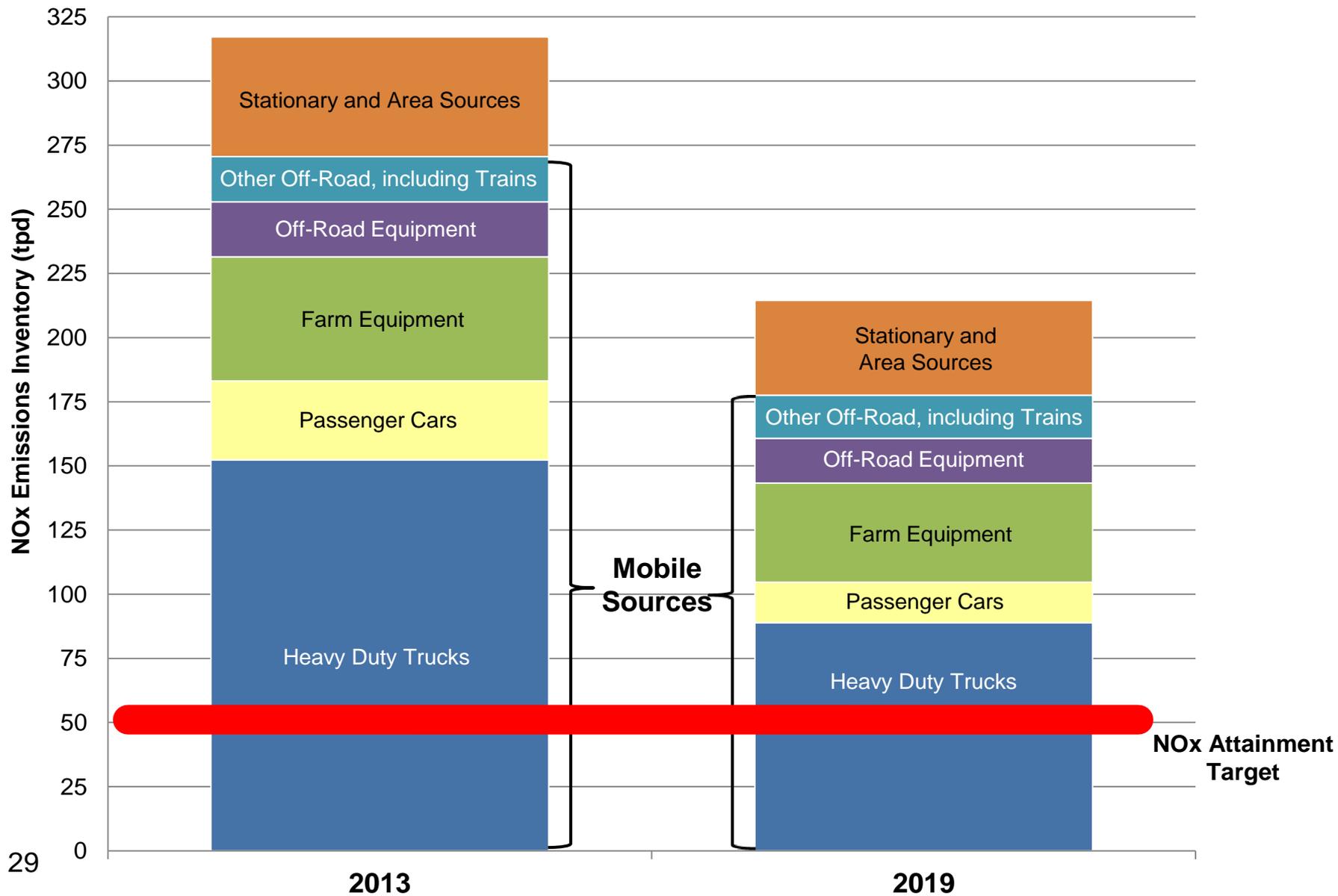
# Modeled Effect of District's Overall Direct PM2.5 Control Strategy

- Based on proposed control strategy for direct PM2.5, and considering the effect among all PM2.5 air monitoring sites throughout the Valley:
  - 24-hour average PM2.5 design value is expected to be reduced by 0.73 to 1.53  $\mu\text{g}/\text{m}^3$
  - Annual average PM2.5 design value is expected to be reduced by 0.29 to 0.64  $\mu\text{g}/\text{m}^3$
- Modeled PM2.5 reductions still fall significantly short of attaining the PM2.5 standards of 35  $\mu\text{g}/\text{m}^3$  (24-hour) and 12  $\mu\text{g}/\text{m}^3$  (annual)

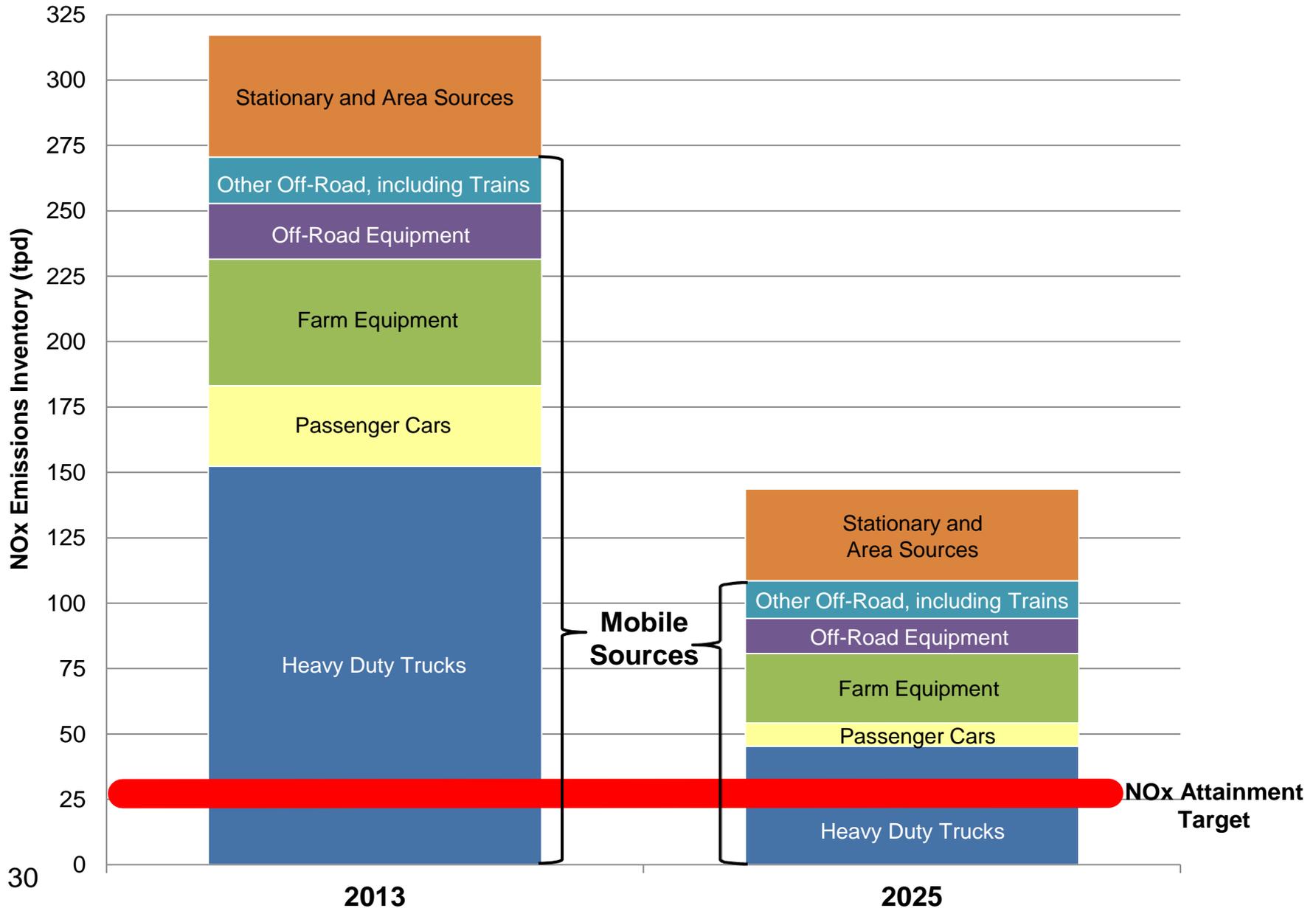
# Modeling Indicates Meeting Latest PM2.5 Standards Requires Enormous Reductions in Emissions

- At beginning of planning process, initial estimates indicated that, in addition to significant reductions in directly emitted PM2.5 emissions, another 140 tons/day of reductions in NOx necessary by 2019
  - ARB's initial NOx projections assumed 25% cut in direct PM2.5 concentrations (organic matter and dust) at peak sites irrespective of specific measures
- More recent District modeling indicates that needed NOx reductions might be even greater
  - District working with ARB to review modeling results and continue to refine and enhance modeling

# Additional Emissions Reductions Required for Attainment After Direct PM2.5 Reductions (2019 Serious Deadline for 2006 24-hr PM2.5 Std)



# Additional Emissions Reductions Required for Attainment After Direct PM2.5 Reductions (2025 Serious Deadline for 2012 Annual PM2.5 Std)



# District List of Ambitious Measures

- At latest workshop, presented list of ambitious measures with overly optimistic projections for timing and effectiveness
  - Replace all almond harvesters in Valley with latest low-emitting harvester technologies
  - Install PM control technology on larger under-fired charbroilers installed within last 10-15 years (360 out of 1,800)
  - Enhance CMPs for ag operations to reduce directly emitted PM
  - Replace 23,628 older high emitting residential wood-burning devices with cleaner devices
  - Electrify 1,053 ag pump engines in areas impacting peak PM2.5 sites where access to electricity is available
  - Lower NOx limit for container glass plants
  - Lower NOx emissions from various boiler, steam generator, process heaters > 5 MMBtu/hr
  - Lower NOx emissions from various boiler, steam generator, process heaters 2 to 5 MMBtu/hr

# District List of Ambitious Measures (cont'd)

- Install ultra-low NOx flare technology and require additional flare minimization practices
- Lower NOx emissions from various non-agricultural engine categories
- Replace 74,912 heavy heavy-duty trucks with upcoming 0.02 g/bhp-hr ultra-low NOx trucks that are 90% cleaner than 2010 trucks recently required by ARB's Truck and Bus Regulation
- Replace 110,000 medium heavy-duty trucks with upcoming 0.02 g/bhp-hr ultra-low NOx trucks that are 90% cleaner than 2010 trucks recently required by ARB's Truck and Bus Regulation
- Replace 102,936 light heavy-duty trucks with upcoming 0.02 g/bhp-hr ultra-low NOx trucks that are 90% cleaner than 2010 trucks recently required by ARB's Truck and Bus Regulation
- Install 2,622 natural gas fueling stations for deployment of 0.02 g/bhp-hr ultra-low NOx heavy duty trucks
- Replace 320,000 passenger vehicles with zero-emission vehicles
- Replace 76 locomotives with new Tier 4 locomotives



# Feasibility of Ambitious Measures

- Feasibility and ability to achieve estimated reductions for ambitious measures highly unlikely
  - Lack of commercially available technology and necessary fueling infrastructure
  - High implementation cost - \$51.5 billion
  - Extremely short implementation timeframe before federal deadlines
- Final scope, design and effectiveness of measures to be considered subject to comments from Valley businesses and residents through public participation process
- Even assuming best case scenario, projected reductions short of achieving attainment in 2019, 2021, or 2025

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

- As evident from sheer scale of fleet and equipment turnover required, regulations alone not sufficient to achieve reductions in timeframe necessary under federal law
- Abundantly clear without significant increase in funding for incentive-based measures, attaining standards not possible
- Reducing emissions from trucks continues to be major priority in any conceivable strategy for attainment
  - Under last truck regulation adopted by state, truck owners purchased or will soon purchase compliant 2010 model year trucks by 2023
  - Asking same truck owners to now purchase newer trucks in 2019 to 2025 timeframe will require massive incentive investment
- ARB adopted 2016 State SIP Strategy on March 23, 2017
  - Does not include any additional measures for the San Joaquin Valley
  - ARB committed to return to their Board with specific additional mobile source measures for the San Joaquin Valley as needed for attainment
- District's attainment strategy will utilize all available local funding sources necessary to achieve expeditious reductions



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Under-fired Charbroilers</b>			
Install PM control technology by 2019 on larger under-fired charbroiler units installed within the last 10-15 years (360 out of a total of 1,800)	\$100,000	\$60,000,000	\$36,000,000
<b>Ag Engines</b>			
Electrify 1,053 ag pumps (50% of total) in areas impacting peak PM2.5 sites where access to electricity available	\$60,000	\$84,240,000	\$63,180,000
<b>Residential Wood-burning Devices</b>			
Replace 7,876 residential wood-burning devices by 2019 with cleaner devices	\$1,671	\$33,754,016	\$13,163,738
Replace 5,251 residential wood-burning devices in 2020 through 2021	\$1,671	\$22,502,677	\$8,775,825
Replace 10,501 residential wood-burning devices in 2022 through 2025	\$1,671	\$45,005,354	\$17,551,650



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Almond Harvesters</b>			
Replace 325 almond harvesters by 2019 with new almond harvester technologies capable of 50% PM2.5 control efficiency with local funding by 2019 (325 out of a total of 650)	\$44,500	\$28,925,000	\$14,462,500
Replace 325 almond harvesters by 2019 with new almond harvester technologies capable of 50% PM2.5 control efficiency with NRCS funding by 2019 (325 out of a total of 650)	\$44,500	\$28,925,000	\$14,462,500
<b>Public Fleets</b>			
Replace 181 public transit buses with 0.02 g/bhp-hr by 2019	\$300,000	\$108,600,000	\$54,300,000
Replace 222 solid waste collection trucks with 0.02 g/bhp-hr by 2019	\$165,000	\$73,260,000	\$36,630,000
Replace 617 school buses with 0.02 g/bhp-hr by 2019	\$92,500	\$114,145,000	\$57,072,500
Replace 977 public agencies and utilities fleet vehicles with 0.02 g/bhp-hr by 2019	\$90,000	\$175,860,000	\$87,930,000

# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Light-duty Vehicles (Passenger Cars, SUVs, Pick-up Trucks, etc.)</b>			
Replace 320,000 light-duty cars and trucks by 2019 with zero-emission vehicles	\$10,000	\$6,400,000,000	\$3,200,000,000
<b>Light Heavy-duty Trucks (LHD)</b>			
Replace 89,237 LHD Trucks by 2019 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$30,000	\$5,354,220,000	\$2,677,110,000
Replace 5,330 LHD Trucks through 2020-2021 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$30,000	\$319,800,000	\$159,900,000
Replace 8,369 LHD Trucks through 2022-2025 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$30,000	\$502,140,000	\$251,070,000
<b>Medium Heavy-duty Trucks (MHD)</b>			
Replace 110,000 MHD Trucks by 2019 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$60,000	\$13,200,000,000	\$6,600,000,000
<b>Natural Gas Infrastructure</b>			
Install 2,622 natural gas fueling stations as necessary to deploy 75,536 HHD 0.02 g/bhp-hr natural gas trucks by 2025	\$480,000	\$3,146,400,000	\$1,258,560,000

# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Heavy Heavy-duty Trucks (HHD)</b>			
Replace 67,728 HHD Trucks by 2019 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$100,000	\$13,545,600,000	\$6,772,800,000
Replace 1055 HHD Trucks by 2019 with 0.02 g/bhp-hr with local funds, Prop 1B	\$100,000	\$211,000,000	\$105,500,000
Replace 68 HHD Trucks by 2019 with 0.02 g/bhp-hr with Federal Funding	\$100,000	\$13,600,000	\$6,800,000
Replace 2,194 HHD Trucks between 2020 to 2021 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$100,000	\$438,800,000	\$219,400,000
Replace 540 HHD Trucks between 2020 to 2021 with 0.02 g/bhp-hr with Local Funds, Prop 1B	\$100,000	\$108,000,000	\$54,000,000
Replace 50 HHD Trucks between 2020 to 2021 with 0.02 g/bhp-hr with Federal funding	\$100,000	\$10,000,000	\$5,000,000
Replace 2,282 HHD Trucks between 2022 to 2025 with 0.02 g/bhp-hr with new state funding (Cap and Trade, AB 118, Others)	\$100,000	\$456,400,000	\$228,200,000
Replace 895 HHD Trucks between 2022 to 2025 with 0.02 g/bhp-hr with Local Funds, Prop 1B	\$100,000	\$179,000,000	\$89,500,000
Replace 100 HHD Trucks between 2022 to 2025 with 0.02 g/bhp-hr with Federal Funding	\$100,000	\$20,000,000	\$10,000,000

# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Agricultural Equipment</b>			
Replace 20,649 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$65,000	\$2,684,370,000	\$1,342,185,000
Replace 21 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with currently allocated Cap and Trade funding	\$65,000	\$2,730,000	\$1,365,000
Replace 969 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with Local, Moyer funds	\$65,000	\$125,970,000	\$62,985,000
Replace 969 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with NRCS funds	\$65,000	\$125,970,000	\$62,985,000
Replace 84 Agricultural Tractors/Other Equipment by 2019 with Tier 4 with Federal funding	\$65,000	\$10,920,000	\$5,460,000



# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Agricultural Equipment</b>			
Replace 8,669 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$75,000	\$1,300,350,000	\$650,175,000
Replace 465 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with Local District, Moyer	\$75,000	\$69,750,000	\$34,875,000
Replace 465 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with NRCS Funds	\$75,000	\$69,750,000	\$34,875,000
Replace 67 Agricultural Tractors/Other Equipment through 2020-2021 with Tier 4 with Federal funding	\$75,000	\$10,050,000	\$5,025,000

# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Agricultural Equipment</b>			
Replace 2,471 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$95,000	\$469,490,000	\$234,745,000
Replace 817 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with Local District, Moyer	\$95,000	\$155,230,000	\$77,615,000
Replace 817 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with NRCS Fund	\$95,000	\$155,230,000	\$77,615,000
Replace 105 Agricultural Tractors/Other Equipment through 2022-2025 with Tier 4 with Federal funding	\$95,000	\$19,950,000	\$9,975,000

# Initial Estimates and Priorities for Needed Incentive Funding and Potential Expenditures

Measures/Strategies	Incentive per unit	Estimated Total Implementation Cost	Estimated Hope for Incentives
<b>Off-road Equipment</b>			
Replace 18,000 Vehicles by 2019 with Tier 4 with new state regulation and or funding for incentives programs	\$40,000	\$1,440,000,000	\$720,000,000
<b>Locomotives</b>			
Replace 64 Locomotives by 2019 with Tier 4 with new state funding (Cap and Trade, AB 118, Others)	\$2,000,000	\$192,000,000	\$128,000,000
Replace 12 Locomotives by 2019 with Tier 4 with Prop 1B	\$2,000,000	\$35,250,000	\$24,000,000
<b>TOTAL</b>		<b>Estimated Total Implementation Cost</b>	<b>Estimated Hope for Incentives</b>
		<b>by 2025</b>	<b>by 2025</b>
Total		\$51,547,187,047	\$25,513,248,713

# Next Steps in Plan Development Process

- Continue extensive public outreach process
- Continue to work with ARB to conduct in-depth air quality modeling that more precisely and accurately predicts PM2.5 concentrations at peak monitoring sites
- Continue to work with ARB to ensure that the State provides all possible mobile source control strategies including incentive-based measures that result in additional reductions in emissions beyond those included in the current control programs
- Continue to evaluate potential emission reduction opportunities that the District could pursue

# Additional Information

- Up-to-date information available at [www.valleyair.org/2017-pm25-plan](http://www.valleyair.org/2017-pm25-plan)
- Receive email updates on the development of this plan and future air quality attainment plans – email sign up available at <http://www.valleyair.org/lists/list.htm>
- Email comments to [airqualityplans@valleyair.org](mailto:airqualityplans@valleyair.org)