

# 2017 Integrated PM2.5 Plan

*Public Advisory Workgroup*

**Topic: Kick-Off Meeting and  
Air Quality Modeling**

***January 11, 2017***



**HEALTHY AIR LIVING™**

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# Purpose of Public Advisory Workgroup (PAW)

- Hear perspective and receive input for plan from all affected stakeholders and subject matter experts
- Provide committee members with resources to reach out to constituents that you represent
- Provide forum for discussion/suggestions before each plan milestone is completed



# PAW Guiding Principles

- Utilize effective means to get input from all affected stakeholders and subject matter experts in the design of the plan
- Provide for public engagement before each plan preparation milestone
- Provide routine updates to the public at large about the plan as it is developed
- Ensure efficiency and effectiveness by using existing infrastructure for public engagement
- Ensure process does not impede District's ability to meet legally mandated deadlines and timeliness



# PAW Meetings

- **Air Quality Modeling**
  - How modeling is conducted and importance for attainment planning
  - Modeling approach and key questions
  - Modeling results and attainment targets
- **Potential Stationary and Mobile Source Control Measures**
  - Current control strategy
  - Potential control measure options
  - Technological & economic feasibility
- **Incentive-based Control Measures**
  - Existing funding and incentive strategy
  - Need for additional incentive funding
- **Contingency Measures**
  - Requirements under federal Clean Air Act
  - Discuss which control measures to withhold to satisfy contingency requirements



# Plan Development Process

- Each new plan builds upon previous plans
- Ongoing scientific research establishes the plan's foundation
  - Research areas: atmospheric chemistry, emissions inventory, control technologies
- Thorough staff analysis spans many months/years
- Extensive public process
  - Public workshops; meetings with stakeholder groups; presentations to the Governing Board, CAC, and EJAG



# Extensive Public Outreach

- Public workshops
  - Public workshops in December 2016
    - ARB workshop: December 1, 2016
    - District workshop: December 7, 2016
  - Additional workshops will be scheduled until adoption
- Public meetings
  - Regular updates at Governing Board, CAC, and EJAG meetings
- CAC and EJAG members encouraged to reach out to constituencies that they represent
- Media outreach to inform the public, enlist participation and build understanding



# Previous Attainment Plans Lay Foundation for 2017 Integrated Plan

- *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*



# PM2.5 Deadlines and Mandates

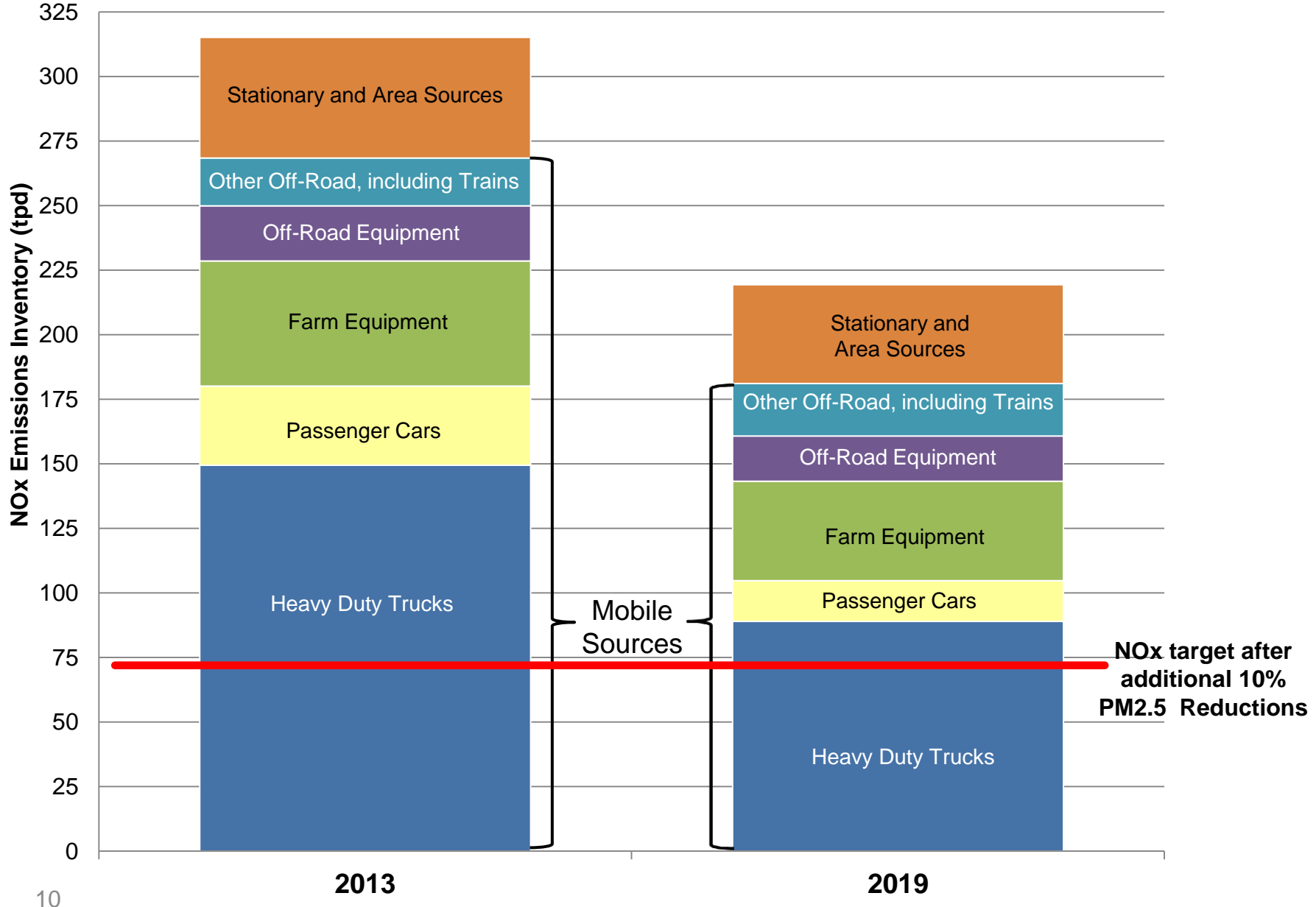
- 1997 Standard 24-hr ( $65 \mu\text{g}/\text{m}^3$ ) and annual ( $15 \mu\text{g}/\text{m}^3$ )
  - District misled into thinking attainment deadline would be extended to 2020
  - Serious Attainment Deadline: 2015
  - 5% Plan due December 31, 2016
- 2006 Standard 24-hr ( $35 \mu\text{g}/\text{m}^3$ )
  - Serious Attainment Deadline: 2019
  - Plan due August 2017
  - Attainment demonstration requires clean data finding for 3 consecutive years 2017-2019 (must reach attainment by 2017)
  - 5 year extension available

# PM2.5 Deadlines and Mandates (cont'd)

- 2012 Standard annual ( $12 \mu\text{g}/\text{m}^3$ )
  - Moderate Attainment Deadline: 2021
  - Moderate plan due to EPA October 2016
  - Plan submitted to ARB on Sept 2016 and tabled at Hearing
  - District allowed to bump up to Serious classification with attainment deadline of 2025
    - 5 year extension to 2030 available
- District will not ask for attainment extension or bump up to a 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

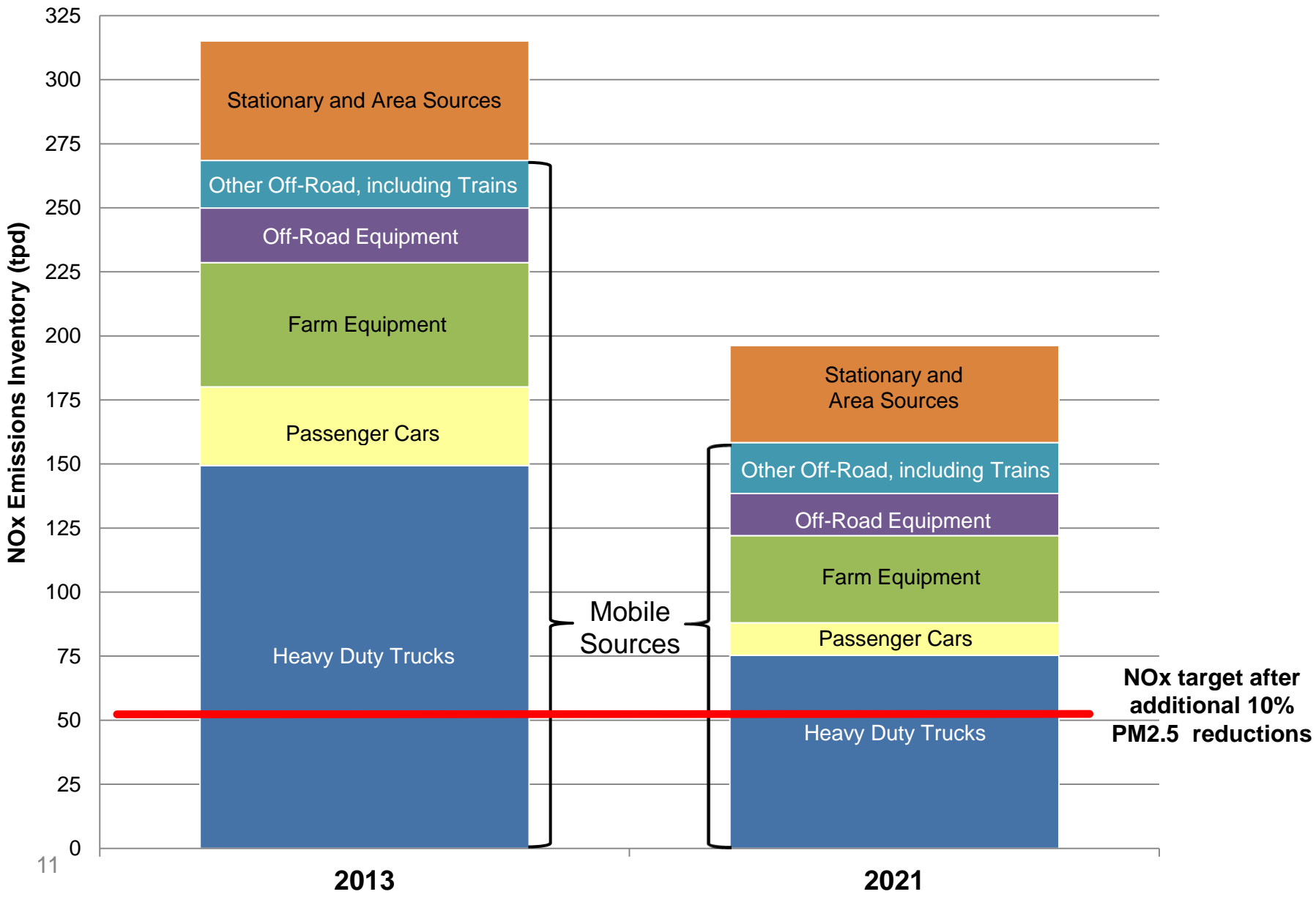
# Projected Emissions Reductions Required for Attainment

(2006 24-hr PM2.5 Standard)



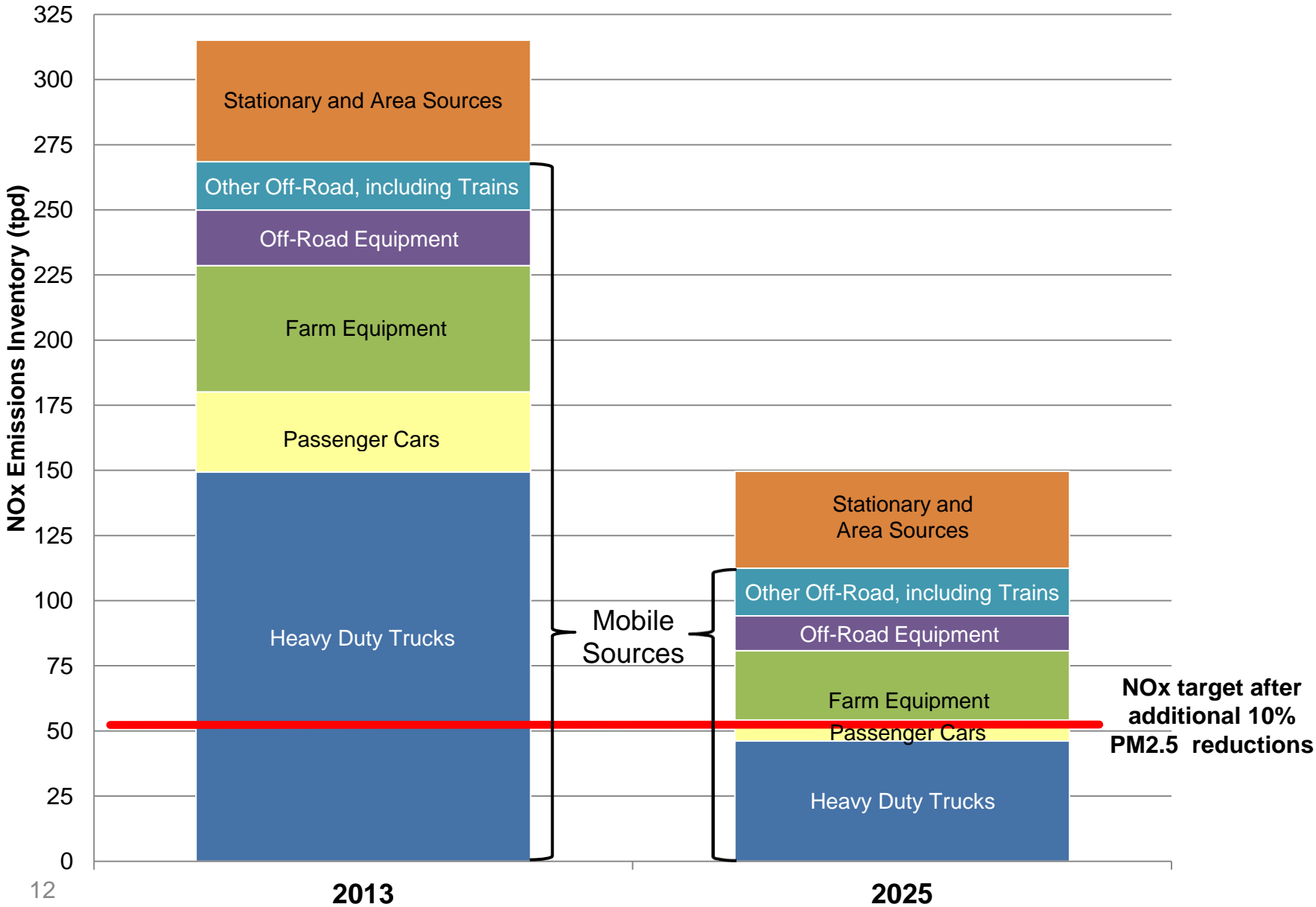
# Projected Emissions Reductions Required for Attainment

## (2012 Annual PM2.5 Standard)



# Projected Emissions Reductions Required for Attainment

## (2012 Annual PM2.5 Standard)



# District Control Measures Under Consideration

- San Joaquin Valley Healthy Soils Initiative aimed at reducing directly emitted particulate matter while enhancing crop yield
- Enhanced Conservation Management Practices (CMP) for ag operations to reduce directly emitted particulate matter
- Continue to develop commercially available and working control technologies for underfired charbroilers
- Enhanced NOx control requirements for flares (Rule 4311)
- Regulatory and incentive-based strategies to electrify agricultural irrigation pumps in areas impacting peak PM2.5 sites in Valley and where access to electricity
- Explore additional NOx controls for non-agricultural internal combustion engines is available
- Explore feasibility of prohibiting wood-burning devices in new homes on parcels with two homes or less per acre



# District Control Measures Under Consideration (cont'd)

- Tighter NOx controls for glass plants matching control levels already achieved in practice in the Valley
- Explore additional SOx controls for glass plants
- Enhanced NOx control requirements for boilers and steam generators with a total rated heat input greater than 5 MMBtu/hr
- Explore additional NOx control requirements for boilers and steam generators with a total rated heat input less than or equal to 5 MMBtu/hr
- Given decline of biomass industry that has served as cleaner alternative for open burning of agricultural waste, continue to identify and develop other alternatives



# District Control Measures

## Under Consideration (cont'd)

- 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 and 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-Recommended Mobile Source Measures for ARB Consideration

- Revise Mobile Source Strategy to include measures that reduce mobile sources emissions of NOx, directly emitted PM2.5, SOx, and black carbon in the Valley within the 2019-2025 timeframe
- Enhance public fleet regulations allowing for near-zero emissions technologies to achieve near-term reductions
- Do not overly relax State's portable engine regulation beyond what is necessary to accommodate unavailability of compliant portable engines
- Add San Joaquin Valley to areas of focus for fuel cell technology development and deployment
- Recognize Valley's need for near-zero emissions technologies that can provide reductions in the more immediate timeframe (2019-2025)



# District-Recommended Mobile Source Measures for ARB Consideration (cont'd)

- Provide incentive funding to replace heavy-duty diesel trucks
- Provide incentive funding to replace locomotives
- Provide incentive funding to replace light-duty vehicles
- Provide incentive funding to replace construction and other off-road equipment
- Provide incentive funding to replace agricultural equipment
- Provide incentive funding to provide infrastructure for zero and near-zero passenger and goods movement technologies
- Provide incentive funding to replace residential wood-burning devices in the San Joaquin Valley
- Request that ARB adopt point-of-sale particulate emissions standards for residential wood/pellet burning devices



# 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 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

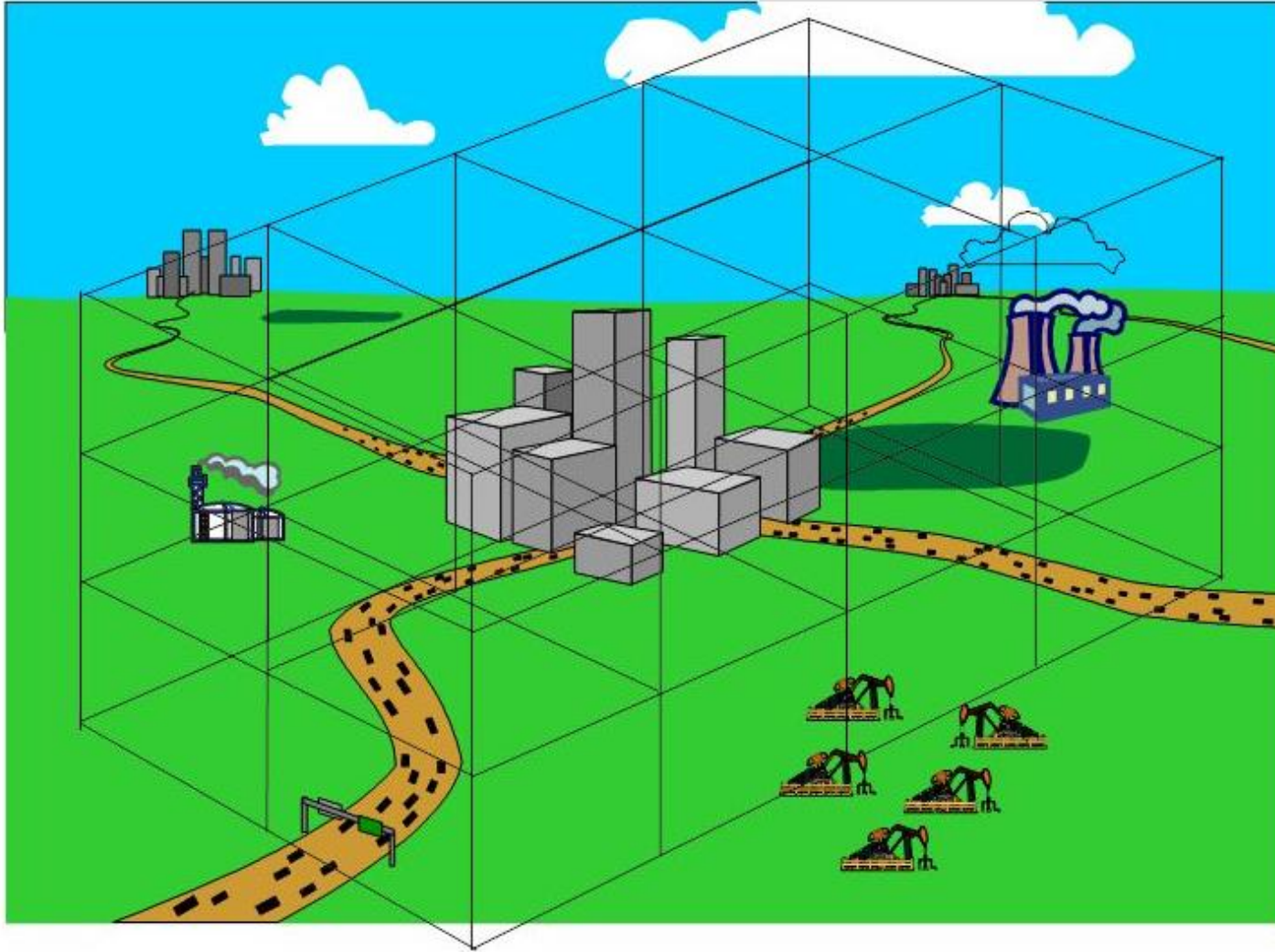
# Scientific Foundation for PM2.5 Planning (cont'd)

- 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 Integrated 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

# Grid Modeling for the Valley



# Grid Modeling for the Valley



# ARB Presentation

# More Precise Modeling Needed

- Generalized assumptions not reliable for complex PM2.5 attainment planning
  - Broad percentage cuts in emissions do not generally represent proportional reductions in concentrations at Valley peak stations
  - More precise modeling reflecting expected cuts in emissions in each grid cell must be performed to accurately estimate the impacts of potential emissions reductions at Valley peak stations
  - In establishing Valley's needed NOx emission reductions to reach attainment, must evaluate and incorporate realistic direct PM2.5 and precursor emissions reductions in modeling to estimate actual benefits of potential control measures (agricultural harvesting, commercial charbroiling, residential wood burning, etc.)

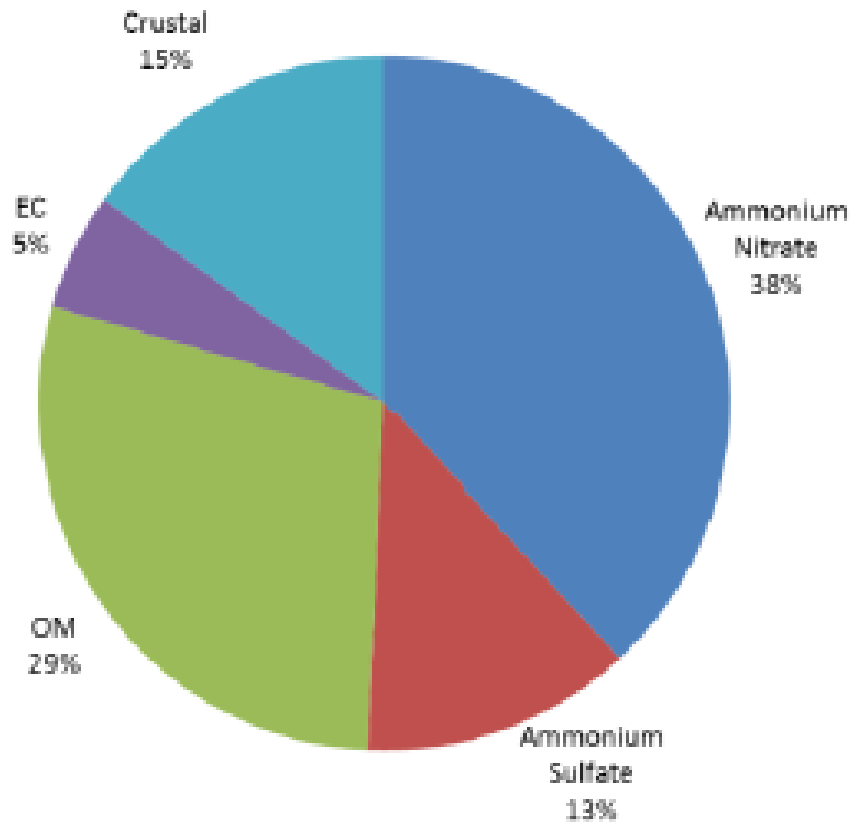


# More Precise Modeling Needed (cont'd)

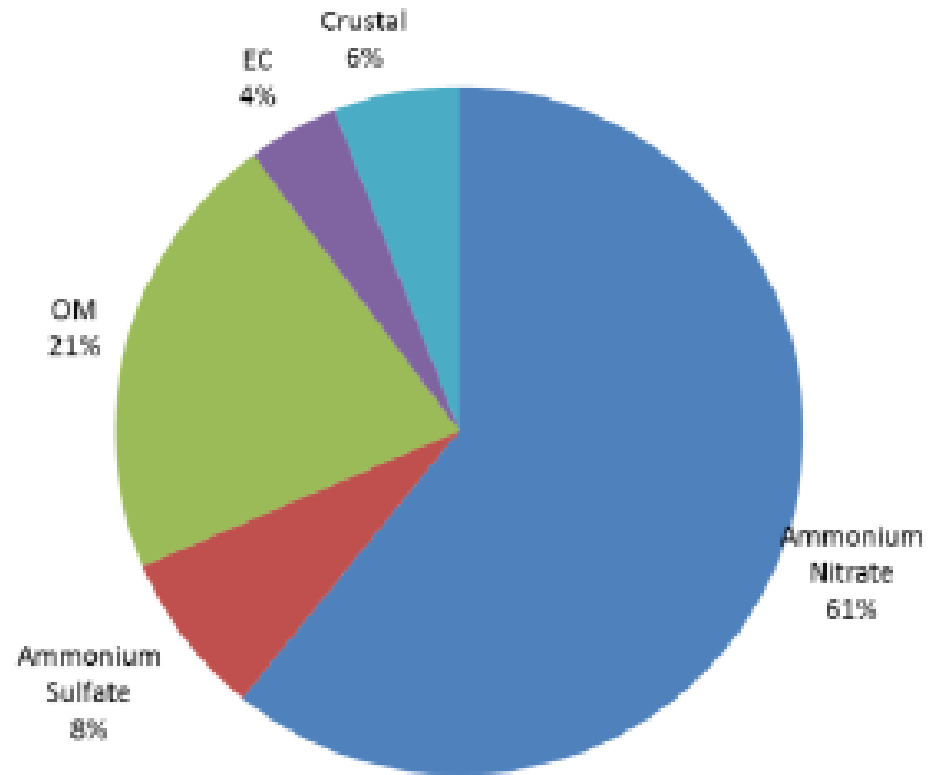
- District will work closely with ARB to ensure that air quality modeling for this plan accounts for the following characteristics:
  - Location of emissions
  - Seasonality and temporal patterns of emissions
  - Particulate matter speciation
  - Current control programs that include episodic curtailment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

# Bakersfield PM2.5 Speciation

## Annual Average

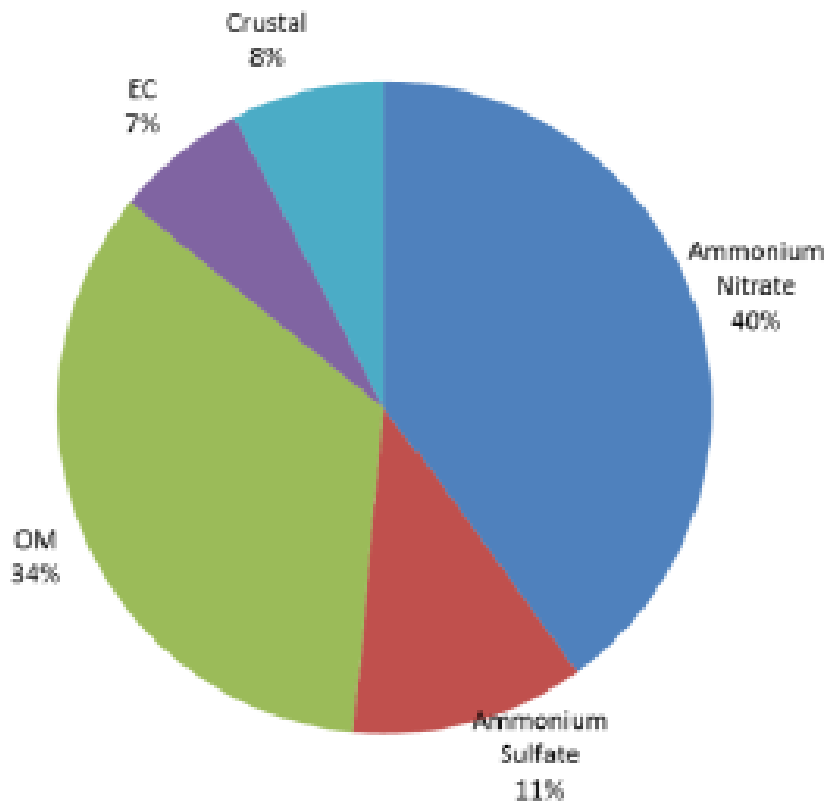


## Average of Top 10% Days

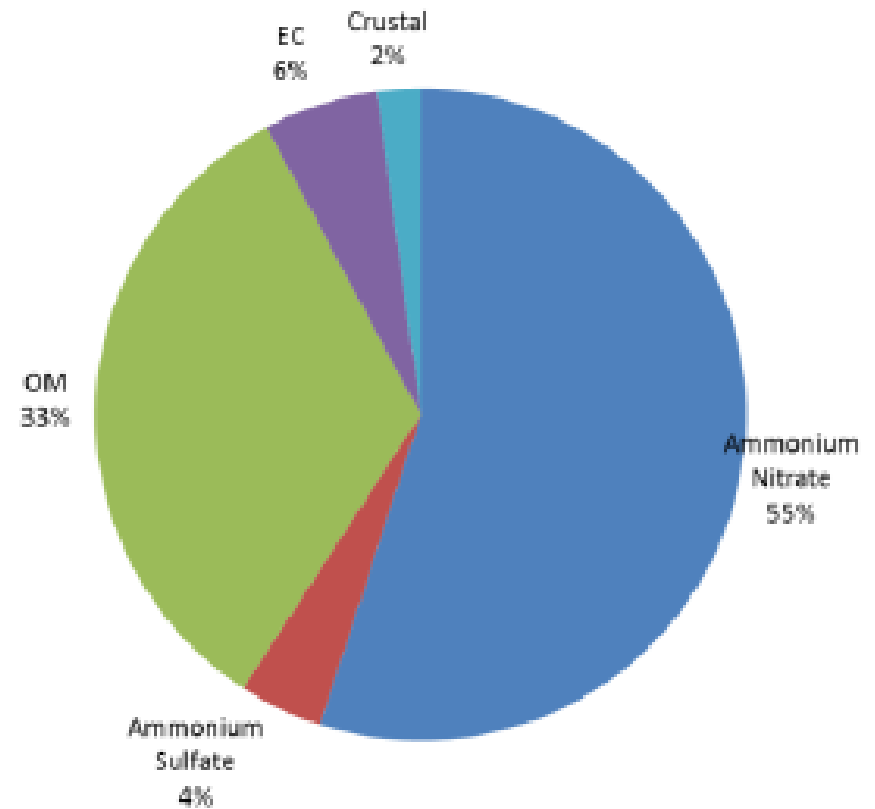


# Fresno PM2.5 Speciation

## Annual Average

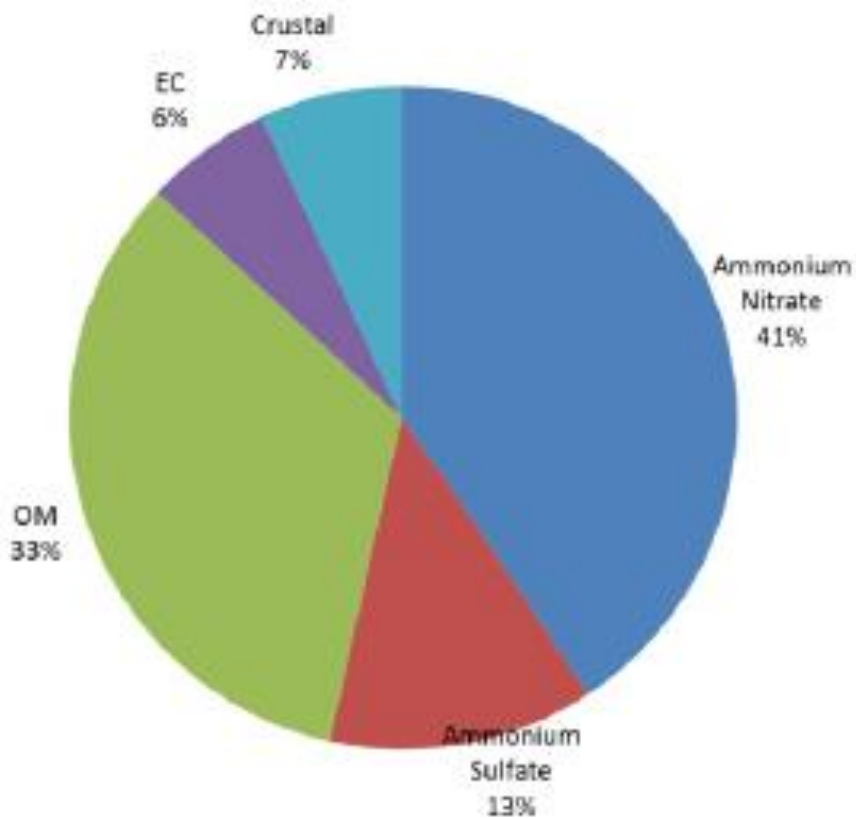


## Average of Top 10% Days

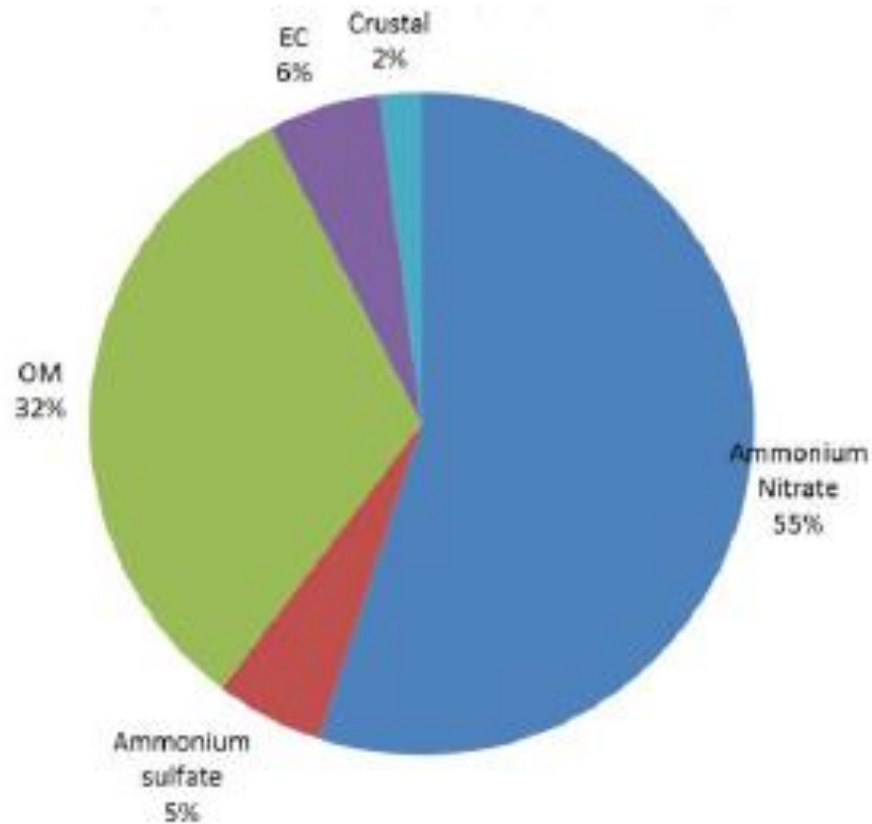


# Modesto PM2.5 Speciation

## Annual Average



## Average of Top 10% Days



# Key Questions for Residential Wood Burning

- Can improvements be made in how residential wood burning emissions are distributed spatially across the Valley in the gridded emissions inventory?
  - Working on updating spatial surrogates
  - Significant improvements to emissions inventory
- With years of implementing the most stringent residential wood burning curtailment strategy, what does recent monitoring data and other research indicate about remaining residential wood burning emissions?
  - Is comprehensive strategy properly accounted for in the modeling?

# Key Questions for Under-fired Charbroiling

- Can improvements be made in how under-fired charbroiling (and other commercial cooking) emissions are distributed spatially across the Valley in the gridded emissions inventory?
  - Recently collected data makes this improvement possible
- How much do commercial under-fired charbroiling operations contribute to Valley PM<sub>2.5</sub> concentrations and what modeled air quality improvements would we see through potential control measure?
- What emissions reductions are possible for under-fired charbroiling with the current proven control technology to date?
- What is the state of manufacturers' capacity to fabricate and install control devices on a mass scale?

# Key Questions for Fugitive Dust

- Can improvements be made in how fugitive dust emissions are distributed spatially across the Valley in the gridded emissions inventory for each source category?
- What is the contribution of fugitive dust emissions to peak PM<sub>2.5</sub> measurements in the Valley?
- Much of the PM<sub>2.5</sub> emissions inventory was estimated based on the PM<sub>10</sub> emissions inventory. Could the PM<sub>2.5</sub> emissions from agricultural activities be overestimated in the inventory?
- How does the model characterize PM<sub>2.5</sub> emissions from agricultural activities? Is it a localized source or does the model spread these emissions regionally? How far do these emissions travel in reality?
- What nearby sources of fugitive dust have the greatest impact on peak PM<sub>2.5</sub> monitors in the Valley?

# Effectiveness of Reducing PM2.5 Precursor Emissions

- Effectiveness in reducing PM2.5 not equal among all potential precursor emission reductions (NO<sub>x</sub>, SO<sub>x</sub>, VOC, ammonia)
  - Investigation of this issue important for robust control strategy development
  - Assists in developing emissions inventory target for each precursor
- To assess precursor effectiveness, EPA established new emissions percentage reduction criteria to assess effectiveness:
  - Emission reductions of 30% to 70% recommended for each precursor to test effectiveness in reducing PM2.5
  - Need to consider what emissions percentage reductions are reasonable for each precursor in this analysis



# Timeline and Next Steps

<b>December 2016</b>	<ul style="list-style-type: none"><li>• District scoping meeting</li><li>• ARB workshop</li></ul>
<b>January – July 2017</b>	<ul style="list-style-type: none"><li>• District public workshops to discuss proposed plan elements</li><li>• Public Advisory Workgroup Committee Meetings to discuss potential emission reduction opportunities</li><li>• <b><u>Next PAW Meeting January 25 to discuss control measure options</u></b></li><li>• ARB public workshops and ARB report on recommended additional measures (Jan-Feb)</li></ul>
<b>Ongoing</b>	Updates at public meetings (Governing Board, Citizens Advisory Committee, Environmental Justice Advisory Group) with opportunities for public input
<b>August 2017</b>	District Governing Board public hearing to consider adoption of the proposed plan

# Additional Information

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

