2016 AQMP PM2.5 WHITE PAPER

Working Group Meeting #1
July 18, 2014

Purpose

- Establishing technical foundations to inform PM2.5 attainment strategy development

Potential Scope of White Paper

- The role directly emitted PM and PM precursor gases play in attaining the annual PM2.5 standard
  - Technical analysis, atmospheric chemistry, relative importance of direct PM, NOx, SOx, and VOC
- Major sources of PM2.5 and precursors
- PM benefits from ozone and climate strategies
- Potential actions for further PM2.5 control

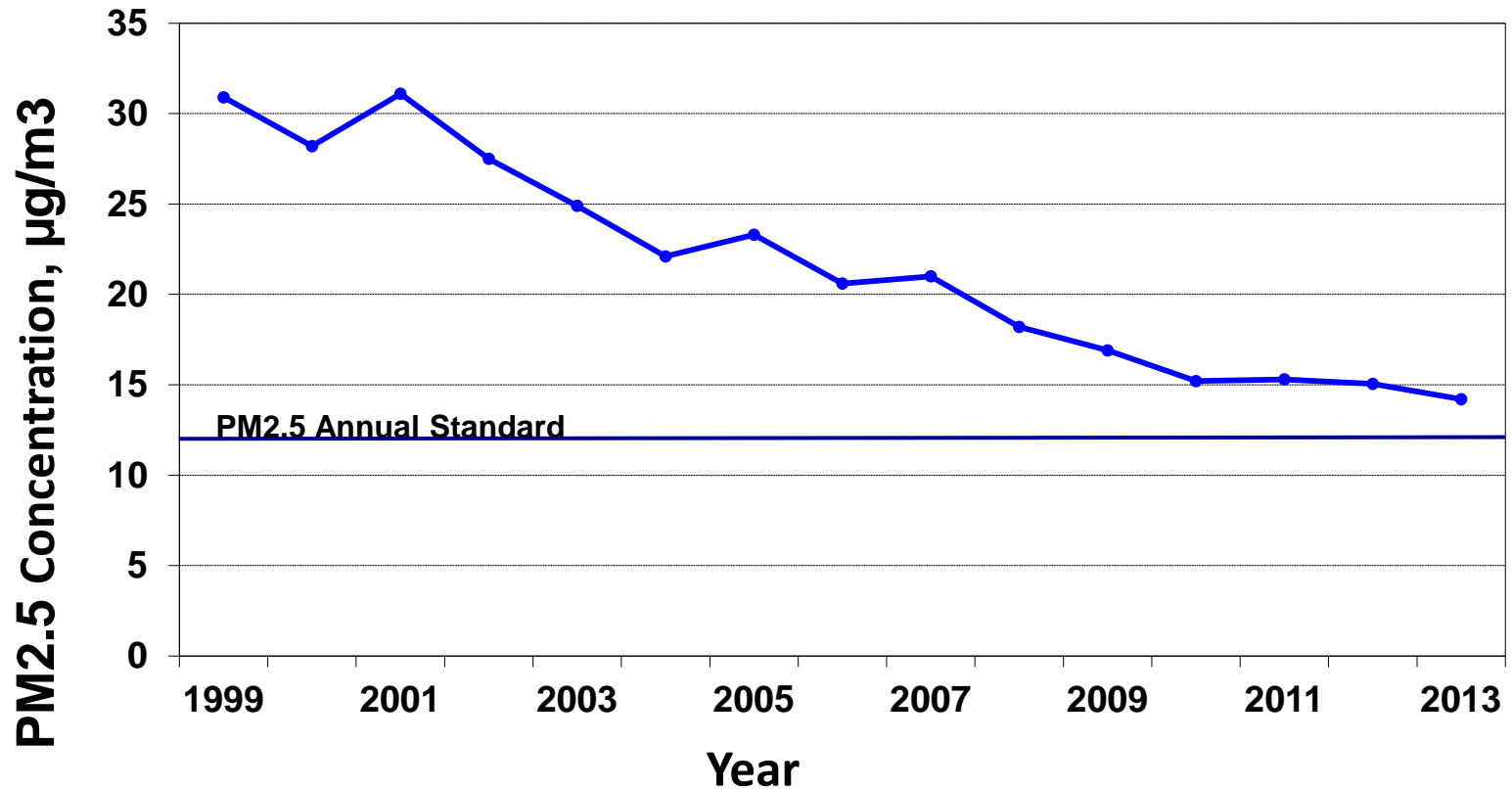# Context – CAA Deadlines

□ PM$_{2.5}$

- Current Daily Standard - 35 µg/m3
  - Attain by 2014 (or 2015)

- Previous Annual Standard - 15 µg/m3
  - Attainment based on 2011-2013 data

- Current Annual Standard – 12 µg/m3
  - Attain by 2020-2025

Annual PM2.5 Air Quality Trend

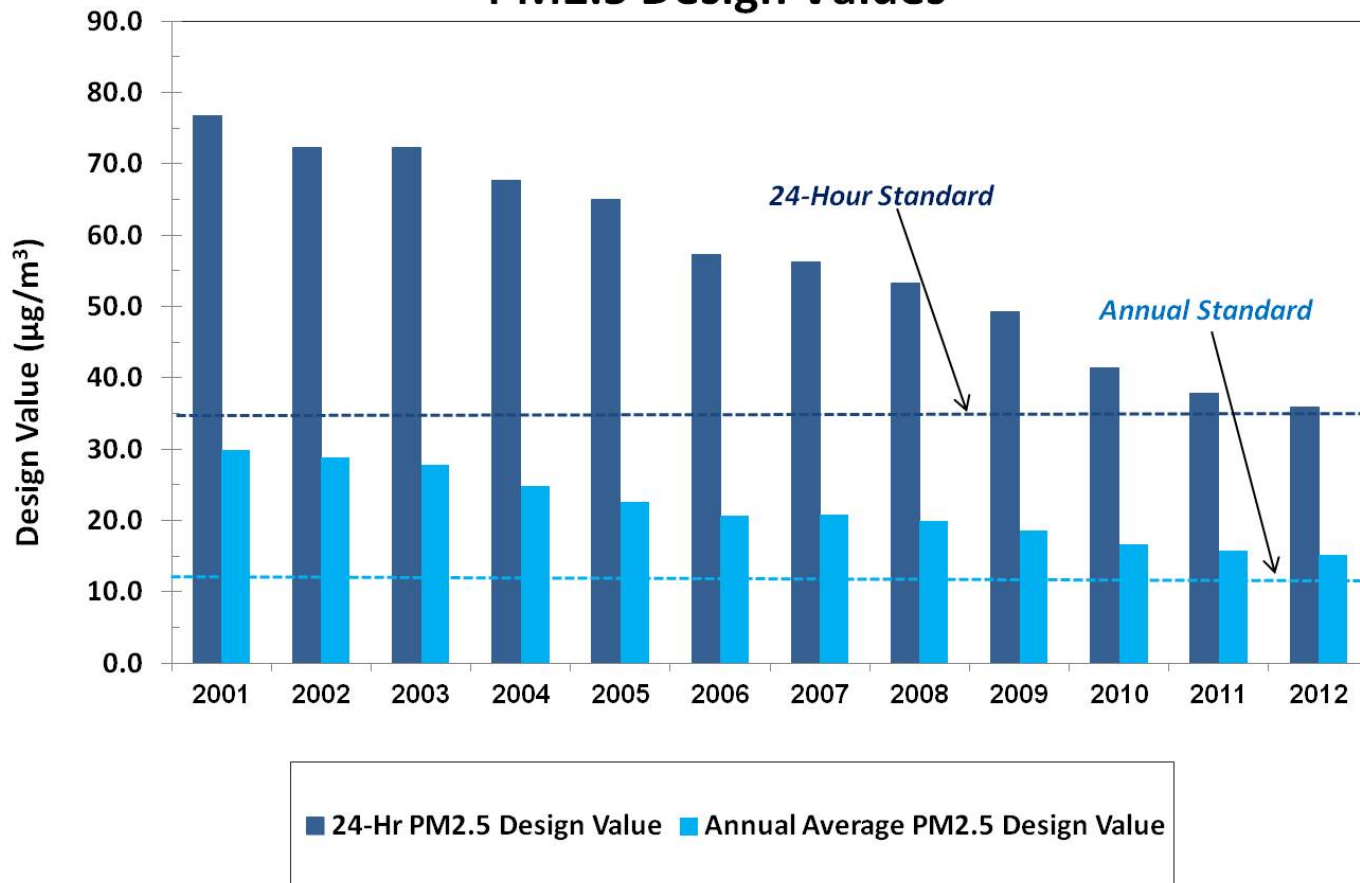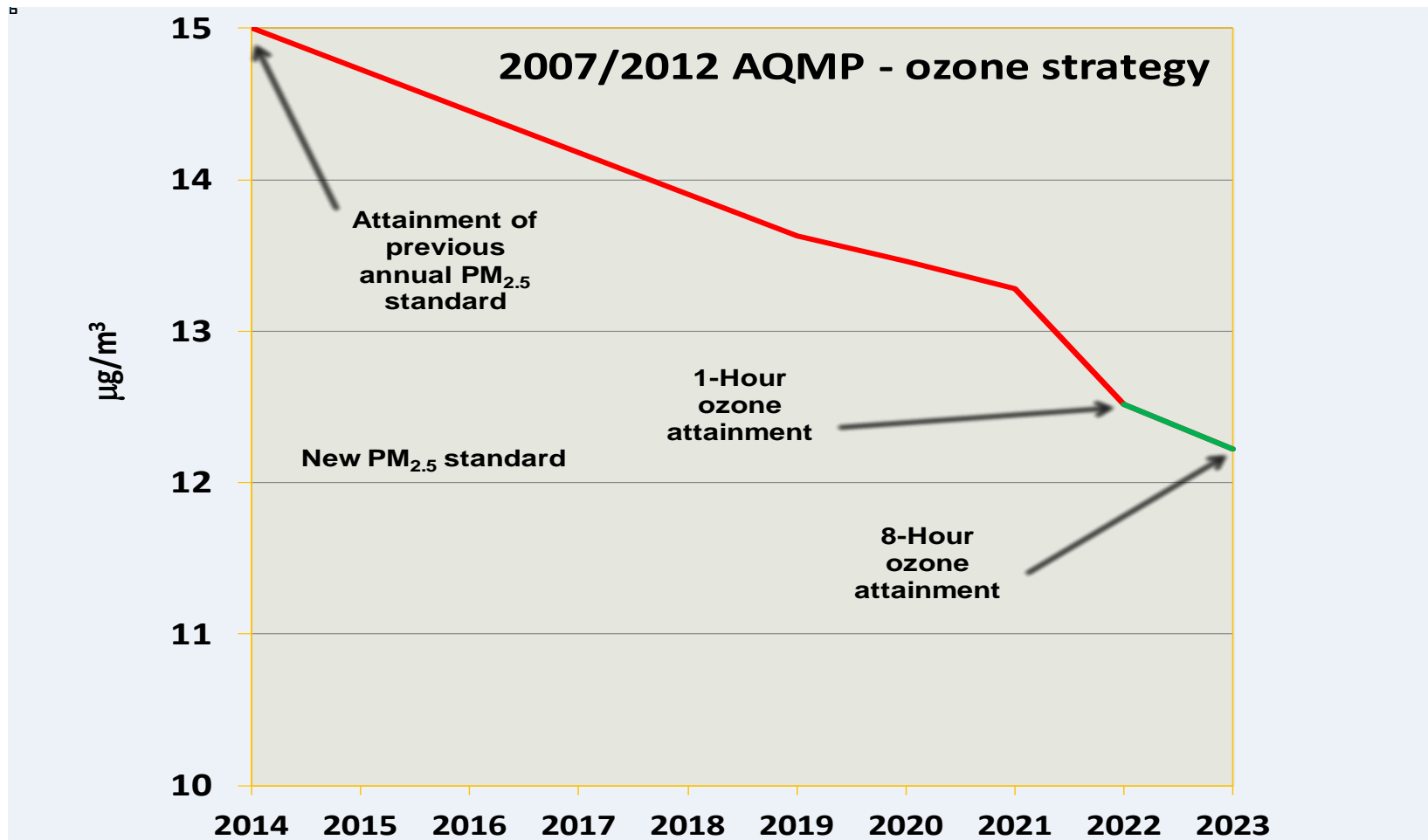# SCAB PM2.5 Design Values

Future Projected Annual PM2.5 Levels

2007/2012 AQMP - ozone strategy

y-axis: $\mu g/m^3$, from 10 to 15

Attainment of previous annual PM$_{2.5}$ standard

New PM$_{2.5}$ standard

1-Hour ozone attainment

8-Hour ozone attainment

x-axis: 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023

- Current ozone strategy brings us near PM2.5 attainment in 2023
- Ozone strategies include §182(e)(5) black box measures

PM2.5 – 2013* Annual Arithmetic Mean µg/m3 (Federal Standard = 12.0 µg/m3)
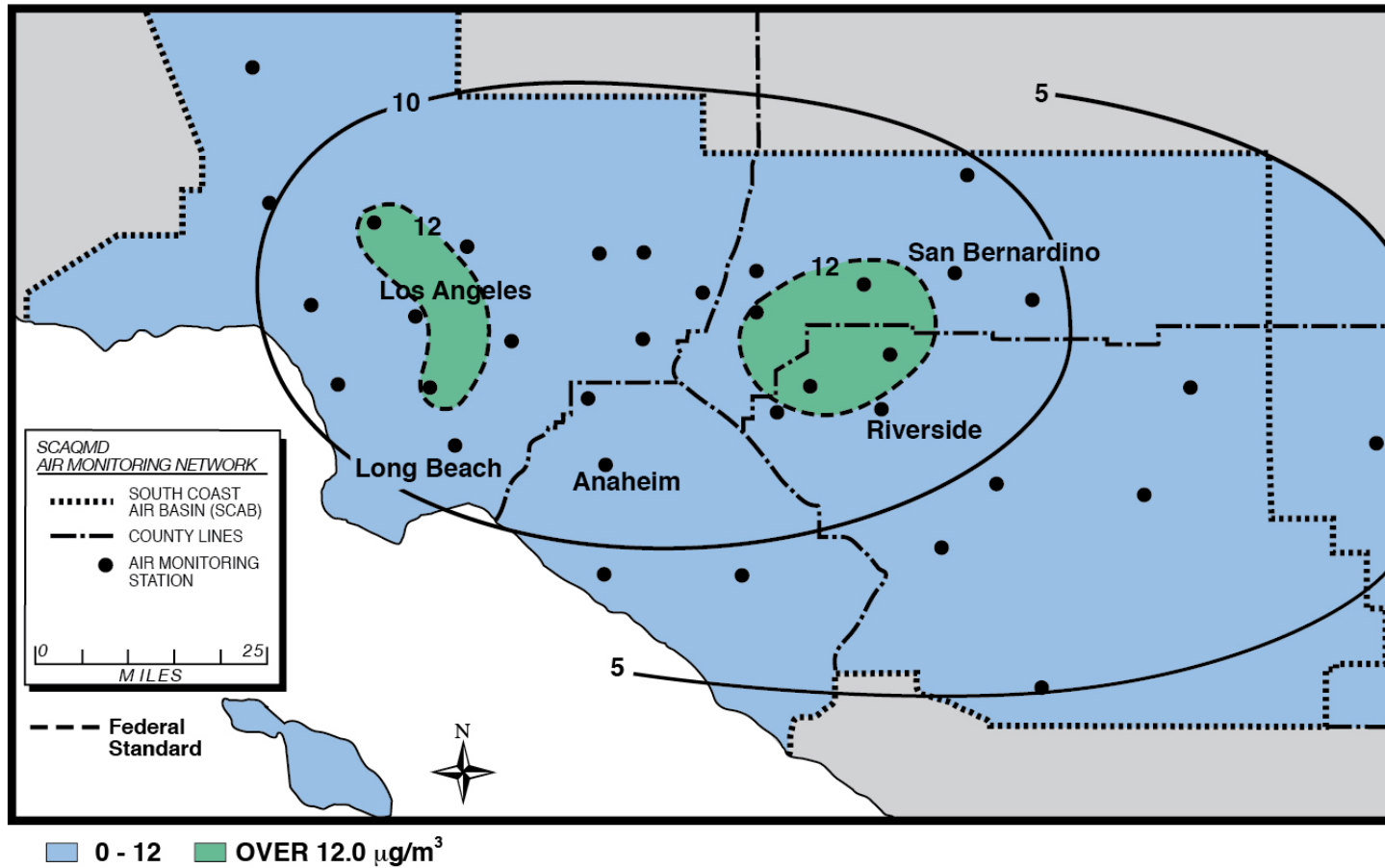
*Based on preliminary invalidated data.

PM2.5 & Precursors

- NOx & SOx
  - Typically from combustion sources
- NH3
  - Variety of sources (i.e., mobile, industrial, livestock, etc.)
- VOCs
  - Variety of combustion, evaporative, natural, and other sources
- PM2.5
  - Primary/directly emitted – dust, combustion, abrasion, sea salt, etc.
  - Secondary - photochemical reactions transform precursor gases (listed above) to non-volatile solid or liquid products that contribute PM2.5 mass

Ambient PM2.5 Speciation Profiles*

Rubidoux 2008 Top 25 Percentile
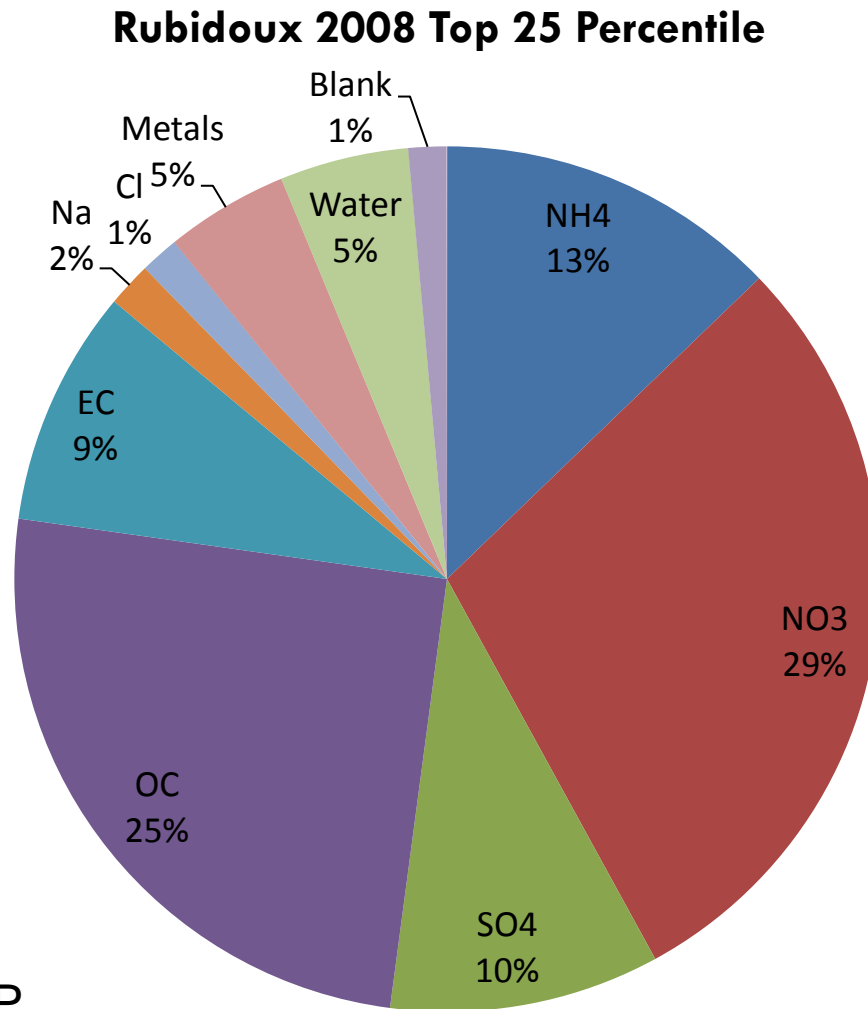
* Source: 2012 AQMP

NOx:SOx:VOC:PM2.5 Relative Ratios

- Comparative effectiveness of reductions (24-hour PM2.5 NAAQS):

  NOx : SOx : VOC : PM2.5

    1 : 15 : 0.4 : 10

- Ratios are different for different PM2.5 standards (annual vs. 24-hour) and may change with time and place
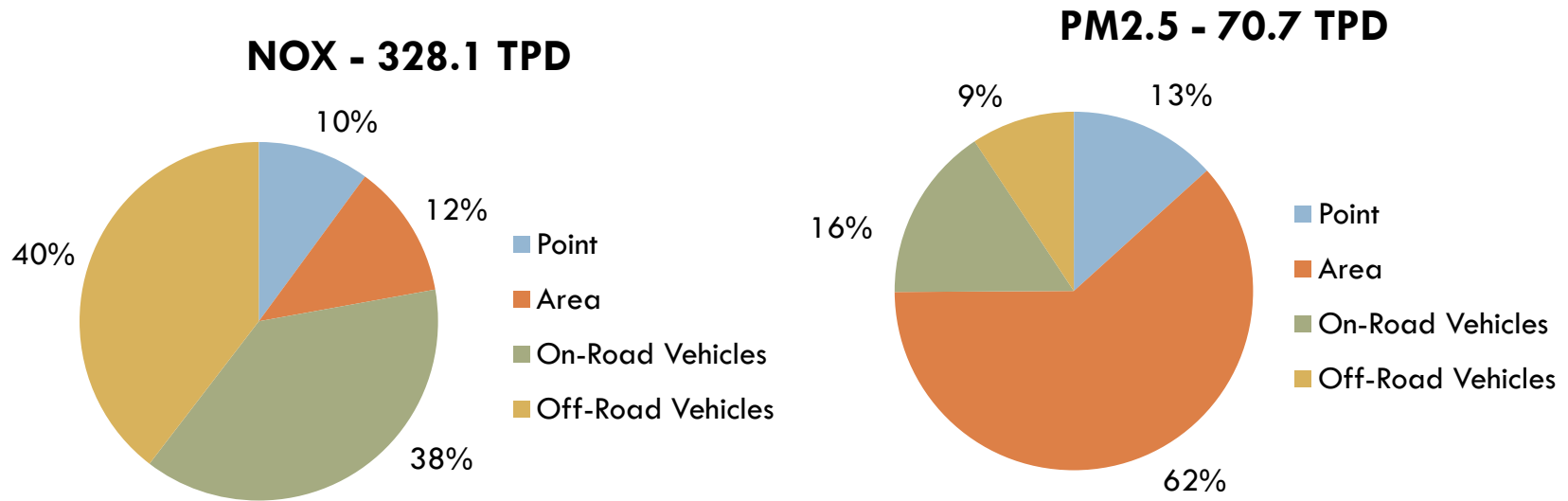
Potential Paths to Achieve the Annual PM2.5 Standard (2016 AQMP)

- VOC Control (Subject of another White Paper)

- NOx & SOx Control

- Direct PM2.5 Control

- Ammonia Control?

Projected 2023 Emissions* by Major Source Categories

NOX - 328.1 TPD

- Point — 10%
- Area — 12%
- On-Road Vehicles — 38%
- Off-Road Vehicles — 40%

PM2.5 - 70.7 TPD

- Point — 13%
- Area — 62%
- On-Road Vehicles — 16%
- Off-Road Vehicles — 9%

* Based on 2012 AQMP projections

Top 10 PM2.5 Source Categories (2023)

Top 10 PM2.5 Sources TPD
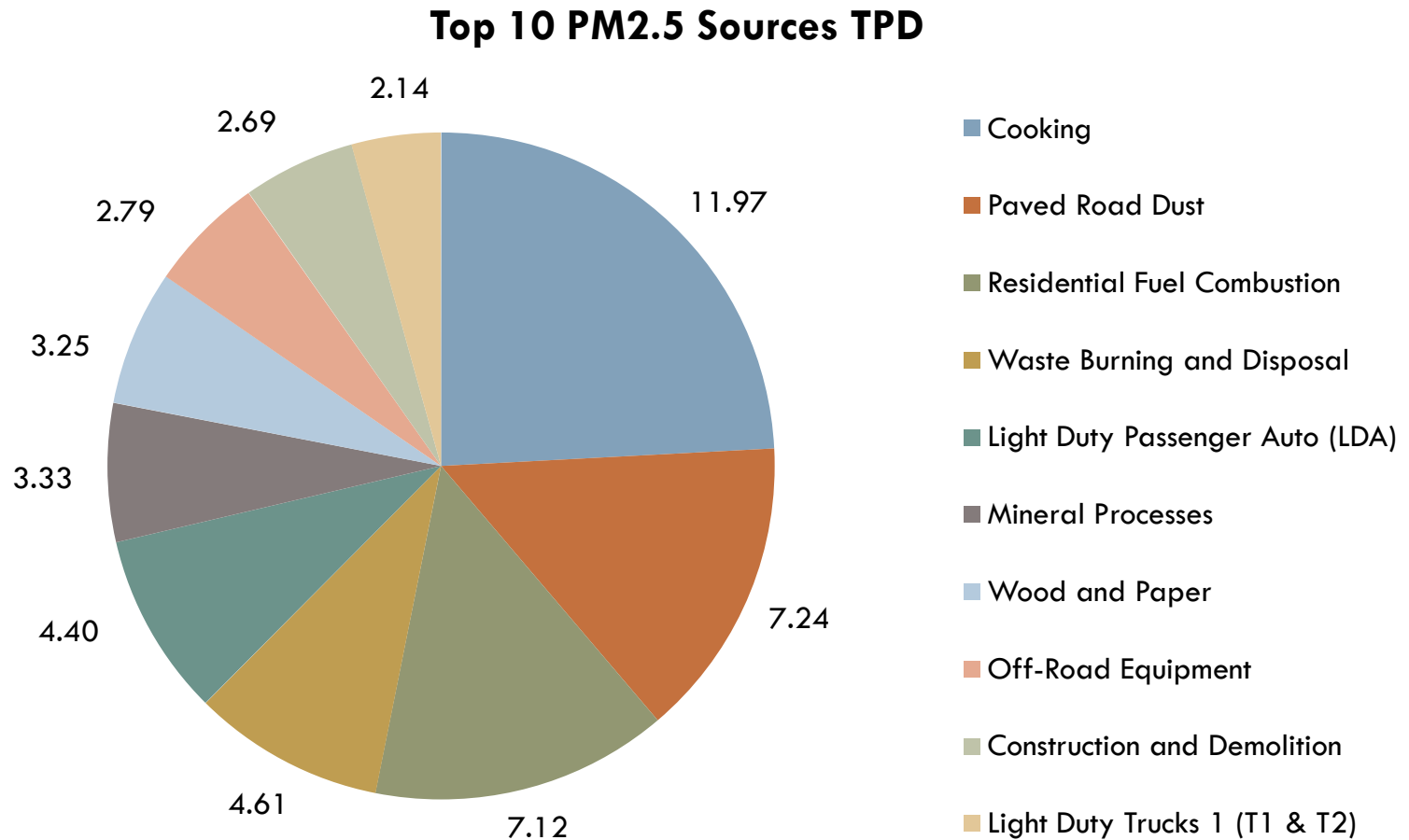
* Based on 2012 AQMP projected emissions

Top 10 NH3 Sources (2023)

Top 10 NH3 Sources (TPD)

Legend:
- Other (Waste Disposal)
- Other (Miscellaneous Processes)
- Other (Industrial Processes)
- Farming Operations
- Light Duty Passenger Auto (LDA)
- Landfills
- Light Duty Trucks 1 (T1 & T2)
- Medium Duty Trucks (T3)
- Service and Commercial
- Manufacturing and Industrial

Pie values: 25.27, 25.03, 9.35, 8.68, 5.17, 4.40, 3.49, 3.33, 3.05, 2.01
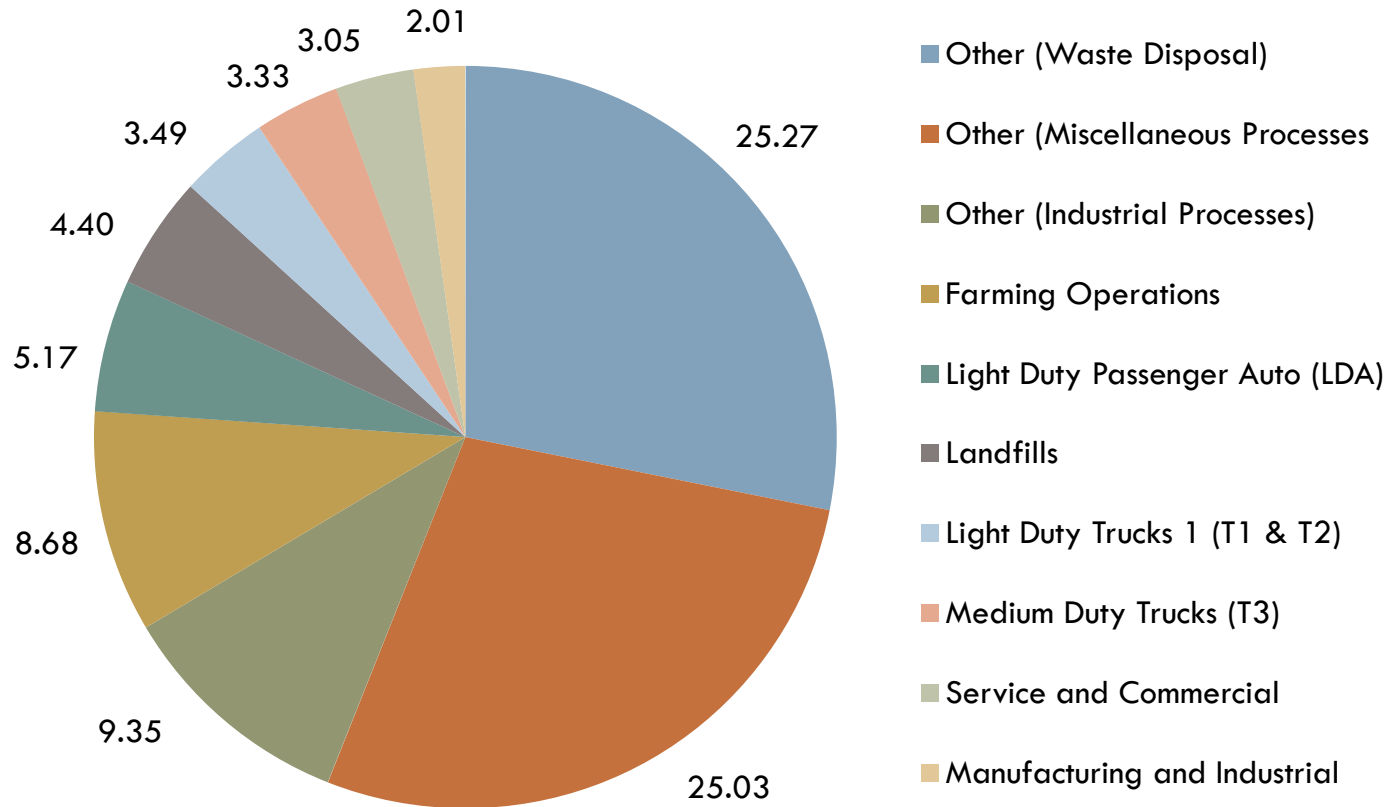
* Based on 2012 AQMP projected emissions

Reducing PM2.5

Potential Approaches

- Additional mass-based approaches - Examples
  - Restaurants – under-fired charbroilers
  - NH_3 controls – dairies, composting (use of digesters)
  - Fugitive dust – sweeping of paved roads
- Seasonal
  - NH_3 controls
  - Wood burning
- Geographical
  - Wood burning
  - Focused incentives (residential indoor/outdoor wood burning devices, vehicles)

Discussion

Potential Schedule/Next Steps

- Feedback from Working Group – August 2014

- 2nd Working Group Meeting early September
    - Detailed Outline
    - Teleconference Only?

- Release Draft Paper – Early October 2014

- Comments on Draft Paper – Late October 2014

- Additional Working Group Meetings – as needed

- Final PM2.5 White Paper – December 2014