
Emissions Inventory in the Base and Future Milestone Years – Point and On-Road Mobile sources

Assembly Bill (AB) 617
Community Air Initiatives

Technical Advisory Group Meeting
May 29, 2019



South Coast
Air Quality Management District

Pollutants and Milestone Years

Types of Pollutants

Criteria Pollutants

- VOC, NO_x, SO_x, NH₃, PM_{2.5} and Pb

Air Toxics Compounds

Time Frame

Base Year:

- 2017

Future Milestone Years

- 2024
- 2029



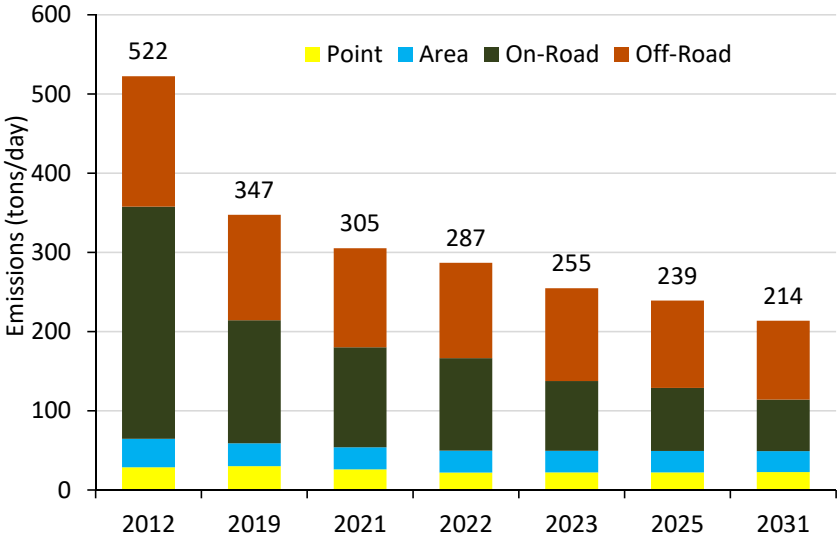
Base Year and Future Milestone Years

- Available Data:
 - MATES IV study
 - 2012 Emissions of criteria pollutants and air toxics
 - Modeling to estimate cancer risk
 - Source attribution to identify air toxic species contributing to the cancer risk and the sources of them
 - 2016 AQMP study
 - Emissions of criteria pollutants for 2012
 - Future emissions projected from 2012 emissions
 - Modeling to analyze chemical transport of criteria pollutants
- AB617 Base and Future Milestone Years
 - CARB's guidance on "Community Key Elements" and "Forecasting Key Elements"
 - Base year 2017
 - Future Years – 2024 & 2029

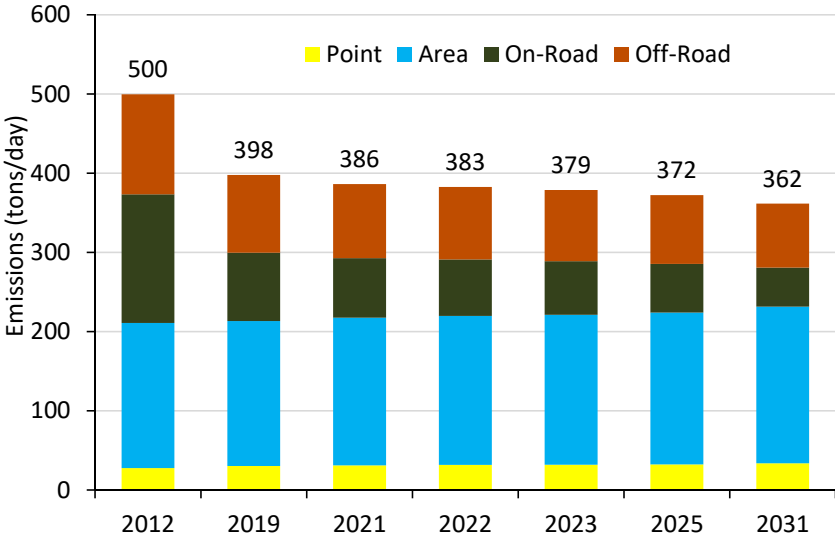


Emission Trends in the South Coast Air Basin

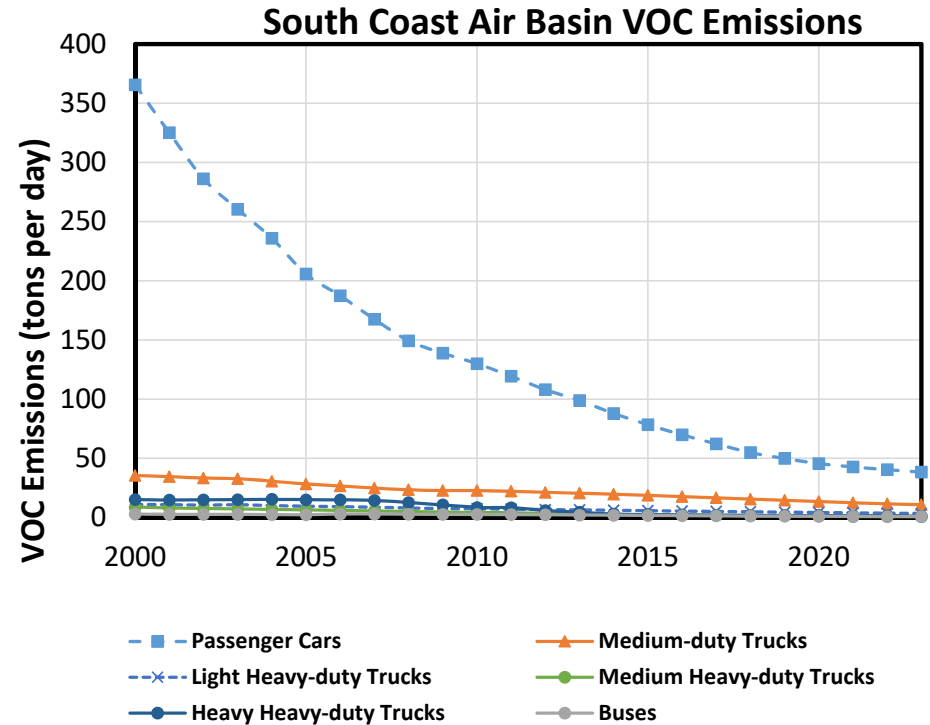
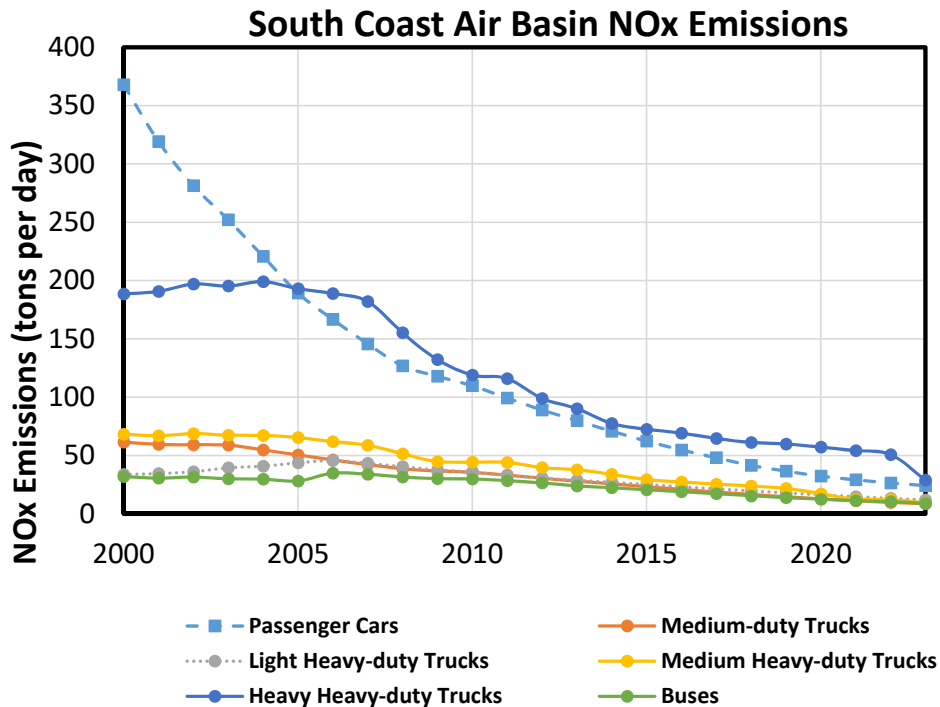
NOx Emissions



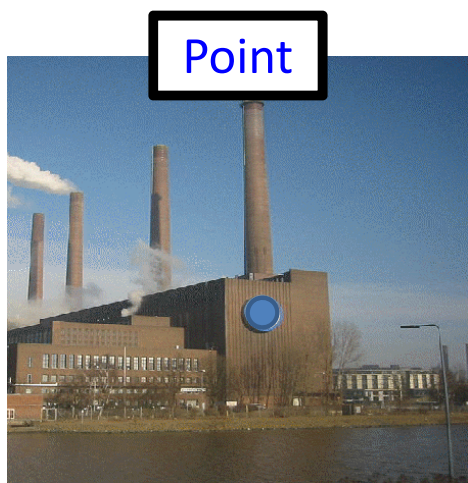
VOC Emissions



On-Road Mobile Emission Trends in the South Coast Air Basin



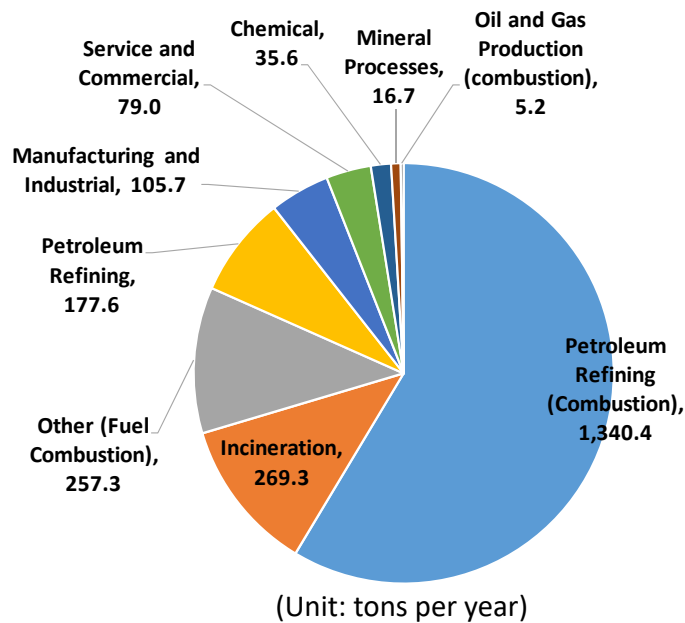
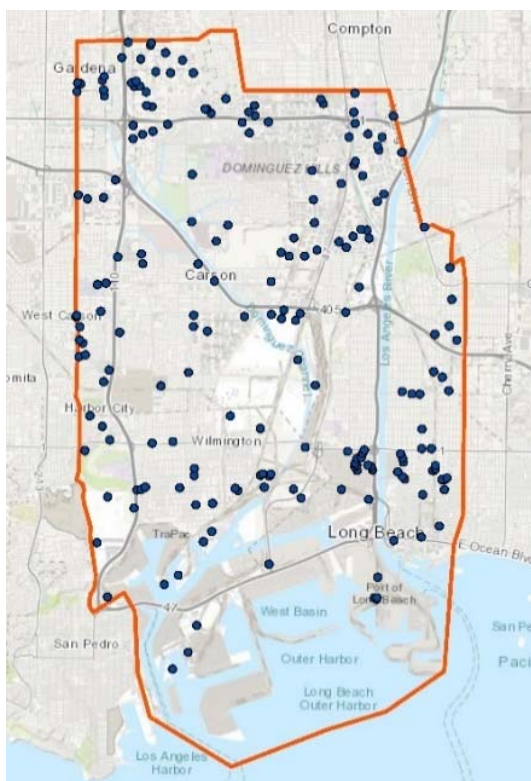
Methodology for Point Source Emissions



- **Base Year emissions:**
 - Reported Emissions from South Coast AQMD's Annual Emissions Reporting (AER) Program
 - Facilities that emit
 - 4 tons/year or more of VOC, NO_x, SO_x or PM, or
 - 100 tons/year or more of CO
 - Approximately 2,000 facilities required to report annually
- **Future Year Emissions:**
 - Growth and Control Factors are applied to the base year emissions

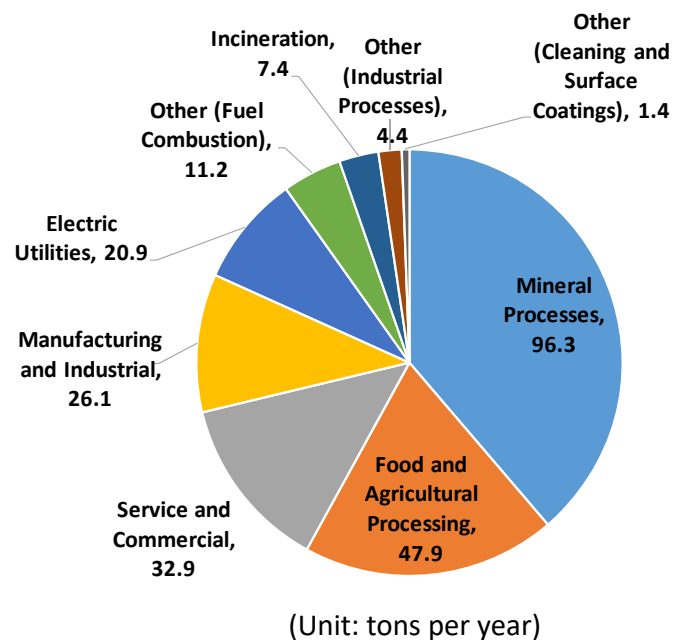
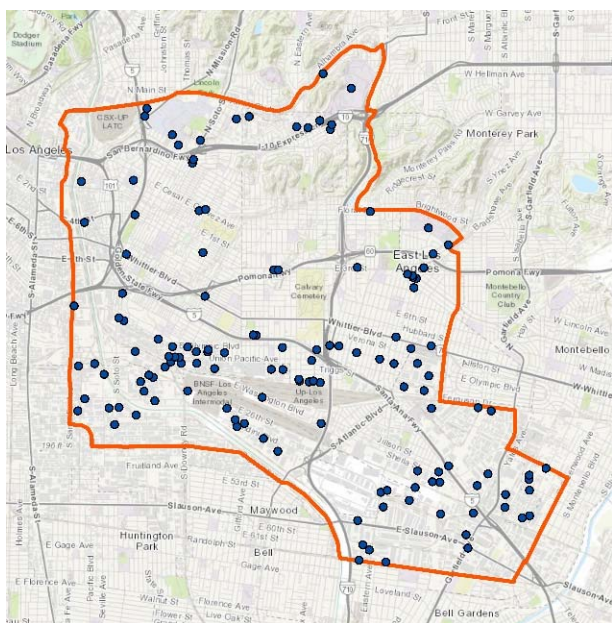
Preliminary NOx Emissions from Point Sources in 2017

Wilmington, West Long Beach and Carson



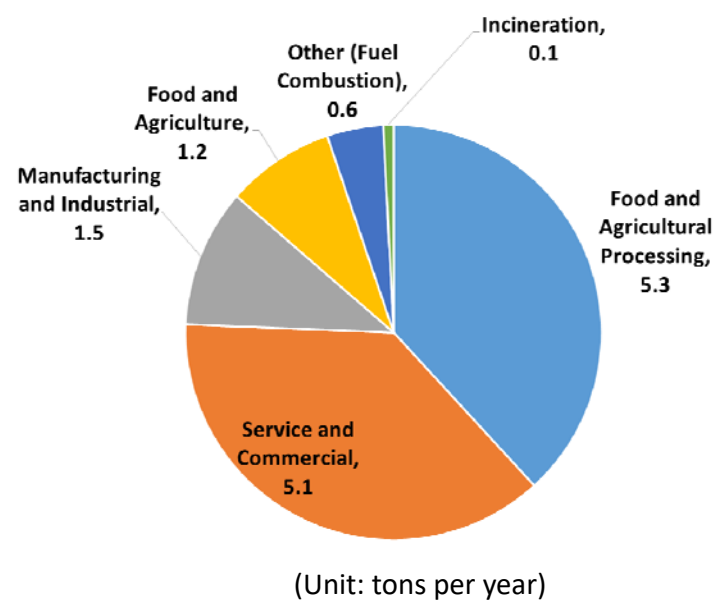
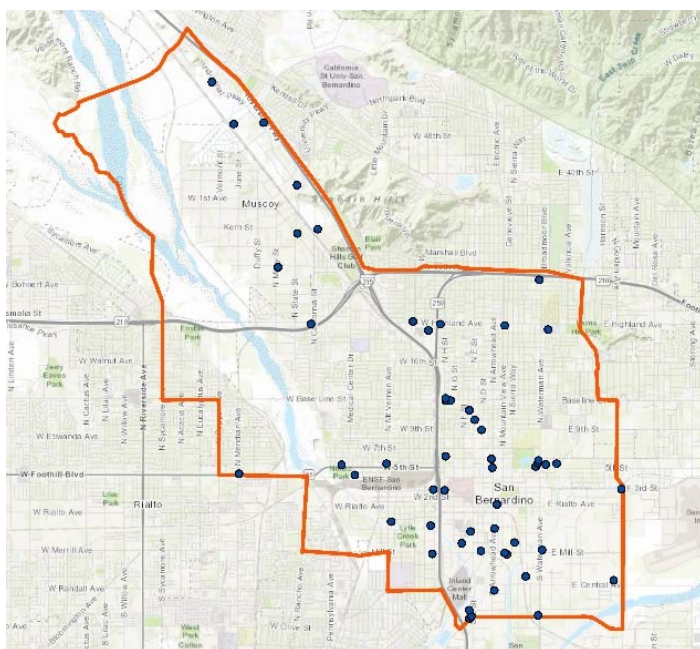
Preliminary NOx Emissions from Point Sources in 2017

Boyle Heights/East Los Angeles/West Commerce



Preliminary NOx Emissions from Point Sources in 2017

San Bernardino/Muscoy



Projecting Future Point Source Emissions

$$FY_i = BY_i \times CF_i \times GF_i$$

Future Baseline
Emissions

Reported 2017
Baseline
Emissions

Control Factor due
to Regulations

Growth Factor from
Industry and Socio-
Economic Data

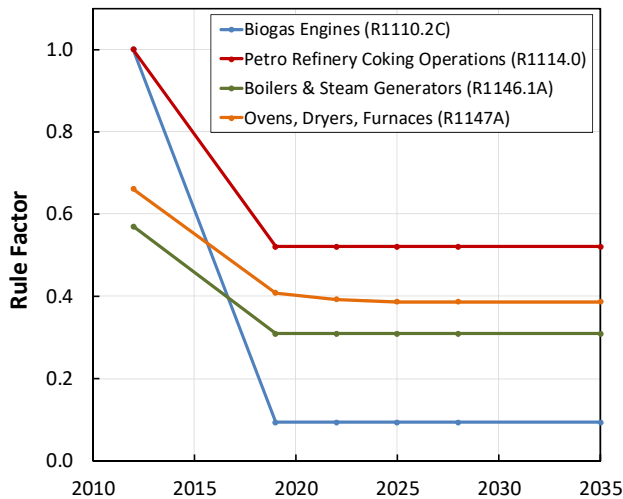


Projecting Future Point Source Emissions: Example of NOx Emission

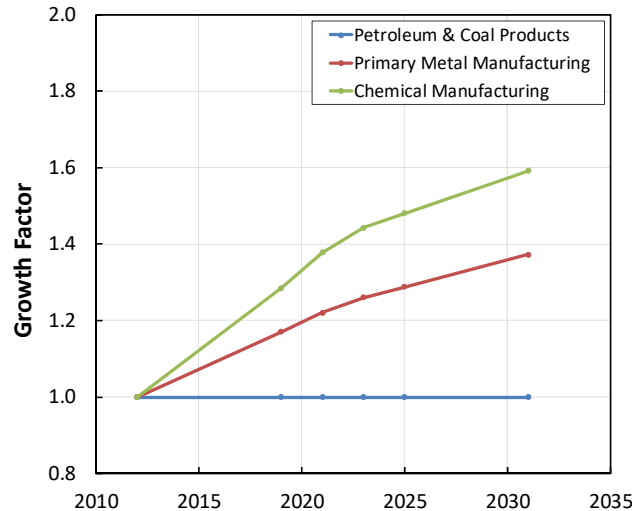
2017 Baseline Emissions



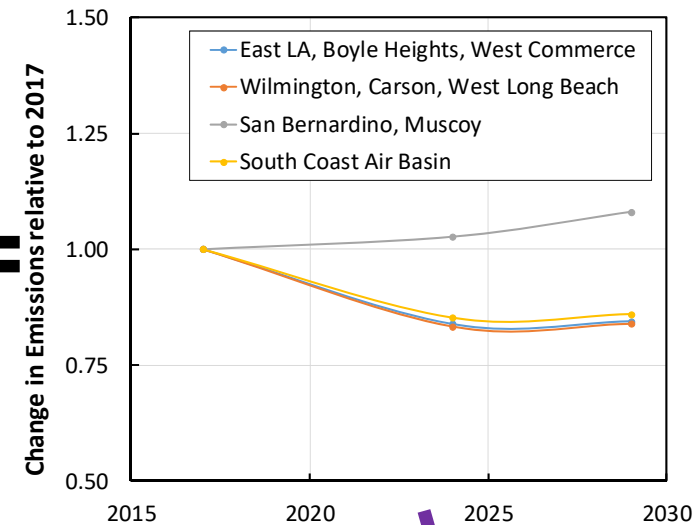
Effects of Selected Rules



Effects of Selected Economic Growth Factors



Overall Impact on Point Source Emissions



Projected Emissions (2024, 2029)

Growth Factors

- Southern California Association of Governments (SCAG), as a metropolitan planning organization, is responsible for forecasting economic and demographic growth
- The latest forecast is available from the 2016 Regional Transportation Plan/Sustainable Community Strategy (RTP/SCS)
- Selected example of demographic forecasts from the 2016 RTP/SCS

CATEGORY		2012	2019	2021	2022	2023	2025	2031
Population	Millions	15.9	16.7	16.9	17.0	17.1	17.3	17.9
	Growth (%)		4%	6%	7%	7%	9%	12%
Housing Units	Millions	5.1	5.5	5.6	5.6	5.7	5.7	6.0
	Growth (%)		7%	9%	10%	10%	12%	16%
Total Employment	Millions	6.7	7.5	7.6	7.7	7.8	7.9	8.2
	Growth (%)		12%	14%	15%	16%	18%	23%
Daily VMT	Millions	380	400	401	404	407	403	409
	Growth (%)		5%	5%	6%	7%	6%	8%



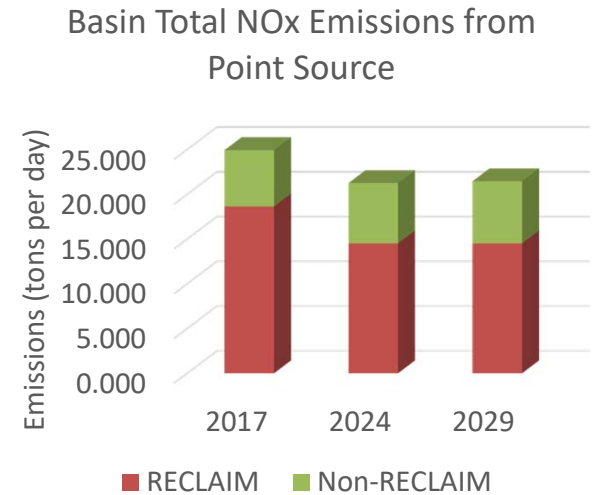
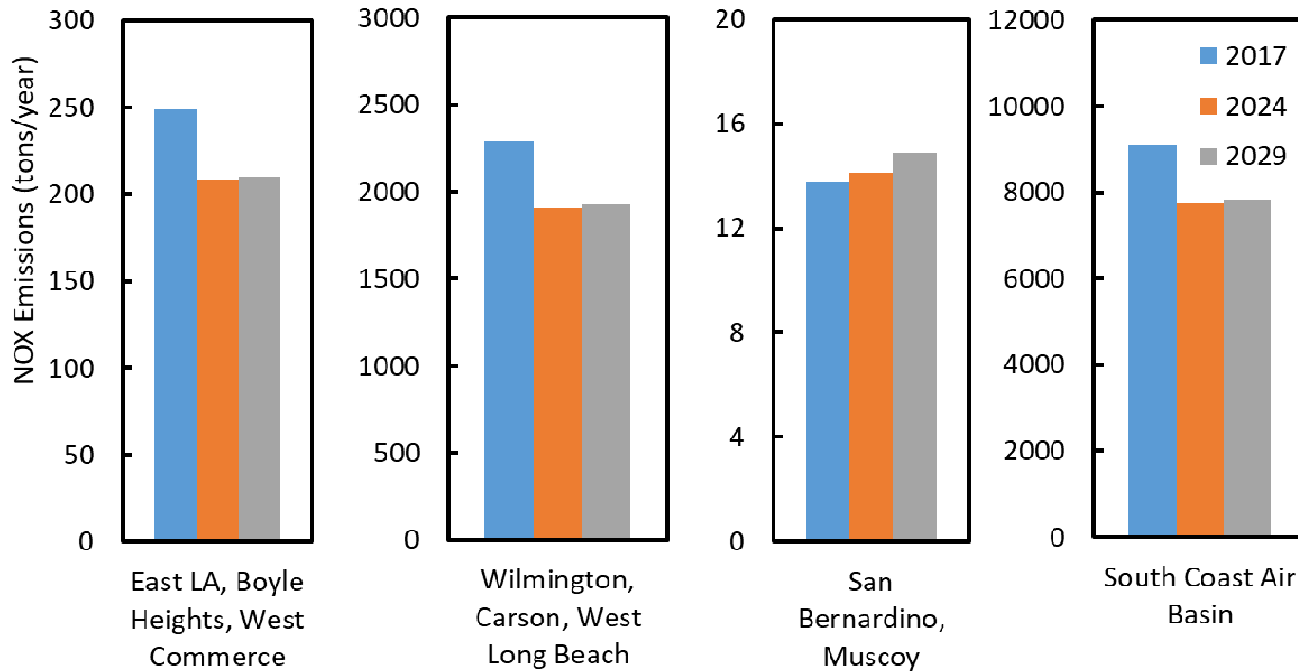
Control Factors: the Impact of Regulation

- South Coast AQMD rules adopted as of December 2015 were reflected.
- Recently adopted rules will be reflected in the next version of emissions inventory
- Selected example of rule factors reflected in the inventory

RULES*	DESCRIPTION	VOC	NOx	SOx	PM
1114	Petroleum Refinery Coking Operation	0.52	-	-	-
1146	Large Ind/Comm Boilers, Steam Generator, & Process Heaters	-	0.46	-	-
1146.1	Small Ind/Comm Boilers, Steam Generators & Process Heaters	-	0.54	-	-
2005	Reclaim NOx	-	0.55	-	-



Point Source



Emissions from non-RECLAIM point sources are leveling off in the future years
 San Bernardino Muscoy community has fewer RECLAIM sources than the other communities

Methodology for On-road Source Emissions

On-road Mobile



Base Year Emissions

- 2017 Travel Activity Data from SCAG
 - Volumes and speeds for Light and Medium Duty and Heavy Duty vehicles are available at the transportation link level for 5 discrete periods of time (morning, midday, afternoon, evening, night).
- Emission factors are obtained from EMFAC 2017
 - Emission factor for a given vehicle type depend on speed, temperature, relative humidity

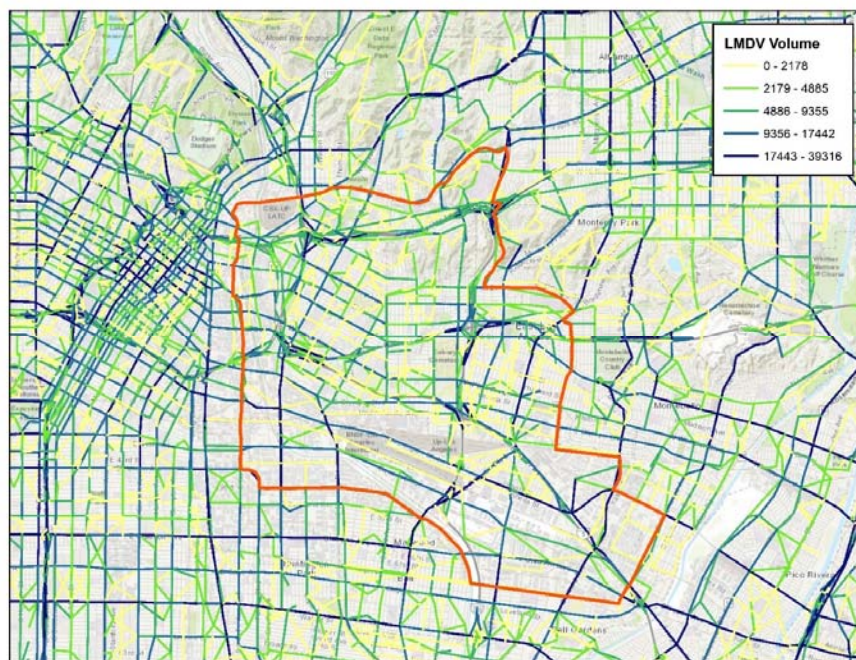
Future Year Emissions

- Travel Demand forecasted by SCAG to meet the need of future economic and demographic growth
- Emission factors from EMFAC 2017 reflecting vehicle turnover to newer vehicles and regulations requiring cleaner vehicles



Spatial Allocation of Emissions

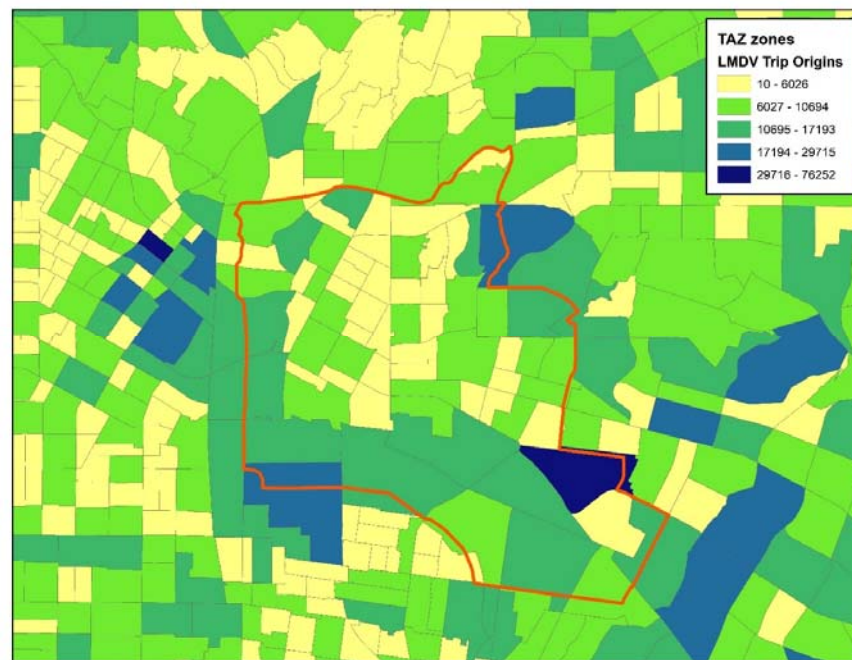
VMT per Traffic Link



VMTs are used to estimate

- Exhaust and running losses
- Tire and break wear

The number of Trip Origins per Travel Analysis Zone



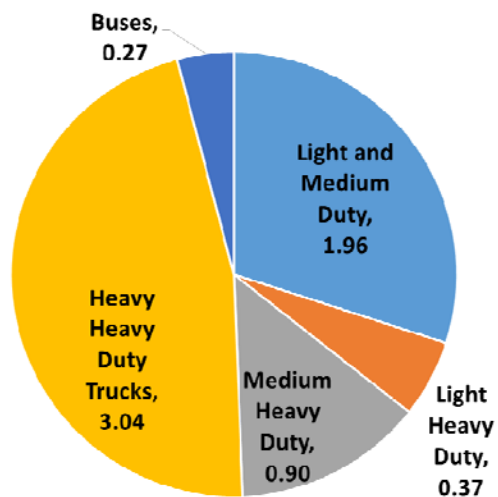
Trip information is used to estimate

- Resting evaporative
- Idling



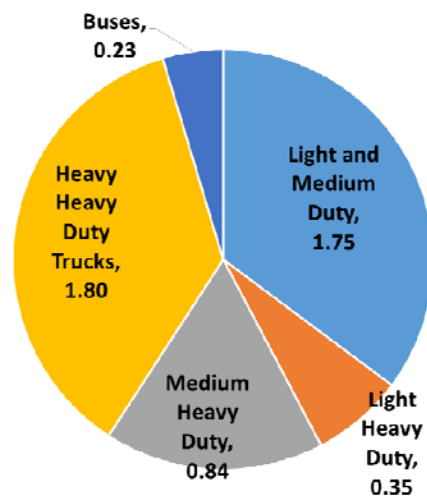
On-Road NOx Emissions Breakdown in 2017

**Wilmington, Carson,
West Long Beach**



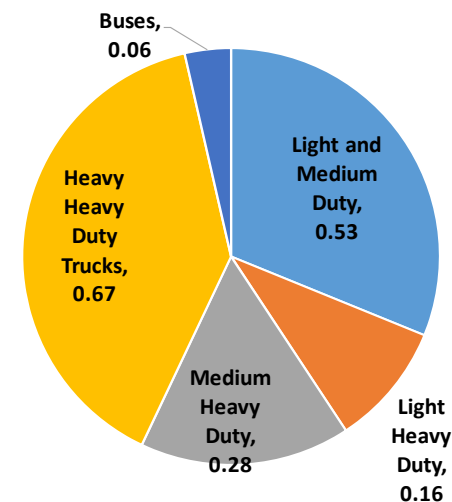
Unit: tons per day

**East LA, Boyle heights,
West Commerce**



Unit: tons per day

**San Bernardino,
Muscoy**



Unit: tons per day

Varying vehicle type Mix:

- WCWLB has the highest proportion of Heavy-Heavy Duty Trucks due to goods movement
- ELABHWC has the highest portion of passenger cars due to proximity to major commuting thoroughfares
- SBM is more similar to ELABHWC than to WCWLB, based on SCAG travel activity projections



Projecting Future Mobile Source Emissions

$$FY_i = FTD_i \times FEF_i$$

Future Baseline Emissions = Future Travel Demand Projected by SCAG's Modeling × Future Emission Factors Projected by CARB's EMFAC Model

Regulations that are not reflected in the EMFAC2017

- Amendments to Smoke Opacity Regulation
- Amendments to HD Engine Warranty requirements
- Innovative Clean Transit
- Zero Emission Airport Shuttle Buses

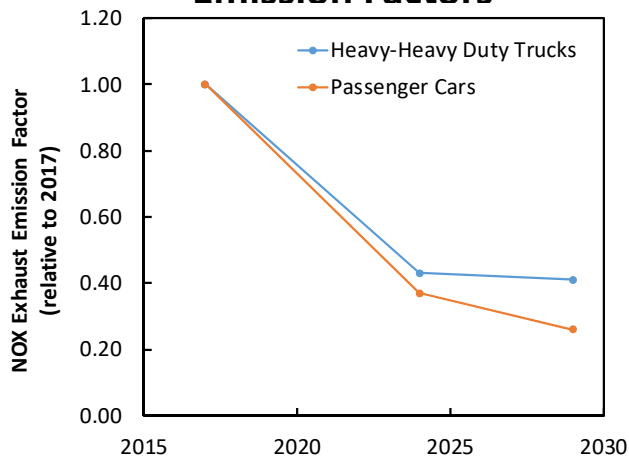


Projecting Future On-road Emissions: Example of NOx Emission

2017 Baseline Emissions

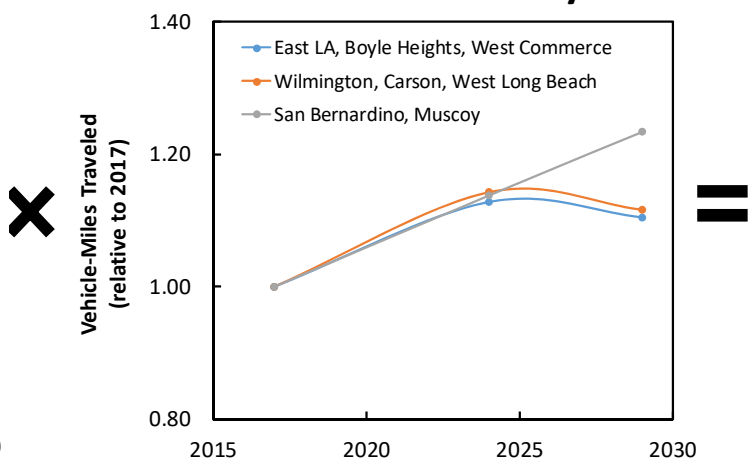


Emission Factors



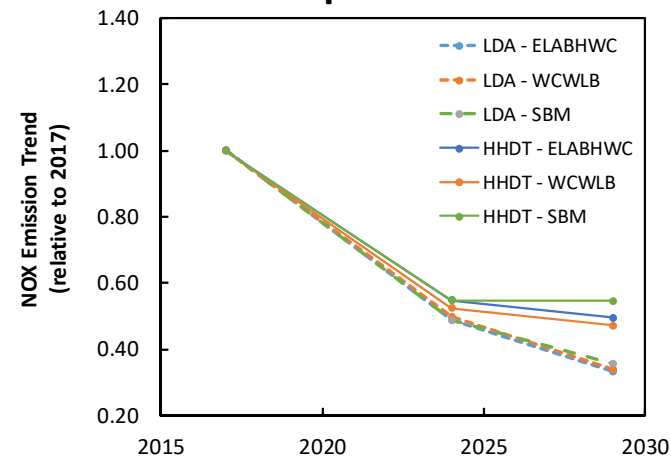
EMFAC2017

Effects of Vehicle Activity Growth



SCAG Travel Demand Data

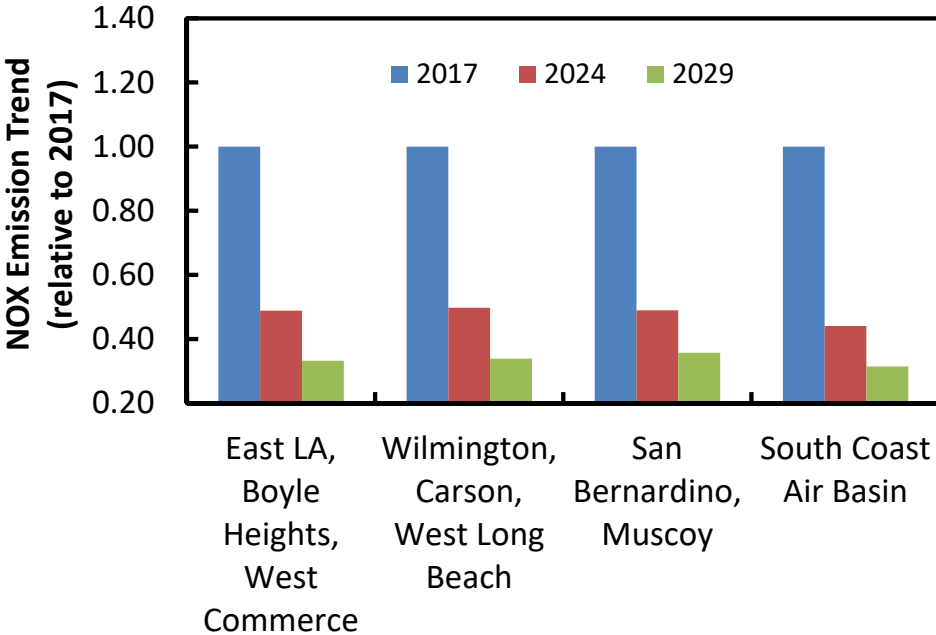
Overall Impact on Emissions



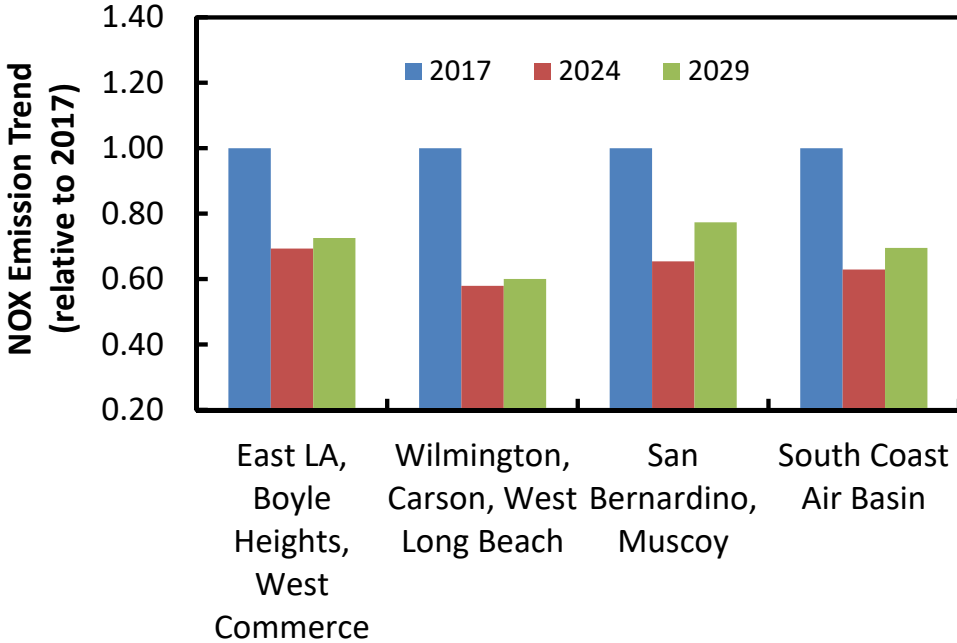
Projected Emissions (2024, 2029)

Future On-road Emissions of each Community and the Basin

Light and Medium Duty Vehicles



Heavy-Heavy Duty Vehicles



Future increases between 2024 and 2029 are being addressed through current rulemaking at CARB

Toxic Air Compounds

- Point Sources
 - Toxic emissions calculated based on CARB speciation profiles for VOC and PM, based on Source Classification Code (SCC)
 - Consolidation of AB 2588 toxics emission inventory reporting requirements into the AER program
- Area, On-Road and Off-Road Sources
 - Toxic emissions calculated based on CARB speciation profiles applied to VOC and PM emissions



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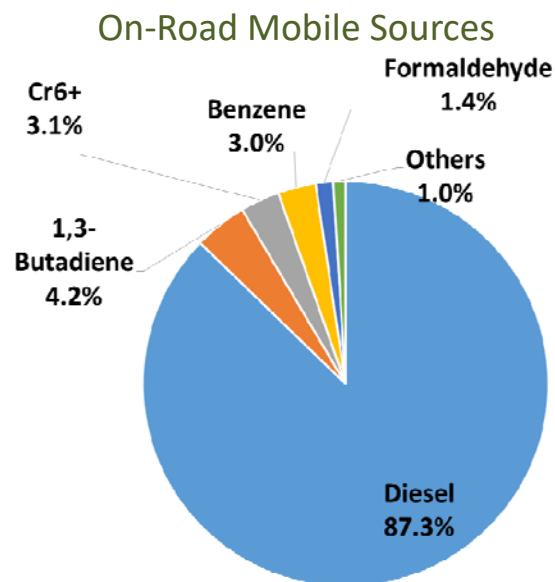
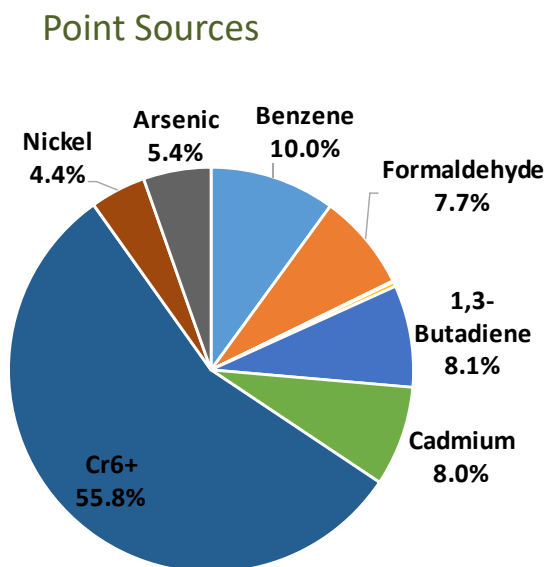
Air Toxics Emissions from Point Source

- AB2588 is Air Toxics “Hot Spots” program to collect emissions data of toxic air compounds, identify facilities having localized impacts, determine health risks, and notify affected individuals.
 - Short list includes 24 species
 - Quadrennial reporting: 1A, 1B, 2 and 3 group
 - Long list includes 177 species
 - Facility with the highest priority will report to HARP over 400 species
- Facilities are required to report their emissions (both criteria and toxics) for calendar year through South Coast AQMD’s AER program



Cancer Risk Weighted Toxic Air Compounds Emissions for 2017

- **Wilmington, Carson, West Long Beach Community**
- Point Sources – reported emissions
- On-Road Mobile Sources – Speciated from VOC and PM emissions



Selected Risk Weighted TAC emissions

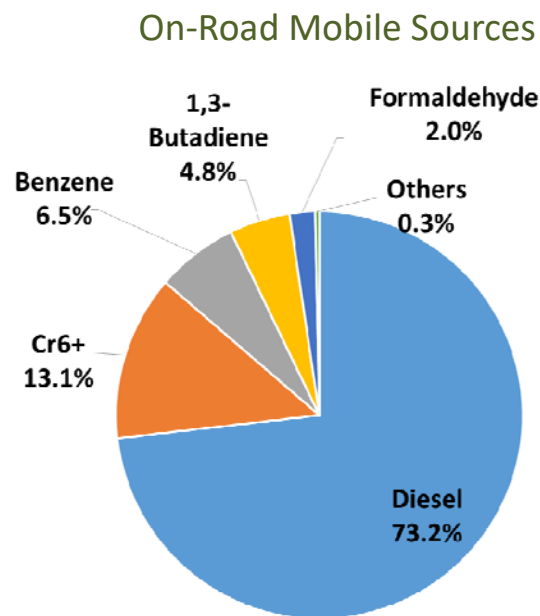
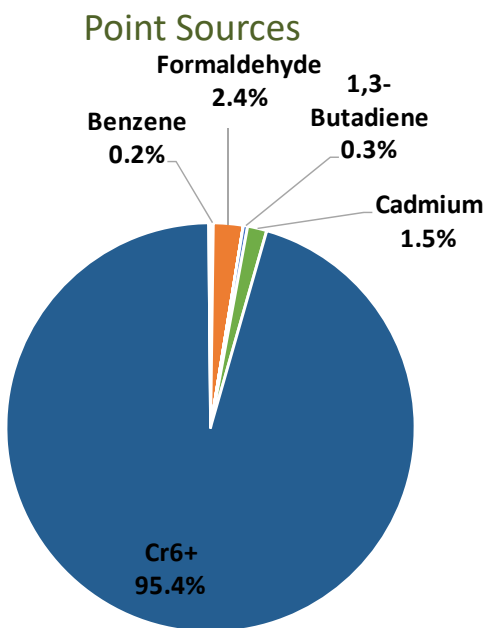
Pollutant	Risk-Weighted Emissions from Point Sources
Cr6+	3,010
Formaldehyde	418
Cadmium	431
1,3-Butadiene	440

Pollutant	Risk-Weighted Emissions from On-Road Mobile Sources
Diesel	55,554
Cr6+	9,951
Benzene	4,937
1,3-Butadiene	3,657

unit: pound per year multiplied by (ug/m3)⁻¹

Cancer Risk Weighted Toxic Air Compounds Emissions for 2017

- East LA, Boyle Heights, West Commerce Community
- Point Sources – reported emissions
- On-Road Mobile Sources – Speciated from VOC and PM emissions



Selected Risk Weighted TAC emissions

Pollutant	Risk-Weighted Emissions from Point Sources
Cr6+	8,246
Formaldehyde	203
Cadmium	131
1,3-Butadiene	29

Pollutant	Risk-Weighted Emissions from On-Road Mobile Sources
Diesel	35,778
Cr6+	7,554
Benzene	3,682
1,3-Butadiene	2,457

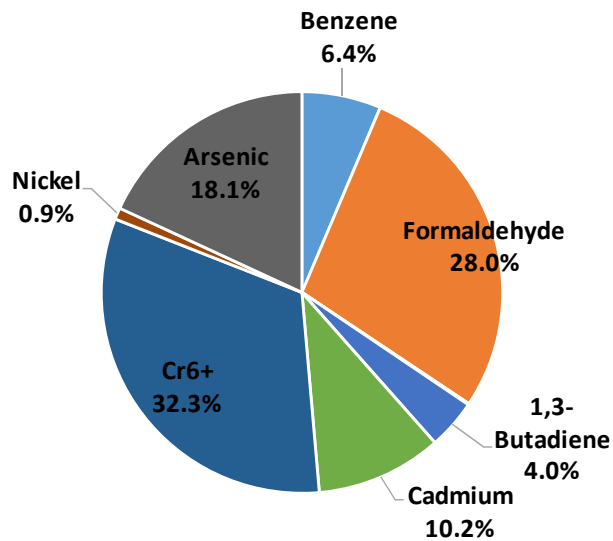
unit: pound per year multiplied by (ug/m3)⁻¹



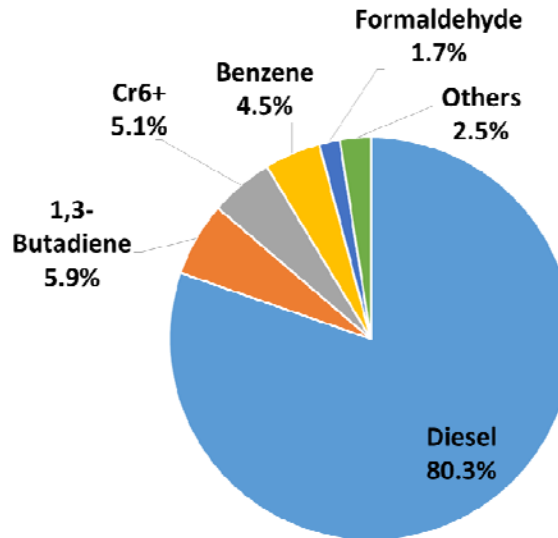
Cancer Risk Weighted Toxic Air Compounds Emissions for 2017

- **San Bernardino, Muscoy Community**
- Point Sources – reported emissions
- On-Road Mobile Sources – Speciated from VOC and PM emissions

Point Sources



On-Road Mobile Sources



Selected Risk Weighted TAC emissions

Pollutant	Risk-Weighted Emissions from Point Sources
Cr6+	9
Formaldehyde	8
Cadmium	3
1,3-Butadiene	1

Pollutant	Risk-Weighted Emissions from On-Road Mobile Sources
Diesel	14,672
Cr6+	2,634
Benzene	1,284
1,3-Butadiene	916

unit: pound per year multiplied by (ug/m3)⁻¹

Projecting Air Toxics Emissions to Future Years

- Industry specific growth factors from SCAG
- Regulations – selected example of recent regulations adopted by South Coast AQMD to reduce air toxics emissions
 - ✓ Rules 1420, 1420.1 and 1420.2 – Lead Reduction
 - ✓ Rule 1469 – Cr6 Reduction
 - Emission reductions for the above two sets of rules are hard to quantify
 - Will examine impacted facilities in the communities in a case-by-case basis
 - ✓ Rule 1421 – perc Dry Cleaning Phase-out
 - ✓ Rule 1122 – Methylene Chloride Degreasing
 - Emissions reductions from the above two rules are well defined

Summary and Next Steps

- Emissions of criteria pollutants and air toxic compounds were developed for 2017, which serves as base year for the Year 1 communities
- Emissions for future milestone years are under development
- The final versions of the emissions inventory will be presented in the next TAG meeting, which will be held in early/mid July.



Questions

