

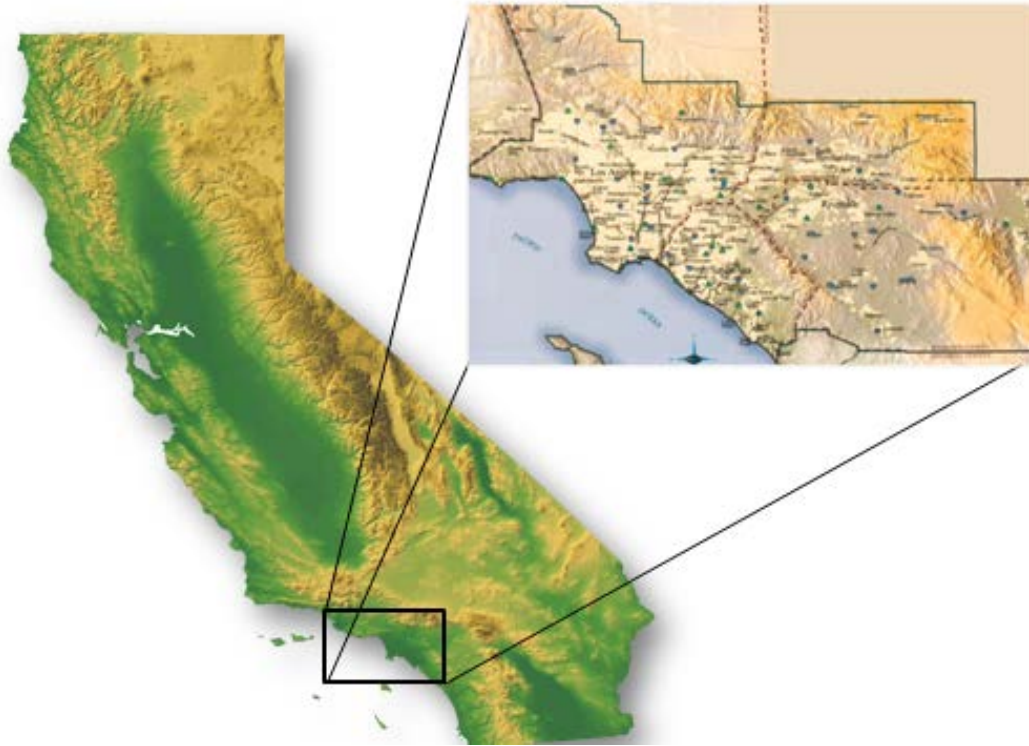
Application of Emission Inventories in the Development of SIP Control Strategies and Reconciliation with Air Quality Measurements



Henry Hogo
Assistant Deputy Executive Officer
Mobile Source Division
Science and Technology Advancement

*2015 International Emission Inventory Conference
San Diego, CA
April 14, 2015*

California's South Coast Air Basin

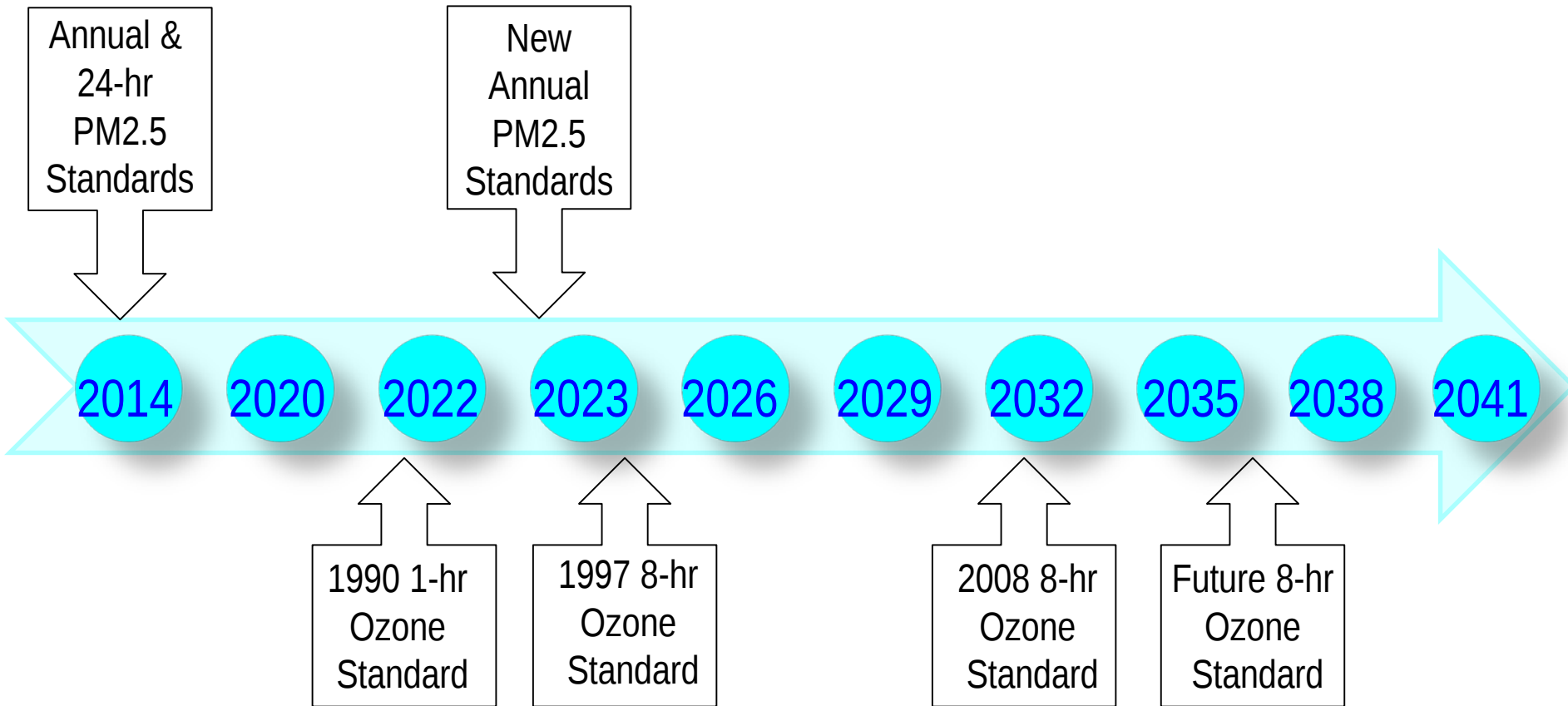


- Substantial Air Quality Progress, But Still Serious Health Impacts
- Nation's Largest Containerized Freight Gateway

4-county Region
16+ Million People

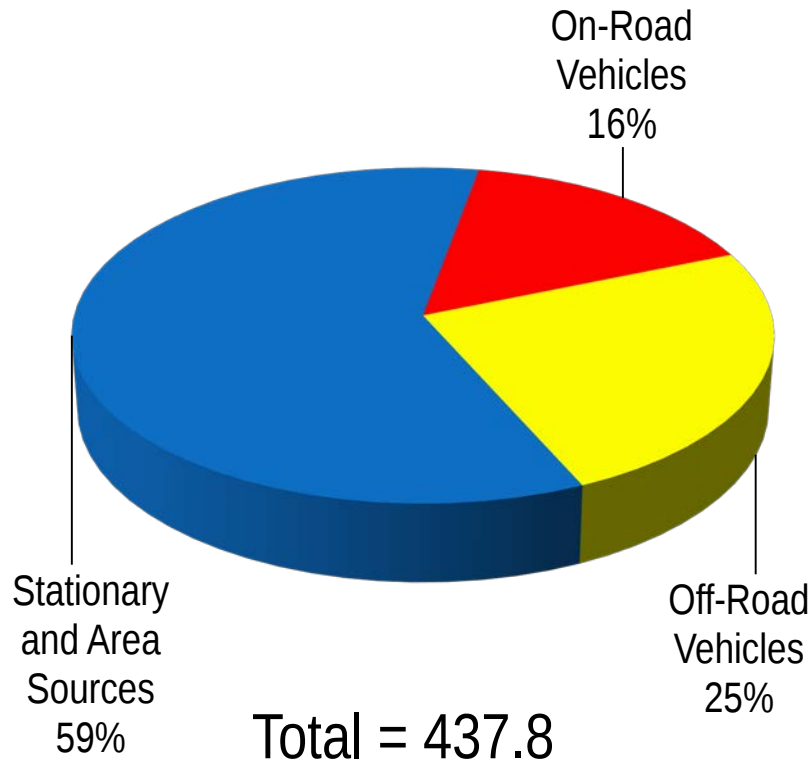
261,000+ Diesel Vehicles
11+ Million Gasoline Vehicles

National Ambient Air Quality Standards

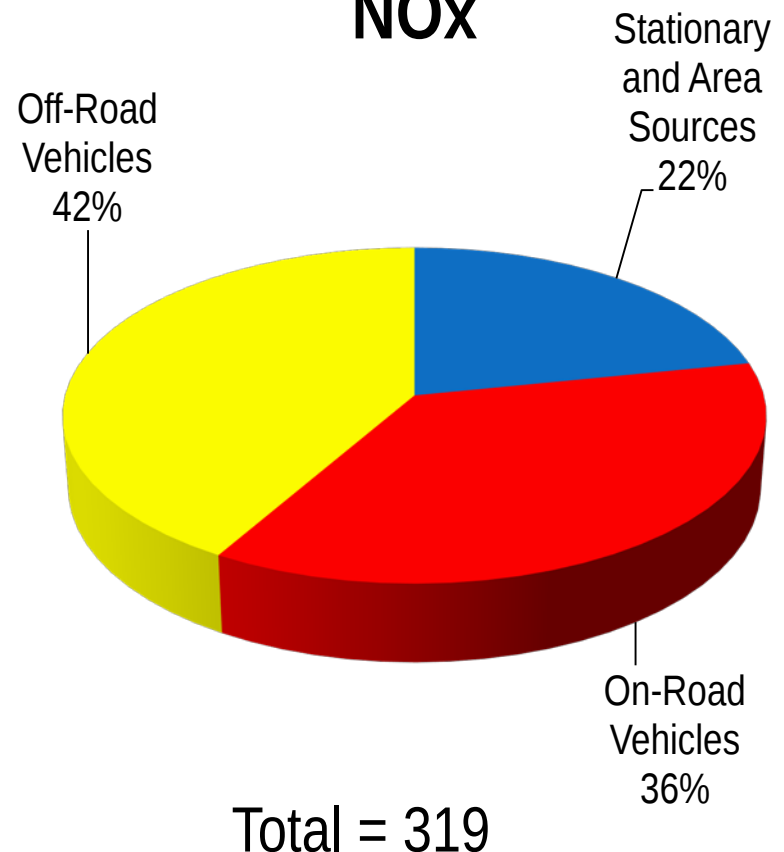


2023 VOC and NOx Emissions in the South Coast Air Basin

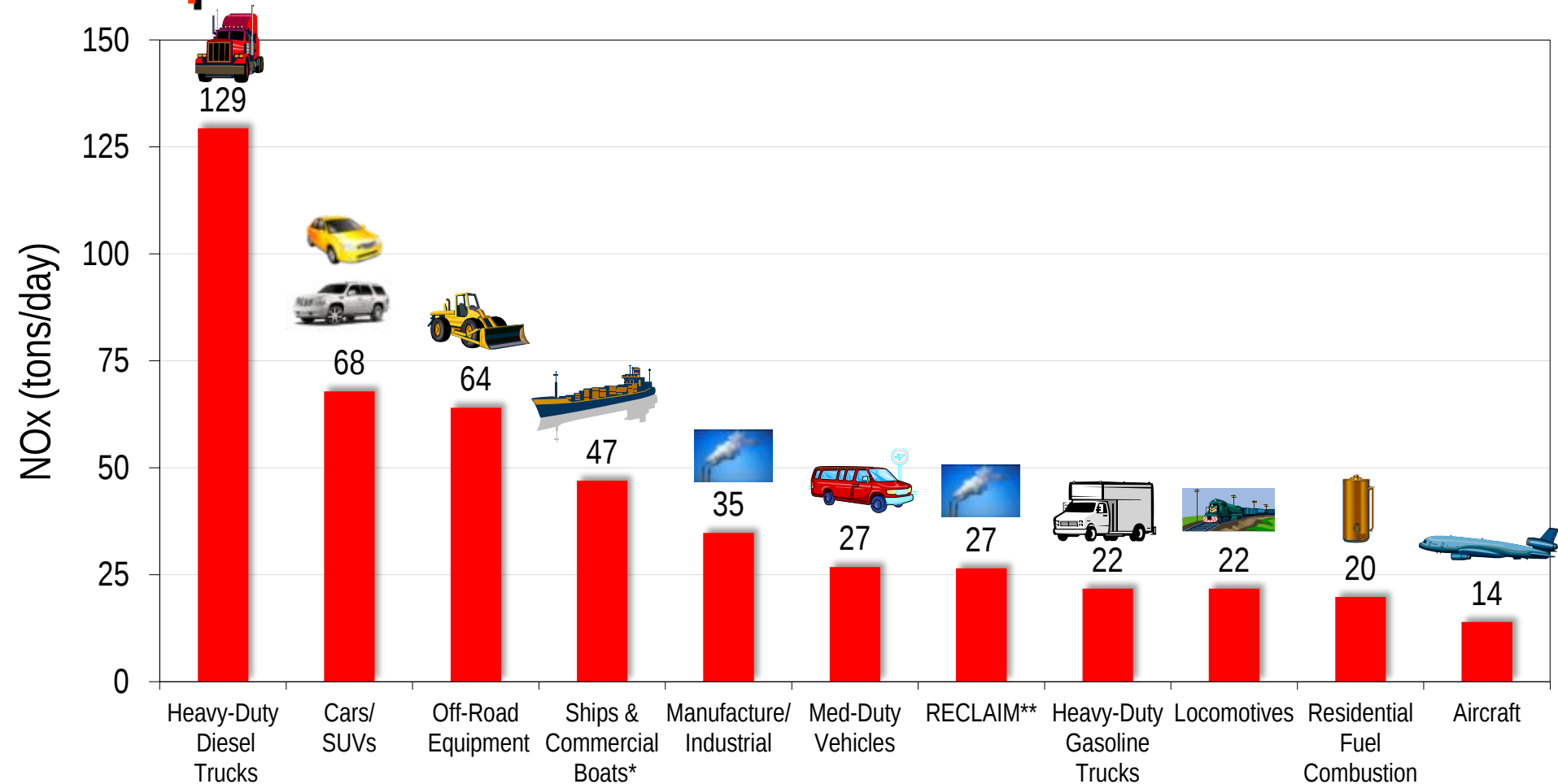
VOC



NOx



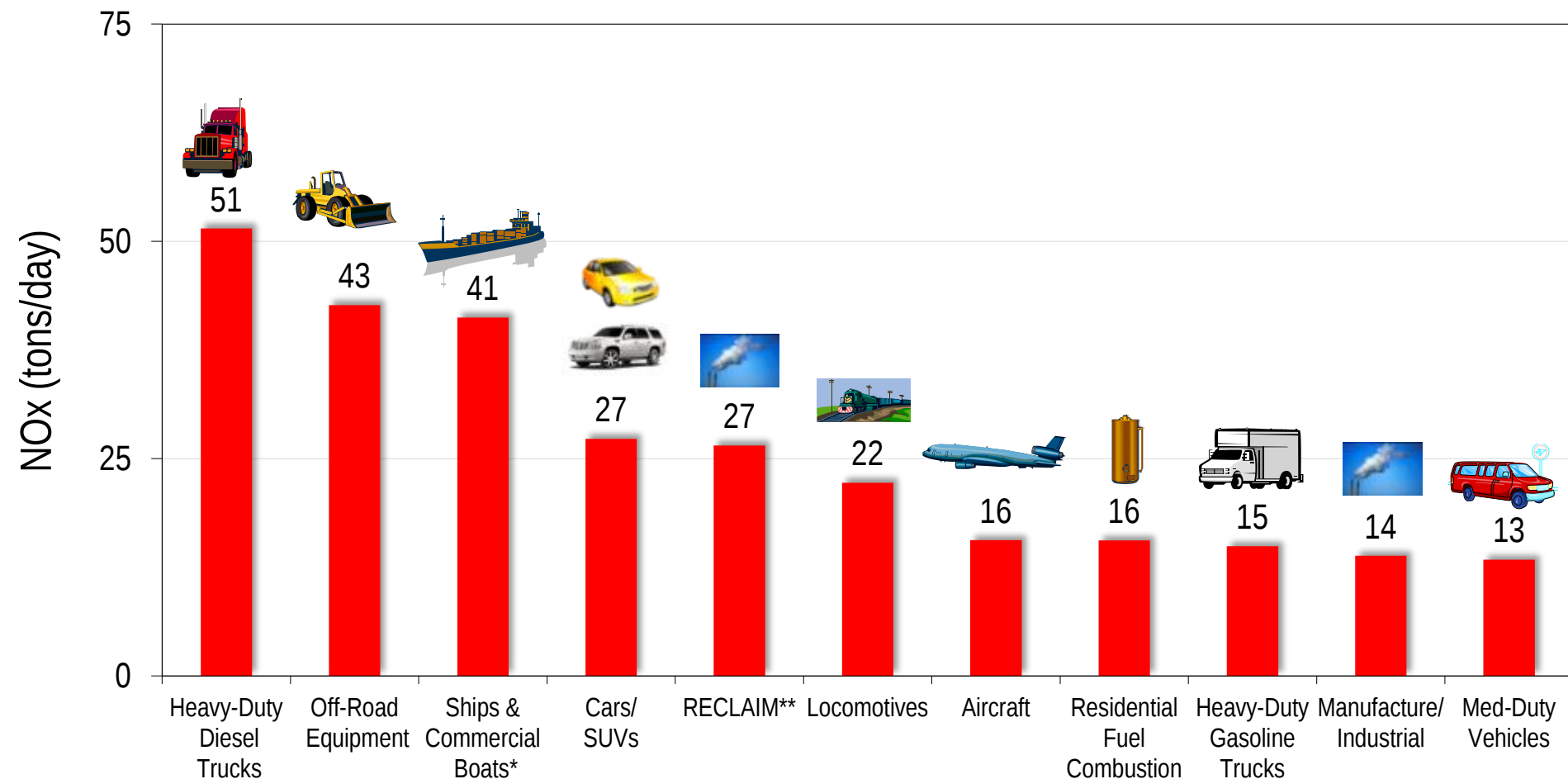
Top NO_x Emissions Sources in 2014



* Ocean-going vessels = 35 tons/day

**RECLAIM: 320 largest stationary sources, including all refineries and power plants

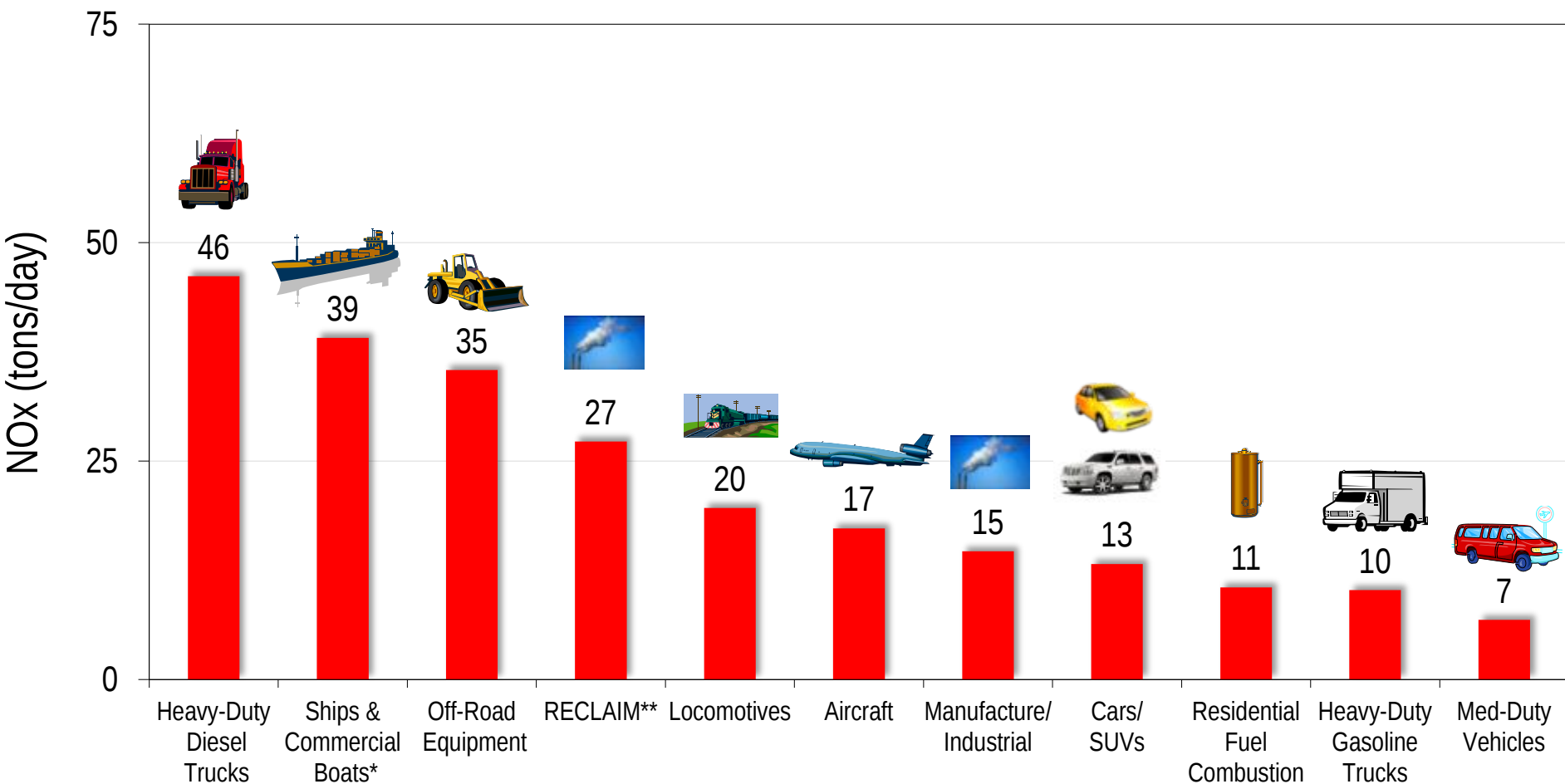
Top NOx Emissions Sources in 2023



* Ocean-going vessels = 32 tons/day

**RECLAIM: 320 largest stationary sources, including all refineries and power plants

Top NO_x Emissions Sources in 2032

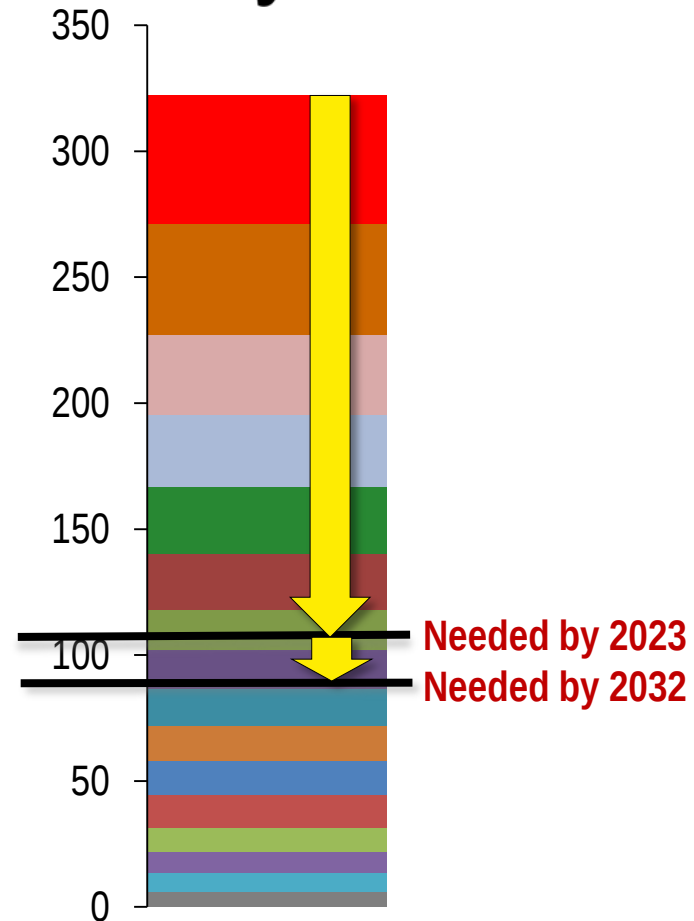


* Ocean-going vessels = 29 tons/day

**RECLAIM: 320 largest stationary sources, including all refineries and power plants

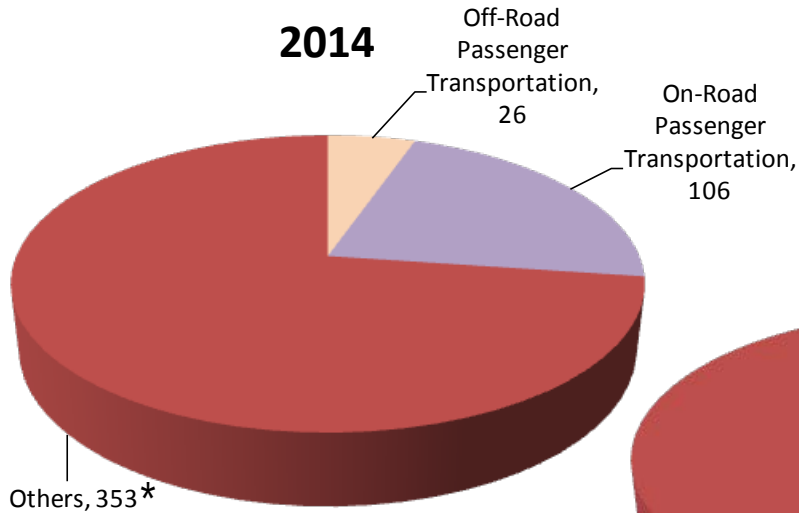
Needed Pollution Reduction to Meet Ozone Air Quality Standards

- Heavy-Duty Diesel Trucks
- Off-Road Equipment
- Ocean-going Vessels
- Other
- RECLAIM (Large Stationary)
- Locomotives
- Aircraft
- Residential Fuel Combustion
- Heavy-Duty Gasoline Trucks
- Light-Duty Vehicles
- Medium-Duty Trucks
- Light-Duty Trucks
- Manufacturing and Industrial
- Commercial Boats
- Service/Commercial



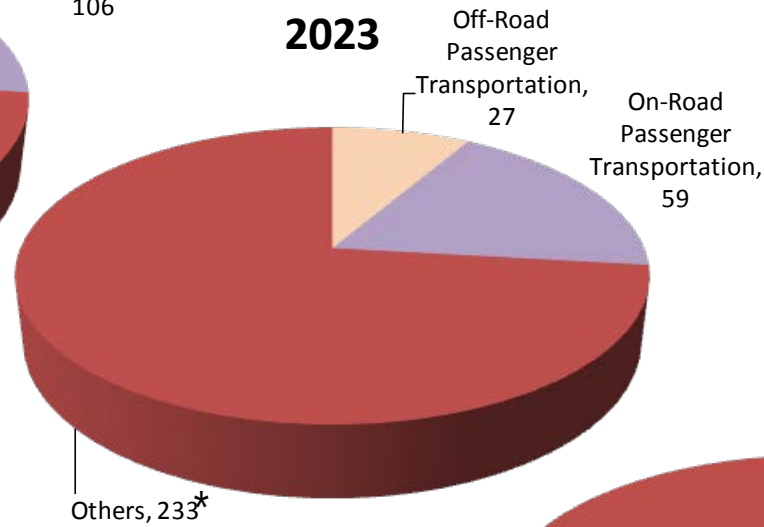
Passenger Sector Emission Contributions – NO_x (tpd)

2014



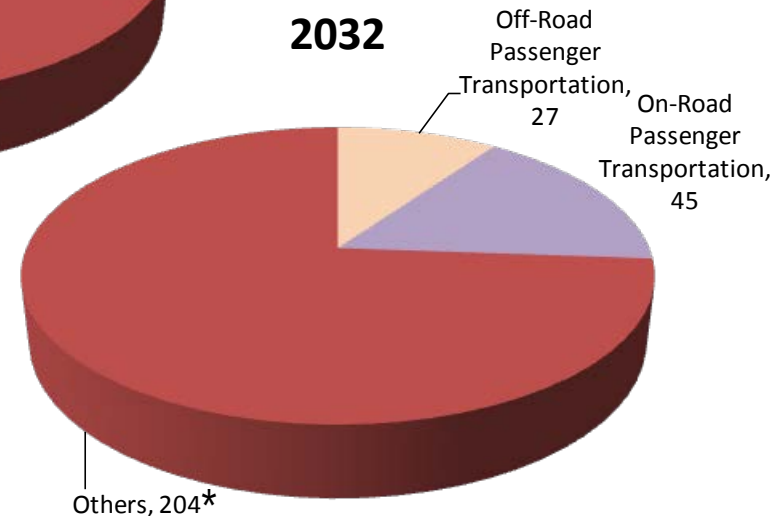
2014 Total: 485 tpd

2023



2023 Total: 319 tpd

2032

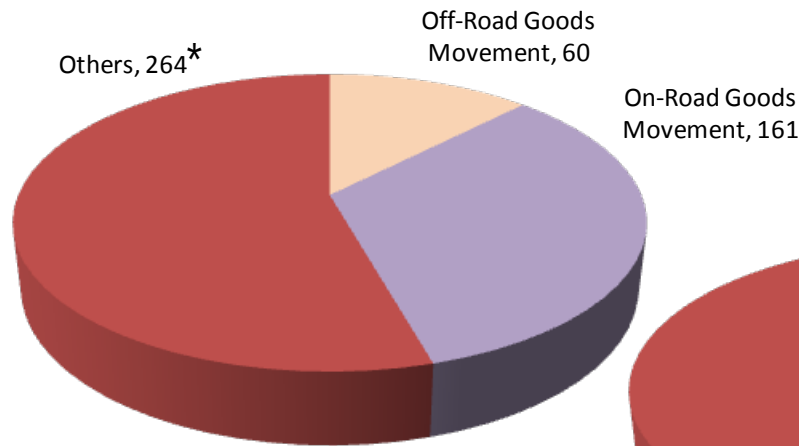


2032 Total: 276 tpd

* Others represent sources not related to passenger transportation

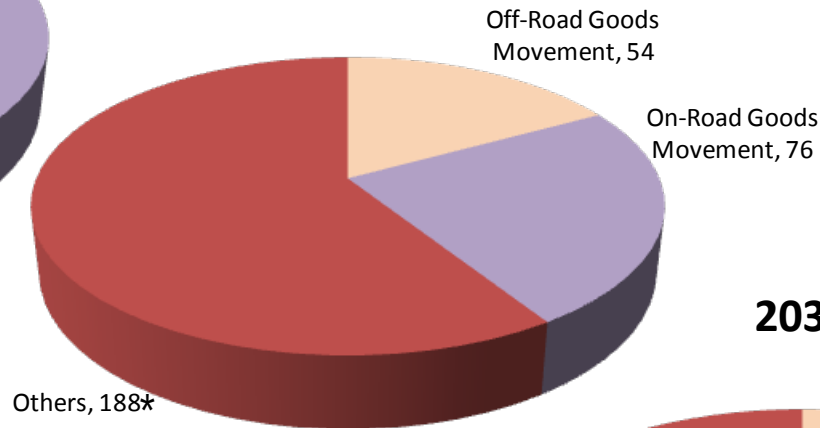
Goods Movement Sector Emission Contribution to Total NOx (tpd)

2014



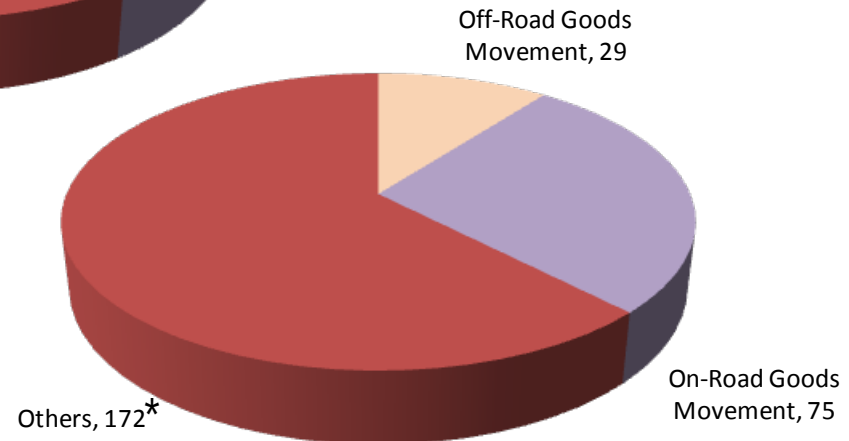
2014 Total: 485 tpd

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2023 Total: 319 tpd

2032



2032 Total: 276 tpd

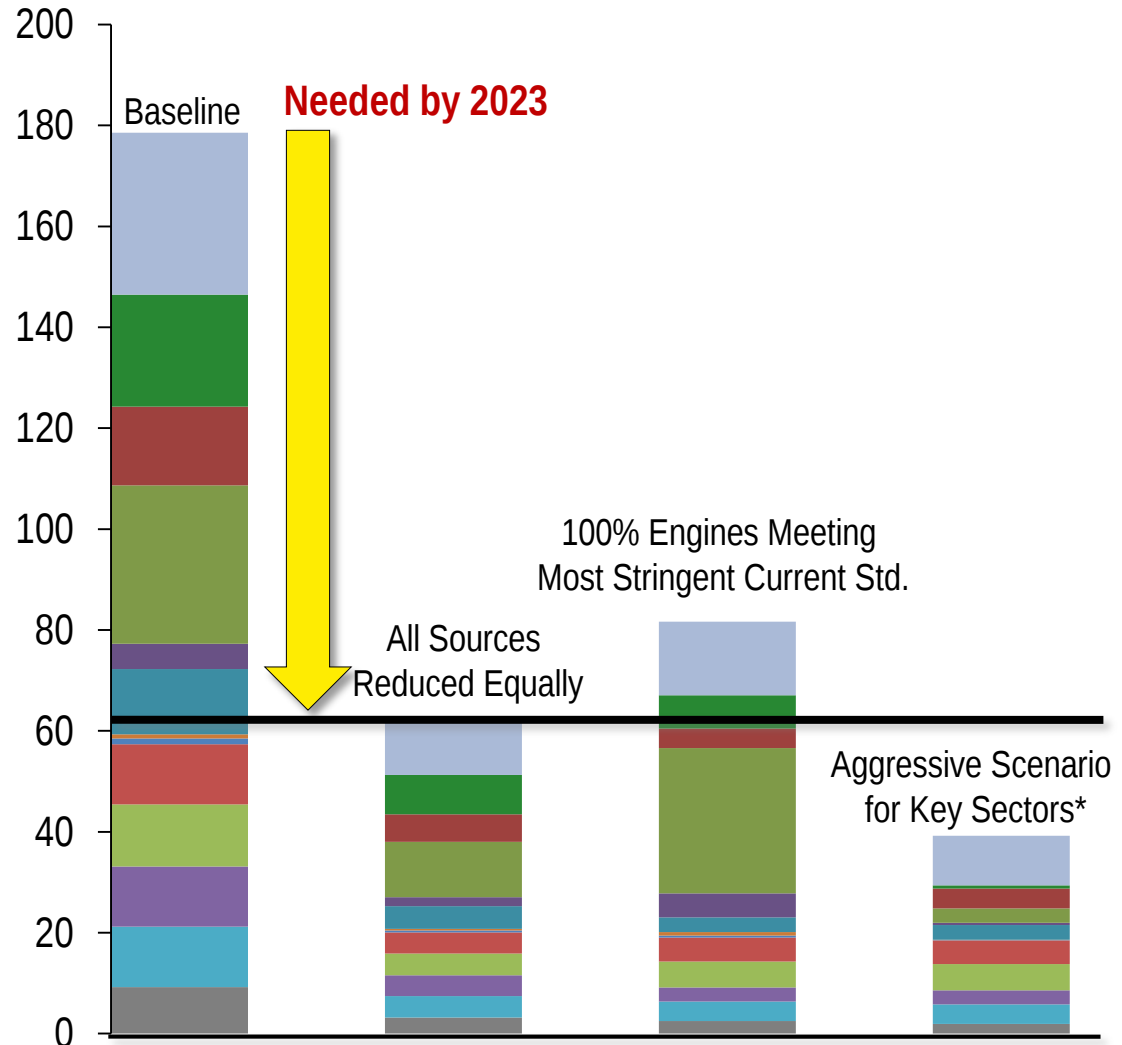
* Others represent sources not related to goods movement

Emission Reduction Scenarios

- Baseline Emissions – 2023, 2032
- Equal Share Reductions (Across-the-Board)
- All Sources at Greatest Level of Control Based on Existing Emission Standards
- Certain Emission Sectors with 90% Greater Reductions than Existing Emission Standards

Mobile Source NOx Emission Reductions to Achieve 8-Hr Ozone Air Quality Standards (2023)

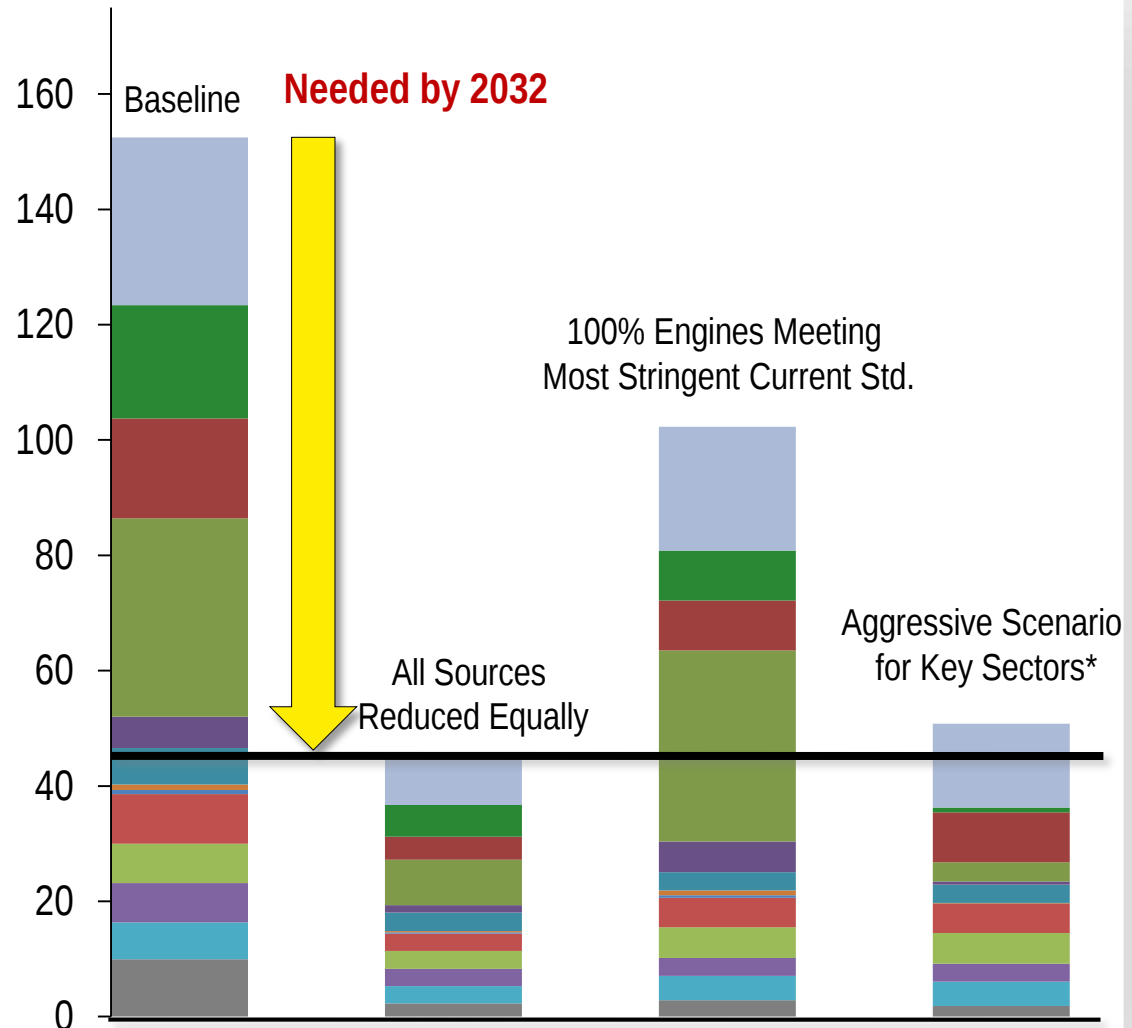
- Ocean-going Vessels
- Locomotives
- Aircraft
- HHD Diesel Trucks
- MHD Diesel Trucks
- LHD Diesel Trucks
- HHD Gasoline Trucks
- MHD Gasoline Trucks
- LHD Gasoline Trucks
- Light-Duty Passenger
- Medium-Duty Trucks
- Light-Duty Trucks
- Harbor Craft



*Key Sectors: On-Road HD Trucks, Locomotives, Marine Vessels at Berth, Harbor Crafts, Cargo Handling Equipment

Mobile Source NOx Emission Reductions to Achieve 8-Hr Ozone Air Quality Standards (2032)

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*Key Sectors: On-Road HD Trucks, Locomotives, Marine Vessels at Berth, Harbor Crafts, Cargo Handling Equipment

Some Initial Observations

- Not Likely to Reach “Equal Share” Levels with Current Emissions Standards
- Some Emission Sources May Not Reach “Equal Share” Level – Need for Other Sources to Further Reduce Emissions
- Potential to Reach “Equal Share” Levels of Emission Reduction with Greater Penetration of Zero- and Near-Zero Emission Technologies

Some Initial Observations

- Need for Earlier Penetration of Zero- and Near-Zero Emission Technologies (Commercialization/Deployment)
- Priority Placed on Reducing Emissions from Largest Contributors (i.e., Sub-Categories of Emissions)



Examples of Using Air Quality Measurements to Reconcile Emission Inventories

Ozone Air Quality Modeling

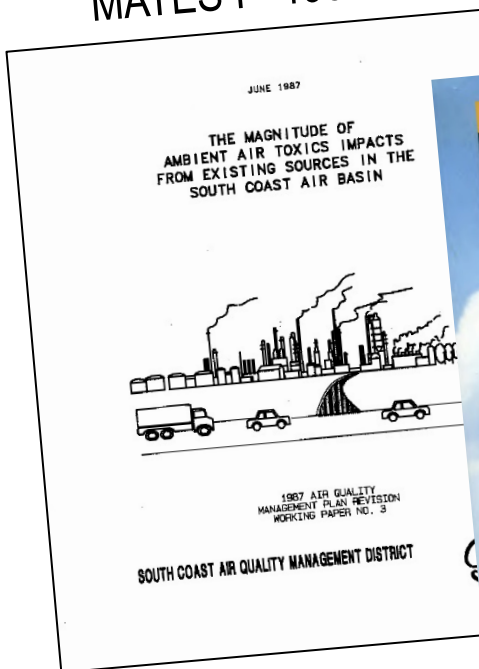
- 1994 Air Quality Management Plan – Air Quality Modeling Showed Low Levels of Ozone in the Eastern Region
- March Air Force Base – Military Aircraft Emission Profiles Different from Commercial Aircraft
 - Military Aircraft – Higher VOC Emissions, Lower NO_x Emissions
 - Commercial Aircraft Emissions – Mostly NO_x
- Revised Emission Profiles Resulted in Closer Levels of Ozone Compared with Monitoring Data

PM Air Quality Modeling

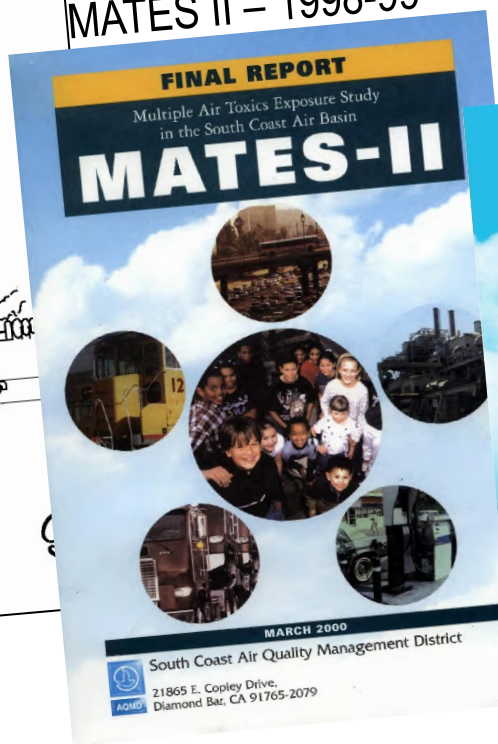
- Use of Default AP-42 Factors May Not Be Applicable in Local Situations
 - Entrained Road Dust – Factors Assumed Increased Dust with Increased VMT (No Limits)
 - GIS Model Developed to Estimate Entrained Road Dust Limiting Amounts

Multiple Air Toxics Studies

MATES I - 1987



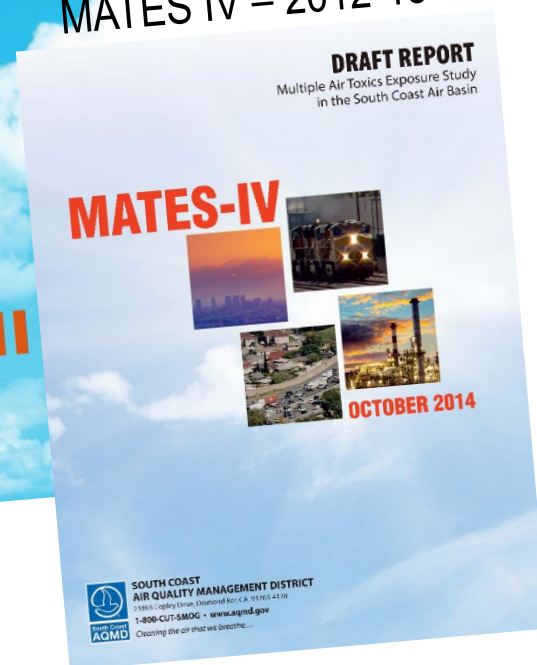
MATES II - 1998-99



MATES III - 2004-06

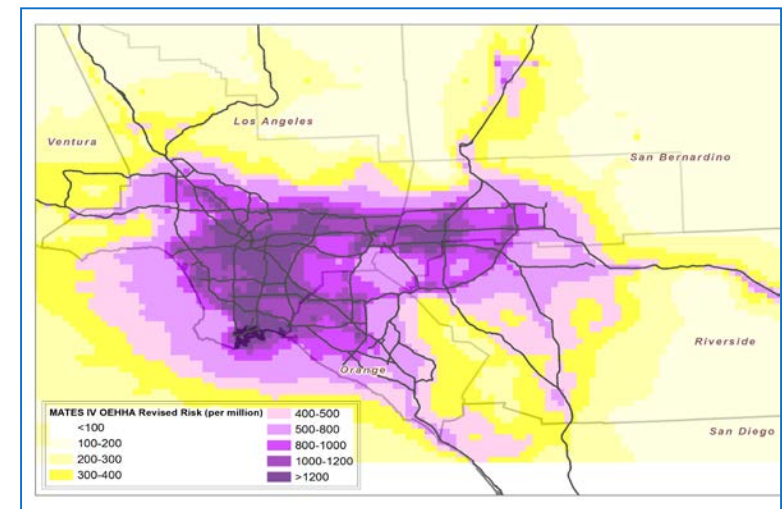


MATES IV - 2012-13



MATES Data Analysis

- Air Monitoring Measurements of ~40 Chemicals at 10 Fixed Sites
- Computer Simulation Modeling to Show Estimated Risk Levels Throughout the Region
- Computer Simulation Results Compared with Monitoring Data



Reconciliation

- MATES-II
 - Elevated Levels of Styrene Measured in Anaheim
 - Model Did Not Predict High Levels
 - Further Investigations Discovered Foam Plant Out of Compliance
- MATES-III
 - Elevated Levels of Hexavalent Chrome in Riverside Area, Not Predicted in Computer Modeling
 - Further Investigations Discovered Elevated Levels of Chromium in Cement Manufacturing Operations
 - Rule Amendments Were Adopted to Remedy Situation

Summary

- Emissions Inventory Development Need to be Cross Checked with Real World Measurements Where Available
- Air Quality Modeling – Iterative Process Between Modeling Staff and Emissions Inventory Staff
- Control Strategy Development – Iterative Process Between Planning Staff, Emissions Inventory Staff, and Air Quality Modeling Staff