



2016 Air Quality Management Plan

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UCLA Air Quality Management Training Program
Chinese Regulators Workshop
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Cleaning The Air That We Breathe...

US Environmental Protection Agency



- Federal government agency
- Began operation December 1970
- Protects human health and environment
- Writes and enforces regulations consistent with laws
- 10 regions and 27 laboratories
- Maintaining and enforcing national standards for:
 - ❑ Air
 - ❑ Water
 - ❑ Land
 - ❑ Endangered Species
 - ❑ Hazardous waste

Federal Clean Air Act



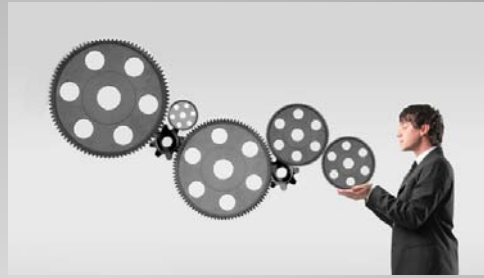
- Federal law designed to control air pollution on national level
- Requires US EPA to develop and enforce regulations to protect the public from airborne contaminants known to be hazardous to human health
- **1955: Air Pollution Control Act**
 - ❑ Funded research on scope and sources of air pollution
- **1963: Clean Air Act**
 - ❑ Research techniques for monitoring and controlling air pollution
- **1967: Air Quality Act:**
 - ❑ Authorized enforcement procedures involving interstate transport of pollutants
 - ❑ Expanded research activities

Federal Clean Air Act



- **1970 Clean Air Act (CAA) established:**
 - ❑ National Ambient Air Quality Standards
 - ❑ Requirements for State Implementation Plans to achieve them
 - ❑ New Source Performance Standards for new and modified stationary sources
 - ❑ National Emission Standards for Hazardous Air Pollutants
 - ❑ Increased enforcement authority
 - ❑ Authorized control of motor vehicle emissions
- **1990 Amendments to the 1970 CAA:**
 - ❑ Addressed acid rain, ozone depletion and toxic air pollution
 - ❑ Established national permit program for stationary sources
 - ❑ Established new auto gasoline reformulation requirements
- First major environmental law in US to include a provision for citizen suits (*a lawsuit by a private citizen to enforce a statute*)

Federal CAA Components



- Title I - Programs and Activities
- Title II – Emission Standards for Moving Sources
- Title III – General Provisions
- Title IV – Noise Pollution (*predates CAA*)
- Title IV-A -Acid Deposition Control
- Title V – Permits
- Title VI – Stratospheric Ozone Protection

General Planning Requirements



- U.S. EPA sets National Ambient Air Quality Standards (NAAQS) for “Criteria” Pollutants
 - ❑ Ozone
 - ❑ Particulate Matter (PM10 and PM2.5)
 - ❑ Carbon Monoxide
 - ❑ Nitrogen Dioxide
 - ❑ Sulfur Dioxide
 - ❑ Lead
- Areas designated attainment or non-attainment (*CAA §172*)
- If non-attainment, state submits **State Implementation Plan (SIP)** to demonstrate how and when NAAQS will be achieved, maintained and enforced (*CAA §172(c)*)

Ozone Classifications



- U.S. EPA “classifies” areas of ozone nonattainment based on how much an area exceeds standard
 - ❑ Extreme
 - ❑ Severe-17
 - ❑ Severe-15
 - ❑ Serious
 - ❑ Moderate
 - ❑ Marginal
- Affects the required date of attainment
 - ❑ The higher the current exceedance, the more time given to attain, but stricter planning and compliance requirements

Type of Air Quality Standards

- Primary
 - ❑ Public health protection
 - ❑ Protecting the health of "sensitive" populations:
 - ✓ Asthmatics
 - ✓ Children
 - ✓ Elderly
- Secondary
 - ❑ Public welfare protection
 - ❑ Protection against decreased visibility and damage to:
 - ✓ Animals
 - ✓ Crops
 - ✓ Vegetation
 - ✓ Buildings



Key Pollutants

- Ozone (summer smog)

- ❑ Building Blocks

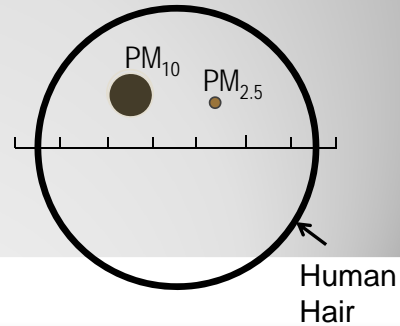
- ✓ VOC, NO_x



- Fine Particles (PM_{2.5})

- ❑ Building Blocks

- ✓ SO_x, PM_{2.5}, NO_x, VOC, Ammonia



California Clean Air Act



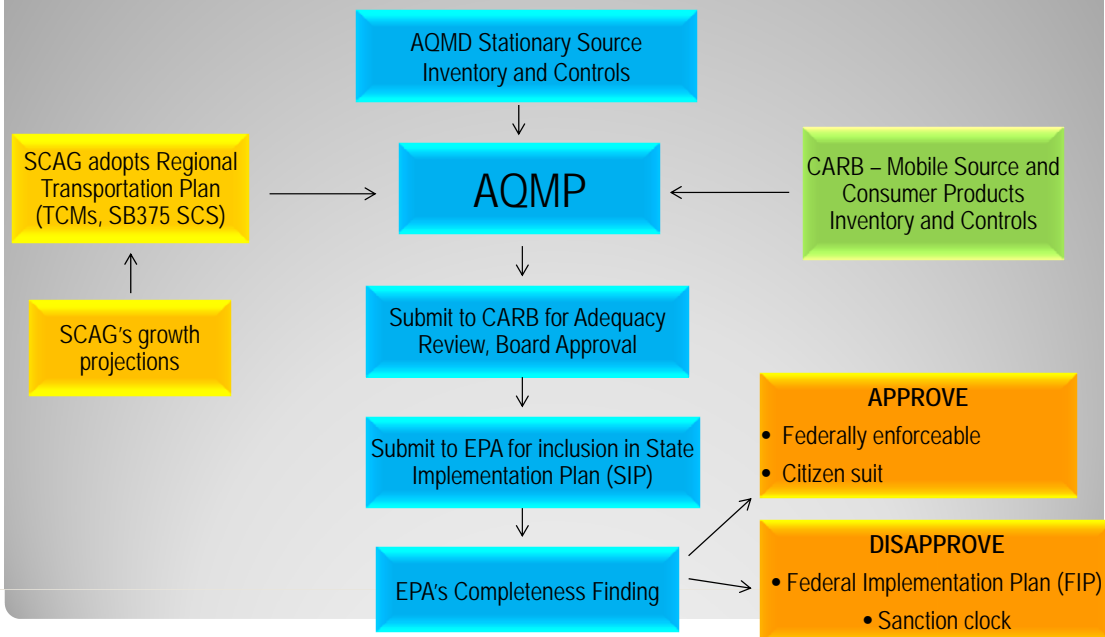
- State law requires adoption and enforcement of rules to achieve state and federal ambient air quality standards (*Health & Safety Code §40001*)
- Requires a Plan for attaining ozone standard every three years (*Health & Safety Code §40925*)
- Plan must demonstrate:
 - ❑ Overall effectiveness of the air quality program
 - ❑ Reduction nonattainment pollutants at a rate of 5% per year; or include all feasible measures and expeditious adoption schedule
 - ❑ Reduction in population exposure to severe nonattainment pollutants according to a prescribed schedule
 - ❑ Rank control measure by cost-effectiveness

Air Quality Management Plan

- California Health & Safety Code requires AQMP since 1979
- Blueprint for how to meet and maintain state and federal air quality standards
- SIP for South Coast
- The 2016 AQMP will be SCAQMD's 11th Plan



AQMP Development



Key Federal and State Clean Air Act Requirements for the AQMP



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Health Effects Report

- Required by California Health & Safety Code §40471
- Content
 - ❑ Criteria pollutants
 - ✓ Ozone, PM, CO, NO₂, SO₂, sulfates, lead
 - ❑ Toxic air contaminants
 - ❑ Overview of health effects
 - ❑ Rely on EPA and CARB reviews and assessments

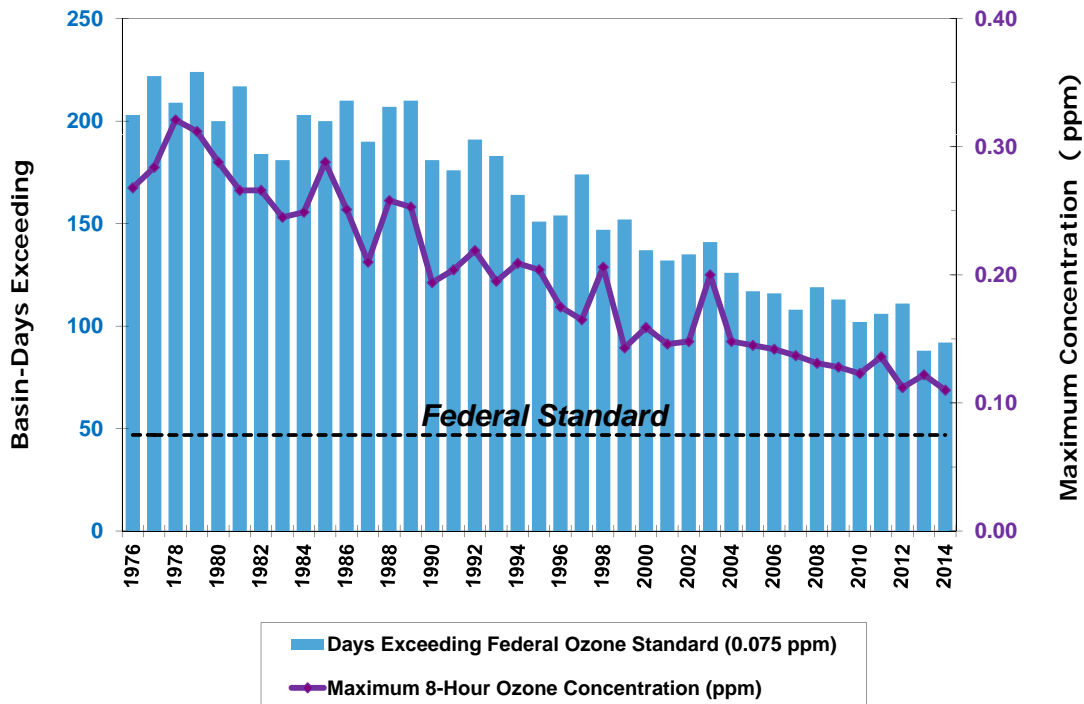


Emission Inventory



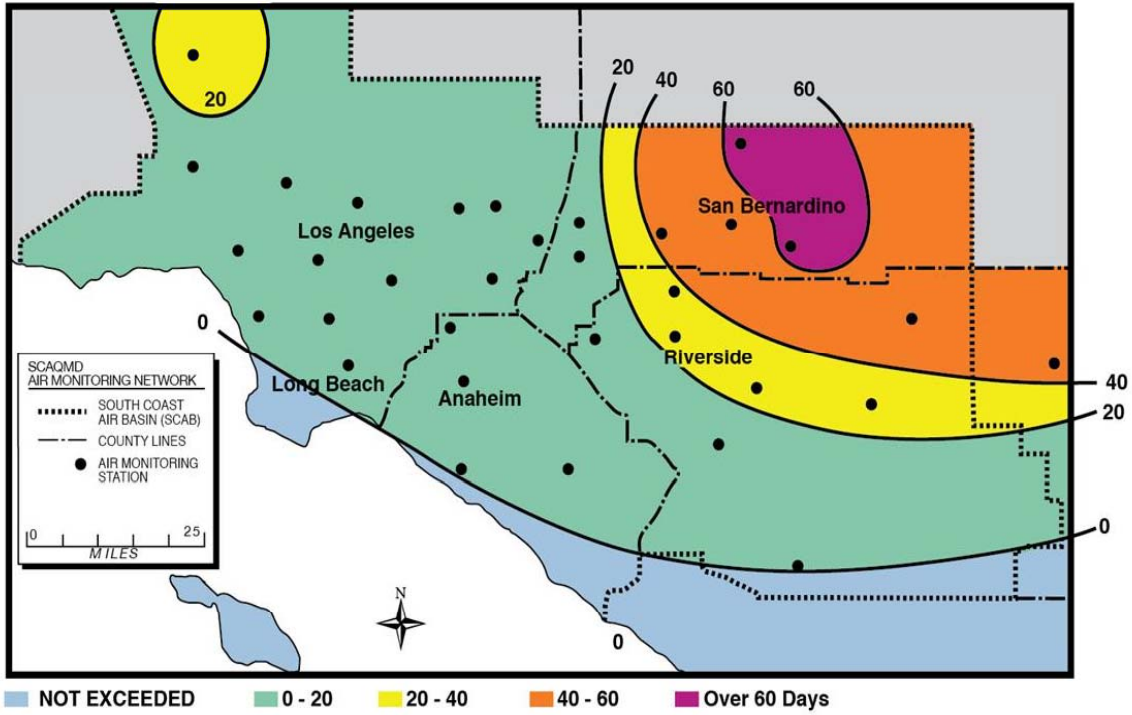
- Emission inventories of criteria pollutants and precursors (e.g., SO_x, NO_x, VOC, ammonia)
- For PM_{2.5}, “direct” (sum of filterable and condensable)
- Point, area and mobile sources
- Inventories for nonattainment areas
 - ❑ Base year and projected attainment year
 - ❑ Reasonable further progress (RFP)
 - ❑ Motor vehicle emissions
 - ❑ Attainment demonstration modeling (spatial, temporal)
- EPA approved inventories provided in 2012 AQMP

South Coast Air Basin Ozone Trend



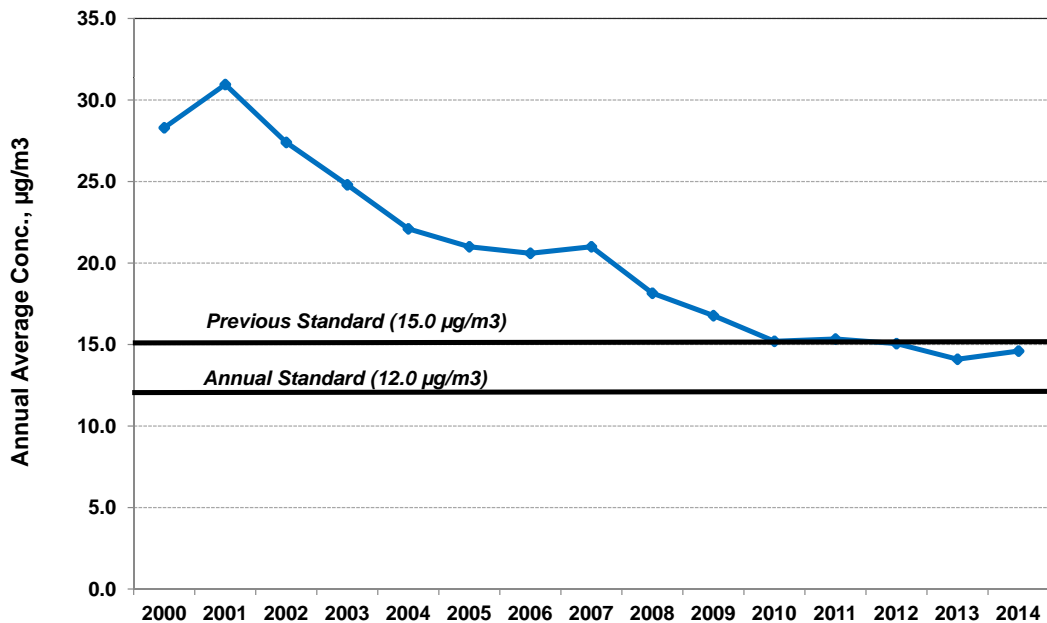
OZONE – 2013

Number of Days Exceeding the Federal Standard
(8-hour average > 0.075 ppm)

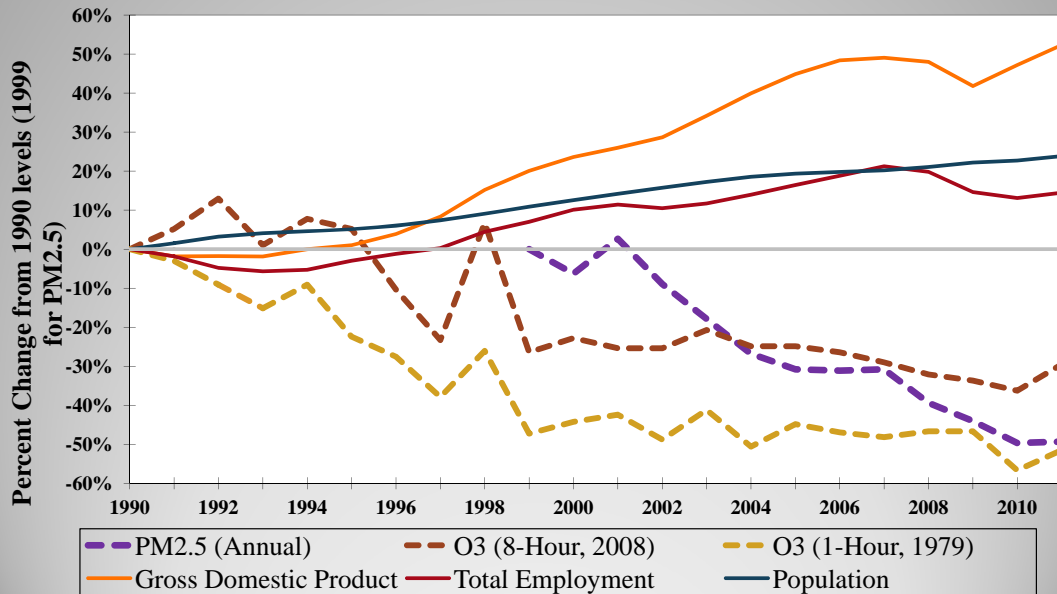


PM2.5 Air Quality, 2000-2014

Annual Arithmetic Mean (AAM), $\mu\text{g}/\text{m}^3$



Air Quality Progress/Demographics

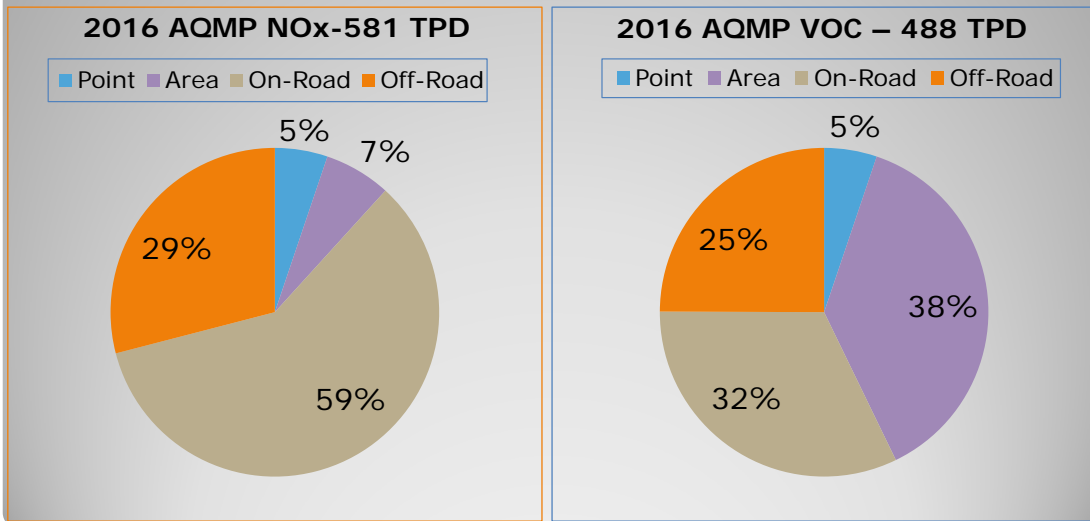


2012 and (2023) Annual Average Emissions

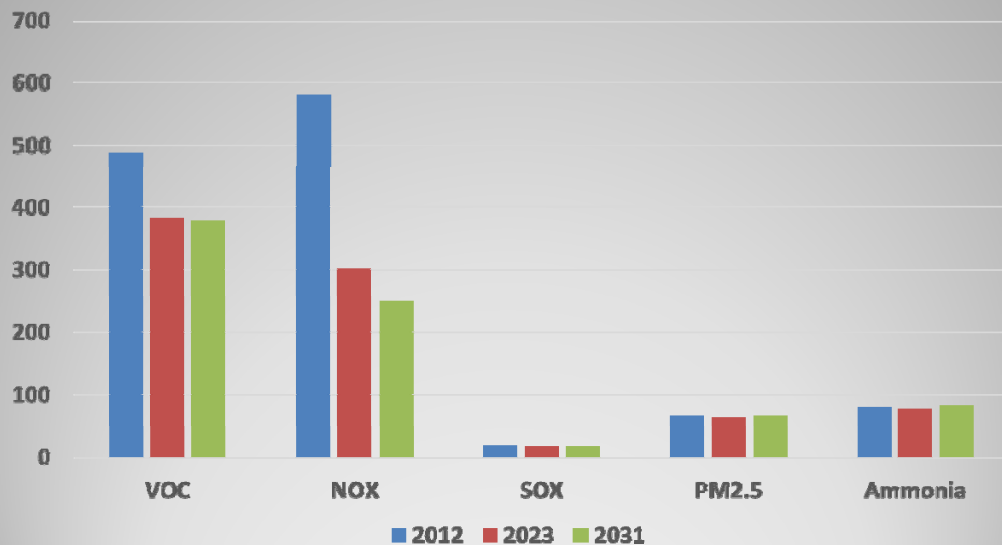
| | VOC (TPD) | NOX (TPD) | SOX (TPD) | PM2.5 (TPD) | Ammonia (TPD) |
|--------------|----------------------------|----------------------------|--------------------------|--------------------------|--------------------------|
| Point | 25 (30) | 27 (33) | 9 (9) | 8 (9) | 9 (11) |
| Area | 198 (210) | 45 (38) | 1 (2) | 35 (39) | 54 (54) |
| On-Road | 165 (69) | 353 (115) | 2 (2) | 15 (10) | 17 (13) |
| Off-Road | 100 (69) | 156 (101) | 6 (3) | 8 (5) | 0 (0) |
| Total | 488 (378) | 581 (287) | 19 (16) | 66 (63) | 80 (78) |

As of June 9, 2015

2012 Base Year Emissions by Major Source Categories



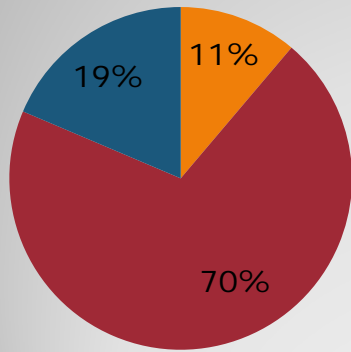
Projected Annual Average Baseline Emissions (TPD)



2012 Base Year Emissions by Responsible Agency

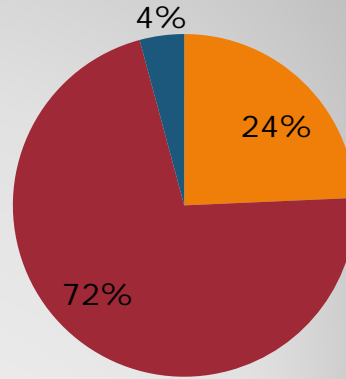
2016 AQMP NO_x-581 TPD

SCAQMD CARB U.S. EPA



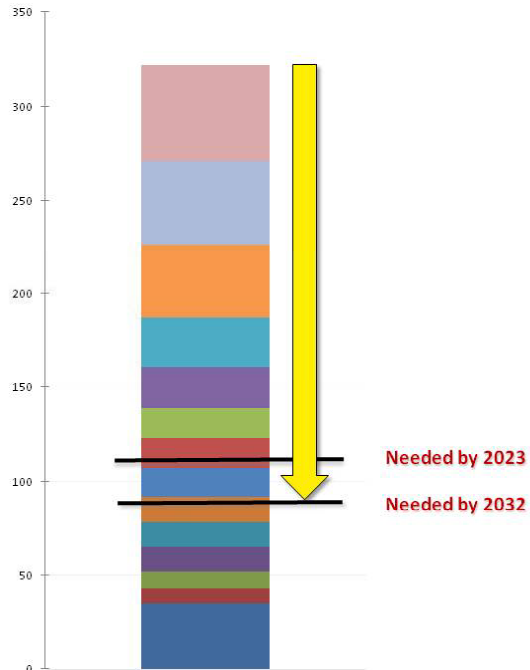
2016 AQMP VOC-488 TPD

SCAQMD CARB U.S. EPA



NO_x Sources – 2023 Emissions (tons per day)

- HD Diesel Trucks
- Offroad Equipment
- Ships & Commercial Boats
- RECLAIM
- Locomotives
- Aircraft
- Residential Fuel Combustion
- Heavy-Duty Gasoline Trucks
- Passenger Cars
- Med. Duty Gasoline Vehicles
- Light Duty Trucks & SUVs
- Manufacturing & Industrial
- Service & Commercial
- Other



* Source: Ambient ozone modeling conducted by SCAQMD, 2012; final data

RACM and RACT



- **Reasonably Available Control Measures (RACM):**
 - ❑ Clean air measures that are technologically and economically feasible
 - ❑ Applicable to wide range of sources (*stationary, area, mobile*)
 - ❑ Include all RACT
- **Reasonably Available Control Technology (RACT)**
 - ❑ “Lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economical feasibility” (*44 Federal Register §53762, 1979*)
- U.S. EPA recommends nonattainment areas to:
 - ❑ Consider all candidate measures that are available and feasible
 - ❑ Consider measures that would advance the attainment date
 - ❑ Include suggested measures; however not obligated to adopt all
 - ❑ Demonstrate no additional reasonable measures available
 - ❑ Include adopted regulations in RACT SIPs (e.g., emission reduction programs already implemented at the federal, other states and local air districts)

Control Strategy

- Based on standard to be achieved and target pollutant
- **Ozone (VOC and NOx)**
 - ❑ VOC sources
 - ✓ Coatings and solvents
 - ✓ Consumer products
 - ✓ Fugitive VOC from industrial process (*e.g., petroleum operations*)
 - ❑ NOx sources
 - ✓ Vehicles, trucks
 - ✓ Off-road equipment
 - ✓ Combustion equipment
 - Boilers, heaters, burners



Control Strategy

- **Particulate Matter (*PM10 and PM2.5*)**
 - ❑ Fugitive dust sources
 - ✓ Stone cutting and polishing
 - ✓ Entrained road dust
 - ❑ Cooking operations (*e.g., restaurants*)
 - ❑ Industrial combustion operations
 - ❑ Precursors to PM such ammonia
 - ✓ Livestock waste
 - ✓ Feed additives
 - ✓ Fertilizers
- **All Pollutants (*co-benefits*)**
 - ❑ Indirect sources
 - ❑ Energy/climate change programs



Control Strategy Symposium



- ~100 attended in person; over 200 via webcast
- Panels discussed and concluded importance of efficiency improvements, funding and incentives, early deployment of zero- and near-zero technologies, co-benefits approaches, as well as regulatory actions
- Agenda, presentations and biographies available online (<http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=2016-aqmp-control-strategy-symposium-june-10-11-2015>)
- Webcast being compiled for archive on website; currently available on YouTube
- Exhibit Hall displayed or discussed variety of new clean technologies
 - ❑ UV and enamel coatings
 - ❑ Ceramic filter systems
 - ❑ New co-generation technology and after-treatment systems for engines
 - ❑ Kitchen ventilation hoods
 - ❑ Landscape maintenance equipment
 - ❑ Zero emission buses and taxis

The Mobile Source Technologies Needed for Attainment are Ready!

- Electric passenger vehicles
- Electric/Hybrid medium-duty trucks
 - ❑ Fed-Ex, UPS, Frito-Lay, EVI
- Heavy-duty electric trucks being demonstrated
 - ❑ Class 7-8 trucks
 - ❑ Challenges – range, cost, infrastructure
- Zero-emission corridors
 - ❑ Wayside power using overhead catenary
- Next generation heavy-duty trucks (90% lower NO_x)



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Critical Actions for U.S. EPA and CARB

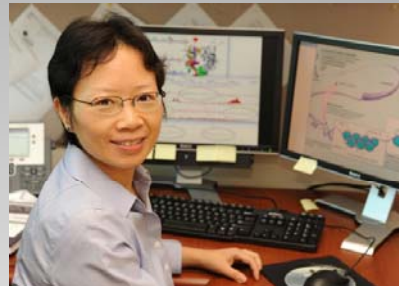
- **On-Road Heavy-Duty Engines/Trucks**
 - ❑ 0.02 g/bhp-hr NO_x emission standard
 - ❑ Incentives/regulation for deployment
 - ❑ Zero-emission drayage trucks (*near-dock railyards*)
- **Ocean-Going Vessels**
 - ❑ Accelerate deployment of Tier 3
- **Locomotives**
 - ❑ Tier 4 or Cleaner
- **Requirements/Incentive for Renewable Fuels**
- **Legislation to Provide Long-Term Funding**
- **Coordination/Partnerships Among Agencies**

Transportation Control Measures



- Transportation Conformity
 - ❑ Ensure highway and transit projects consistent with SIP
 - ❑ Projects do not cause AQ violations or delay attainment
 - ❑ Test that motor vehicle budgets are adequate
 - ❑ Consider PM_{2.5} exhaust emissions, entrained road dust and construction-related fugitive dust
- Transportation Control Measures (TCMs)
 - ❑ Applicable to ozone extreme and severe nonattainment areas
 - ❑ To offset emissions attributable to growth in VMT

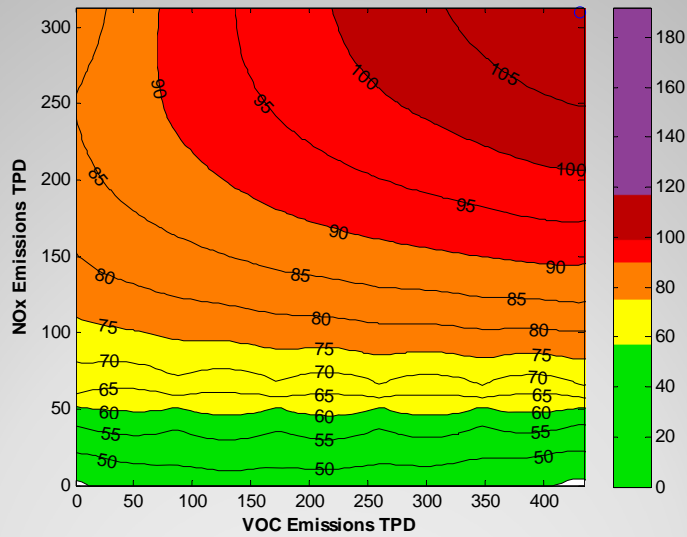
Attainment Demonstration and Modeling



- Demonstrate area will attain NAAQS “as expeditiously as practicable”
- No later than 5 years from effective date of the area designation
- Demonstration shall consist of:
 - ❑ Technical analysis that locate, identify and quantify sources of emissions
 - ❑ Analysis of future year emissions reductions from adopted and proposed control measures
 - ❑ Schedule of implementation of proposed emission reduction measures
 - ❑ Analysis supporting proposed attainment date by performing detailed modeling analysis

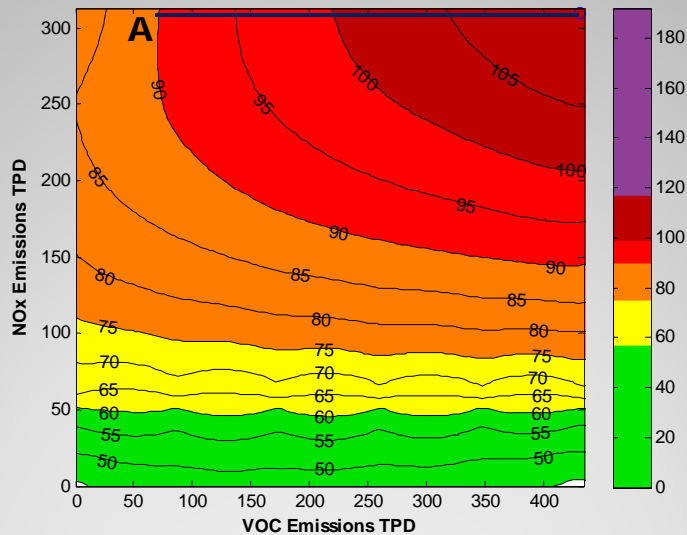
O3 Attainment Plans: Carrying Capacity Plot for Crestline

8 hour Ozone at CRES

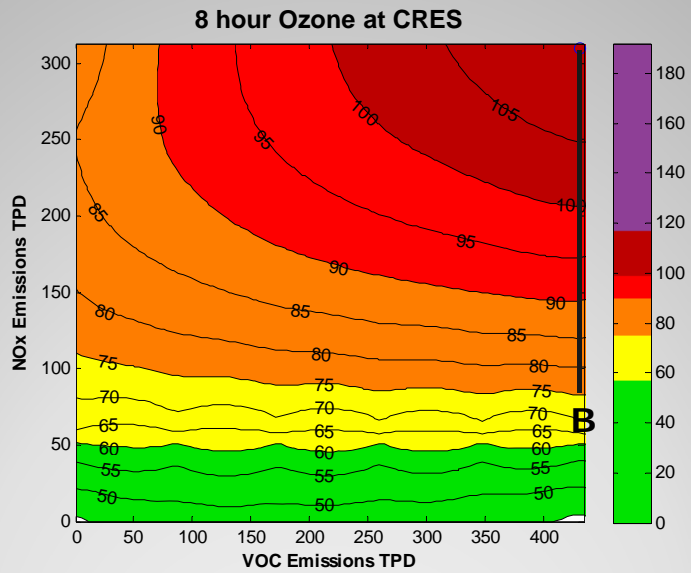


VOC-only Control Strategy

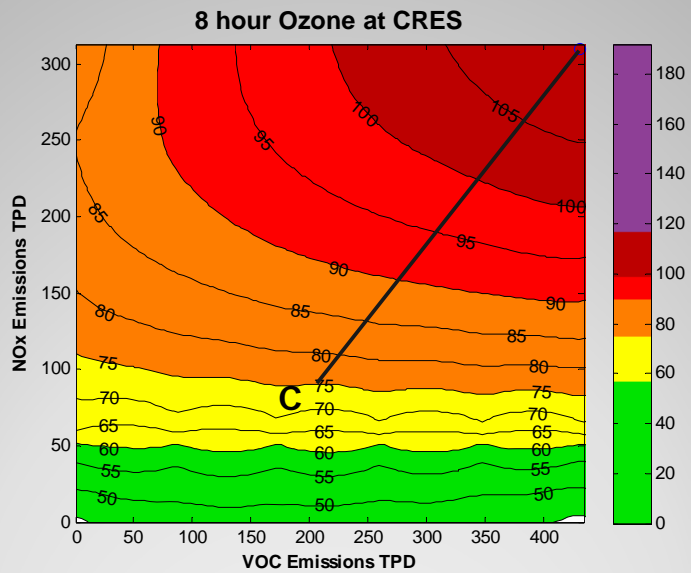
8 hour Ozone at CRES



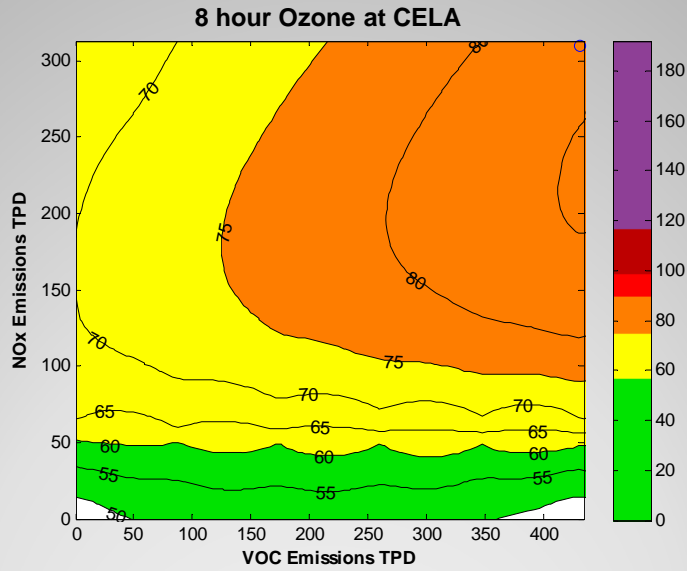
NOx-only Control Strategy



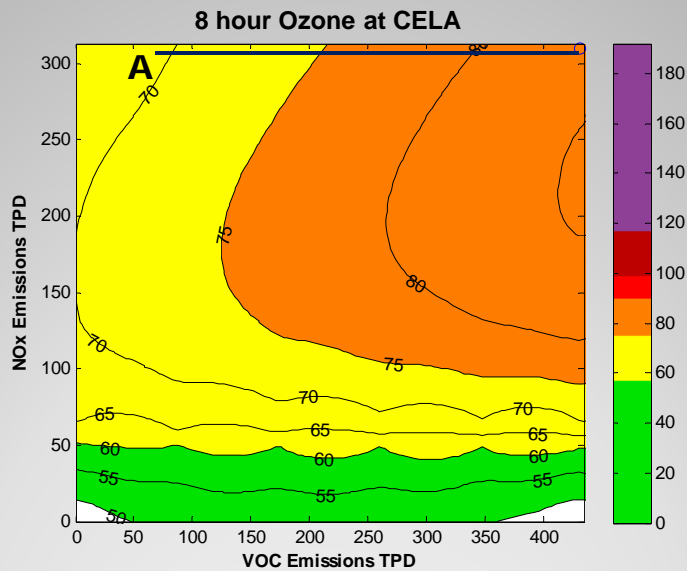
Combined Control Strategy



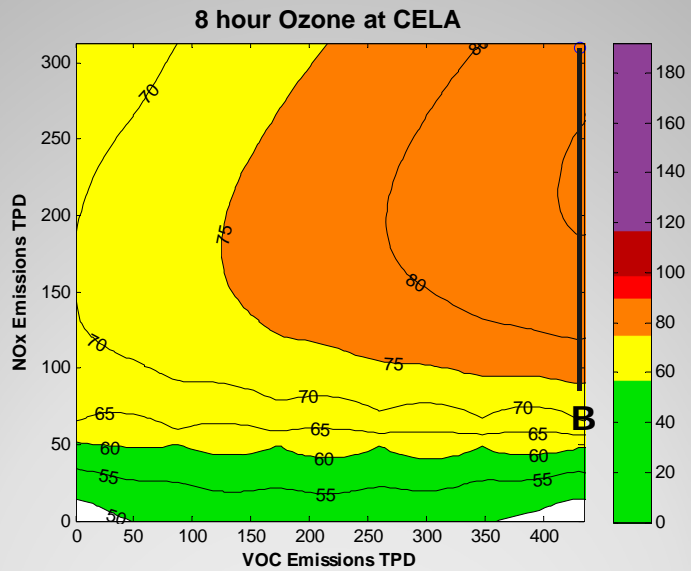
Carrying Capacity at Central LA



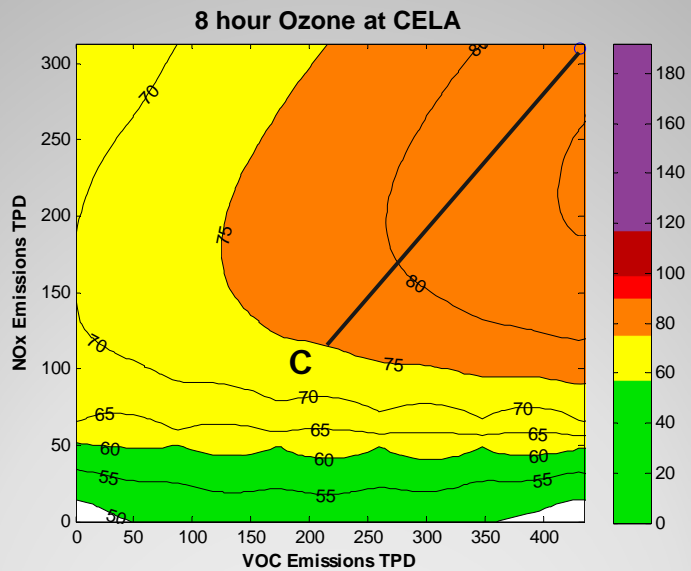
VOC-only Control Strategy



NOx-only Control Strategy

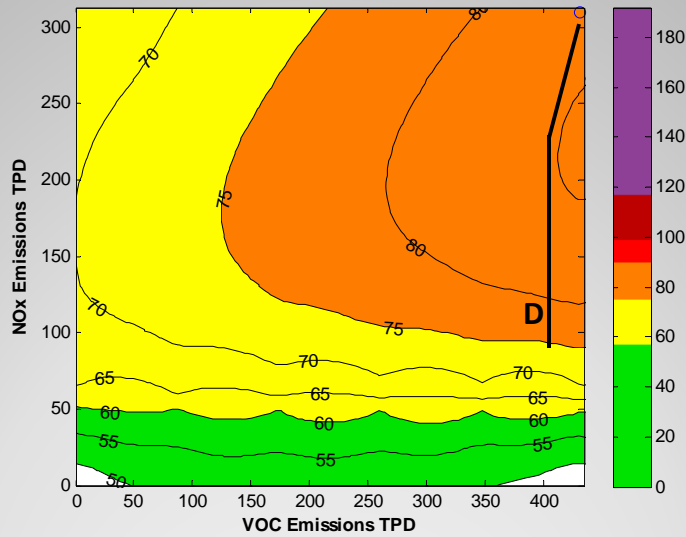


Combined Control Strategy



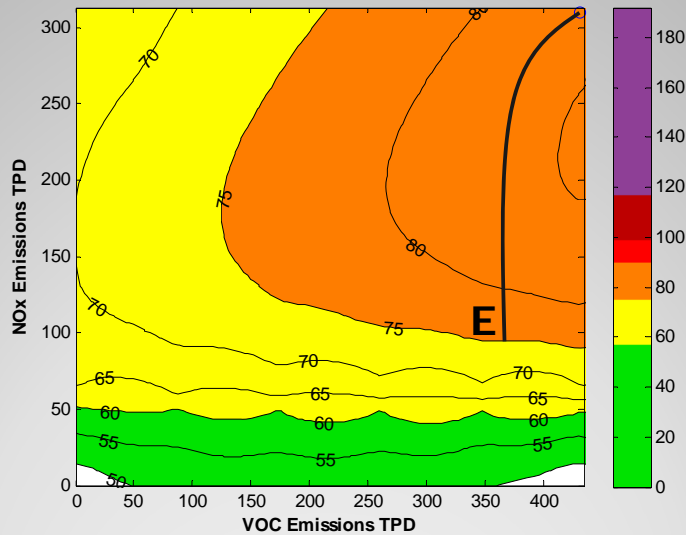
Avoid Potential Ozone Increase Above 1997 Standard (80 ppb)

8 hour Ozone at CELA



Eliminate Potential Ozone Increase

8 hour Ozone at CELA



Reasonable Further Progress



- Demonstrate progress towards attainment through emission reductions phased in from SIP submission until attainment date
- Ensures sufficient emission reductions in each nonattainment area
- Goal is to achieve generally linear progress toward attainment
- Show ongoing annual incremental reductions achieving targets in interim milestone years
- Submittal of RFP required if attainment date is more than 5 years from effective date of designation

New Source Review (NSR)



- Requires “lowest achievable emission rate” for federal major sources
- Requires “Best Available Control Technology” (BACT) for major sources
- In SCAQMD, subject to existing approved NSR (Regulation XIII) and RECLAIM (Regulation XX) programs

Contingency Measures



- Additional control measures to be implemented if area fails to meet RFP milestones or attainment date
- Must be fully adopted and ready to implement
- Trigger mechanisms and schedule for implementation
- Already adopted measures, beyond those needed for attainment are acceptable
- Quantifiable; provide 1 years worth of reductions based on RFP

General Conformity



- General Conformity
 - ❑ Federal actions to conform with SIPs
 - ❑ Direct PM_{2.5} de minimis level -100 tons/year
 - ❑ Ozone (NO_x or VOC) de minimis level
 - ✓ 25 tons/year (severe nonattainment)
 - ✓ 10 tons/year (extreme nonattainment)

2016 AQMP



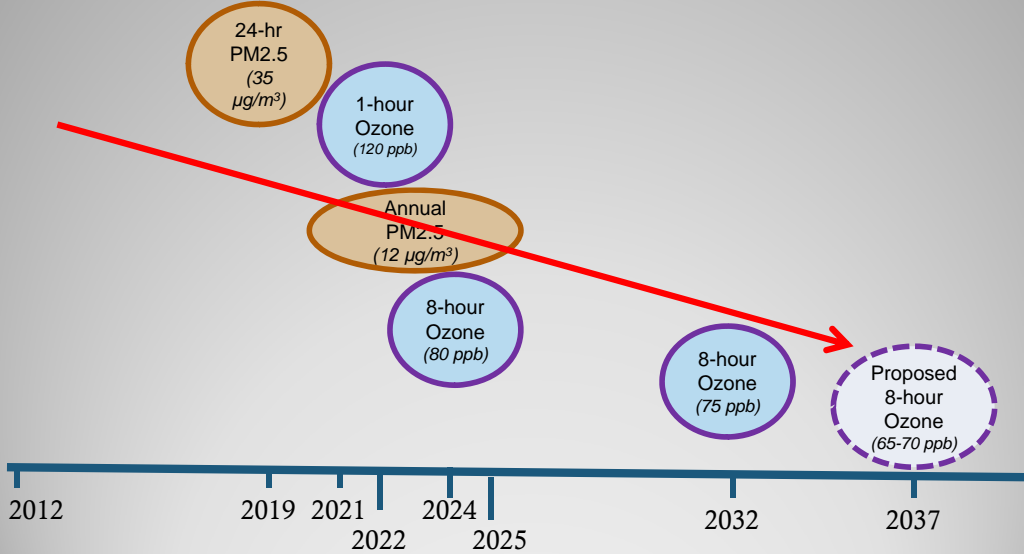
- **Attainment Demonstration**
 - ❑ 2008 8-hour ozone (75 ppb) SIP (*attain by 2032*)
 - ❑ 2012 annual PM_{2.5} standard (12 $\mu\text{g}/\text{m}^3$) SIP (*attain by 2021-2025*)
- **Additional Analysis**
 - ❑ Update to previous 1997 8-hour ozone (80 ppb) SIP (*reductions by 2023*)
 - ❑ Update to 1-hour ozone SIP (*reductions by 2022*)
 - ❑ Serious area 24-hour PM_{2.5} SIP (*reductions by 2019*)

Air Quality Standards to be Addressed

- 8-hour Ozone (75 ppb)
 - ❑ “Extreme” attainment year: 2032 (*demonstrate in 2031*)
- Annual PM_{2.5} (12 $\mu\text{g}/\text{m}^3$)
 - ❑ “Moderate” attainment year: 2021
 - ❑ “Serious” attainment year: 2025
- 8-hour Ozone (80 ppb)
 - ❑ “Extreme” attainment year: 2024 (*demonstrate in 2023*)
- 1-hour Ozone (120 ppb)
 - ❑ Attainment year: 2022
- 24-hour PM_{2.5} (35 $\mu\text{g}/\text{m}^3$)
 - ❑ “Serious” attainment year: 2019



Timeline for Meeting the Standards



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Conceptual Framework of the 2016 AQMP

1. **Eliminate** reliance on “**black box**” (*undefined future technologies*)
 - ❑ Define the pathway to attainment
2. Develop strategy with **fair-share** emission reduction commitments at federal, state, & local levels
 - ❑ New federal engine emission standards
 - ❑ Additional authority provided to the states
3. Significant **funding** for incentives
 - ❑ Early deployment of zero and near-zero technologies – *fleet turnover is critical*
 - ❑ GHG Reduction Funds – *current allocation for air quality too low*
 - ❑ **Smart investments in technologies that meet multiple objectives** - *air quality, climate, toxics, energy efficiency*

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Conceptual Framework of the 2016 AQMP

4. Select the **most efficient** and **cost-effective** path to achieve multi-pollutant and multi-deadline targets
5. Calculate and take credit for **co-benefits** from other planning efforts (*e.g.*, *GHG reduction targets, energy efficiency, transportation*)
6. Prioritize non-regulatory, innovative and “**win-win**” approaches for emission reductions
7. Account for international transport of emissions
8. Enhanced analysis of the economic impacts of the AQMP

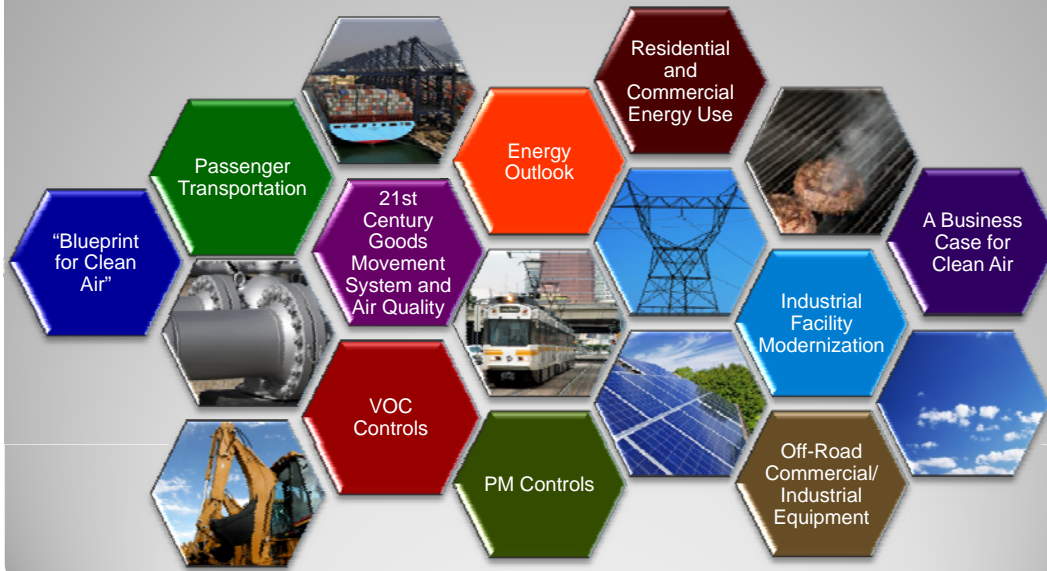
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2016 AQMP Advisory Group



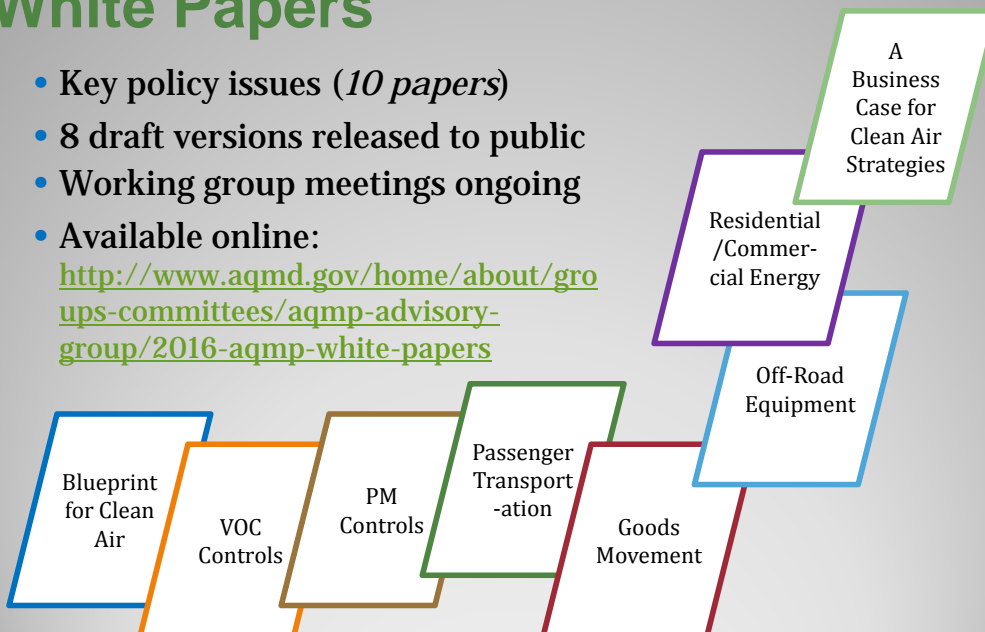
- Currently 56 members approved by Governing Board
 - ❑ Community/environmental groups (9): Air, Health, EJ
 - ❑ Business (26): Energy, Building/Real Estate, Shipping, Trucking, Railroads, Printing, Waste, Commerce, Petroleum
 - ❑ Academia (2): Public Health, Policy, Sustainable Communities
 - ❑ Government (19): Air, Public Health, Energy, Ports, Aviation, Sanitation, Local Cities

White Papers for 2016 AQMP



White Papers

- Key policy issues (*10 papers*)
- 8 draft versions released to public
- Working group meetings ongoing
- Available online:
<http://www.aqmd.gov/home/about/groups-committees/aqmp-advisory-group/2016-aqmp-white-papers>

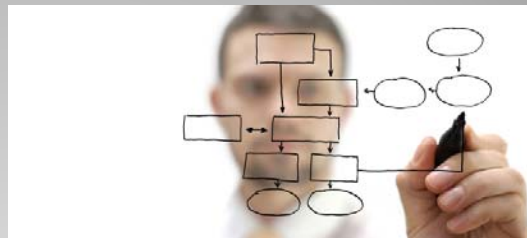


White Paper Contents



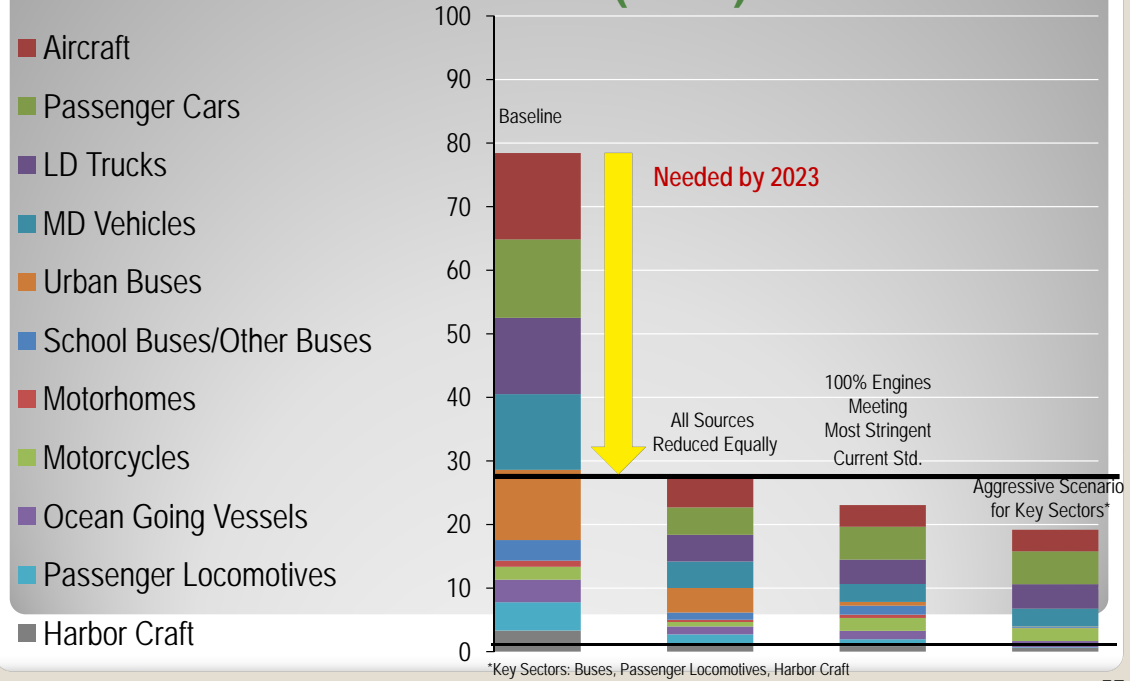
- General format:
 - ❑ Scientific discussion
 - ✓ Pollutant formation
 - ✓ Precursors
 - ✓ Trends
 - ❑ Paths to attainment: NO_x-heavy controls
 - ❑ Recommendations on future control strategies
 - ✓ Maximize co-benefits
 - ✓ Time and place controls
 - ✓ Outreach and incentives
 - ❑ Further studies

VOC and PM Controls - Integrated Path to Attainment

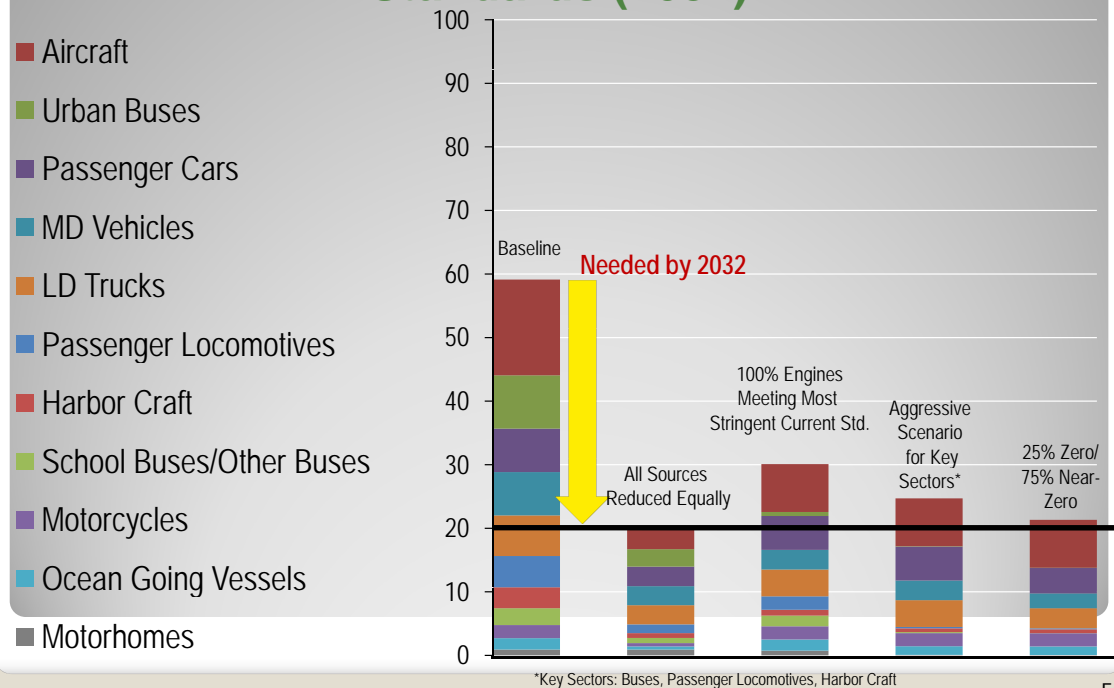


- Attainment paths for both ozone and PM_{2.5} call for heavy NO_x reductions augmented with limited, strategic VOC and PM_{2.5} controls

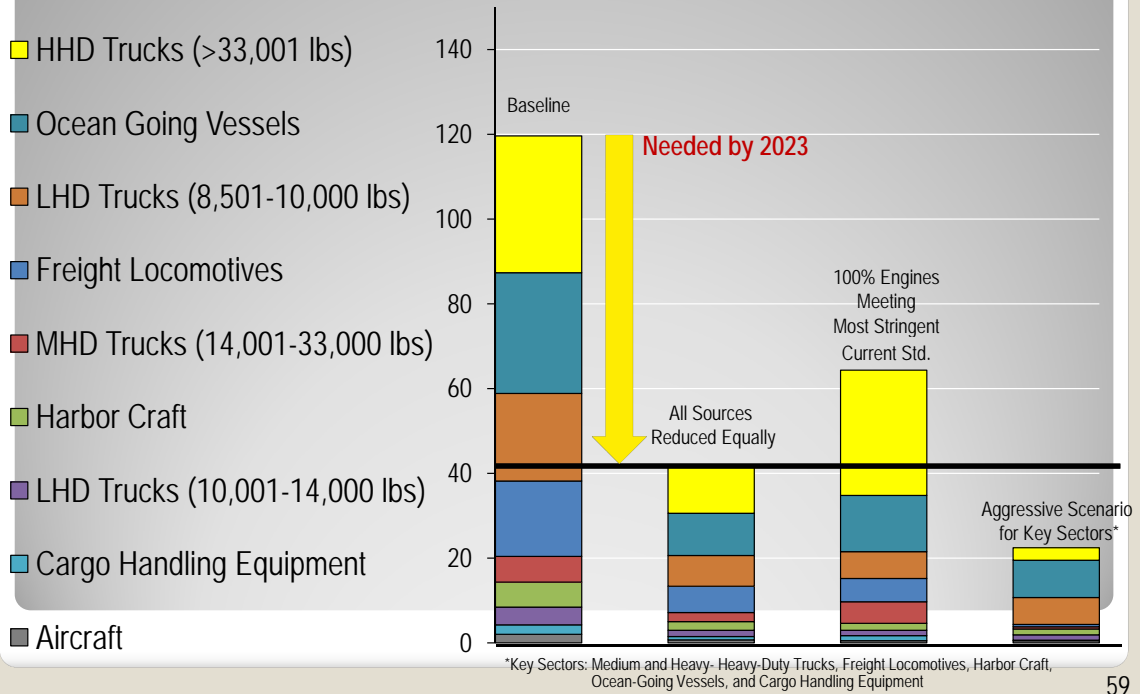
Passenger Transportation NOx Emission Reductions to Achieve 8-Hr Ozone Air Quality Standards (2023)



Passenger Transportation NOx Emission Reductions to Achieve 8-Hr Ozone Air Quality Standards (2032)

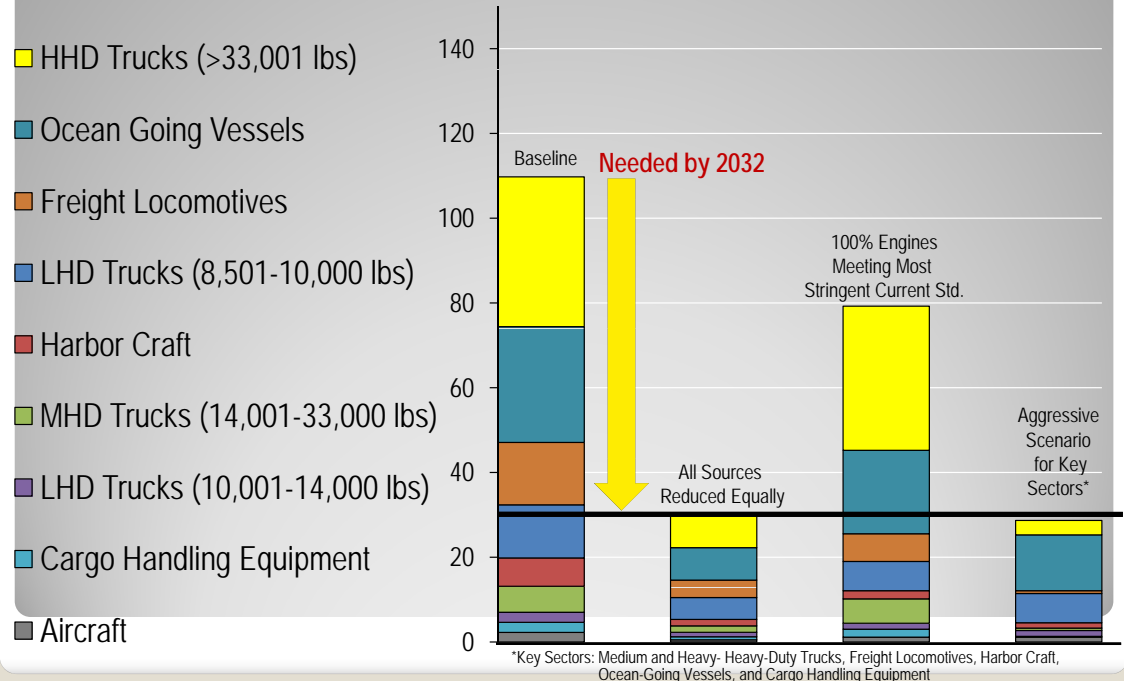


Goods Movement NOx Emission Reductions to Achieve 8-Hr Ozone Air Quality Standards (2023)



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Goods Movement NOx Emission Reductions to Achieve 8-Hr Ozone Air Quality Standards (2032)



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Off-Road Equipment

White Paper Key Recommendations

- Initiate and fund cleaner off-road engine RD&D programs
- Establish new cleaner off-road engine NOx standards as soon as possible
- Sustained incentive (monetary and non-monetary) programs
- Sustained public funding to maximize deployment of zero- and near-zero emissions technologies
- New mechanisms (regulations, monetary and non-monetary incentives) to increase deployment of zero- and near-zero technology
- Support use of renewable fuels
- Develop industry best practices

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Residential/Commercial

Energy Recommendations



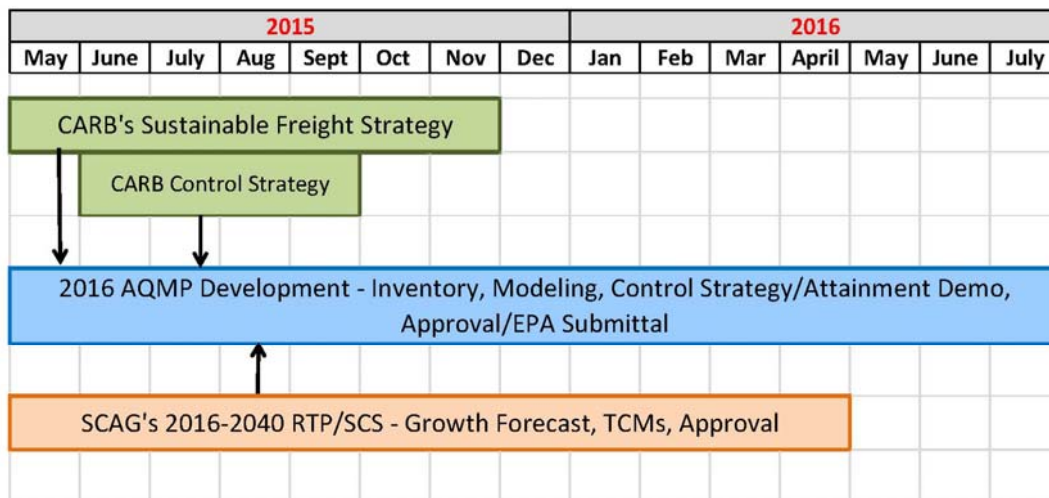
- Actions, planning efforts, programs, control strategies that SCAQMD might further pursue:
 - General, Electricity, Natural Gas
- Some Key Recommendations:
 - Quantification of emission reductions energy efficiency and distributed generation for SIP
 - Add emission reductions to appliance labels
 - Methodologies and best practices in moving towards net zero energy in existing buildings
 - Transparent utility rate structures (electricity)
 - Use energy efficiency as emission reduction tool in SCAQMD regulatory or incentive programs

“A Business Case” for Clean Air Strategies Overview



- What is a “business case” for clean air strategies?
 - When **Economic Benefits** offset **Compliance Costs**
 - ❑ Improvements in energy efficiency
 - ❑ Reducing fuel or maintenance costs
 - ❑ Creating new job opportunities
 - ❑ Other cases of “win-win”
- Business cases do not exist in all situations
- Goal: maximize business case strategies within attainment plan
- White paper includes:
 - ❑ Five industry case studies
 - ❑ Stakeholder comments & examples
 - ❑ Beyond subsidies: incentivize business clean air actions

2016 AQMP Development and Approval Schedule



Public Process



- AQMP Advisory Group
 - ❑ Advise in the development of the AQMP
 - ❑ Meet monthly into 2016
- Focus Working Groups
 - ❑ White paper development
 - ❑ Control strategy development
- Community/Environmental Justice Outreach
- Legally required regional workshops

Ongoing Activities



- White paper working groups
 - ❑ Release draft versions of remaining 2 white papers
- Monthly AQMP Advisory Group meetings
 - ❑ Meeting information and presentations available online at <http://www.aqmd.gov/home/about/groups-committees/aqmp-advisory-group>
- Working with CARB on control strategy development
- Working with SCAG staff on demographics, growth factors and transportation control measures