History and Control of Air Pollution in Los Angeles

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It all started in the 1940’s . . .
South Coast Air Quality Management District

- Formed to Improve Air Quality in broader Los Angeles (South Coast Air Basin)
- 27,500 km²
- ~ 17 million residents
- 12 + million vehicles
- 27,000 + stationary sources
- Largest manufacturing base in U.S.
- 10th Largest economy in the world
Southern California Air Quality

- Historically, the Worst in the Nation
- Long History of Air Pollution Control Program
- Continued Improvements Over Last 50 Years
Since 1950s

- Population -
  - 4.8 Million
  - 16.5 Million
- Vehicles -
  - 2.3 Million
  - 12 Million
- Manufacturing
  - $10.5 Billion
  - $203.8 Billion
- Peak Ozone Levels
  - 0.68 ppm
  - 0.18 ppm
What Are the Health Consequences? Annually in South Coast Basin

- >6,500 premature deaths
- 4,100 hospital admissions
- 100,000 asthma cases & other respiratory symptoms
- 8,400 cases acute bronchitis
- 660,000 lost workdays
- 5,200,000 restricted activity days

Source: CARB. Based on 2004-06 monitored concentrations.
High Cost of Health

$10 Billion
Pollutants of Concern

- Federal/State Standards Established for:
  - Ozone Smog
  - PM2.5
    - Annual Average
    - 24-hour Average

- Also of Concern
  - Air Toxics (carcinogens)
  - Ultrafine Particulates
  - Greenhouse Gases
Improving Air Quality
Key Challenges

• Topography
• Climate
• Expanding Economy
• Population Growth
Know Your Pollutants
Pollutant Chemistry &
Sources of Emissions
Major Contributors to Ozone

Sources of NOx and Hydrocarbons (VOCs)
Top Sources of NOx Pollution by 2014
Top Sources of VOC Emissions by 2014

- Consumer Products: 107 tons per day
- Light-Duty Passenger Cars: 78 tons per day
- Light-Duty Trucks: 54 tons per day
- Off-Road Equipment: 45 tons per day
- Recreational Boats: 44 tons per day
- Petroleum Marketing: 28 tons per day
- Architectural Coatings: 24 tons per day
- Off-Road Recreational: 23 tons per day
- Heavy-Duty Truck: 22 tons per day
- Coatings & Related Processes: 22 tons per day
What is PM10, PM2.5 and Ultrafines?

Particulate Matter with an aerodynamic diameter less than 10, 2.5, or .1 microns, respectively.
PM$_{2.5}$ Component Species Basin 2005 Annual Average

- Nitrate, 30%
- Organic Carbon, 28%
- Sulfate, 12%
- Ammonium, 11%
- Na & Cl, 2%
- Metals, 10%
- Elemental Carbon, 7%
Air Quality Management Plan (AQMP) Purpose

- Road Map to Clean Air
- Developed and Regularly Revised since 1979
- Meet Federal/State Requirements
- Multi-agency Collaborative Effort
- Set Framework for Future Rules
AQMP

• Comprehensive Document
• Integrates Input From:
  - 34-station Monitoring Network
  - Detailed Emission Inventory
  - Sophisticated Air Quality Modeling Tools
  - Other Regional Planning Efforts
    - Transportation & Goods Movement
    - State/Federal Mobile Source Strategies
    - Effort by Ports
AQMP Development

• Open/Transparent Process

• Seeks Input from Public/Stakeholders
  – Advisory Groups
  – Workshops

• Identify Optimal Control Strategy
  – Maximize Air Quality Benefit
  – Minimize Costs/Socioeconomic Impacts

• Identify Control Measures
  – Short, Intermediate – Term (rely on current technologies)
  – Long-Term Measures (require technological breakthroughs)
AQMP Catalyzed Many Technological Innovations
Some Examples

- Automotive Catalytic Converter
- Reformulated Gasoline
- Hybrid/Fuel Cell / Electric Vehicles
- Water Based and Ultra low Polluting Paints/ Solvents
South Coast Air Basin
Demographic Projections and Ozone Air Quality Trend

YEAR

0%
20%
40%
60%
80%
100%
120%
140%
160%
180%
1980
1985
1990
1995
2000
2005
2010
2015
2020

Percent Increase in Population and Activities

O3 8-Hour Design Value (ppb)

Design Value (ppb)

0
50
100
150
200
250
300

0% 20% 40% 60% 80% 100% 120% 140% 160% 180%


YEAR

O3 8-Hour Design Value
Population
VMT
Housing Units

AQMD

20
South Coast Air Basin
Days Exceeding Federal Ozone Standards 1976-2011

Baseline - Days Exceeding Former 1-Hour Federal Ozone Standard
Former (1997) 8-Hour Federal Ozone Standard (0.08 ppm)
Current (2008) 8-Hour Federal Ozone Standard (0.075 ppm)
South Coast Air Basin
Annual Average PM$_{2.5}$ Trend

Percentage of Federal Standard

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South Coast Air Basin
24-Hour PM2.5 Trend

Basin-Days Exceeding Federal Standard
Benefits Far Outweigh Costs

COSTS

$2.3 Billion / Yr

BENEFITS

$14.6 Billion / Yr
Conclusions

- Air Pollution Control Efforts in broader Los Angeles (Southern California)
  - Improved air quality dramatically
  - Produced many technological breakthroughs
  - Can co-exist with expanding economy
  - Benefits far outweigh costs
  - Road map for other large Metropolitan areas

- Strong emphasis on zero/near zero-emission technologies needed in the future to meet the Clean Air goal
Our Decisions Today Will Shape Their Future

Thank You – Any Questions?

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