BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Integrating GHGs in the Bay Area 2010 Clean Air Plan

David Burch
Principal Planner
November 16, 2011

Bay Area AQMD

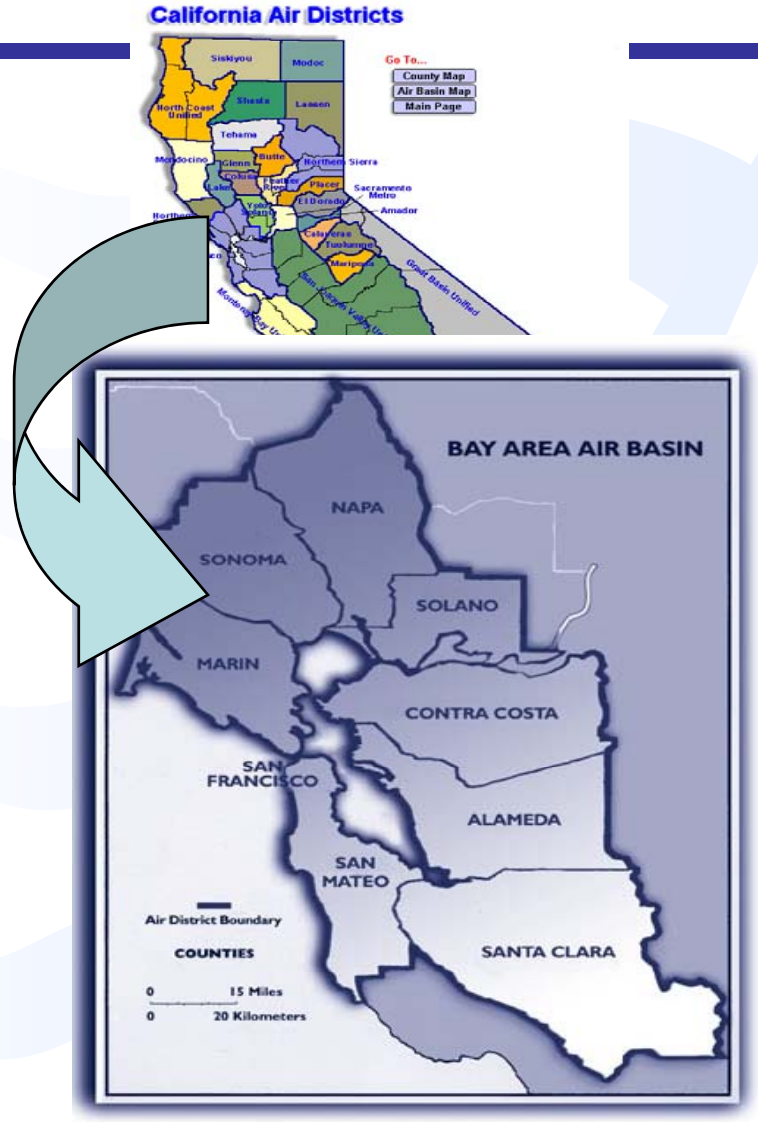
Protect AQ & public health in SF Bay Area

Governing Board:
- 22 local elected officials

Large, complex region:
- 9 counties / 101 cities
- > 7 million people
- > 5 million vehicles

Regulate stationary sources

Mobile sources (motor vehicles) are largest source of emissions



Bay Area AQMD Climate Program

- Board adopted climate protection policy: 2005
- Integrate climate into all core programs
- Bay Area regional GHG inventory
- Two major climate summits: 2006 & 2009
- Support for local climate action plans
- Climate grant program: funded 50+ projects
- GHG cost-recovery fee on stationary sources
- GHG thresholds in CEQA guidelines (June 2010)

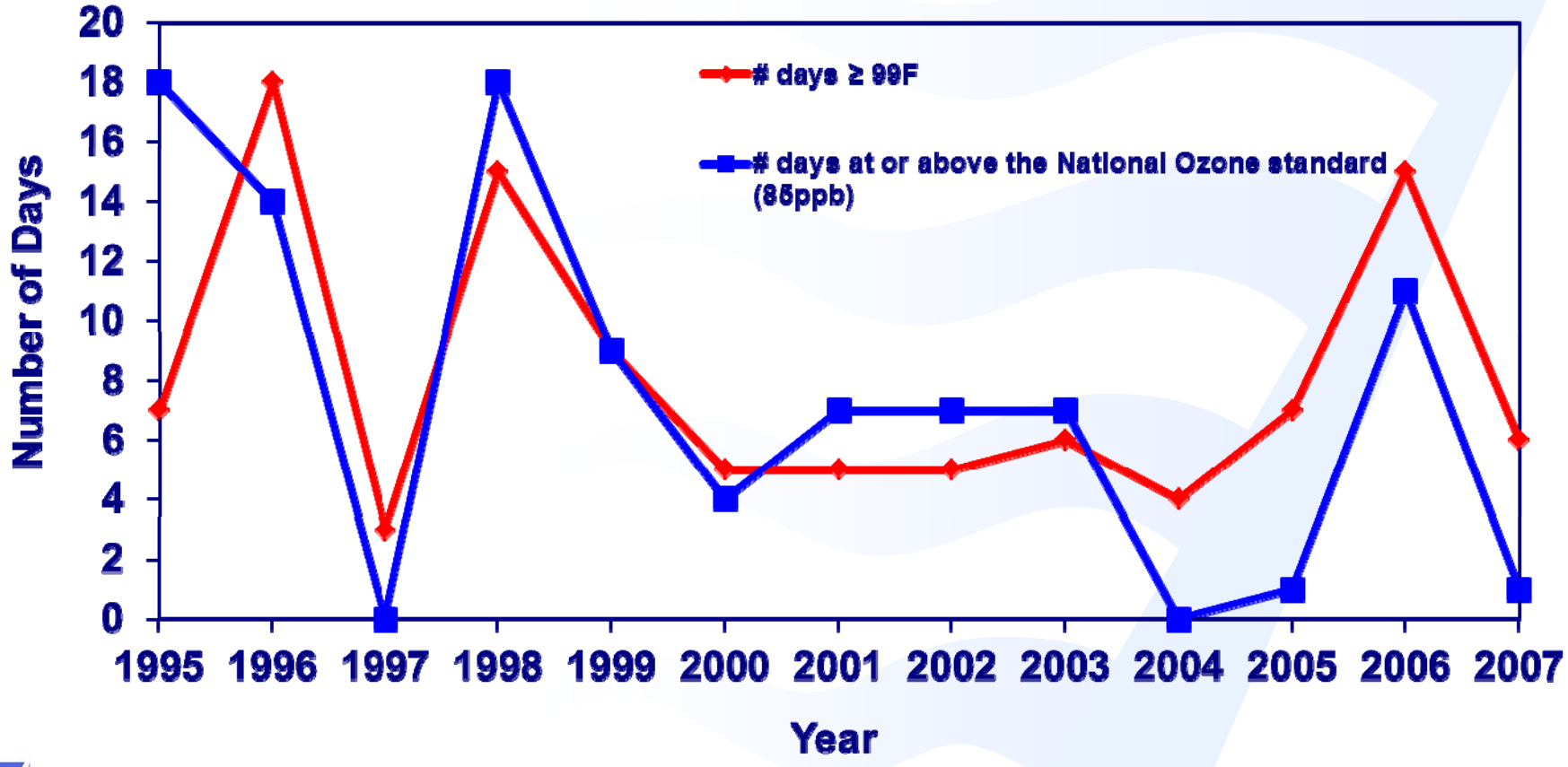
Climate & Air Quality

Climate change may impact air quality by:

- More frequent & severe heat waves
- Longer ozone season
- Increased emissions of ozone precursors (VOCs)
  - trees & vegetation (biogenic sources)
  - evaporative emissions from gas tanks
- Changes in meteorology:
  - wind patterns, humidity, mixing, etc.

Climate change could reverse decades of AQ progress

More heat → higher ozone



AQ Planning Challenges

- Limited authority & resources
- Low-hanging fruit is gone
- Future population & economic growth
- More stringent AQ standards expected

One potential solution:

More effective planning → more bang for the buck

New Directions in AQ Planning

Traditional AQ planning: Single-Pollutant

- One pollutant per plan; focus on attaining AQ stds

New concept: Multi-Pollutant (MP) Planning:

- Holistic, outcomes-based approach to protect:
  - public health
  - climate
  - ecosystems
- No requirements or guidelines for MP plans
- BAAQMD chose to pursue MP approach in updating its state ozone plan → 2010 Clean Air Plan

Key Objectives of 2010 Plan

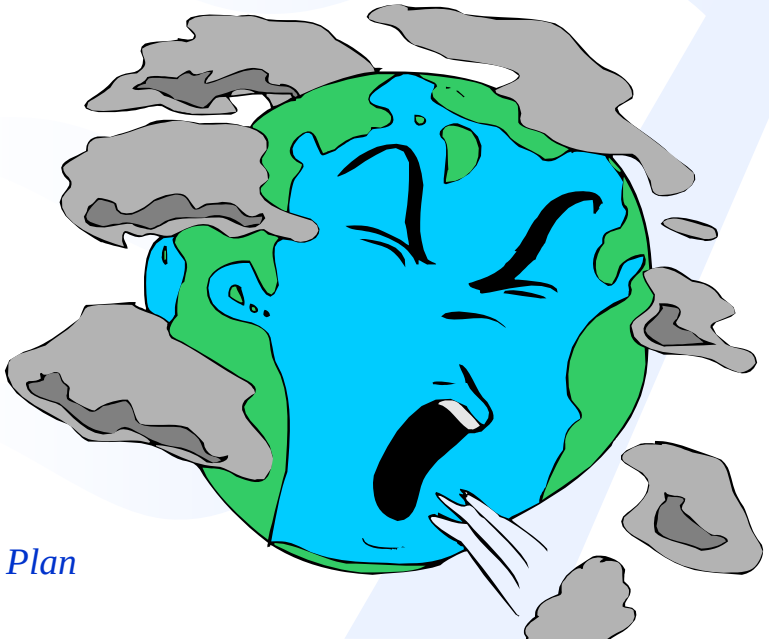
- Attain AQ standards

- Protect public health

- Protect the climate

Pollutants in 2010 Plan

- Ozone & its precursors: VOCs & NOx
- Particulate matter (PM) & its precursors:
  - VOCs, NOx, SOx, NH3 (ammonia)
- Key air toxics: e.g. diesel PM, benzene
- "Kyoto 6" GHGs
  - CO_2
  - Methane
  - NO_2, HFCs, PFCs, SF_6



Rationale for MP Planning

- Pollutants share common emission sources
- Pollutants & precursors interact in the atmosphere
- Potential synergistic effects

Pollutants impact both AQ & climate

- Ozone (smog) is a potent, but short-lived GHG
- Methane (a key GHG) contributes to increasing background levels of ozone at global scale
- Impact of PM on climate is complex
  - aerosols scatter light, reduce temperatures
  - but black carbon (soot) is a powerful climate forcing agent

Pollutant Characteristics

- MP planning is more complex
- Pollutants differ in mass, scale, impacts

Pollutant	Mass Scale	Spatial Scale	Time Frame
Air toxics	1	Local	Near term
PM	10	Local	Near term
Ozone precursors	100	Regional	Near term
GHGs	10,000	Global	Centuries +

Evaluating Control Measures

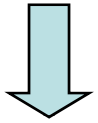
Developed **Multi-Pollutant Evaluation Method** (MPEM) to help analyze control measures:

- Evaluate benefits (or disbenefits) on MP basis
- Maximize co-benefits
- Identify and mitigate any trade-offs
- Evaluate impacts on public health
- Express health & climate benefits in $ terms
- Consider $ benefits as well as $ costs

Steps in MPEM Analysis

Ozone, PM, Toxics

Δ Emissions



Δ Ambient Concentrations

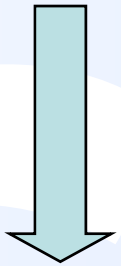
Δ Population Exposure

Δ Health effects

Δ Net $ Benefits

GHGs

Δ Emissions

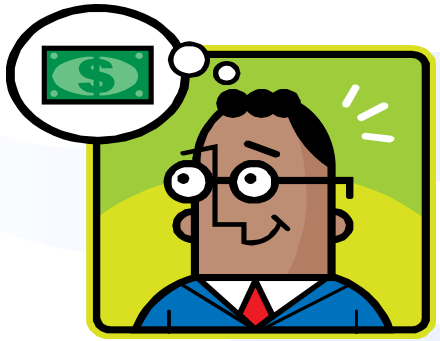


Δ $ Benefits

($28/metric ton CO2-e)

Valuing GHG Reductions

Estimate $ value per ton of CO2-e reduced



Challenges:

1. Wide range of climate change impacts:
   sea level rise, extreme weather events, water supply, crop yields, species diversity, ocean acidification, etc.
2. How to value future impacts in current $?

Chose value of $28 per ton of CO2-e reduced

- based on R.S.J. Tol meta-study (2005/2008)

2010 Plan Control Strategy

1. **Maximize GHG reductions from traditional control measures**
2. **Develop new measures focused on reducing GHGs**

55 control measures in five categories:

- Stationary sources measures (18)
  SSM 15: GHGs in permitting program
- Mobile sources measures (10)
- Transportation control measures (17)
- Land use & local impacts measures (6)
- Energy & climate measures (4)

Energy & Climate Measures

- **ECM 1: Energy Efficiency**
  - promote green building codes & practices
- **ECM 2: Renewable Energy**
  - promote solar power & other renewables
- **ECM 3: Urban heat islands**
  - cool roofing & cool paving
- **ECM 4: Tree-Planting**
  - promote planting of low VOC-emitting trees

Key Findings of 2010 Plan

- Performed health burden analysis for 2010 Plan
- PM imposes the greatest health impact on BA residents
- AQ improvements in recent decades have provided public health benefits worth multiple $ billions per year
- Increased average life expectancy ~ 6 months in Bay Area
- But we need to do more to fully protect public health
- Air pollution imposes $ billions per year in health burden
- Climate protection (GHG reduction) benefits account for ~ 20% of total benefits from 2010 Plan control strategy

How 2010 Plan addresses climate

- Identifies climate protection as a key goal
- Explains how climate & AQ interact
- Estimates GHG reduction from control measures
- Includes GHGs in estimate of $ benefits
- Seeks to reduce GHG from traditional measures
- Includes new Energy & Climate Measures to reduce GHGs & offset higher temperatures

Concluding Thoughts

- MP planning makes sense: develop integrated strategy to reduce air pollutants & GHGs
- Bay Area 2010 Plan incorporates climate protection/GHG benefits in plan to improve AQ
- Also makes sense to consider AQ & health co-benefits in developing climate protection plans
- 2010 Plan was very well-received
- Can serve as an example for others to build on

For more information

David Burch: 415-749-4641
dburch@BAAQMD.gov

Bay Area 2010 Clean Air Plan:
www.baaqmd.gov/Divisions/Planning-and-Research/Plans/Clean-Air-Plans.aspx

EPA pilot projects re: multi-pollutant planning:
www.epa.gov/air/aqmp/pilot.html

EPA study re: AQ benefits of City SF climate measures: Kurpius.Meredith@epamail.epa.gov

Stationary Source Measures

SSM 1: Metal Melting Facilities *(PM, odor, TAC)*

SSM 2: Digital Printing *(ROG)*

SSM 3: Livestock Waste *(PM, ROG, GHG)*

SSM 4: Natural Gas Process & Dist. *(ROG, GHG)*

SSM 5: Vacuum Trucks *(ROG)*

SSM 6: General Particulate Matter *(PM)*

SSM 7: Open Burning *(PM)*

SSM 8: Petroleum Coke Calcining *(SOx)*

SSM 9: Cement Kilns *(NOx, SOx)*

Stationary Source Measures

SSM 10: Refinery Boilers & Heaters *(NOx)*

SSM 11: Residential Fan-type Furnaces *(NOx)*

SSM 12: Space Heating *(NOx)*

SSM 13: Dryers, Ovens, Kilns *(NOx)*

SSM 14: Glass Furnaces *(NOx)*

SSM 15: GHG in Permits – Energy Efficiency *(GHG)*

SSM 16: New Source Review: PM2.5 *(PM)*

SSM 17: New Source Review: Air Toxics *(TAC)*

SSM 18: Air Toxics Hot Spots/CARE *(TAC)*

Mobile Source Measures

Promote clean vehicles & fuels

Replace /repair high-emitters; accelerate turnover

Reduce emissions in advance of regulations

Via incentives & partnerships

10 MSMs proposed:

- 4 light & medium-duty MSMs
- 3 heavy-duty MSMs
- 3 off-road MSMs

Transportation Control Measures

Reduce vehicle travel & emissions

TCMs grouped into 5 categories:

- Improve transit services
- Improve system efficiency
- Encourage sustainable travel behavior
- Support focused growth
- Implement pricing strategies

TCMs

Improve Transit Service:

TCM A-1: Improve Local & Areawide Bus Service

TCM A-2 Improve Local & Regional Rail Service

Improve System Efficiency:

TCM B-1: Freeway & Arterial Operations

TCM B-2: Transit Efficiency & Use Strategies

TCM B-3: Bay Area Express Lane Network

TCM B-4: Goods Movement Improvements

TCMs

Encourage Sustainable Travel Behavior:

TCM C-1: Voluntary Employer Trip Reduction

TCM C-2: Safe Routes to School & Transit

TCM C-3: Rideshare Services & Incentives

TCM C-1: Conduct Public Outreach & Education

TCM C-1: Smart Driving / Speed Moderation

TCMs

Support Focused Growth:

TCM D-1: Bicycle Access & Facility Improvements

TCM D-2: Pedestrian Access Improvements

TCM D-3: Local Land Use Strategies

Implement Pricing Strategies:

TCM E-1: Value Pricing Strategies

TCM E-1: Parking Pricing & policies

TCM E-1: Transportation Pricing Reform

Land Use & Local Impacts

- Promote focused growth
- Protect public health
- Multi-faceted effort that draws on wide range of tools & policies

LUM 1: Goods Movement

LUM 2: Indirect Source Review Rule

LUM 3: Enhanced CEQA

LUM 4: Land Use Guidelines

LUM 5: Track cumulative risk in impacted communities

LUM 6: Enhanced AQ monitoring