



The Next NARSTO Science Assessment: Science to Help Define the Problem and Set the Right Priorities

CAAAC, Air Quality Management Subcommittee
June 26, 2006
Atlanta, GA

Jim Vickery, Public Sector Co-Chair

William T. Pennell, NARSTO Management Coordinator

NARSTO, who we are and what we do

RETHINKING
THE OZONE PROBLEM
IN URBAN AND REGIONAL
AIR POLLUTION

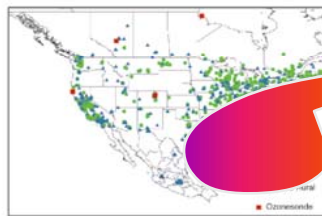
NRC

1991



1995

An Assessment of Tropospheric
Ozone Pollution
— A North American Perspective



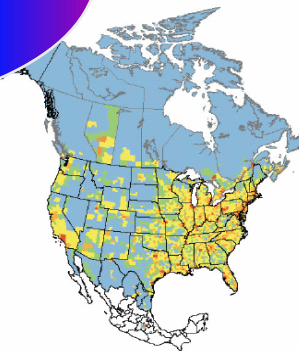
Particulate Matter Science
for Policy Makers

A NARSTO
Assessment

Edited by
Peter McMurry • Marjorie Shepherd • James Vickery

NARSTO-05-001

Improving Emission Inventories for
Effective Air Quality Management
in North America



A NARSTO Assessment

Prepared by:

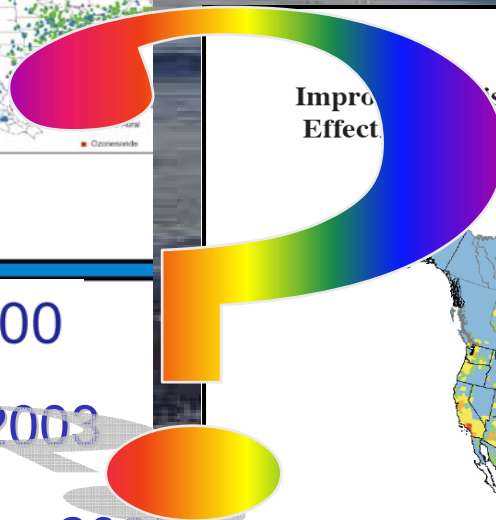
The NARSTO Emission Inventory Assessment Team

2000

2003

2005

2008



NARSTO Sponsoring Members

FEDERAL GOVERNMENTAL AGENCIES

ENVIRONMENTAL PROTECTION AGENCY (ORD & OAR), DEPARTMENT OF COMMERCE (NOAA), DEPARTMENT OF ENERGY, DEPARTMENT OF AGRICULTURE, DEPARTMENT OF INTERIOR, DEPARTMENT OF TRANSPORTATION, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, NATIONAL SCIENCE FOUNDATION, TENNESSEE VALLEY AUTHORITY, ENVIRONMENT CANADA, INSTITUTO NACIONAL de ECOLOGIA, INSTITUTO MEXICO del PETROLEO

SUBNATIONAL GOV'T ORGANIZATIONS

CALIFORNIA AIR RESOURCES BOARD, LAKE MICHIGAN AIR DIRECTORS CONSORTIUM, MIDATLANTIC REGIONAL AIR MANAGEMENT ASSOCIATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE ENERGY RESEARCH & DEVELOPMENT AUTHORITY, NORTHEAST STATES FOR COORDINATED AIR USE MANAGEMENT, TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, ONTARIO MINISTRY OF ENVIRONMENT

PRIVATE INDUSTRY

AMERICAN PETROLEUM INSTITUTE, CHEMICAL SPECIALTIES MANUFACTURERS ASSOCIATION, COORDINATING RESEARCH COUNCIL, DUNN-EDWARDS COMPANY, E.I. DUPONT de NEMOURS & COMPANY, FORD MOTOR COMPANY, GENERAL MOTORS CORPORATION

UTILITIES

EDISON ELECTRIC INSTITUTE, ELECTRIC POWER RESEARCH INSTITUTE, SOUTHERN COMPANY SERVICES INC.





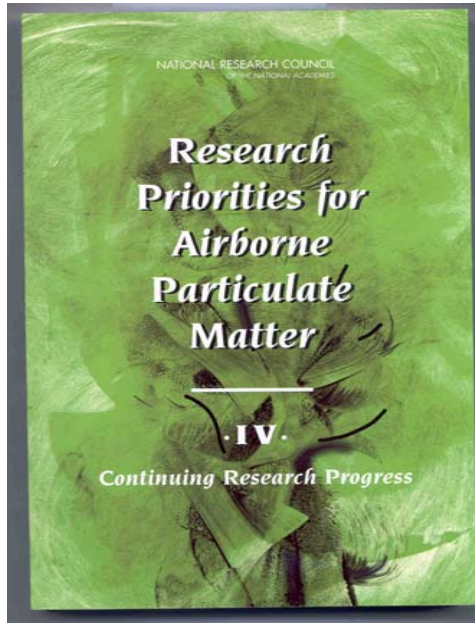
NARSTO Multi-Pollutant Assessment

- The proposal: *The Technical Challenges of a Multi-Pollutant Approach to Managing Air Quality Under an Accountability Framework: A NARSTO Assessment*

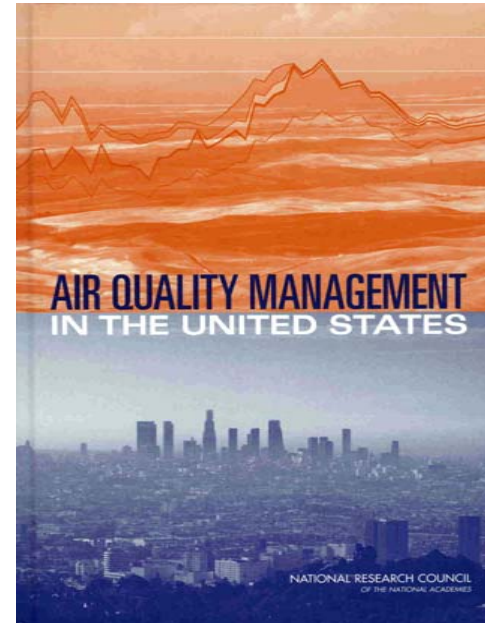
- Response to 2005 Executive Assembly directive
 - Small working group reviewed / considered NARSTO multi-pollutant activity during 2005
 - Proposal submitted to the Executive Steering Committee (ESC) in December, 2005
 - Proposal was modified per ESC comments
 - “Let’s hear from the potential users”



Why we're doing this now



2004



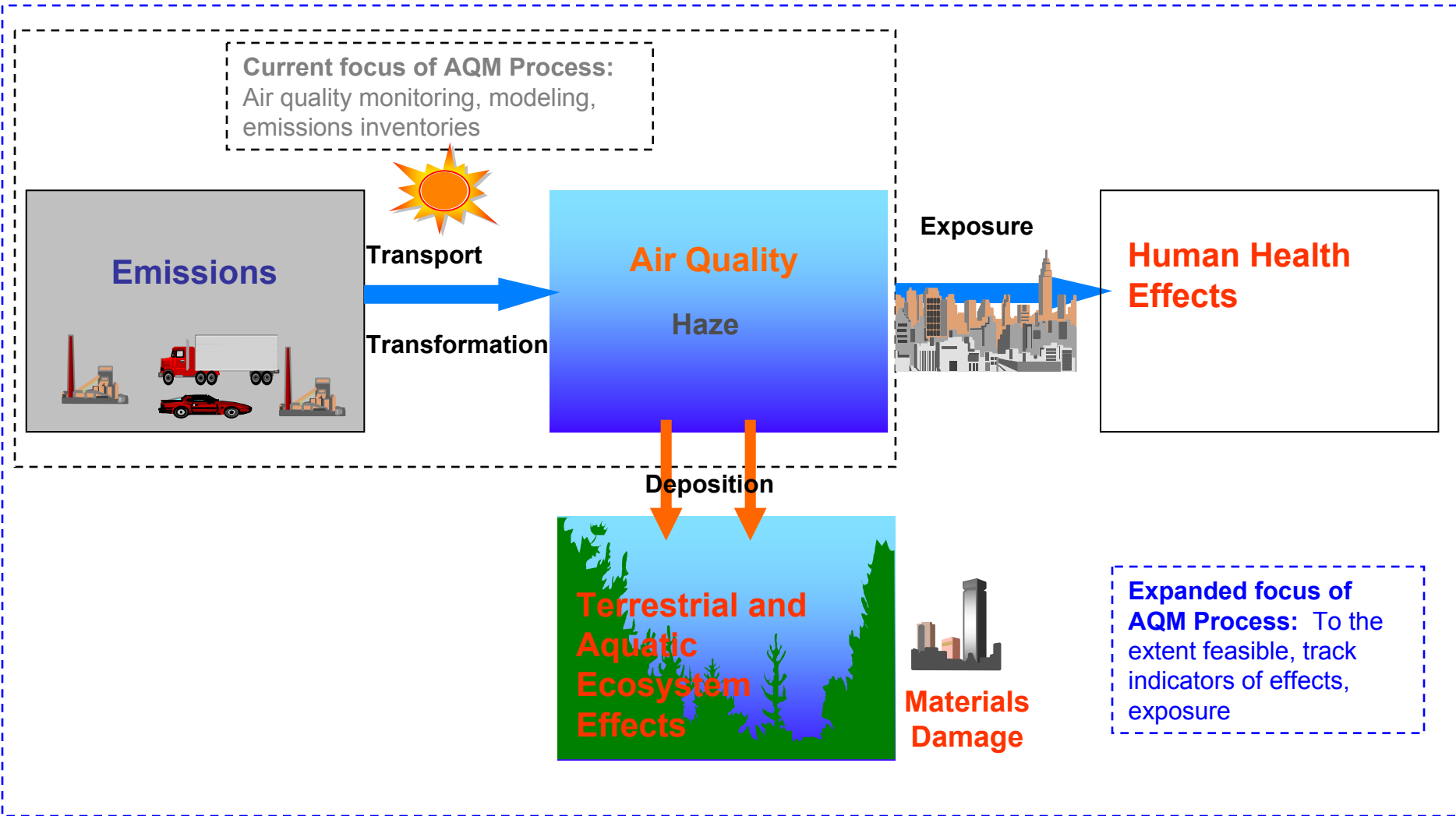
2004

National Research Council themes:

- Integrated, multi-pollutant programs and research
- Accountability

Air Quality Management

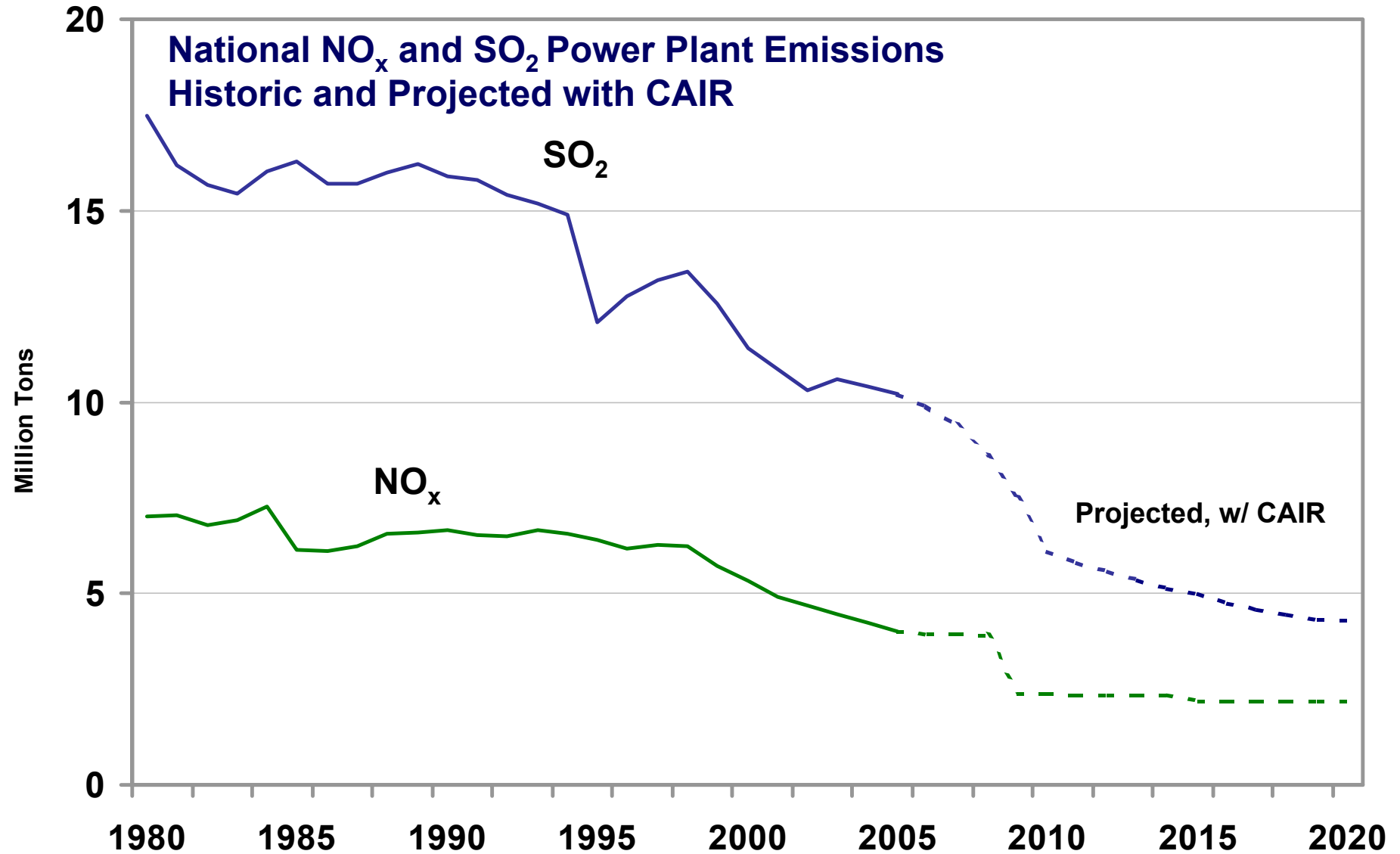
Expanding Air Accountability



National/Regional Rules: multi-pollutant sector approaches

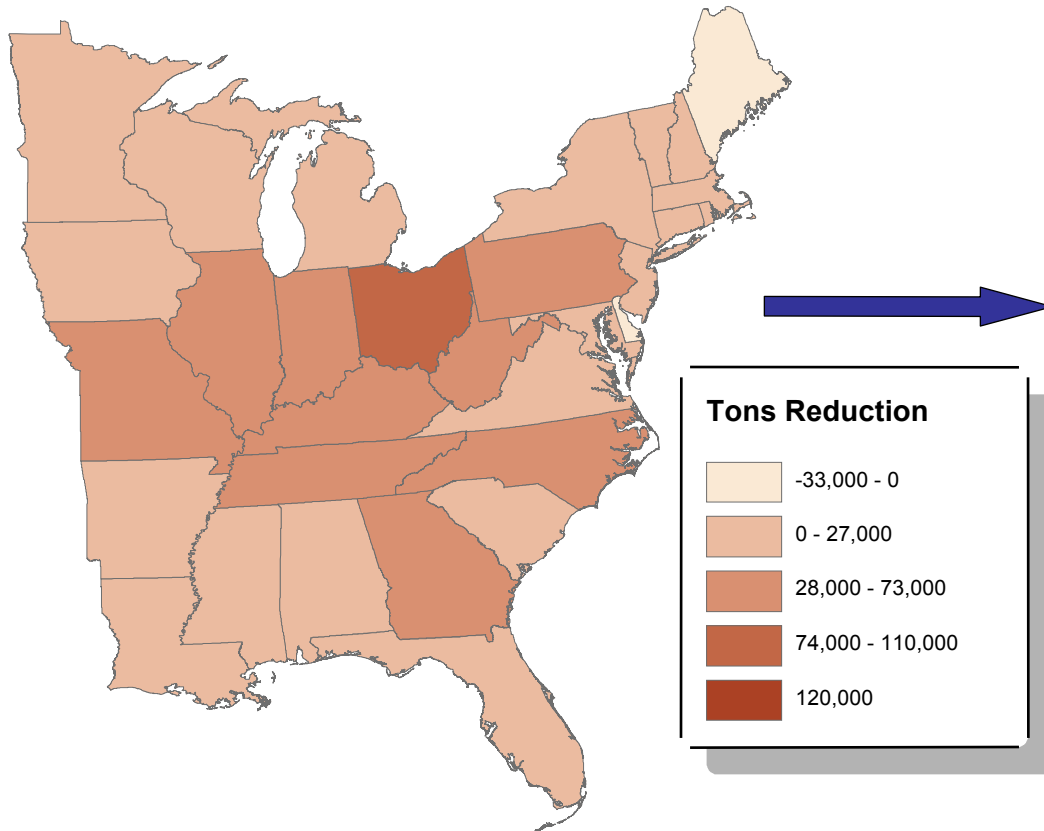
- Regional controls for major stationary sources
 - The NO_x SIP call
 - The Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR) (SO₂, NO_x, Hg)
- National rules for mobile sources
 - Tier 2 motor vehicle standards (VOC, NO_x, SO₂)
 - Heavy duty on-road diesel standards (PM, NO_x, SO₂)
 - Off road diesel standards (PM, NO_x, SO₂)
- State and local controls
 - PM and Ozone SIPs under NAAQS implementation

Big National reductions via CAIR



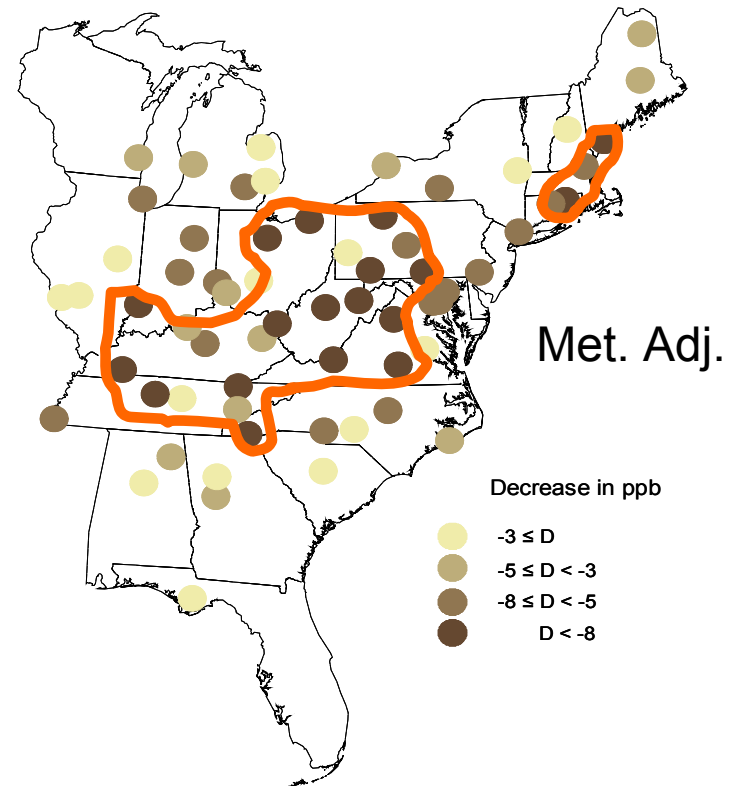
Big regional impacts via NOx SIP Call

EGU NOx Tons Reduced



Decline in "Seasonal Average" 8-Hour Daily Maximum Ozone

Decrease from 2002 to 2004 (Adjusted Data)



Ozone decline downwind of major EGU NOx emissions reductions after 2002

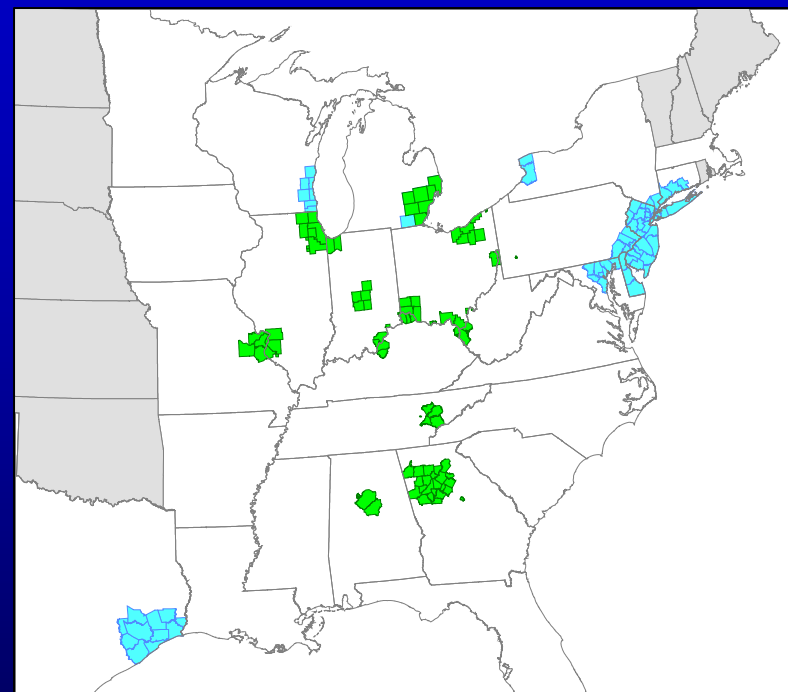
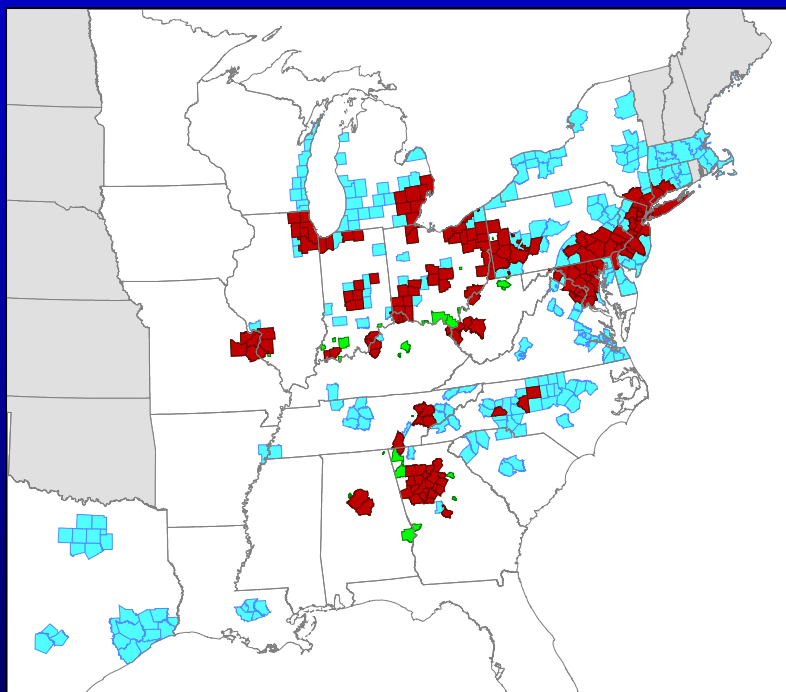
Average rate of decline in ozone between 1997 and 2002 is 1.1%/year.




Average rate of decline in ozone between 2002 and 2004 is 3.1%/year.

CAIR and other programs greatly reduce transported ozone and Particle Pollution: residual nonattainment in the East -- 2015

Ozone and Fine Particle Nonattainment Areas (March 2005)

Projected Nonattainment Areas in 2015 after Reductions from CAIR and Existing Clean Air Act Programs



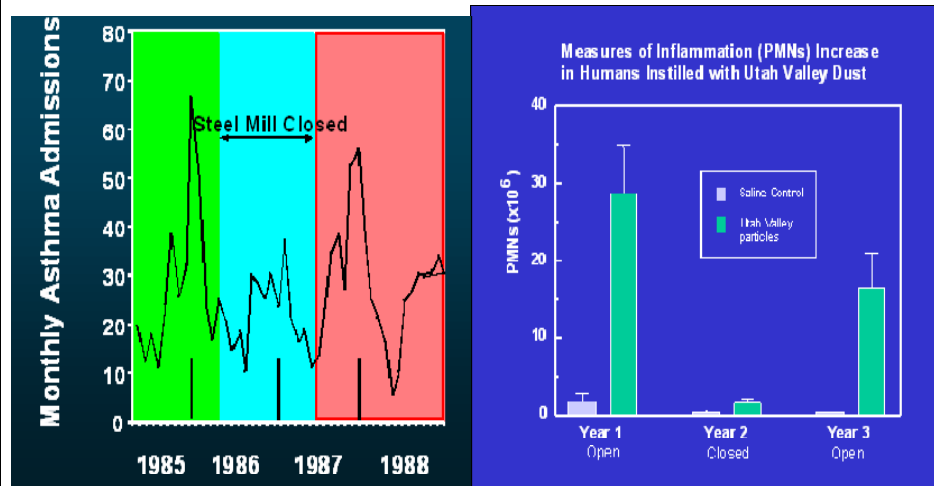
-  Nonattainment areas for 8-hour ozone pollution only
-  Nonattainment areas for fine particle pollution only
-  Nonattainment areas for both 8-hour ozone and fine particle pollution

These areas are a priority for PM/O₃ programs – today

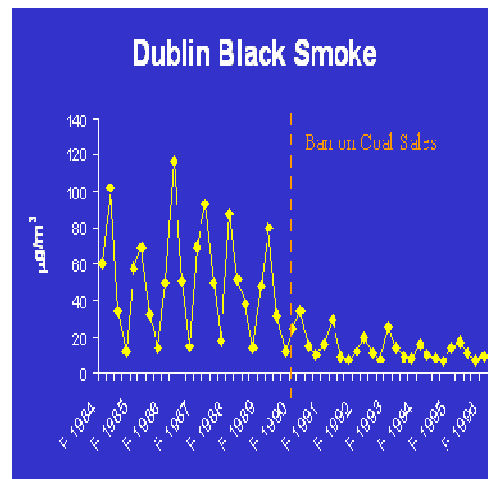
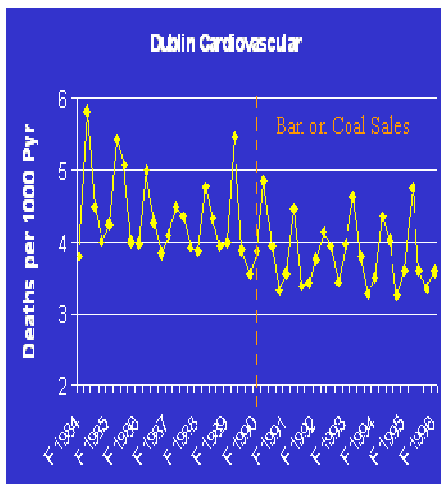
Projections concerning future levels of air pollution in specific geographic locations were estimated using the best scientific models available. They are estimations, however, and should be characterized as such in any description. Actual results may vary significantly if any of the factors that influence air quality differ from the assumed values used in the projections shown here.

Utah Valley: A Natural Experiment

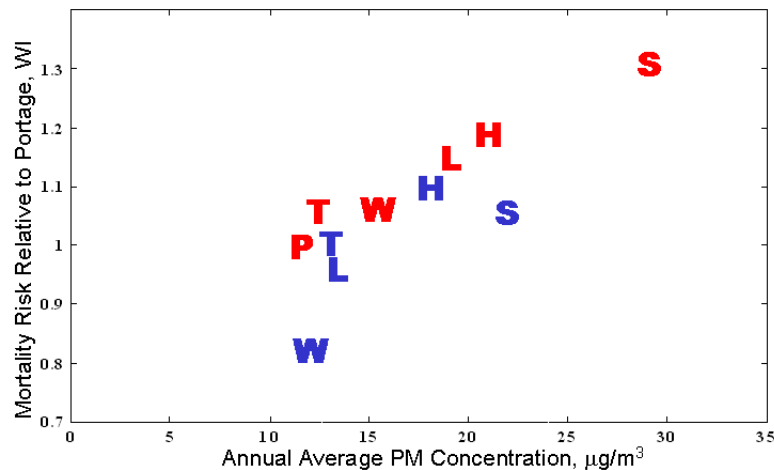
Local Intervention Impacts



The Dublin Study: Evaluating the Impact of Air Pollution Regulation



Updated Harvard Six Cities Study





NARSTO Contribution in the AQM Context

- **AQM T1- G1- R1: Improve accuracy, robustness, and availability of environmental and health data**
 - air quality data
 - emission inventories and air quality modeling
 - external partners
- **AQM T1- G1- R2: Improve the priority setting process (*a relative risk, multi-pollutant approach*)**
 - multi-pollutant air quality plan
 - air quality health trends report
 - report on links of air quality and ecosystem health
 - new science to policy mechanism
- **AQM T1- G1- R3: Improve accountability**
 - air accountability framework
 - indicators
 - progress evaluation
- **AQM T1- G2- R2: Move from a single pollutant approach to an integrated, multiple pollutant approach**
 - framework for an AQMP
 - tools
 - new/ improved science
 - pilots, guidance, tools and data
- **AQM T1- G3: Coordinate with other programs such as land use, energy, transportation and climate.**



Air Quality Manager Needs

(A NARSTO View)

- In Canada and the U.S.
 - Means to measure progress toward air quality, public health and environmental goals
 - Means to be reassured that the goals are the right ones
 - Means to determine adjustments to existing emissions controls if progress / goals are not sufficient
- In Mexico
 - Information for policy / program development



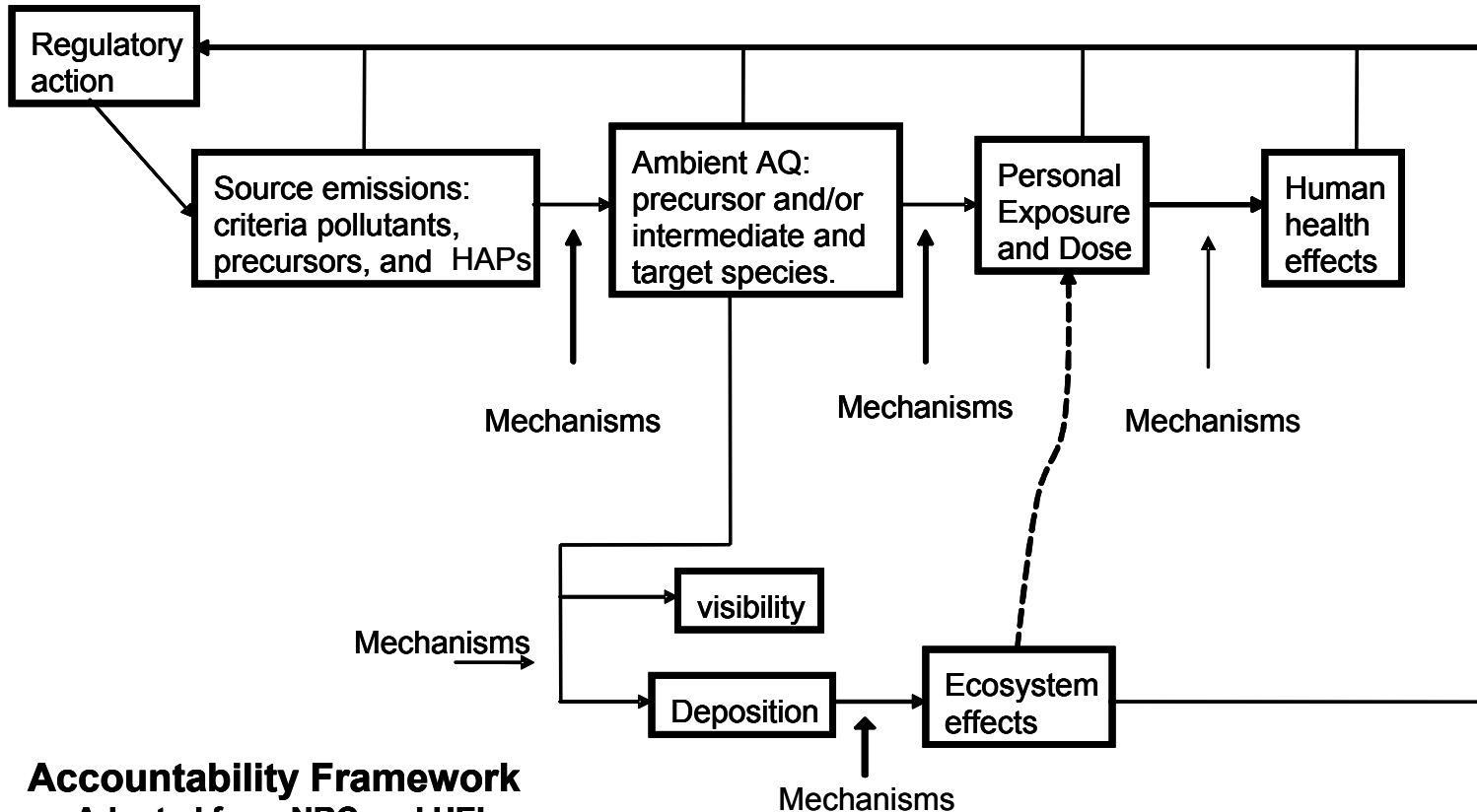
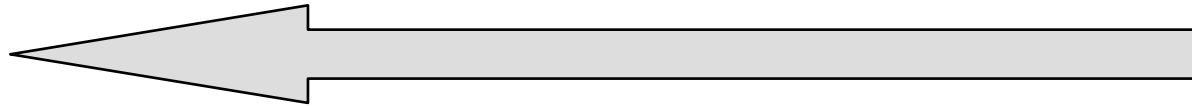
Scope of Proposed Next NARSTO Assessment

NARSTO will perform an assessment of the technical challenges (including the adequacy of the data, measurement and modeling tools) and implications of a multi-pollutant approach to managing air quality under an accountability framework.



Approach

Direction of Assessment Inquiry



Accountability Framework
Adopted from NRC and HEI



Charge Statement

- **Charge 1:** In time to lay the foundations for a 2010 assessment of improvements in human health and ecological conditions,
 - Air quality scientists will work with exposure, health and ecosystem scientists to identify the air quality information needed to associate:
 - Air quality composition and concentration with health and environmental conditions, and
 - Source emissions with health and ecosystem effects.



Charge Statement – cont'd

- **Charge 2:** In time to lay the technical foundation for a 2010 assessment of progress in air quality improvement,
 - Identify the technical challenges to and the capabilities of monitoring networks and modeling systems to provide the information needed to understand effects of air quality on human and ecosystem health, including the technical challenges of:
 - Quantifying air quality changes of criteria, hazardous and precursor pollutants,
 - Determining the source emissions and meteorological factors responsible for observed air quality changes, and
 - Understanding the relationships between climate change and air quality.



Principal Tasks of the Assessment

- 1. Identify **health and exposure related** air accountability assessment needs**
 - Products
 - Prioritized technical monitoring and source apportionment needs from the health and exposure community
 - Atmospheric sciences assessment of the capabilities for meeting these needs
 - Identified course of action to fill the gaps
- 2. Identify **ecosystem related** air accountability assessment needs**
 - Products
 - Prioritized technical monitoring and source apportionment needs from the ecosystem science community
 - Atmospheric sciences assessment of the capabilities for meeting these needs
 - Identified course of action to fill the gaps
- 3. Identify **air quality accountability** assessment data requirements, tools, and procedures**
 - Products
 - Combined set of accountability needs
 - Assessment of the capabilities for meeting these needs
 - Recommendations for strengthening these capabilities
 - Description of the activities required to perform multi-pollutant assessments of progress in meeting air quality, public health, and environmental goals
- 4. Produce assessment synthesis**



Task 1 Identify Health and Exposure Related Air Accountability Assessment Needs

- Workshop(s) involving human exposure scientists, health scientists, and NARSTO air quality scientists.
- What is needed to
 - Associate health and exposure changes with air quality and emission changes
 - Associate hazardous components and mixtures of air pollution and their sources, personal exposures and specific health effects (needed to evaluate standards)
- NARSTO AQ scientists assess the capabilities of monitoring and modeling to address these needs



Task 1 Identify Health and Exposure Related Air Accountability Assessment Needs

■ Products

- Prioritized technical monitoring and source apportionment needs from the health and exposure community
- Atmospheric sciences assessment of the capabilities for meeting these needs
- Identified course of action to fill the gaps



Task 2 Identify Ecosystem Related Air Accountability Assessment Needs

- Workshop(s) involving ecosystem scientists and NARSTO air quality scientists.
- What is needed to
 - Associate ecosystem changes with air quality, deposition, and emission changes
 - Investigate the effects/consequences of acid deposition, ozone exposure, and mercury deposition on ecosystems
(also needed for evaluating standards)
- NARSTO AQ scientists assess the capabilities of monitoring and modeling to address these needs



Task 2 Identify Ecosystem Related Air Accountability Assessment Needs

■ Products

- Prioritized technical monitoring and source apportionment needs from the ecosystem science community
- Atmospheric sciences assessment of the capabilities for meeting these needs
- Identified course of action to fill the gaps



Task 3 Identify Air Quality Accountability Assessment Data Requirements, Tools, and Procedures

- Assess challenges of meeting Charge 2. Principally,
 - Quantify air quality changes of criteria, hazardous and precursor pollutants
 - Account for the effects of meteorology
 - Account for the potential effects of climate change (or consequences for climate policy)
 - Determine the contributing source emission changes
 - Relationship of emission changes to AQ management actions
 - Contribution of transported pollutants to local changes and the contribution of local emissions to long range transport



Task 3 Identify Air Quality Accountability Assessment Data Requirements, Tools, and Procedures – Cont'd

- Conduct an integrated assessment of the technical challenges in meeting all air quality management accountability needs.

- Products
 - Combined set of accountability needs
 - Assessment of the capabilities for meeting these needs
 - Recommendations for strengthening these capabilities
 - Description of the activities required to perform multi-pollutant assessments of progress in meeting air quality, public health, and environmental goals



Next Steps / Timetable

- Endorsement by Executive Assembly
 - May 9-10
- Mini-Scoping Workshop
 - September 25-26 in RTP, NC
- Selection of Assessment Team
 - June-Oct
- Assessment begins
 - Fall, 2006
- Assessment Complete
 - End of Year, 2008



Thoughts ?

Contribution to Client Activities: Findings from 2005 EPA Survey

- ORD (NARSTO?) contributes greatly to clients' ability to improve the scientific foundation of rules and regulations and to increase their knowledge of scientific principles
- The scientific tools and or information provided by ORD (NARSTO?) are very useful to clients in completing their work
- ORD's (NARSTO's?) contribution is less significant in clients' interactions with their own clients/stakeholders
- Analysts find ORD's (NARSTO's?) contribution to be more significant than managers, particularly in the application of scientific tools and information



Contribution to Client Actions/Decisions: Findings

- The majority of clients report that at least half of their office's major actions or decisions rely on ORD (NARSTO?) science, and nearly all clients indicated that the foundation of this science was excellent.
- The majority of clients reported that ORD (NARSTO?) made a "substantial" or "critical" contribution to the quality of the office's major actions or decisions.
- For important science-supported decisions or actions, ORD (NARSTO?) science was used over 90% of the time.
- Analysts rely more heavily than managers on ORD (NARSTO?) science for actions and decisions.



Conclusions

- Overall, clients are very satisfied with the scientific tools and information developed by ORD (NARSTO?) and with efforts to assist clients in applying ORD (NARSTO?) science.
- ORD's (NARSTO?) scientific tools and information provide important support for clients' activities, actions, and decisions.



NARSTO Contribution in the AQM Context

- **AQM T1- G1- R1: Improve accuracy, robustness, and availability of environmental and health data** to enable more complete characterization of air quality, emissions, and environmental and health outcomes and to facilitate the assessment and characterization of relative risks.
 - Improve **air quality data**
 - Fill gaps in **emission inventories** and **air quality modeling**
 - Improve information on health and ecosystem endpoints
 - Improve coordination/ communication between EPA and **external partners**
 - Improve the collection of control and cost data
- **AQM T1- G1- R2: Improve the priority setting process** by creating mechanisms to systematically realign resources and regulatory focus toward areas of greatest health and environmental risk. (*a relative risk, Multi-pollutant approach*)
 - Develop a comprehensive, **multipollutant air quality plan** and review/update every 5 years
 - Use the updated information to in developing national regulatory priorities
 - EPA and CDC working with S/L/T should produce an **air quality health trends report** every 5 years
 - EPA, Federal Land Managers, others should produce a **report on links of air quality and ecosystem health** every 5 years
 - Improve the link from improved science to improved policy through a **new science to policy mechanism**
 - EPA and States should focus on multipollutant approaches
- **AQM T1- G1- R3: Improve accountability** by systematically monitoring progress and evaluating results, working to ensure that data collection is meaningful and that feedback loops exist to ensure that actual environmental results inform the future allocation of resources and the establishment of priorities.
 - Adjust the NAAQS review process to be more timely and efficient
 - EPA in close consultation with the States should develop an **air accountability framework** providing an overarching structure for priority setting
 - EPA should work with CDC and others to improve **indicators**
 - EPA and S/L/T should evaluate the **progress** being made under various programs
- **AQM T1- G2- R2:** EPA, States, local governments, and Tribes should **move from a single pollutant approach to an integrated, multiple pollutant approach** to managing air quality through the creation of an AQMP as a comprehensive air quality management plan updated every 5-10 years
 - Develop a **framework for an AQMP**, identifying legislative changes
 - Transition to an AQMP approach with **tools** and incentives
 - Assess period of NAAQS reviews correlating them with **new/ improved science**
 - Assess option of developing NAAQS in parallel
 - Continue support of multipollutant control strategies with **pilots, guidance, tools and data**
 - Use AQMP Phase I to target emissions reductions
 - Determine approaches for targeted, expeditious, greatest overall benefit emissions reductions
- **AQM T1- G3: Coordinate with other programs such as land use, energy, transportation and climate.**