

Air Quality Management Literature Review
CAAAC Air Quality Management Subcommittee Meeting
Ann Arbor, Michigan, June 16-17, 2005

BASIC PURPOSE OF REVIEW

The AQM Subcommittee's charge, in part, is to extend the work of the AQM Work Group by outlining a broader and longer-term vision of desirable changes to the AQM system. The NRC's comprehensive report, *Air Quality Management in the United States* (2004), provides many recommendations for long-term change, opening up avenues for the Subcommittee to explore in its consideration of what (in addition to the 38 recommendations the AQM Work Group advanced in the short term) it would recommend for long-term change.

As it pauses to reflect upon the current system, the Subcommittee wishes to adopt as broad and well-informed a view as possible; thus, in addition to considering the NRC's suggestions, the Subcommittee is interested in reviewing other recommendations for change and alternative visions of appropriate air quality management strategies and approaches. This brief summary of available literature is intended to support the Subcommittee's comprehensive assessment of prior evaluations of the AQM system. As a supplement to the NRC's recommendations, this review is intended to help inform the Subcommittee's discussions.

KEY COMPREHENSIVE ASSESSEMENTS OF U.S. AIR QUALITY SYSTEM.

There are only a few truly comprehensive studies of the U.S. air quality management system that raise critical issues and/or provide recommendations for change. These include:

Bryner, Gary C. 1993. *Blue Skies, Green Politics: The Clean Air Act of 1990*. Washington, D.C.: CQ Press.

Focuses on political maneuvering that occurred around the 1990 CAAA. Discusses relative roles of different branches of government, and critiques the rulemaking process. Critical issues raised:

- Who does, and who should, direct the regulatory process—relative roles of Congress, President, OMB, CEQ, EPA, others?
- Does Congress have the right level of oversight of EPA, and does EPA have enough flexibility to implement its statutory mandate?
- Does the current rulemaking process ensure balanced, equitable, and/or reasonable rules?
- Does the current rulemaking process ensure that rules are as cost-effective as possible?
- Would a negotiated rulemaking process (“reg neg”) be more efficient or lead to better outcomes?
- How can we ensure better program evaluation and assessment of results? Congress “needs to go beyond a simple check to ensure that deadlines have been met to a much broader examination to determine whether the main provisions of the CAA continue to make sense, given the nature and the causes of air pollution” (pp. 182-3).

Cahn, Robert, ed. 1985. *An Environmental Agenda for the Future*. Washington, D.C.: Island Press.

“Since the enactment of landmark environmental legislation, the items on the pollution control agenda have increased faster than they have diminished. Progress has been made in controlling some sources of

pollution, though more slowly and with greater difficulty than expected a decade ago. Serious pollution problems remain unsolved, while new problems continue to arise.

“Environmental regulation has worked in some areas, but progress often is excruciatingly slow. In many American cities, air quality has stopped getting worse and started getting better since passage of the Clean Air Act. Yet more than ... 140 million Americans live in areas where air pollutants still exceed health standards for some part of the year.... There is much evidence that compliance with even those pollution control standards that are in effect is poor. Monitoring, inspection, and enforcement have been sporadic and inconsistent” (pp. 65-66).

Makes a series of recommendations on air pollution, including (p. 75):

- “Congress should pass acid rain legislation requiring a 50% reduction in sulfur emissions and providing assurances that the costs of the program will be fairly apportioned.
- Congress should amend the Clean Air Act to impose enforceable deadlines for EPA action on specified toxic air pollutants.
- EPA should take immediate action to reduce dangerous particulate emissions from diesels and wood-burning stoves and furnaces.
- Congress should require EPA, in cooperation with the NAS, to make an expeditious and complete review of the problem of indoor air pollution, and develop model building code provisions for adoption by the states to deal with indoor air quality problems.
- Congress should require EPA, in cooperation with other nations, to conduct a comprehensive study of the extent, causes, and potential consequences of the buildup of pollutants in the atmosphere.”

Federal Advisory Committee (FACA) Subcommittee for Ozone, Particulate Matter and Regional Haze Implementation Programs. 1998. *Final Report: Final Report on Subcommittee Discussions through December 1997.* <http://www.epa.gov/ttn/faca/sudirs/finalfac.pdf>.

Like current subcommittee, the FACA Subcommittee sought to encourage its workgroup members to “develop innovative solutions to issues even if they were outside of the current statutory or regulatory framework—to ‘think outside the box.’” Furthermore, the FACA Subcommittee started with a list of principles, which “served as the foundation for ... recommendations developed by the Subcommittee.” (p. ES-2)

Subcommittee considered a very wide range of issues, and made many suggestions for significant changes to the AQM process. Critical among them:

- 1) **Area of Influence/Area of Violation concept**—altering the traditional distinction between attainment and nonattainment areas to account for role of transport in causing air quality problems in many areas. AOV would be area in which NAAQS exceeded; AOI is the larger area contributing to the AQ violations.
- 2) **Regional Air Management Partnerships (RAMPs)**—cooperative partnerships comprising multiple States and tribes working collectively to address regional air quality problems. RAMPs would coordinate air quality assessment, share data, develop shared strategies for emissions reductions to control regional transport.
- 3) **Clean Air Investment Fund**—sources whose cost of control exceeds a certain level have the option of paying a fee in lieu of reducing emissions. The fund is used to pay for more cost-effective emissions reductions elsewhere.

- 4) Need **greater flexibility** and more use of **economic incentives** and **voluntary measures**, but simultaneously need to adjust **accountability mechanisms**.
- 5) Need to provide **better incentives for good air quality monitoring**: increase monitoring incentives, decrease/eliminate monitoring disincentives.
- 6) **Better metrics for assessing progress** in air quality
 - i. rather than just measuring tons of emissions reduced, **measure “effective” emissions reductions**—based on location, height, species/composition, and timing, as well as amount.
 - ii. **Allow latitude for multi-year programs** to become effective (some programs, esp. land use initiatives, may take many years to become effective but may have lasting beneficial results)
 - iii. **Create opportunities for mid-course evaluation and correction**
 - iv. **Greater incentives for and use of private air quality data**
- 7) **Preemptive air quality control strategies** for “borderline” or “declining” areas

Goklany, Indur. 1999. *Clearing the Air*. Washington, D.C.: Cato Institute.

Considers whether federalization of controls was desirable historically, whether it has improved the rate of progress in air quality, and whether it still makes sense given progress and current pollution levels.

Argues that “for intrastate pollutants—that is, relatively short-range, primary pollutants—the federal government’s role should be limited to undertaking research, providing scientific and technical information about benefits and costs of controls to the states and the public, and establishing guidelines for NAAQS. The states would then be responsible for adopting their own ambient air quality standards and attaining those standards at a pace dictated by their own political processes and their knowledge and perception of what balances need to be struck to optimize their quality of life. This is preferable to having such decisions made by those who do not directly bear either the costs or the benefits of attainment” (139). Also suggests U.S. should:

- Allow emission trading between all sources for a given pollutant
- Freeze new source emissions standards
- Leave states free to institute stricter standards if desired
- Recognize that most health effects are due to local pollution control problems – and collective action barriers are not necessarily best solved by federalization
- Pursue most cost-effective solutions—federal programs and federally directed command & control approaches are often much more expensive than they could be
- Replace pollutant-by-pollutant approach with “one that focuses on reducing overall risks to public health and welfare at local and regional levels” (154).

In a nutshell: “Control of interstate pollution should be negotiated between affected states, with the downwind states being free to accept, in lieu of additional control of specific air pollutants, other reductions in risk to public health and welfare funded by the upwind (polluting) states... For intrastate pollution, the federal government should step back from its role as the micromanager of air pollution control and instead enter into a more equal partnership with the states. Under such a federalist approach, the federal government would set idealized goals, and states would determine their own attainment

schedules and control measures for pollutants produced within, and affecting, their own jurisdictions” (154).

“Today the nation is well into its postenvironmental transition period for the traditional air pollutants. Air quality continues to improve, and politicians, no matter what their partisan stripe, have by and large embraced the environment” (153).

Krupnick, Alan J. and Jhih-Shyang Shih. 2004. “A New Approach to Air Quality Management,” in *New Approaches on Energy and the Environment: Policy Advice for the President*, ed. Richard D. Morgenstern and Paul R. Portney, pp. 73-77. Washington, D.C.: Resources for the Future.

In recognition of the strong role of transport, they advocate altering the current AQM system substantially in one of two ways:

- 1) **Building Regional Air Management Partnerships (RAMPs)**—CAA authorizes EPA to establish transport commissions and air quality control regions. EPA needs to use this authority to expand OTC and create parallel organizations around the country to address transport. “RAMPs could act as a forum for information sharing, reaching agreement and developing recommendations on how to solve regional air pollution problems. The new regional organization could provide technical support and assessment, and create areas of influence (AOI) and areas of violation (AOV) using air quality modeling and tracer experiments. Institutional mechanisms could also be structured to support the development and implementation of incentive- and market-based approaches to managing regional pollution problems, including developing positive incentives for upwind areas to reduce precursor emissions, such as emissions trading and air pollution funds. The organization may also endow areas of violation with some power to compel actions from areas of influence. Under RAMPs, states would retain primacy, subject to EPA oversight and Federal Implementation Plan (FIP) authority, to the greatest extent consistent with air quality and equity goals, with responsibility assigned at the lowest level of government practicable.” RAMPs would have authority to oversee trading programs and ensuring that States’ SIPs incorporate policies consistent with the RAMP. EPA would reject SIPs that did not meet this requirement.
- 2) **Increasing Federal Responsibility and Eliminating Most of SIP Process**—Federal measures are more effective and cost-effective than State/local approaches. Furthermore, may be easier to implement than RAMPs due to structure of federal system, and because will be less costly and contentious. Federal government is in better position to coordinate and ensure equity, also to conduct proper modeling to design programs appropriately. State/local governments would only be required to ensure no net increase in local emissions.

Morag-Levine, Noga. 2003. *Chasing the Wind: Regulating Air Pollution in the Common Law State*. Princeton: Princeton University Press.

Discusses the deficiencies of the common law approach to air pollution regulation, which relies on reactive “proof-of-harm” demonstrations and judicial resolution of conflict. Notes that the American approach includes use of “land-use separation rather than deployment of available technology, and an attendant exclusion ... of scientifically uncertain harms from the realm of remediable legal injury” (180). The result—U.S. system relies on science to legitimate policy, which means that pollution is abated rather than prevented. “This stands in contrast to European regulation, which bases interventions not in evidentiary demands for scientific proof of harm, but in governmental expertise and in the requirement that industrial operators undertake feasible measures of mitigation” (180).

Suggests that American approach gives rise to unnecessarily conflict and the expenditure of resources on litigation and lobbying that could otherwise be spent on pollution control. Notes that European environmental policy often less conflictual—relies more heavily on negotiations between industry and government.

However, also cautions against the dangers of administrative expertise and discretion, especially noting that public participation under such systems tends to be lower and transparency of policymaking process is limited. This leaves open potential for abuse and capture by special interests, perhaps more so than in common law system.

National Commission on Air Quality. 1981. *To Breathe Clean Air*. Washington, D.C.: National Commission on Air Quality.

Advances 109 recommendations in key areas (see summary, pp. 55-66):

- 1) **Establishment of Public Health Standards** (27 recommendations)
 - a. Primary Standard Setting Process (14)
 - b. Hazardous Emission Standards (4)
 - c. EPA Research (4)
 - d. Multimedia Pollutants (2)
 - e. Indoor Air Pollution (3)
- 2) **Institutional Relationships and Resources** (16 recommendations)
 - a. State Implementation Plan Process (5)
 - b. Federal Support of Federal, State, and Local Programs (5)
 - c. Role of Indian Tribes (4)
 - d. Public Participation (2)
- 3) **Air Quality Status Designation** (3 recommendations)
- 4) **Nonattainment Program** (18 recommendations)
- 5) **Prevention of Significant Deterioration Program** (10 recommendations)
- 6) **Mobile Source Controls** (7 recommendations)
- 7) **New Source Performance Standards** (4 recommendations)
- 8) **Enforcement Activities** (6 recommendations)
- 9) **Atmospheric Transport** (6 recommendations)
- 10) **Research, Development and Demonstration** (1 recommendation)
- 11) **Economic Considerations** (4 recommendations)
- 12) **Economic Incentives** (2 recommendations)
- 13) **Energy and Air Quality** (5 recommendations)

**Presidential Memorandum, “Implementation of Revised Air Quality Standards for Ozone and PM,”
62 FR 38423, No. 138, July 18, 1997.**

Set forth numerous goals, including:

- 1) Rewards for early pollution reductions and cost-effective approaches
- 2) Enhance regulatory flexibility to improve efficiency without compromising health
- 3) Minimize State/local planning and regulatory burdens for regional problems
- 4) Create Clean Air Investment Fund to provide safety valve for improved efficiency

EXAMPLES OF ISSUE-SPECIFIC STUDIES ON AIR QUALITY.

A wide assortment of studies is available on virtually every topic. Most offer recommendations for change within current system, rather than considering alternative futures. A couple of relevant examples:

Liroff, Richard A. 1986. *Reforming Air Pollution Regulation: The Toil and Trouble of EPA's Bubble*. Washington, D.C.: The Conservation Foundation.

Evaluates EPA's use of bubbles, and provides recommendations about ways to improve such approaches.

McMurry, Peter, Marjorie Shepherd, and James Vickery. 2004. *Particulate Matter Science for Policy Makers: a NARSTO Assessment*. Cambridge: Cambridge University Press.

National Research Council. 1991. *Rethinking the Ozone Problem in Urban and Regional Air Pollution*. Washington, D.C.: National Academy Press.

Key recommendations focus on issues such as:

- Enhancing mechanisms for tracking progress—better tools for measuring air quality trends, emissions inventories, regulatory compliance and control effectiveness. “The SIP process, outlined in the CAA... is fundamentally sound in principle but is seriously flawed in practice because of the lack of adequate verification programs” (5).
- Improving methods of measuring and accounting for the impact of biogenic emissions and meteorology
- Assessing individual source contributions (quantitative and qualitative) to ambient concentrations of key pollutants
- Increasing flexibility—using best science to design appropriate control programs, such as NO_x/VOC substitution options
- Investigating climate change

National Research Council. 1993. *Protecting Visibility in National Parks and Wilderness Areas*. Washington, D.C.: National Academy Press.

National Research Council. 2002. *Estimating the Public Health Benefits of Proposed Air Pollution Regulations*. Washington, D.C.: National Academies Press.

U.S. Congress, Office of Technology Assessment. 1989. *Catching Our Breath: Next Steps for Reducing Urban Ozone*, OTA-O-412. Washington, D.C.: U.S. Government Printing Office.

GENERAL CRITIQUES OF AMERICAN ENVIRONMENTAL SYSTEM: RELEVANT RECOMMENDATIONS.

Many studies have been done that examine the American system of environmental protection from a broader perspective. Some of these studies have made recommendations that can be useful in critiquing the current air quality management system. Key examples:

Carnegie Commission on Science, Technology, and Government. 1993. *Risk and the Environment: Improving Regulatory Decision Making*. New York: Carnegie Commission.

Similar to EPA's *Unfinished Business* and *Reducing Risk* reports, as well as NAPA's *Setting Priorities, Getting Results* report (1995), this report advocates incorporating more comparative risk assessment into policymaking. Specifically, they say that:

- “Agencies should place problems in broad risk categories and develop strategies to address risks of high priority. To do this, each regulatory agency addressing environmental and risk-related issues should develop a broad-based risk inventory. The agencies should use the inventories’ output to help develop multidimensional risk rankings. The agencies should experiment with methods to integrate societal values into relative risk analyses where statutes do not supply all the value judgments necessary to rank risks. Agencies should repeat relative risk analysis initiatives periodically, readjusting the process at each iteration in light of lessons learned, new information and progress in addressing high-priority risks.”
- “Regulatory agencies should enhance their long-range planning capabilities by strengthening the linkages between research and regulatory policymaking efforts and by undertaking policy planning exercises in the context of relative risk analyses.”
- On NGOs: “The extensive capabilities of nongovernmental organizations should be used more frequently to evaluate the regulatory process, suggest ways to improve existing regulatory strategies, and aid federal agencies in establishing regulatory priorities. Nongovernmental policy research organizations should establish stronger ties with scientists and engineers in universities to bolster their capacities to examine issues pertaining to environmental and health risks.”

Kosobud, Richard F., ed. 2000. *Emissions Trading: Environmental Policy's New Approach*. New York: John Wiley & Sons, Inc.

Reviews existing market-based programs and considers options/advantages/potential problems of various market-based options. Key issues:

- Pollutant(s) involved
- Geographic spread & boundaries of market
- Appropriate market-based instrument—Taxes, Fees, Incentives, Permits
- Participants—who is in, who is out, and who can opt-in
- Characteristics of commodity at stake (what is being taxed or traded?)
- Mechanisms for recording price and transaction data
- Establishment and revision of levels/caps
- Transaction costs
- Monitoring and enforcement

National Academy of Public Administration. 1995. *Setting Priorities, Getting Results: A New Direction for the Environmental Protection Agency*. Washington, D.C.: National Academy of Public Administration.

NAPA panel made 6 main recommendations (focus on comparative risk assessment (CRA)):

- 1) EPA needs a clearer mission—and the flexibility to carry it out.
- 2) States and localities should be granted more responsibility and decision-making authority (“accountable devolution”).
- 3) The private sector and local governments should be given more flexibility in exchange for better-than required performance (“beyond compliance”).
- 4) EPA needs a better management system: a) use comparative risk assessment to set specific priorities; and b) use budget process to allocate resources to the agency’s priorities.
- 5) EPA should refine and expand the use of CRA and CBA in making decisions.
- 6) EPA’s fragmented environmental statutes and programs should be integrated across media into a single, comprehensive, and coherent approach.

National Academy of Public Administration. 1997. *Resolving the Paradox of Environmental Protection: An Agenda for Congress, EPA and the States*. Washington, D.C.: National Academy of Public Administration.

National Academy of Public Administration. 2000. *Environment.gov: Transforming Environmental Protection for the 21st Century*. Washington, D.C.: National Academy of Public Administration.

Makes a series of recommendations for change at the Federal, State, and local levels:

- 1) **The next EPA administrator should:**
 - a. **Tackle the big environmental problems**—especially nutrients in watersheds, smog, and GHGs—through application of market-based and other flexible, innovative tools. Encourage States to use trading systems to achieve federal goals.
 - b. **Invest in information and assessment**—by creating bureau of environmental information and increasing program evaluation and accountability.
 - c. **Hold States accountable for results**—increase accountability for outcomes, rather than just process and transfer greater responsibility to States. Strengthen/reform the NEPPS system through greater use of self-assessment, public participation, core performance measures, grants linked to performance partnership agreements, and *ex post* evaluation. Increase Regions’ responsibilities for oversight and state-level performance.
 - d. **Use all the tools available to change management cultures and practices to focus on achieving critical environmental goals**—focus on internal accountability for achieving major outcome-based goals, rework the outdated organizational structure of the agency and eliminate fragmented, media-based approach to problem; create “bias for action” and encourage innovation.
- 2) **Congress should:**
 - a. **Authorize EPA and the States to use the tools they need to tackle the big problems**—many critical sources are unregulated or under-regulated, and existing regulations are unduly

expensive and static. Encourage use of market-based allowance trading systems rather than permits, correcting for hot-spots, and authorize experimentation with other performance-based and innovative approaches, including certification.

- b. **Invest in information**—increase and standardize the collection of information, and tie it back to results through program evaluation (accountability).
 - c. **Put aside partisanship because American wants Congress to solve serious problems**—need aggressive leadership from Congress and greater commitment to innovative approaches.
- 3) **State regulators and legislatures should:**
- a. **Challenge EPA, Congress, and one another to transform environmental governance**—improve efficiency and effectiveness of environmental programs, seek continual progress, improve accountability and tracking of results, consider environmental implications of land-use and planning decisions.
- 4) **Business leaders, NGOs and foundations should:**
- a. **Embrace more effective and efficient policies for environmental protection.**
 - b. **Help build a national system for gathering, disseminating, and using environmental information.**

Speth, James Gustave. 2004. *Red Sky at Morning: America and the Crisis of the Global Environment*. New Haven: Yale University Press.

Presents an alternative list of principles that may be helpful in informing discussion (pp. 175-6):

- 1) ***Fundamental human right.*** All human beings have a right to an environment adequate for their health and well being
- 2) ***Common concern.*** The global environment is a common concern of humanity.
- 3) ***Common but differentiated responsibilities.*** In view of their different contributions to global environmental degradation and their different capacities to support solutions, states have common but differentiated responsibilities.
- 4) ***Duty not to cause environmental harm.*** States have the responsibility to ensure that activities within their jurisdiction or control do not damage the environment of other states or of areas beyond the limits of national jurisdiction.
- 5) ***Integration.*** In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.
- 6) ***The polluter pays principle.*** National authorities should promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution.
- 7) ***The precautionary principle.*** Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.
- 8) ***Public participation.*** Environmental issues are best handled with the participation of all concerned citizens, at the relevant level.
- 9) ***Right to development.*** The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Stavins, Robert N. 2001. “Lessons from the American Experiment with Market-Based Environmental Policies.”

Dimensions of market-based instruments to consider:

- How much do abatement costs vary across sources? If little, then trading approaches do not necessarily improve efficiency.
- Hot spots
- Price-based systems (taxes) vs. quantity-based systems (allowances, tradeable permits) – we persistently lean towards the latter b/c more politically acceptable, keep costs per unit pollution more hidden, and favors existing allocation of pollution “rights” (so supported by industry)
- Transaction costs