

Cost effective control of urban smog: a report of a conference held at the Federal Reserve Bank of Chicago, June 7-8, 1993

**Richard F. Kosobud, William A. Testa, and
Donald A. Hanson**



The new environmental mandates set forth in the Clean Air Act Amendments of 1990 (CAAA '90) are expected to cost the nation \$20 to \$30 billion annually through the end of the decade. These costs will fall particularly hard on Seventh District metropolitan areas such as Chicago, Milwaukee, and Muskegon, Michigan, which are classified as severe nonattainment areas.

Responding to these expectations, a group of academics, business people, government regulators, and environmentalists gathered on June 7 and 8, 1993, for a conference at the Federal Reserve Bank of Chicago sponsored by the Chicago Fed, the Workshop on Market-Based Approaches to Environmental Policy of the University of Illinois at Chicago, and the Chicago Council on Foreign Relations. The conference was designed to evaluate the promise and the potential shortcomings of urban smog control strategies from various perspectives, ranging from the impact on human health to the potential effects on regional economies. The conference proceedings reflect this diversity of topics and explore ways of crafting environmental policy that will improve air quality while minimizing the extent of economic disruption.

During the past twenty-five years, most regions of the United States have experienced both growing per capita standards of living (as measured by national income) and improved air quality. Environmental policy measures have brought about reduced atmospheric concentrations of lead, particulate matter, and sulfur dioxide. In contrast to this improvement, however,

recent years have seen the emergence of two apparently opposing trends: a heightened interest in reducing urban smog concentrations, which remain high, and a growing apprehension that improved air quality will require increasing costs per unit of improvement.

What explains this shift from optimism about having achieved certain environmental goals to the more recent apprehension of an environment-prosperity trade-off? Perhaps some of the more tractable environmental problems have been solved and the less costly pollution abatements have been achieved, leaving those complex environmental problems that will be very costly to remedy. One of the remaining problems is the quantity of low-level airborne ozone, perhaps the most important component of urban smog. After twenty years of efforts such as modifications to automobiles, many urban areas still fail to meet national standards for ambient ozone.

Given the difficulties in attaining national ozone standards, it is natural to ask whether the goals of current ozone legislation can be justified within a cost-benefit framework. In the minds of many of the conference participants was an earlier and influential study by the economists Alan Krupnick and Paul Portney (1991), which estimated that the costs of a one-third reduction

Richard F. Kosobud is professor of economics at the University of Illinois at Chicago, William A. Testa is a research officer and senior regional economist at the Federal Reserve Bank of Chicago, and Donald A. Hanson is manager of the Energy Policy Section at Argonne National Laboratory. The authors wish to thank their associate editors, Pamela Pinnow, Jennifer Zimmerman, and Jeff Camp.

of volatile organic compounds, a precursor of ground-level ozone, far exceeded the benefits associated with this reduction—by a factor of eight or more.¹ Calculations for the Los Angeles area, that “superbowl” of smog, reduced the factor but left the ratio above three. These findings were consistent with those of earlier research. Yet the Clean Air Act Amendments of 1990 (CAAA ‘90) set new and even more stringent goals for the nation that could require more expensive control measures.

Recent research suggests that the benefits of reducing smog are greater than previously estimated. This shift in thinking is due to new discoveries about the health impacts of ozone, as well as its adverse effects on agriculture and material contamination—primarily vehicle tires. Moreover, as new market-based approaches to controlling emissions are tried, the smog cleanup costs, both for volatile organic compounds and nitrogen oxides, appear to be decreasing or increasing less rapidly per unit of improvement. If this is true, the new legislation might be even closer to the mark than previously thought.

Some observers view Title I of CAAA ‘90 as a renewed effort by the federal government to attain cleaner urban air, but in the most cost-efficient fashion so as to allow continued improvement in both living standards and air quality. The legislation sets more stringent requirements for reducing ozone concentrations, yet it provides for new, flexible, market-based approaches to controlling those ozone precursors generated by human activity. Such approaches hold out the promise of more cost effective and innovative control of air pollution. Among the responses to the legislation are programs that allow firms to trade rights to emit prescribed levels of the precursors of urban ozone, and “cash-for-clunkers” programs that offer bounties to car owners who scrap their high-emitting, often older, automobiles.

Incentive systems such as these have long appealed to economists. In theory, given cost variability within and among firms, market incentives allow firms to realize significant cost savings by choosing the cheapest, most efficient methods of reducing their own emissions. In addition, programs of tradeable emission credits give firms an incentive to search out-of-house for the most cheaply reduceable emission sources to control first, such as motor vehicles. But perhaps the most significant benefit of incentive systems is that they stimulate advances in en-

vironmental control technologies and promote practices that lead to additional cost savings and emissions reduction.

Clearly, incentive systems hold out the promise of substantial savings in resources that would be welcome in an era of increasing demands. The only hitch is that they are relatively untried and untested. A heavy load of program design, institution creation, monitoring, and enforcement problems remains to be resolved before the promise of incentive systems can be fulfilled. Additionally, many of the parties concerned with environmental policy are uneasy with market-based approaches. This includes not only some environmental groups, but also segments of the business and government regulatory communities.

An important objective of the June conference, therefore, was to contribute to a full airing of these disparate views. Several contributions to the conference bear on this point. The director of the Illinois Environmental Protection Agency and the president of Commonwealth Edison Company announced the initiation of a new market-based program whereby emitters in the Chicago region can trade nitrogen oxide emission credits. A senior economist with the Environmental Defense Fund voiced support for this program, illustrating the potential for cooperation among groups previously in opposing environmental camps.

Such signs of cooperation are welcome at this time. The debate leading up to CAAA ‘90, both inside and outside Congress, revealed a dramatic widening of the range of interest groups demanding a say in the legislative process. Groups with differing points of view and conflicting historical positions on environmental policy—particularly, the business and environmental communities—seemed to be modifying previous positions and opening up tentative new lines of communication and cooperation. At the local and regional level, such cooperation will be needed if these innovative policies are to be successfully designed and implemented. The conference aimed to nurture the development of these new cooperative relationships, which can ultimately fashion the most cost effective policies for solving the ozone abatement problem.

FOOTNOTE

¹Alan J. Krupnick and Paul R. Portney, “Controlling urban air pollution: a benefit-cost assessment,” *Science*, Vol. 252, 1991, pp. 522-28.

Proceedings of the Conference on Cost Effective Control of Urban Smog

Preface

David R. Allardice, *Federal Reserve Bank of Chicago*

Editors' introduction

Richard F. Kosobud, *University of Illinois at Chicago*;
William A. Testa, *Federal Reserve Bank of Chicago*; and
Donald H. Hanson, *Argonne National Laboratory*

Special address

Samuel K. Skinner, *Commonwealth Edison Company*

The challenges facing Illinois: achieving balance between a cleaner environment and economic growth

Mary A. Gade, *Illinois Environmental Protection Agency*

The urban ozone abatement problem

George Tolley, *University of Chicago and RCF, Inc.*;
Jeffrey Wentz, *Harding-Lawson Associates*;
Steven Hilton, *RCF, Inc.*; and
Brian Edwards, *RCF, Inc.*

Discussion

Karl A. McDermott, *Illinois Commerce Commission*

The status of the modeling of ozone formation and geographic movement in the Midwest

Stephen L. Gerritson, *Lake Michigan Air Directors Consortium*

Discussions

Mark E. Fernau, *Sigma Research*
Peter A. Scheff, *University of Illinois at Chicago*

Cost effectiveness of remote sensing of vehicle emissions

Winston Harrington, *Resources for the Future*; and
Virginia D. McConnell, *University of Maryland and Resources for the Future*

Discussions

Wynn Van Bussmann, *Chrysler Corporation*
Thomas R. Wallin, *Illinois Environmental Protection Agency*
James D. Boyd, *California Air Resources Board*

Incentives and the car

Daniel J. Dudek, *Environmental Defense Fund*

Discussions

Thomas F. Walton, *General Motors Corporation*
Elmer W. Johnson, *Kirkland & Ellis*

Health impacts of ozone

John D. Spengler, *Harvard University*

Discussions

Victoria W. Persky, *University of Illinois at Chicago*
Richard A. Wadden, *University of Illinois at Chicago*

Emissions offset trading programs in the Northeast and Mid-Atlantic states

Bruce S. Carhart, *Ozone Transport Commission*

Mobile source emissions reduction credits as a cost effective measure for controlling urban air pollution

James D. Boyd, *California Air Resources Board*

Discussion

Tom Tietenberg, *Colby College*

Regional economic impacts of marketable permit programs: the case of Los Angeles

Kelly Robinson, *Rutgers University*

Title I of the Clean Air Act Amendments of 1990 and implications for market-based strategies

John Calcagni, *E³ Ventures Incorporated*

For a complimentary copy of these proceedings, write or phone *Public Affairs Department, Federal Reserve Bank of Chicago, P.O. Box 834, Chicago, Illinois 60690-0834, telephone 312-322-5111.*