Cross-Media Pollution and the Chesapeake Bay

Nitrogen oxide (NO_x) emissions pollute the air. In turn, polluted air can contaminate the water. Airborne NO_x emissions, for example, are responsible for anywhere from 10 to 40 percent of the Chesapeake Bay's nitrogen buildup, which enriches nutrients that choke out aquatic life. Despite awareness of this cross-media effect, however, analysts have found it difficult to account correctly for the contributions NO_x emissions make to nutrients in the bay.

Pollution laws do not account for the cross-media effect, either, treating air and water in isolation from one another. Thus, if a stricter emission standard were placed on cars in the Northeast tomorrow, the benefit of making the bay a little cleaner at no additional cost would go unrecognized in the enactment.

Certainly the task of accounting for cross-media interactions is not easy. Many different sources of NO_x emissions exist whose impacts on Chesapeake Bay waters vary with time, location, and source. Likewise, the available response options vary, as do their political viability and cost-effectiveness.

Yet making an effort to recognize the cross-media effect is well worth the trouble, RFF researchers say. Neither cleanup of the Chesapeake nor cleanup of NO_x emissions will be cost-effective otherwise.

What is needed is a framework to determine how best to account for the dual impact of NO_x emissions on air and water quality in devising pollution controls and to identify cost-effective policies when both media are affected. Until then, RFF researchers point out, the real costs of pollution control will continue to be distorted, since all costs are now attributed to a given medium in isolation.

To begin to build the needed framework, researchers Alan Krupnick and Virginia McConnell in RFF's Quality of the Environment Division are conducting a study funded by the Air Quality Coordination Group of the Chesapeake Bay Program and by the U.S. Environmental Protection Agency's Office of Policy Planning and Evaluation.

Working with Brian Morton of the Environmental Defense Fund and Scott Atkinson of the University of Georgia, Krupnick and McConnell are studying the use of marketable NO_x emission allowances to achieve both air quality and water quality goals. To that end, they are helping to analyze the results of a model that Atkinson developed to simulate trading of NO_x emission allowances to reduce nutrient pollution in the bay.

Eventually, Krupnick and McConnell will help extend the Atkinson model to consider trading under a NO_x emissions cap designed to reduce air pollution after deducting water pollution benefits from abatement costs. They hope insights from the study will allow them to develop policy options for trading programs and for other incentive-based NO_x emission reduction programs.

In related work, Krupnick and McConnell will explore how the air and water impacts of NO_x emissions from electric utilities vary depending on facility location and what this suggests about how policies for reducing utility emissions should vary at the state or county level. Knowing more about such air and water impacts for each facility will also help set the appropriate trading ratios among facilities for the marketable permit program.

Into their analysis of cost-effective abatement policies and cross-media trading programs, Krupnick and McConnell will also integrate the array of possible actions that might be taken to deal with cars and trucks—the so-called "mobile sources" that make a major contribution to NO_x emissions and nutrients in the bay.

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Emissions from cars and trucks make a major contribution to the Chesapeake Bay's nitrogen buildup, enriching nutrients that choke out aquatic life.