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Air Quality Issues Rise in Importance?

Brent Sohngen

This issue of the Ohio Environment Report takes a look at air quality issues affecting Ohio. One important conclusion from the analysis by Dr. Andy Keeler in this issue is that air quality regulation will have increasingly important implications for Ohio citizens. In recent years, the U.S. Environmental Protection Agency (EPA) has revised the standards for air pollutants regulated under the Clean Air Act. With the tightening of standards, additional counties in Ohio could be required to take additional action to reduce air pollution. States, like Ohio, must develop implementation plans to meet the new federal air quality regulations. In addition the U.S. EPA recently issued new federal rules on transboundary pollutants (i.e. emissions in Ohio that travel to other states and cause impacts). The “Clean Air Interstate Rule,” for instance, is likely to affect Ohio industries that emit nitrogen oxides and sulfur dioxide. New regulations on mercury pollution also will affect large industrial sources. These regulations will affect all Ohioans.

The heart of air pollution regulation remains focused on large industrial emitters, and mobile sources in non-attainment areas, but the U.S. EPA has begun to look more closely at potential air quality impacts in agriculture, and in particular with a fast-growing segment of that sector – large animal feeding operations. In 2003, the National Academy of Sciences reported on the potential health effects of air pollutants emitted directly from livestock operations, (NAS, 2003). This study, for the first time, considered agriculture as a potential source of pollutants regulated under the Clean Air Act. This report concluded that we did not know enough about the potential scale of emissions from these facilities, so additional research was warranted. The U.S. EPA last winter developed an agreement with a number of large livestock operations in the U.S. to implement monitoring on those facilities. The results of this monitoring will be used in the future in consideration of potential regulatory programs affecting agriculture.

There has been lots of confusion within the agricultural sector about agriculture and air pollution. At the moment, little can be said. The regulatory community, farm organizations, farmers and the public await the results of the research conducted through the agreement developed last winter.

In this issue of the Ohio Environmental Report, Dr. Andy Keeler of the School of Public Policy and Management at Ohio State University provides an overview of air quality regulations, and changes in air quality regulations, with special emphasis on how they affect Ohio. Dr. Keeler is an internationally recognized expert on the economics of environmental issues. Previous to joining the faculty at Ohio State, he served as the Senior Staff Economist for Environment at the President’s Council of Economic Advisers (2000 – 2001), as a senior economist at the Environmental Protection Agency’s Innovative Strategies and Economics Group (1999-2000) and as an Economist for the Republic of Tanzania’s Marketing Development Bureau (1982-1985). The Ohio Environment Report thanks Dr. Keeler for his willingness to help us understand the potential implications of recent changes in air quality regulations affecting Ohioans.

REFERENCE:

National Academy of Science (NAS).2003. “Air Emissions from Animal Feeding Operations: Current Knowledge, Future Needs.” (<http://books.nap.edu/catalog/10586.html>)

Air Quality Issues in Ohio

Andy Keeler, School of Public Policy and Management, Ohio State University

Introduction

Ohio, like all of the US, has faced major challenges and made significant progress in improving air quality since the National Ambient Air Quality Standards (NAAQS) were first set under the Clean Air Act of 1970. Helped by a combination of national, state, and local programs and regulations, the overwhelming majority of Ohio counties were in compliance with the NAAQS for ground-level ozone and particulate matter (PM) by the turn of the century. This situation is set to change dramatically as new, stricter NAAQS for both of these pollutants come into effect over the next five years. This article describes the new standards and details the implications of their changes. It then provides an overview of the options available to Ohio for reducing pollution from electric utilities, other stationary sources, and mobile sources.

The NAAQS

The NAAQS set by EPA under the direction of congress to protect the public health:

National primary ambient air quality standards... shall be ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health. [CAA § 1 09(b)(1)]

EPA has had a difficult time in meeting these requirements because of a lack of clear guidance about what constitutes “an ample margin of public safety”. Neither ozone nor PM has absolute thresholds below which health risks disappear. Some populations are put at increased health risk even at very low or background levels, and reducing these pollutants to zero is an absolute impossibility with current transportation, power generation, and industrial technologies. EPA continues to try to determine what constitutes an adequate margin of safety in the light of new knowledge about the effects of these pollutants on human health. It is largely new evidence about health effects that led EPA, supported by guidance of epidemiological and public health experts, to propose new and stricter standard for ozone and PM.

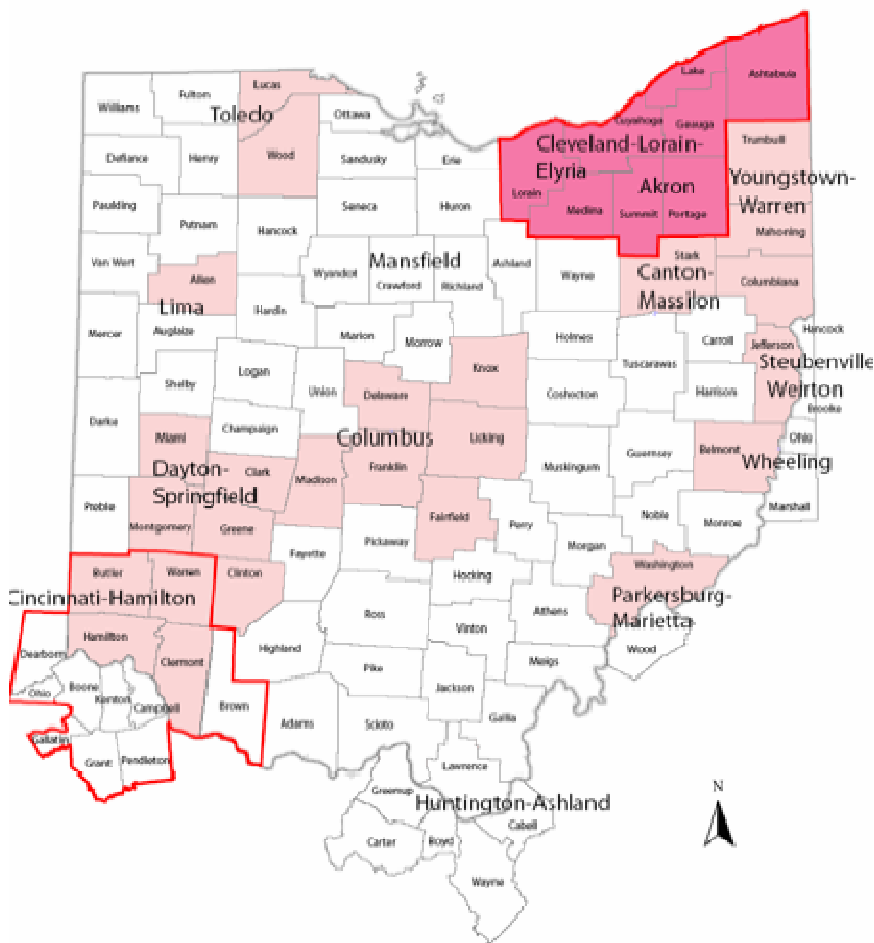
Changes in NAAQS and the Effect on Ohio

Ozone

Ozone is formed by the reaction of other pollutants, particularly oxides of nitrogen (NO_x) and volatile organic compounds (VOCs). Its formation is significantly enhanced by both heat and sunlight, causing it to be a more serious problem in the summer months than in the winter in most areas of the country. EPA determined, based on extensive epidemiological and clinical studies, that the existing standard of 0.121 ppm for any one-hour period was not adequate to protect public health, as required under the CAA. Instead, the standard is now set so that the average concentration should be less than 0.085 ppm ozone averaged over any eight-hour period. The Agency further determined that the form of the existing standard was too arbitrary – extreme meteorological conditions could produce (or prevent) a single violation and cause areas to move in and out of compliance. Compliance now depends on the average of the annual fourth-highest eight-hour concentration over any three-year period. This means that compliance requires ozone levels to remain below 0.085 ppm virtually all the time, but a small number of exceptions will not necessarily trigger noncompliance.

Under the 1-hour (old) ozone standard, only eight Ohio counties, all in the Cleveland area, were designated as being in nonattainment. Under the new 8-hour standard, these eight counties are designated as “moderate” nonattainment regions, meaning that they are recognized as having relatively more serious challenges in meeting the new standards. An additional 25 counties, including multiple counties in the metropolitan areas of Cincinnati, Columbus, Dayton/Springfield, Steubenville-Weirton, and Toledo, are designated as out of attainment with the news standard (see map for more detail).

Ohio 8-Hour Ozone Non-attainment Areas



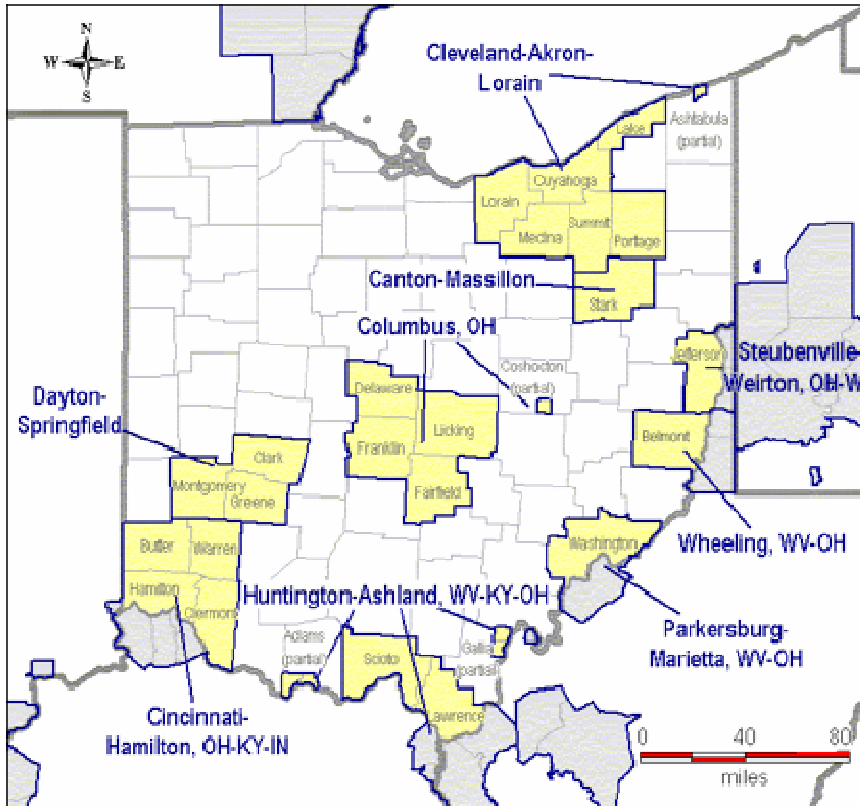
Source: [Ohio Environmental Council](http://www.ohioenvironmental.org)

Particulate Matter

Particles suspended in air come from a wide variety of sources, and have been shown to cause premature death and illness primarily through cardiovascular and lung disease. The change in the PM standard proposed by EPA in 1997 and now being implemented is significant for the change in the definition of the regulated pollutant rather than just the level. Based on epidemiological and clinical evidence, EPA chose to add an additional PM NAAQS that focuses specifically on the smallest particles – those of 2.5 micrometers or less in diameter. The previous standard for PM – which remains in effect in addition to the new one -- was defined in terms of particles of 10 micrometers or less in diameter. Particles of less than 2.5 micrometers are now called “fine” particulate matter and particles of 2.5 to 10 micrometers are called “coarse”.

The new PM_{2.5} standard is in two parts. First, a level of 65 micrograms per cubic meter can only be exceeded once in any year. Second, the annual average concentration cannot be greater than 15 micrograms per cubic meter. As with the new ozone standard, the new PM_{2.5} standard is more stringent than the existing NAAQS, causing a dramatic increase in the number of areas that will not be in compliance. Historically, only two counties (Cuyahoga and Jefferson) have had attainment problems with the PM₁₀ standard. Twenty-seven counties, in whole or in part, are designated as nonattainment areas

with the PM_{2.5} standard, including three or more counties each in the Cincinnati, Cleveland, Columbus, and Dayton areas (see map for more detail).



Source: [USEPA](#)

Consequences of Noncompliance

Each state, including Ohio, is required to submit a State Implementation Plan (SIP) to USEPA detailing how it plans to bring all areas into compliance. The large increase in the number of nonattainment areas under the new standards for ground-level ozone and PM_{2.5} will require a significant change in the content of Ohio's SIP. Ohio will also have to expand its program for setting strict standards for all significant new stationary sources of pollutants that contribute to ground-level ozone and PM_{2.5}. There are also some additional requirements placed on federally funded transportation projects in nonattainment areas to ensure that they do not worsen air quality, although in practice this has not proved much of an impediment to federal transportation projects in the past.

The real significance of the dramatic increase in noncompliance is that federal, state, and local regulators will be under increased political and legal pressure to devise strategies to lower PM_{2.5} and ozone concentrations. In the following section a brief overview of these actions is presented.

Actions to Reduce Emissions

Federal Actions

While there is widespread and bipartisan consensus that a major legislative initiative to reduce sulfur dioxide and NO_x is called for, disagreement about the timetable, stringency, and other details have prevented such a program from being passed. Disagreement about the status of carbon dioxide, which is not a NAAQS criteria pollutant but is a significant cause of increasing atmospheric carbon levels, has also been a factor. The Bush Administration has gone ahead with a new administrative rule that should accomplish part of the reduction that a legislative initiative would have achieved. The Clean Air Interstate Rule calls for reductions in SO₂ emissions of 75% of 2003 levels from affected sources by 2010 and 82%

by 2015. For NO_x, the reductions called for are 73% by 2010 and 76% by 2015. These reductions come almost entirely from the electric utility sector.

Transportation is a significant source of emissions of both NO_x, VOCs, and PM_{2.5}. Diesel engines, which have been a particularly significant source of PM_{2.5}, are the object of the most significant changes in federal regulation of transportation technology. Beginning in 2007, diesel engines in new trucks and busses must meet significantly more stringent standards for PM and NO_x. A recently announced rule for new offroad diesel applications (construction, agricultural, and industrial diesel engines) will mandate similar technologies for new engines that will be phased in between 2008 and 2014. Supporting all of these mandates is a requirement for major reductions in the sulfur content of diesel fuel beginning in 2006. Low-sulfur diesel fuel is a necessary condition for new diesel emission reduction technologies to work. Similar standards are expected for marine and locomotive diesel engines. There are no current federal plans to increase the stringency of technology standards for gasoline engines.

State Actions

As mentioned above, states will be required to submit SIPs with details about what steps, in addition to the implementation of the federal rules discussed above, they will take to come into compliance with the new PM_{2.5} and ozone standards. Ohio will be able to mandate stricter standards for all kinds of new stationary sources of PM_{2.5}, ozone, and their precursors. States have the option of changing the terms of permits for existing stationary sources, but they are not required to do so. It is generally politically difficult to change the terms of permits for businesses outside the utility sector, many of which have already invested in new technologies for previous SIP implementations.

States can also suggest changes in strategy and regulations for reducing emissions from transportation. It is likely that such changes will be needed to bring Ohio's nonattainment areas into compliance, particularly for ozone. There are significant political and legal impediments to many regulatory strategies for achieving such reductions. Americans do not like being told when, where, and how to drive (or not drive) their cars, and the state's authority to force them to change their behavior is limited. Nevertheless, state decisions about supporting highway projects, mass transit, and personnel policies for state employees (like flextime and telecommuting) have the potential to reduce emissions and are candidates for inclusion in the state's SIP. Lowering emissions from transportation remains a challenge that current regulatory tools and approaches make it difficult for Ohio to meet.

Local and Regional Actions

New stationary sources, as well as existing sources wishing to expand or change their operations, will under many circumstances have to purchase offsets in order to get permits to emit any of the pollutants contributing to noncompliance. This means that they must find another source in the same area that will reduce its emissions enough to offset any new emissions. This adds to both the expense and difficulty of setting up new business enterprises, and places additional regulatory requirements on the state or regional agency running the programs.

There are two additional factors worth noting here. First, several Ohio nonattainment counties are part of metropolitan areas spanning more than one state. Coordinating transportation and other strategies with West Virginia, Pennsylvania, Indiana, and Kentucky cities will have to be part of a successful strategy. Second, metropolitan areas have a key part in transportation and land use planning and regulation that affect commuting behavior and therefore emissions from the transportation sector. Designation as being in noncompliance with the new rules will give Ohio's cities another reason to take a careful look at their patterns of residential and commercial development.

Emissions Trading

[Emissions trading](#) is a regulatory tool that provides flexibility and cost savings in meeting environmental standards. It works by providing financial incentives for entities who can reduce pollution most efficiently, while allowing businesses that have only difficult or expensive pollution reduction choices to pay for more efficient reductions made by others. The nationwide [Acid Rain Trading Program](#) has been very successful in reducing sulfur dioxide pollution from utilities at relatively low cost. A number of states, including [Michigan](#), have developed infrastructure to support intrastate trading to meet state air quality objectives.

These states will be at an advantage in setting up functioning offset markets in their noncompliance areas as the new NAAQS come into force.

Conclusion

The new NAAQS for ozone and PM_{2.5} will cause most of Ohio's urban areas to be designated as out of compliance with at least one of our national ambient air pollution standards. Federal regulatory responses that have already been announced will make some progress toward improving air quality. Ohio and her metropolitan areas will be under pressure to make further improvements. Given the political environment and the difficulty of changing her citizens' choices about transportation, finding out how to make this progress remains a difficult and unanswered question for Ohio.

More Information

[US EPA's site for the new ozone NAAQS](http://www.epa.gov/ozonedesignations/index.htm) (<http://www.epa.gov/ozonedesignations/index.htm>)

[US EPA's site for the new particulate matter standard](http://www.epa.gov/air/urbanair/pm/) (<http://www.epa.gov/air/urbanair/pm/>)

[US EPA's site for new federal clean air rules](http://www.epa.gov/cleanair2004/) (<http://www.epa.gov/cleanair2004/>)

[Ohio EPA Division of Air Pollution Control](http://www.epa.state.oh.us/dapc/) (<http://www.epa.state.oh.us/dapc/>)

[Ohio Environmental Council's take on the new standards](http://www.ehw.org/Air_Pollution/AIR_OECOzone.htm)

(http://www.ehw.org/Air_Pollution/AIR_OECOzone.htm)

Energy and Environment: A Perfect Storm or Pleasant Mix?

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A recent poll conducted by the Pew Research Center for the People and the Press (see Pew, 2005) nearly perfectly illustrates the conundrum about the environment and the economic that we face in the U.S. A few of the interesting results...

- 48% of Americans say that those driving SUV's should switch to driving more fuel efficient cars, but only 27% said they bought another car that gets better gas mileage.
- While Americans hope that other SUV drivers give up their luxury automobiles, 50% want drilling in the Arctic National Wildlife Refuge (ANWR), 52% want to give tax cuts for oil exploration, 69% want price controls, 73% want tax cuts for alternative energy, and 86% want the government to increase fuel efficiency standards for all automobiles.
- 57% of Americans rate developing new energy sources as a higher priority than protecting the environment (only 36% ranked protecting the environment higher than developing new energy sources).

What's the conundrum? Higher gasoline prices cause us to consume less gasoline. Recent estimates suggest that each 1% increase in prices reduce fuel consumption by 0.5%. Thus, higher prices cause SUV drivers to switch to driving more fuel efficient cars. They also spur the rest of us to buy more efficient cars, to take public transportation, or just simply to drive less. Higher gasoline prices spur research and development into alternative sources of energy, such as fuel cells, they lead to more investment in oil extraction technologies, and new discovery efforts. However, when it comes to higher gasoline prices in reality, as we have been experiencing the past month in particular, people are not happy: some 69% of respondents in the Pew poll want price controls, 48% want other people, namely SUV drivers, to buy something more efficient, but only 27% have actually bought more efficient cars. Price controls would have the opposite effect of what people say they want. They would reduce the incentive for SUV drivers to buy more efficient automobiles. They would reduce the payoff from drilling in ANWR, oil exploration, and tax cuts for alternative energy. They would shift some oil currently headed for the U.S. to other markets where prices are not controlled. They would lead some oil wells to be shut down.

Higher prices for transportation seem to be helping us realize in the U.S. that it is important to reduce our reliance on oil. Unfortunately, there are no silver bullets on the near horizon, although over the next 30 – 40 years, fuel cells and battery power could have large implications. Perhaps the best policy that can be undertaken today is to avoid undertaking substantial policy changes. This is a difficult thing for an economist who spends lots of times examining government policy and suggesting new policies, or changes in policies, to say. But reading the results of the recent poll by Pew, reading the newspapers and letters to the editor, and watching the TV news, I get concerned thinking about some of the policies government could impose. Here, I believe, markets can, and are, already helping us solve our energy issues. There is simply no free lunch. If gas prices are low, as they were through most of the 1990's, to reduce our reliance on oil we would have to heavily subsidize alternatives. That money would have to come from somewhere, likely the federal government and either those of us paying taxes now or in the future would have to pay for that. With higher gas prices, we are essentially making the payments today.

In the News...

Peril At the Pumps (in Asia)...

<http://www.time.com/time/asia/magazine/article/0,13673,501050905-1098995,00.html>

Chinese gas price controls need to be eased

<http://www.taipeitimes.com/News/biz/archives/2005/08/20/2003268506>

Did environmental suits stall levee upgrades?

http://www.insidebayarea.com/ci_3037929?rss

Environmental calamity spawned by hurricane

http://seattletimes.nwsourc.com/html/hurricanekatrina/2002495829_katenviro15.html?syndication=rss&source=seattletimes.xml&items=127

Senate Republicans push for EPA rule waivers

http://news.yahoo.com/news?tmpl=story&u=/nm/20050916/pl_nm/katrina_environment_dc_1

High Mercury Levels Found In Storebought Fish

http://news.yahoo.com/news?tmpl=story&u=/WCVB/20050916/lo_WCVB/2938396

Ohio Ethanol Bill

<http://www.wtol.com/Global/story.asp?S=3815563&nav=5Uai>

U.S. Army Corps of Engineers to Open up 11,000 Acres of Wetlands in 15 States

<http://www.baltimorechronicle.com/2005/091605Integrity.shtml>