Facts Not Fear on Air Pollution:

How Regulators, Environmentalists and Scientists Exaggerate the Level and Health Risks of Air Pollution and Impose Counterproductive Regulations

by

Joel Schwartz

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National Center for Policy Analysis
12770 Coit Rd., Suite 800
Dallas, Texas 75251
(972) 386-6272

Executive Summary

Air pollution has been declining for decades across the United States, yet most Americans still believe air pollution is a growing problem and a serious threat to their health. The reason: most information on air pollution from environmentalists, regulators and journalists — the public's main sources for information on the environment — is false. Air quality in America's cities is better than ever. Between 1980 and 2005:

- Fine particulate matter ($PM_{2.5}$) declined 40 percent.
- Peak 8-hour ozone (O_3) levels declined 20 percent, and days per year exceeding the 8-hour ozone standard fell 79 percent.
- Nitrogen dioxide (NO_2) levels decreased 37 percent, sulfur dioxide (SO_2) dropped 63 percent and carbon monoxide (CO) concentrations were reduced by 74 percent.
- Lead dropped 96 percent.

What makes these air quality improvements so extraordinary is that they occurred during a period of increasing motor vehicle use, energy production and economic growth. Between 1980 and 2005:

- Automobile miles driven each year nearly doubled (93 percent) and diesel truck miles more than doubled (112 percent);
- Tons of coal burned for electricity production increased about 61 percent; and
- The real dollar value of goods and services (gross domestic product or GDP) more than doubled (114 percent).

Air pollution of all kinds declined sharply because of cleaner motor vehicles, power plants, factories, home appliances and consumer products.

Not only are Americans unaware that air quality has improved, they also harbor fears about air pollution that are out of proportion to the minor health risks posed by today's historically low air pollution levels:

- The prevalence of asthma rose 75 percent from 1980 to 1996, and nearly doubled for children; however, air pollution cannot be the cause, since it declined at the same time asthma increased.
- Emergency room visits and hospitalizations for asthma are lowest during July and August, when ozone levels are highest.
- Reducing nationwide ozone from 2002 levels (by far the highest levels of the last six years) to the federal 8-hour ozone standard would reduce respiratory hospital admissions by 0.07 percent and asthma emergency room visits by only 0.04 percent, according to the Environmental Protection Agency (EPA) and California Air Resources Board (CARB).

Regulators, scientists and journalists have all played a role in perpetuating baseless fears. For example:

- Studies that report harm from air pollution are more likely to be published and receive press coverage than studies that do not.
- Government officials fund much of the research, and the funding is provided with the explicit intent to provide proof of harm from air pollution.
- Regulators create fear through regional air pollution alert systems, such as "code red" days; even though pollution levels are dropping, the number of warnings increases because of increasingly tighter standards.

This constant stream of alarmist studies and air pollution warnings maintains unwarranted anxiety that air pollution is causing great harm. Furthermore, omission of contrary evidence on air pollution and health is common among researchers, journalists, activists and regulators, causing claims of harm from air pollution to appear more consistent and robust than suggested by the actual weight of the scientific evidence.

None of this would matter if air pollution could be reduced for free. But reducing air pollution is costly. Attaining the federal standards will cost tens to hundreds of billions of dollars per year. These costs are ultimately paid by people in the form of higher prices, lower wages and reduced choices.

Some requirements are especially counterproductive. For example, New Source Review (NSR) requires businesses to install "state-of-the-art" pollution controls to achieve the lowest possible emission rates when they build new plants. This gives businesses an incentive to keep older, less-efficient and higher-polluting plants operating well beyond their useful lives, rather than build less-polluting new plants. NSR harms consumers by slowing the pace of pollution reductions, raising the cost of any pollution reductions that do occur, and increasing the prices of consumer goods by slowing innovation and reducing competition.

Perhaps the most harmful aspect of the air quality regulation is that it has no negative feedbacks that would slow down or stop its bureaucratic expansion. Regulators' jobs and powers depend on a public perception that air pollution is a serious and urgent problem. But regulators also fund much of the research intended to demonstrate the need for more regulation, and fund environmental groups to agitate for increases in regulators' powers. Regulators also set the level of the health standards, meaning that they get to decide when their job is finished. Naturally, it never will be. And as the standards are tightened, the number of daily air pollution "alerts" increases, even as actual air pollution levels continue to decline.

The bureaucratic incentives built into air quality regulation explain why regulators and activists work so hard to make it appear that air pollution is still a serious problem, even as air pollution has reached historic lows that have, at worst, minor effects on people's health.

Air pollution affects far fewer people, far less often and with far less severity than regulators, environmentalists, health scientists and journalists have led Americans to believe. By pursuing tiny or nonexistent health benefits at great cost, air pollution regulations are making us worse off.

Introduction

Most of what Americans "know" about air pollution is false. Polls show most Americans believe air pollution has been steady or rising during the last few decades and will worsen in the future, and is a serious threat to people's health. But these widely held views are based on myths that are demonstrably false. Air quality in America's cities is better than it has been in more than a century, despite the fact that Americans are driving more miles, using more energy, and producing and consuming more goods and services than ever.

"Air quality is improving, not getting worse."

Indeed, despite the fact that air quality has improved dramatically, government regulators are in the process of implementing much more stringent standards that are unnecessary and unattainable. In some metropolitan areas, the war on air pollution — and its associated costs, perverse incentives and lifestyle restrictions — will become a permanent fixture.

As this paper will show, air pollution affects far fewer people, far less often and with far less severity than regulators, environmentalists, health scientists and journalists have led Americans to believe. By pursuing tiny or nonexistent health benefits at great cost, air pollution regulations are making us worse off.

Myth No. 1: Air Quality Is Bad and Getting Worse

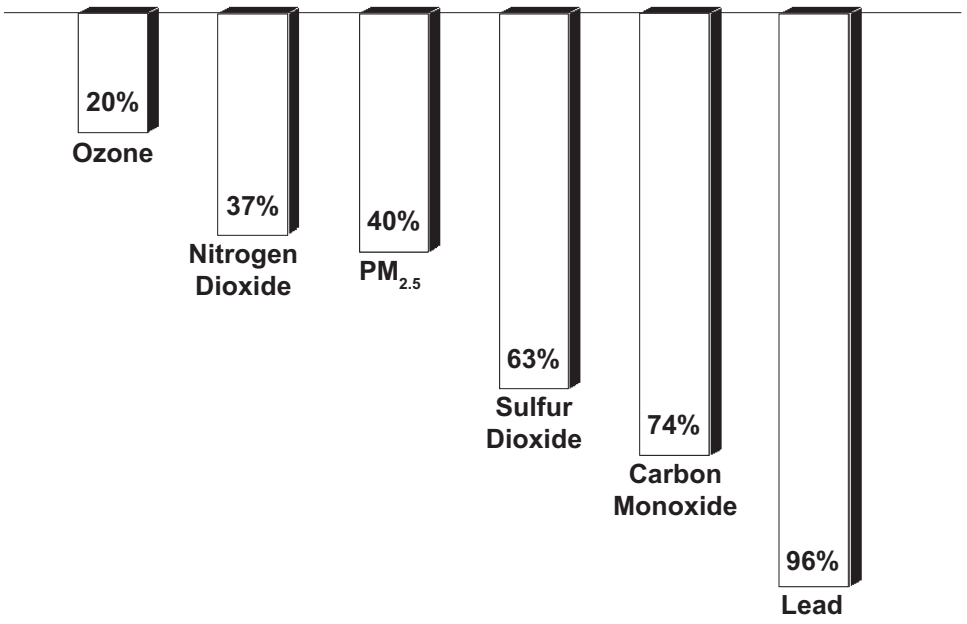
Air pollution has been declining for decades across the United States. Since the passage of the Clean Air Act in 1970, the U.S. Environmental Protection Agency (EPA) has been the federal agency charged with monitoring and regulating emissions of air pollutants. Trends for the monitored concentrations of some regulated pollutants are displayed in Figure I. [Also see the Appendix Table.][1] Note the large improvements for all of them. Between 1980 and 2005:

- Fine particulate matter ($PM_{2.5}$) declined 40 percent.
- Peak 8-hour ozone (O_3) levels declined 20 percent, and days per year exceeding the 8-hour ozone standard fell 79 percent.
- The improvement was even greater for the older, less stringent 1-hour ozone standard; peak levels dropped 28 percent and exceedances days dropped 94 percent.
- Nitrogen dioxide (NO_2) concentrations in air dropped 37 percent while sulfur dioxide (SO_2) decreased 63 percent; carbon monoxide (CO) levels dropped 74 percent; and lead declined 96 percent.

"Levels of regulated pollutants in the air have fallen dramatically."

FIGURE I

Reduction in Air Pollution Concentrations
(1980-2005)



Note: Ozone measured under the 8-hour standard.

Source: Environmental Protection Agency.

Not all pollutants have been tracked since 1980. Those that have only been monitored more recently are also declining. For instance:

- Specific components of particulate matter are also declining; for example, sulfate particulates formed from sulfur dioxide (SO_2) emissions, most of which comes from burning coal for electricity, declined 32 percent from 1989 to 2004.[2]
- EPA also recently reported that larger particulate matter — less than 10 microns in diameter (PM_{10}) — dropped 25 percent between 1990 and 2005.

As Figure II shows, total emissions also improved dramatically. Between 1980 and 2005:

- Oxides of nitrogen (NOx) emissions decreased 30 percent and SO_2 dropped 42 percent;
- Emissions of volatile organic compounds (VOCs), which are a variety of compounds regulated as pollutants, fell 47 percent;
- CO emissions were reduced by 50 percent; and
- Lead dropped 96 percent.

Meeting Federal Standards. These large pollution reductions have significantly improved compliance with federal air pollution standards for metropolitan areas:

- Virtually the entire nation meets federal standards for CO, NO_2, SO_2 and lead.[3]
- The nation is also near full compliance with the 1-hour standard for ozone and soot (PM_{10}).

Compliance has also greatly improved for the more stringent ozone and soot standards EPA adopted in 1997:

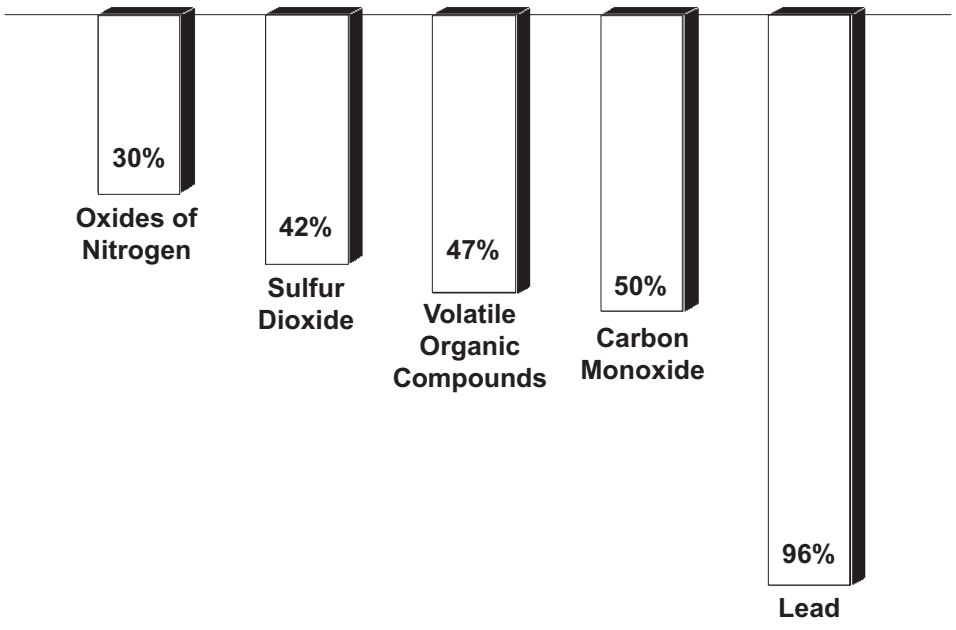
- About 75 percent of the nation's ozone monitors violated the 8-hour ozone standard in 1980, but the violation rate was 18 percent at the end of 2005.[4]
- About 90 percent of monitoring locations violated federal $PM_{2.5}$ standards in 1980, compared to only 16 percent by the end of 2005.[5]

These pollution reductions translate into corresponding decreases in the fraction of Americans living in areas that violate federal air pollution health standards.

"Emissions of regulated pollutants have also fallen."

FIGURE II

Reduction in Total Emissions
(1980-2005)

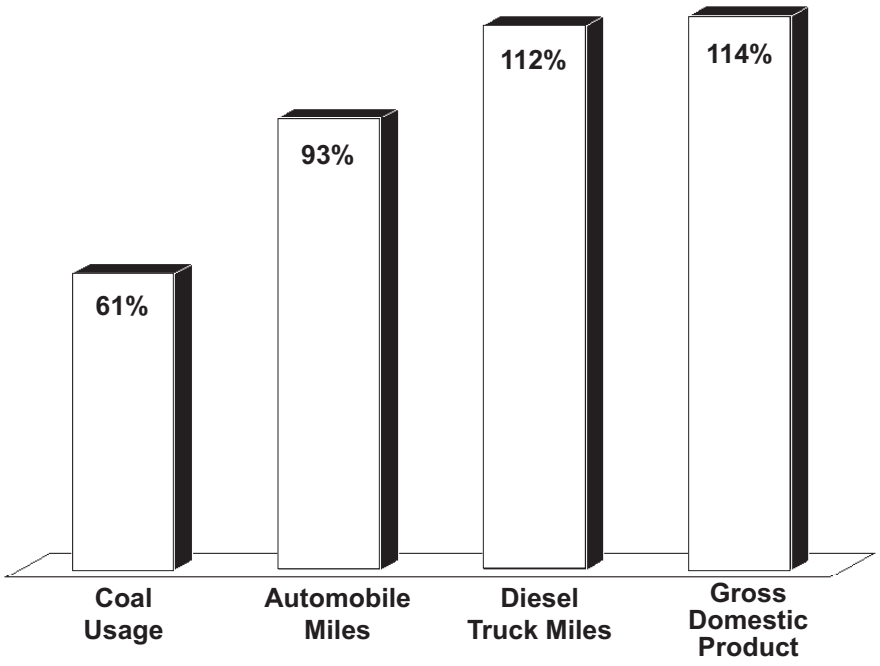


Source: Environmental Protection Agency.

"Remarkably, pollution fell while energy use rose, automobile travel increased and the economy grew."

FIGURE III

Transportion, Energy and Economic Growth
(1980-2005)



Source: Bureau of Economic Analysis, Bureau of Transportation Statistics, Environmental Protection Agency, Energy Information Administration.

Air Pollution, Transportation and Economic Growth. What makes these air quality improvements so extraordinary is that they occurred during a period of increasing motor vehicle use, energy production and economic growth. As Figure III shows, between 1980 and 2005:

- Miles driven each year nearly doubled for automobiles (93 percent), while diesel truck miles more than doubled (112 percent).
- Tons of coal burned for electricity production increased 61 percent.
- The dollar value of goods and services (gross domestic product or GDP) more than doubled (114 percent).

Nevertheless, air pollution of all kinds sharply declined because of cleaner motor vehicles, power plants, factories, home appliances and consumer products.

Automobile and Diesel Truck Emissions. On-road measurements of emissions from cars and diesel trucks show rapid improvements:

- In Pennsylvania tunnels, emissions from the average diesel truck declined 83 percent from 1973 to 1999[6] and in a San Francisco Bay Area tunnel, emissions from the average diesel truck declined at least 50 percent between 1997 and 2004.[7]

- Emissions data collected on the road and in automobile inspection programs in several cities show that average automobile emissions are declining about 10 percent per year as the fleet turns over to inherently cleaner automobiles and older models head for the scrap heap.[8]

"Emissions from SUVs, pickups and diesel trucks will continue to decline."

Pollution from vehicles will continue to decline. EPA tightened automobile emission standards in 1994, 2001 and 2004.[9] The 2004 standards require a reduction of at least 90 percent below the emissions of the average car currently on the road. Most of the benefits of this standard will not be fully realized until more than a decade from now as older cars are progressively retired. The 2004 regulations also require the same low emissions from SUVs and pickup trucks. The average automobile on the road 20 years from now will therefore be about 90 percent cleaner than the average car in use today.[10]

Growth in driving will do little to offset these per-mile emissions improvements. For example, if total driving increases 3 percent per year over the next 20 years — say, in a rapidly growing region — total miles driven would increase about 80 percent. But the net effect of an 80 percent increase in miles driven and a 90 percent decrease in per-mile emissions is an 82 percent reduction in total automobile emissions.

Emissions from on- and off-road heavy-duty diesel vehicles will also sharply decline. EPA tightened standards for new diesels several times during the last 20 years.[11] The benefits of these standards will continue to accrue as earlier models are retired. Additional standards are coming down the pike. Beginning in 2007, new diesel trucks will have to reduce NOx, soot and other emissions 90 percent below previous new-vehicle requirements.[12] Similar requirements apply to new off-road diesel vehicles and equipment starting in 2010.[13]

Industrial Emissions. Industrial emissions will also continue to decline. EPA's Clean Air Interstate Rule (CAIR) will require power plants to meet summer "ozone-season" standards for NOx year-round in 2009.[14] And compared with 2003 emissions, CAIR requires a 53 percent reduction in power plant SO_2 by 2010, a 70 percent reduction by 2020 and ultimately a 77 percent reduction.[15] Rules to reduce emissions of a variety of potentially hazardous pollutants from more than a dozen industries come into effect over the next few years.[16]

Compared with past decades, most air pollution has already been eliminated. And already-adopted requirements will eliminate most of the remaining pollution emissions.

Behind the Myth: Widespread Misinformation

While air pollution levels have declined, polls show most Americans think air pollution has stayed the same or even increased and will continue to

increase in the future.[17] The reason: Most information on air pollution from environmentalists, regulators and journalists — the public's main sources for information on the environment — is false. Here are just a few examples:

- In November 2001, the Sierra Club wrote that "smog is out of control in almost all of our major cities" — after two years of the lowest recorded levels of ozone and fine particulates ($PM_{2.5}$) nationwide.[18]
- In 2002, the Public Interest Research Group published *Darkening Skies*, which claimed $PM_{2.5}$ was increasing — near the end of a fourth consecutive record-low year for $PM_{2.5}$.[19]
- In April 2004, the *Washington Post* lamented, "Ozone pollution has declined *slightly* over the past 30 years" (emphasis added) — although, nationwide, the total number of times the 1-hour and 8-hour ozone standards were exceeded had declined 95 percent and 65 percent, respectively, since the mid-1970s.[20]
- A recent *USA Today* article claimed Americans now drive "vehicles that give off more pollution than the cars they drove in the '80s" — despite spectacular improvements in automobile emissions performance during the last few decades.[21]

Similarly, in December 2005, EPA proposed a lower 24-hour standard for fine particulates ($PM_{2.5}$) that would nearly double the number of areas violating the federal standard.[22] Yet activists and journalists created the impression that the EPA had not tightened the standard at all. "EPA proposes 'Status Quo' revisions to PM NAAQS [particulate matter standard]," claimed an American Lung Association press release.[23] According to Clean Air Watch, another environmental group, "President Bush gives early Christmas present to smokestack industries."[24] The *Atlanta Journal-Constitution* headline read, "EPA Barely Budges on Soot; Health Advice Disregarded."[25]

"Activists, regulators and journalists have falsely claimed air pollution is worse."

Furthermore, 2003 through 2005 were the three lowest ozone years on record. This should have been cause for celebration. But just the opposite occurred:

- Shortly after the 2005 ozone season ended, a press release from Clean Air Watch proclaimed, "Smog Problems Nearly Double in 2005."[26]
- Pennsylvania's Department of Environmental Protection warned, "Number of Ozone Action Days Up from Last Year."[27]
- EPA's New England regional office noted, "New England Experienced More Smog Days during Recent Summer."[28]
- Referring to 2005 ozone levels in Connecticut, a *New York Times* headline lamented, "A Hot Summer Meant More Smog."[29]

Ozone levels were indeed higher in 2005 than in 2004 — because 2005 was only the *second* lowest ozone year since the 1970s, while 2004 was the lowest. Ozone levels were so improbably low in 2004 that it would have been astounding if ozone *wasn't* higher in 2005. Nevertheless, 2005 was one of the hottest years on record, but ozone levels remained at historic lows. Opinion makers turned this success into an apparent failure.

Alarmists Coast to Coast. Journalists and activists have also created the false impression that much of the country has high levels of air pollution. During the last few years dozens of newspapers around the country have claimed their city or state has "some of the worst air pollution in the nation" or some variation of that phrase.[30] In fact, only parts of the Los Angeles metropolitan area and the San Joaquin Valley have the worst ozone or soot in the country.[31] No other area of the United States even comes close.

"The air is getting clearer in the worst areas of the country."

In one particularly embarrassing example, on May 1, 2001, five separate Associated Press (AP) stories claimed that Maryland and Connecticut each have "some of the worst smog in the country," New Jersey has "some of the nation's dirtiest air," 11 Southern cities are "among [the] nation's most polluted," and "some of the country's worst air can be found in the San Joaquin Valley."[32]

Newspapers make these "some of the worst" claims even in many areas that comply with federal ozone and/or $PM_{2.5}$ standards. These exaggerations mislead tens of millions of Americans into believing their air is far more polluted and dangerous than it really is. The lack of temporal context adds to the misperception. Someplace in the United States has to be the worst at any given time. But even in the "worst" areas of the country, air pollution is much lower now than it used to be. For example, Riverside, Calif., has the highest $PM_{2.5}$ levels in the country. But $PM_{2.5}$ in Riverside has dropped more than 50 percent since the early 1980s.[33] Ignoring and obscuring these large improvements widens the gap between public perception and actual air quality.

Myth No. 2: Air Pollution at Current Levels Is a Serious Threat to Health

Not only are Americans unaware that air quality has improved, they also harbor fears about air pollution that are out of proportion to the minor health risks posed by today's historically low air pollution levels. Regulators, scientists and journalists have all played a role in perpetuating these fears.

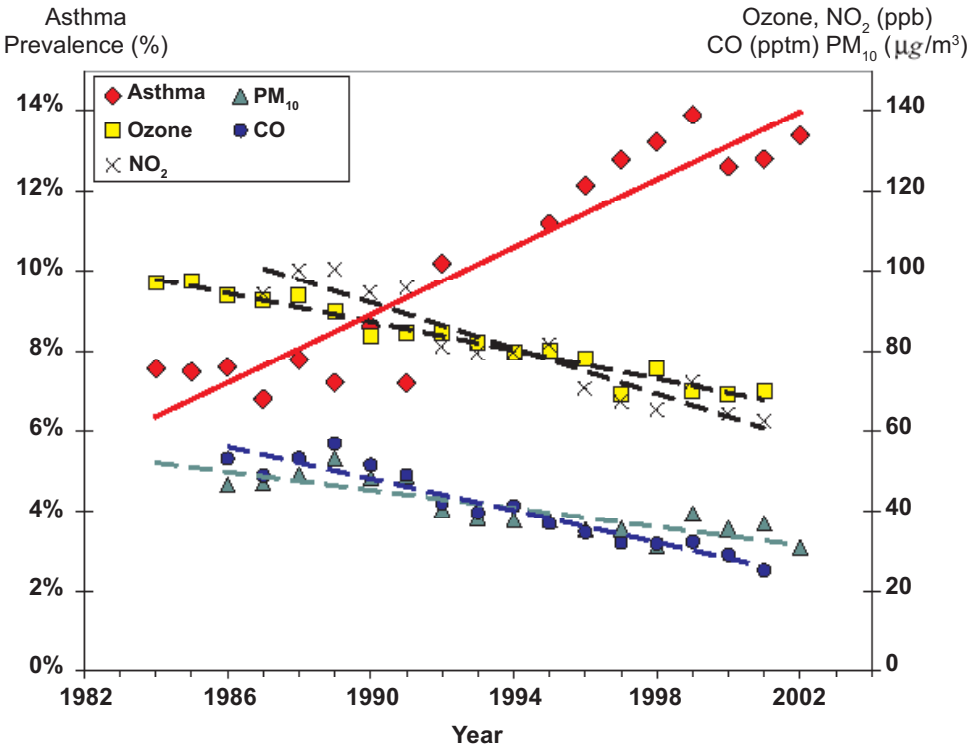
Air Pollution and Asthma. Asthma is the most conspicuous example of the extent to which the conventional wisdom on air pollution is demonstrably false. According to the Centers for Disease Control, the incidence of asthma in the United States rose 75 percent from 1980 to 1996, and nearly doubled for children. This rise in the asthma rate may have leveled off since then.[34] Researchers have proffered a number of hypotheses to account for the

rise — from increased exposure to roach allergens in urban areas to a decrease in exposure to infectious agents as a result of antibacterial cleansers and antibiotics.[35] But air pollution cannot be the cause, since it declined at the same time asthma prevalence increased. Figure IV displays trends in asthma and various air pollutants for California. The graph displays data for ozone, carbon monoxide, nitrogen dioxide and PM_{10}. While the incidence of asthma has more than doubled in California since 1982, air pollutants of all kinds have steadily declined.

"Asthma levels rose while air pollution levels declined."

FIGURE IV

Trend in Asthma Prevalence vs. Trend in Air Pollution in California



Notes: Ozone, CO, and NO_2 are the average of the top 30 daily readings for each year (ozone and CO peak 8-hour, NO_2 peak 1-hour) across all monitoring sites for the given pollutant. PM_{10} is the average of the annual-average PM_{10} readings for all monitoring sites. Only sites with data in every year throughout the time period for each pollutant were included in the analysis. Number of monitoring sites for each pollutant: NO_2=57, CO=47, Ozone=68, PM_{10}=29. Pollution declined not only on average, but at almost every individual monitoring site. The start of the time period (which ranges from 1984 to 1987) for each pollutant was chosen to maximize the number of monitoring sites included, while still overlapping the time period during which asthma prevalence rose. CO is listed in parts per ten million (pptm; divide by 10 in order to get parts per million) so that CO values fall within the same range as other pollutants. Ppb = parts per billion; $\mu g/m^3$ = micrograms per cubic meter.

Sources: "Asthma in California," California Department of Health Services, Points of Interest No. 9, May 2003; available at http://www.ehib.org/cma/papers/brfss_poi_asthma.pdf. California Air Resources Board, 2003 Air Pollution Data CD; available at http://www.arb.ca.gov/aqd/aqdcd/aqdcd.htm.

The pattern of hospital visits for asthma suggests air pollution cannot be significantly exacerbating the condition. For example, emergency room visits and hospitalizations for asthma are lowest during July and August, when ozone levels are highest.[36]

"Hospital admissions for asthma are lowest in summer, when ozone levels are highest."

Similarly, a study of California children found that while higher ozone was associated with a greater risk of developing asthma for children who played three or more team sports (8 percent of children in the study), higher ozone was also associated with a 30 percent *lower* risk of asthma among all children in the study. Other air pollutants, such as nitrogen dioxide and particulate matter, were also associated with a lower risk of developing asthma.

International data also show that air pollution is not causing asthma. Asthma rates are highest in wealthy Western countries that have relatively low air pollution levels, while developing countries with awful air pollution have low asthma rates.[37] Before 1991, for example, the former East Germany had high air pollution levels and low asthma prevalence. But after reunification East Germans adopted Western lifestyles, incomes increased and air pollution declined — but the incidence of asthma rose to levels comparable to West Germany.[38]

Pollution and Long-Term Effects on Respiratory Health. Popular portrayal and reality also diverge when it comes to the long-term effects of air pollution on respiratory health. In addition to asthma, the Children's Health Study assessed the relationship between air pollution and growth in children's lung function.[39] After following more than 1,700 children from age 10 to 18 over the years 1993 to 2001, the study reported no association between ozone and lung growth or capacity.[40] The Children's Health Study included communities with higher ozone than have ever occurred anywhere else in the country, and even the CHS communities no longer have ozone anywhere near that high. This suggests that even the worst ozone levels in the country are not affecting children's lung development.[41]

Unlike ozone, $PM_{2.5}$ actually was associated with a small effect on lung development. Living in an area with $PM_{2.5}$ concentrations two times greater than the federal standard of 15 $\mu g/m^3$ was associated with about a 1 percent to 2 percent decrease in lung capacity.[42] Thus, even particulate levels far higher than the federal standard were associated with minimal health effects. And even the areas where the study was performed no longer have $PM_{2.5}$ levels anywhere near this high.

Despite the minimal effects of air pollution, the press release from the University of Southern California researchers who conducted the study created a misleading appearance of serious harm. Titled "Smog May Cause Lifelong Lung Deficits," the press release asserted: "By age 18, the lungs of many children who grow up in smoggy areas are underdeveloped and will likely never recover."[43]

Pollution and Other Health Conditions. Although they don't publicize it, even regulators and environmental activists have quietly concluded that air pollution is a minor factor in Americans' health.

- EPA estimated that reducing nationwide ozone from 2002 levels (by far the highest ozone levels of the last six years) to the federal 8-hour standard would reduce respiratory hospital admissions by 0.07 percent and asthma emergency room visits by only 0.04 percent.[44]
- Similarly, California Air Resources Board (CARB) estimates[45] indicate that eliminating *all* human-caused ozone in the state would reduce respiratory-related hospital admissions by 0.23 percent and asthma emergency room visits by 0.35 percent.[46]
- A study commissioned by the Clean Air Task Force, an activist group, estimated that completely eliminating *all* U.S. power plant pollution would reduce serious respiratory and cardiovascular health events (e.g., hospital visits) by only 0.4 percent to 1.6 percent.[47]

Power plants contribute roughly a third of all $PM_{2.5}$ in the United States, yet even environmentalists have concluded, implicitly at least, that they are a minor contributor to respiratory and cardiovascular distress.[48]

How can CARB, EPA and environmentalists estimate that air pollution has a minor quantitative role in public health but then create an impression of widespread harm in their rhetoric? They simply don't publicize the quantitative estimates and sometimes do not even calculate them explicitly. However, their own estimates show that air pollution is responsible for at most 1 percent or 2 percent of all instances of respiratory and cardiovascular distress.[49]

"Regulators obscure evidence that air pollution has minor health effects."

Is Air Pollution Deadly? The most serious claim leveled against air pollution is that even current, historically low air pollution prematurely kills tens of thousands of Americans each year, mainly due to soot ($PM_{2.5}$), but also ozone.[50] The air in developed countries today is by far the cleanest air humans have breathed since the industrial revolution began. And urban air in developed countries today is likely the cleanest urban air humans have breathed since cities were first formed.[51] Can these low levels of air pollution really be killing tens of thousands of Americans each year? Controlled human and animal studies suggest the answer is no.

Even air pollution levels many times greater than Americans ever breathe do not kill laboratory animals. As a recent review concluded, "It remains the case that no form of ambient PM has been shown, experimentally or clinically, to cause disease or death at concentrations remotely close to U.S. ambient levels."[52]

For example, a Health Effects Institute (HEI) study exposed healthy and asthmatic human volunteers to concentrated ambient $PM_{2.5}$ collected in the

Los Angeles area and had them exercise to increase their respiration rates and therefore their pollution exposures.[53] This represents a "worst-case," real-world $PM_{2.5}$ exposure. Even in areas with the highest $PM_{2.5}$ levels in the country, peak hourly levels rarely exceed even half the level used in this study.[54]

Despite the relatively high $PM_{2.5}$ levels, there were no changes in symptoms or lung function in either the healthy or asthmatic subjects, and there was little evidence of inflammatory responses.

"Regulators ignore their own studies that find few health effects from pollution."

Another HEI study exposed both healthy and asthmatic volunteers to high levels of diesel soot for two hours while they intermittently exercised.[55] Once again, despite the high exposure, the researchers found little evidence of an inflammatory response, and the healthy subjects exhibited more evidence of inflammation than the asthmatics.

This laboratory evidence suggests that low-level air pollution does not cause premature death. The claim that air pollution prematurely kills tens of thousands of Americans each year instead rests on indirect evidence from so-called "observational" studies in which researchers look for correlations between air pollution and risk of death.

What They're Not Telling You. The small effects of air pollution estimated by government agencies are still exaggerations of the real harm from air pollution because they ignore contrary evidence. For example, researchers from Kaiser Permanente studied the relationship between air pollution and emergency room visits and hospitalizations in California's Central Valley, and reported that *higher* ozone was associated with a statistically significant *decrease* in serious health effects, such as hospital admissions.[56] CARB omitted this study from its estimate of the ostensible benefits of a tougher ozone standard.[57] Yet CARB must have been aware of the Kaiser study, because CARB funded it. EPA also did not mention the Kaiser study in its review of ozone health effects.[58]

Omission of contrary evidence on air pollution and health is common in environmental policy activism. At a March 2006 CARB board meeting, staff members gave a detailed presentation on an epidemiological study of the Los Angeles region that reported a stronger link between $PM_{2.5}$ and mortality than suggested in previous research.[59] What the CARB staff did not tell its board is that another California study concluded that $PM_{2.5}$ was having no effect on mortality.[60] Several California papers, including the *Los Angeles Times*, covered the study with alarming findings, but none covered the study that found no effects.

Three journal articles have used data from CARB's Children's Health Study to assess whether ozone is associated with increases in school absences. One study reported an increase.[61] Two reported no effect.[62] CARB cited only the first study in its recommendation to tighten California's ozone standard.[63]

Likewise, the American Lung Association's Medical Journal Watch Web site mentions only the first. Medical Journal Watch summarizes hundreds of air pollution health studies.[64] But the site omits studies and portions of studies that do not report any harm from air pollution.[65] For example, it does not mention the two studies described above, which found little or no adverse health effects in human volunteers who breathed high levels of $PM_{2.5}$ and diesel soot, respectively.

Omitting contrary results makes claims of harm from air pollution appear more consistent and robust than suggested by the actual weight of the scientific evidence.

Behind the Myth: Bad Science — The Problem with Observational Epidemiology Studies

Many studies on the health effects of air pollution a type known as "observational" studies. In observational studies, researchers might follow a large group of people from several different areas and see if there is any correlation between air pollution levels and health. Or they might look within an area for correlations between fluctuations in pollution levels and the numbers of deaths or hospital admissions over time.

"Health problems are linked to factors other than air pollution."

Confounding. Since observational studies are based on nonrandom data, they risk turning up chance correlations between air pollution and health that aren't due to air pollution at all. For example, if people who live in high-pollution cities are more likely to be overweight or smoke, the studies might attribute health effects to air pollution that were actually caused by poor health habits. This problem, called "confounding," occurs when some third factor is correlated with both health status and air pollution levels. Researchers take steps to try to control for confounding. However, experience has shown that it is generally impossible to remove all important sources of confounding.

For example, the National Morbidity, Mortality and Air Pollution Study (NMMAPS) reported that in about one-third of the 90 cities studied, higher levels of particulate matter and ozone were associated with *lower* risks of premature death.[66] How could air pollution kill people in some cities but save them in others? More likely both effects are the spurious result of uncontrolled confounding.

Another recent study showed that previous attempts to link daily air pollution fluctuations with premature deaths suffered from uncontrolled confounding due to weather. Higher temperatures in the summer are associated with higher ozone levels. But heat stress increases people's risk of death independently of air pollution levels, so inadequately accounting for weather could cause one to conclude that ozone increases mortality when in fact heat stress was the culprit. Two British researchers recently showed that accounting for

this and other previously ignored weather effects eliminates the apparent harm from both ozone and particulate matter.[67]

As the sidebar shows, findings from many medical health studies that were based on observational techniques were later shown to be the spurious result of confounding. [See the side bar "The Problem of Confounding."]

Publication Bias and Data Mining. Another challenge to the validity of air pollution health effects studies are problems known as publication bias and data mining. Publication bias refers to the tendency of researchers to seek publication of — and for journals to accept — mainly those studies that find a statistically significant effect, while not publishing studies that do not find an effect.[68]

The related problem of data mining refers to the risk that observational studies can become statistical fishing expeditions that turn up chance correlations, rather than real causal relationships. In other words, scientists tend to choose statistical models to maximize the size of the effect they "expect" or "hope" to find and are more likely to seek publication of studies that find the desired effect. This means the tendency of observational studies to give false indications of risk (or of health benefits) is not random.

If low-level air pollution really has no effect on health, publication bias and data mining would not result in equal numbers of studies reporting harmful and protective effects of air pollution. Rather, because researchers are expecting to find harmful effects, and the funding agencies (usually environmental regulatory agencies or the National Institutes of Health) provide the funding with the intention of demonstrating harm from low-level air pollution, publication bias and data mining favor false indications of harm.

Spurious Risk Estimates. Many researchers consider spurious risk estimates to be a major problem in medical and health research in general. Several new journals — the *Journal of Spurious Correlations*, the *Journal of Negative Results in Biomedicine* and the *Journal of Negative Observations in Genetic Oncology* — have been created specifically to publish negative results and expose spurious risk estimates from previous studies; more such journals are on the drawing board.[69] The problem of spurious risk estimates is especially likely when the subjects are not randomly selected and the putative risks are small — weaknesses that characterize all the observational air pollution studies EPA uses to set health standards.[70]

"Scientific journals tend to publish studies that find harm from air pollution, and reject studies that find no effect."

There are many more examples of observational studies turning up false "evidence" of harm in the form of spurious air pollution-mortality correlations. For example, EPA relied largely on an American Cancer Society (ACS) cohort study to justify its annual $PM_{2.5}$ standard. However, a reanalysis of the ACS data showed that $PM_{2.5}$ apparently kills men, but not women; those with no more than a high school degree, but not those with at least some col-

The Problem with Confounding

The implicit assumption of "observational" epidemiology studies — that is, studies based on nonrandomly selected subjects — is that after researchers have controlled for all known sources of confounding, any residual correlation between two variables, say air pollution and health, represents a genuine causal connection. Several lines of evidence show this assumption is almost certainly false.

First, experience has shown that adequately controlling for all important confounders is exceedingly difficult, if not impossible. The evidence comes not from air pollution, but from traditional medical health studies. For example, based on observational studies of hormone-replacement therapy (HRT), medical researchers concluded that not being on HRT doubled a woman's risk of developing heart disease.[1] In 1991, an influential analysis of these studies helped make HRT one of the most prescribed therapies in the United States.[2]

But more recently, randomized controlled trials, which randomly assign subjects to "treatment" and "control" groups in order to eliminate the possibility of confounding by unobserved factors that affect health, indicated that HRT does not reduce heart disease risk and might even increase risk. Similarly, other randomized controlled trials have belied much conventional medical wisdom that was based only on observational studies. For example:

- A study of nearly 49,000 women reported that following a low-fat diet for eight years did not reduce women's risk of heart disease, breast cancer or colorectal cancer.[3]
- Another randomized trial showed calcium and vitamin D supplements do not reduce women's risk of osteoporosis.[4]
- Observational studies suggested beta-carotene (Vitamin A) supplements reduce people's risk of dying from heart disease by about 30 percent; but randomized trials have reported a 12 percent increase in risk of death from beta-carotene supplements.[5]

In other words, observational studies were giving false indications of risks that were not borne out by more reliable research methods. The results of observational studies of air pollution risks should be treated with even greater skepticism, because the purported risks are much smaller and the risk of confounding therefore much greater. Yet the claim that low-level air pollution can kill, and regulators' justification for ever-tighter air pollution standards is based on the results of observational studies. A number of epidemiologists have suggested that observational studies are inherently incapable of reliably assessing the existence of small risks.[6]

[1] This discussion of the implications of HRT studies for air pollution epidemiology is summarized from S. H. Moolgavkar, "A Review and Critique of the EPA's Rationale for a Fine Particle Standard," *Regulatory Toxicology and Pharmacology,* Vol. 42, 2005, pages 123-44.

[2] M. J. Stampfer and G. A. Colditz, "Estrogen Replacement Therapy and Coronary Heart Disease: A Quantitative Assessment of the Epidemiologic Evidence," *Preventive Medicine,* Vol. 20, 1991, pages 47-63.

[3] S. A. Beresford, K. C. Johnson, C. Ritenbaugh et al., "Low-Fat Dietary Pattern and Risk of Colorectal Cancer: The Women's Health Initiative Randomized Controlled Dietary Modification Trial," *Journal of the American Medical Association*, Vol. 295, 2006, pages 643-54; B. V. Howard, L. Van Horn, J. Hsia et al., "Low-Fat Dietary Pattern and Risk of Cardiovascular Disease: The Women's Health Initiative Randomized Controlled Dietary Modification Trial," *Journal of the American Medical Association,* Vol. 295, 2006, pages 655-66; R. L. Prentice, B. Caan, R. T. Chlebowski et al., "Low-Fat Dietary Pattern and Risk of Invasive Breast Cancer: The Women's Health Initiative Randomized Controlled Dietary Modification Trial," *Journal of the American Medical Association,* Vol. 295, 2006, pages 629-42.

[4] G. Kolata, "Big Study Finds No Clear Benefit of Calcium Pills," *New York Times*, February 16, 2006.

[5] George Smith, "Reflections on the Limitations to Epidemiology," *Journal of Clinical Epidemiology*, Vol. 54, 2001, pages 325-31.

[6] J. P. Ioannidis, "Why Most Published Research Findings Are False," *PLoS Med* 2, 2005, page e124; and George Smith, "Reflections on the Limitations to Epidemiology."

lege; and those who said they were moderately active, but not the very active or the sedentary.[71] Results like these are biologically implausible and suggest a failure to adequately control for confounding by nonpollution factors.

Furthermore, when migration rates into and out of various cities over time were added to the ACS statistical model relating $PM_{2.5}$ and risk of death, the apparent effect of $PM_{2.5}$ disappeared.[72] Cities that lost population during the 1980s — Midwest "rust belt" cities — also had higher $PM_{2.5}$ levels. People left these cities, which were in economic decline, in search of work in more economically dynamic parts of the country. But people who work and have the wherewithal to migrate also tend to be healthier than the average person. Hence, what appeared to be an effect of $PM_{2.5}$ was actually the result of relatively healthier people leaving cities with higher than average pollution levels. Migration was just one of several confounding factors that diminished or erased the apparent harm from $PM_{2.5}$ but were not accounted for by the ACS researchers.

Myth No. 3: Federal Air Regulations Make Americans Better Off

"Air quality was improving for decades before the federal government became involved."

The Clean Air Act and federal regulation were not *necessary* to reduce air pollution. Air pollution has indeed sharply declined since the Clean Air Act was adopted. But regulators and environmentalists create the false impression that air pollution was on an ever-rising trajectory before the federal government stepped in to protect Americans from unrestrained capitalism and from state and local governments more interested in jobs and economic growth than their citizens' health. This self-serving picture is false. Air pollution had been dropping for decades before the federal government took over policy control in 1970. For example:

- Pittsburgh reduced particulate levels by more than 75 percent between the early 1900s and 1970.[73]
- Chicago, Cincinnati and New York all have records going back to the 1930s or 1940s showing ongoing reductions in particulate matter leading up to the Clean Air Act.[74]
- Los Angeles began reducing ozone in the 1950s, soon after skyrocketing population and automobile use created the problem; ozone has been declining ever since.[75]
- Between 1960 and 1970, total suspended particulate levels declined nearly 20 percent nationwide,[76] while average sulfur dioxide levels dropped 36 percent — nearly 60 percent in New York City.[77]

Through a combination of market forces pressing for greater energy efficiency and cleaner technologies, common law nuisance suits, and local

and state regulation, Americans were addressing air pollution decades before the federal government took over policy control. Air pollution is not unique in this respect. Other environmental problems, such as water quality, were also improving before the federal government took over.[78]

The Price of Clean Air Regulations. If air pollution could be reduced for free we could be less concerned about the validity of alarming claims of harm from low-level air pollution. But reducing air pollution is costly. Attaining the federal 8-hour ozone and annual $PM_{2.5}$ standards will cost tens to hundreds of billions of dollars per year.[79] These costs are ultimately paid by people in the form of higher prices, lower wages and reduced choices.[80] Spending more on air quality means spending less on other things that improve health, safety and welfare.

"Statistically, every $17 million in regulatory costs is associated with one additional death."

Lower Incomes — Not Pollution — Harm Health. Higher incomes are associated with improved health because people spend a portion of each additional dollar of income on things that directly or indirectly improve health and safety, such as better medical care, more crash-worthy cars and more nutritious food.[81] People made poorer by the costs of regulations do fewer of these things and are less healthy as a result.

Risk researchers estimate that every $17 million in regulatory costs induces one additional statistical death.[82] Thus, regulations are not pure risk-reduction measures, but instead inevitably impose tradeoffs between the health benefits of the regulation and the harm from the regulation's income-reducing costs. The costs of attaining EPA's current ozone and $PM_{2.5}$ standards will likely be more than a thousand dollars per year for each American household. In fact, the current ozone standard is so stringent that some areas may not be able to attain it.[83] Nevertheless, EPA recently tightened its 24-hour $PM_{2.5}$ standard and is in the process of tightening the 8-hour ozone standard, which will increase the burdens of air regulation still further. These huge expenditures will at best eliminate a tiny fraction of all disease and disability.

Prioritizing Health Measures. Even if additional air pollution reductions would confer net benefits, focusing on air pollution would still be a foolish policy because other measures would provide far greater health benefits per dollar invested. Based on an assessment of more than 500 life-saving measures in four categories — environmental pollution reduction, workplace safety, injury prevention and medical care — researchers at the Harvard School of Public Health concluded that environmental measures saved by far the fewest years of life per dollar invested.[84]

Maximizing human welfare requires targeting scarce resources in ways that generate the greatest health and welfare improvements per dollar invested. Spending money on air pollution means choosing to save fewer lives than if the same amount of money were spent in other ways.

One might argue that talking about other ways to reduce risk is irrelevant because it is not as if money is sitting around waiting to be spent on risk reductions, and air pollution is just one of many choices. People can choose to reduce air pollution or not, but if they choose not to, this does not mean the government will fund some other risk-reduction measure(s). This reasoning implicitly assumes that only publicly determined risk-reduction priorities and expenditures are legitimate. But if people are not forced to spend money to attain EPA's standards, they will have more money to spend as they see fit. People will spend these funds to improve their health, welfare and quality of life as they define it. And as a result, they will be better off than if they had been forced to spend the money on air pollution reductions that deliver tiny benefits compared to the costs imposed.

Behind the Myth: The Politics of Air Pollution Policy

Despite what are at worst minor risks from current air pollution, the EPA's war on air pollution continues unabated. Already-adopted regulations will eliminate most remaining pollution emissions during the next two decades. And EPA is in the process of adopting tougher pollution standards that will be unattainable in many areas of the country. Despite ongoing declines in air pollution, these tougher standards will be exceeded more frequently and over a wider area, increasing the number of public air pollution alerts. This will further contribute to mistaken public perceptions of worsening air pollution and serious, pervasive health risks.

"The 1970 Clean Air Act put federal bureaucrats in charge of air quality."

Federalizing Pollution Control: The Clean Air Act. How did air pollution regulation get this way? It all goes back to the nationalization of air pollution control in 1970, with the enactment of the Clean Air Act. In several key ways, the Act created a system geared toward growing the power and budgets of regulatory agencies and activist groups, rather than solving real problems by the most rapid and least costly means available.

If Congress and the president had wanted states to achieve given air pollution levels, they could simply have told states: 1) the air quality standards and the dates by which they must be achieved, 2) how attainment would be measured and 3) the penalties for failure. Given sufficiently large penalties, states would have had incentives to find effective means of meeting their obligations. Furthermore, such measures could be written on a few pages and would require few or no federal regulations.

Instead, the Clean Air Act is hundreds of pages long, and EPA has written thousands of pages of regulations to implement the requirements, along with tens of thousands of pages of guidance documents to explain what the regulations mean. States must develop their own laws and regulations to implement the federal requirements, and businesses must obtain permits to

operate. Business permits often specify operating conditions and pollution control methods unit by unit and process by process. They must be amended any time a production process changes. Legions of lawyers and consultants help businesses figure out what the rules mean and how to comply with them. The vast majority of this activity has nothing to do with reducing air pollution, but instead involves creating and then demonstrating compliance with administrative requirements. Indeed, just a few emissions requirements — mainly for motor vehicles and power plants — are responsible for most air pollution reductions achieved since the Clean Air Act was passed.[85]

State Compliance. One window into the process-focused nature of air quality regulation is the State Implementation Plan (SIP) — the centerpiece of the Clean Air Act — through which states demonstrate to EPA how they plan to reduce pollution and ultimately attain federal air standards. A SIP includes state and local air pollution officials' inventory of estimated pollution emissions from all sources in a region, a series of pollution control measures the region commits to implement, and an "attainment demonstration" — a combination of computer modeling and other analyses that purports to demonstrate that the region will attain federal pollution standards once the SIP control measures are fully implemented. Once approved by EPA, the SIP becomes legally enforceable.

"The states must satisfy federal bureaucrats, rather than improve air quality."

But despite the ostensible goal of improving air quality, it is far more important to have an EPA-approved SIP than to actually reduce air pollution or attain federal air standards. If a state fails to obtain approval for its SIP, the EPA can withhold federal highway funds and limit economic development in areas of the state violating federal standards. In contrast, if a state fails to actually clean the air or attain federal air standards, the main "consequence" is that the EPA can, and typically does, extend the attainment deadline and require the state to submit a new SIP.[86] The paper plan is more important than actual air pollution levels.

The SIP planning process is more about fulfilling administrative requirements that often have little to do with reality, rather than actually reducing air pollution. For example, the emissions inventories used in SIPs have been known since at least the late 1980s to be inaccurate and have repeatedly failed real-world validation tests.[87] EPA has since gone through three revisions of its computer model for predicting vehicle emissions; the latest version is MOBILE6. And still, real-world validation tests continue to reveal considerable discrepancies between the model and actual on-road measurements.[88]

One important discrepancy is that the model overpredicts the emissions of new cars relative to old cars.[89] This means SIPs, which must be prepared using MOBILE6, are overestimating future vehicle emissions. As a result, the SIP process may force the nation to waste perhaps tens of billions of dollars on measures to reduce phantom future vehicle emissions, while ignoring other possible sources of pollution that are not accounted for in regulators' models.

Ineffective and Counterproductive Regulations. Federal air pollution regulation also includes many ineffective or even counterproductive programs. One key example is a requirement for industrial plants called New Source Review (NSR). NSR requires businesses to install "state-of-the-art" pollution controls when they build new plants or make major modifications to existing ones.

"Perversely, regulations encourage continued use of older, more polluting power plants."

New Source Review has a number of perverse effects.[90] First, it makes new and upgraded facilities relatively more expensive than existing ones and therefore has encouraged businesses to put their research and development funds into finding ways to keep older, less-efficient and higher-polluting plants operating well beyond their useful lives. Second, all new or modified facilities are required to install state-of-the-art pollution controls, even if the facility is already comparatively low-emitting. NSR thus funnels resources into comparatively high-cost/low-benefit pollution reductions.

Power plants tend to be long-lived and are therefore a prime example of NSR's perverse incentives. For example:

- New natural gas-fired power plants — without any add-on pollution controls — emit 85 percent to 97 percent less NOx than old coal-fired plants.
- Some of the older coal-fired power plants could reduce NOx for as little as $300 per ton of pollution eliminated.[91]
- Nevertheless, NSR requires new gas plants to meet the Lowest Achievable Emission Rate at a cost of $2,500 to more than $10,000 per ton, or 8 to 33 times more than the cost of reducing the same amount of pollution from old coal-fired plants.[92]

NSR in effect requires the most expensive and inefficient pollution reductions and greatly increases the costs of building new and efficient power plants. The predictable result is that NSR has encouraged the continued operation of older coal-fired power plants and has therefore caused higher pollution levels than might have occurred under a regulatory system that treated old and new sources equally.

Protecting Special Interests. NSR has slowed progress in reducing air pollution and it is the reason why many old, high-polluting power plants are still running. Yet for environmentalists and regulators, New Source Review is a sacred cow. Why do activists and regulators love NSR and hate less expensive and more effective programs, such as "cap-and-trade" programs that place a declining cap on total emissions from a group of industrial facilities and allow them to trade pollution credits with each other? One explanation is that NSR creates a complex administrative system which confers greater power and oversight to regulators and limits private decisions by third parties. It also creates a ready-made environment for public rela-

tions campaigns and ongoing opportunities for lawsuits by environmentalists and other special interest groups. Large businesses also often find NSR to be advantageous, because it protects them from competition. Although NSR can sometimes cost existing businesses money, its more important feature is that it *protects* existing businesses from upstart competitors who would have to incur the costs of NSR in order to build a competing facility.

In contrast, under a cap-and-trade program the key political decision — how much to reduce pollution — is made up front and covers a wide range of facilities. Pollution reductions occur quietly on a predetermined schedule, driven by the incentives created by the declining cap at each facility and without the opportunity or need for micromanagement.[93]

"Special interests benefit from federal air regulations."

The much higher costs of NSR relative to cap-and-trade are also advantageous for environmentalists, since one of their goals is to make fossil fuel energy as expensive as possible. Thus, while they would never say so explicitly, NSR provides environmentalists and regulators with benefits that trump their concern for air quality. NSR is thus a triple whammy for American consumers: it slows the pace of pollution reductions, raises the cost of any pollution reductions that do occur, and increases the prices of consumer goods by slowing innovation and reducing competition.

Regulations and Programs Driven by Special Interests. There are many more examples of ineffective or counterproductive Clean Air Act programs. For example, many cities have automobile emissions inspection and maintenance (I/M) programs. A range of evidence shows they do little to reduce emissions and devote most money to testing clean cars, rather than repairing the few broken ones.[94] I/M is like trying to stop drunk driving by giving people a sobriety test once a year at the Department of Motor Vehicles. We know from on-road studies that a small fraction of all cars (mainly old and middle-aged ones) produce most pollution from cars. For example, the worst 5 percent of cars produce 50 percent of automobile VOC emissions.[95]

Although fleet turnover to 21st century automobiles will eventually mitigate this problem, emissions from the "gross polluters" could be reduced much more rapidly with an effective program to identify and either repair or scrap them. Instead of testing the whole vehicle fleet in a scheduled I/M program, the technology has existed for more than 15 years to detect emissions from each car as it passes a pollution sensor on the roadway. Car owners could be subject to fines or incentives to encourage repair or scrapping of high-polluters. But traditional I/M programs are protected by state and federal bureaucracies that oversee them, and by businesses that make money testing cars. Environmentalists also support and protect I/M programs in order to further their social agenda, because I/M programs help to make motorists feel sinful for driving their cars. Furthermore, by requiring all cars to be tested, I/M programs create the false appearance that all cars, rather than just a few gross polluters, make a significant contribution to air pollution.

Federal law also requires motorists to use gasoline that contains ethanol.[96] The requirement was implemented under the guise of improving air quality, but it actually makes air quality worse by increasing emissions of smog-forming pollutants — as well as increasing the cost of gasoline.[97] But ethanol has survived in the political marketplace because it is made from corn, and therefore has powerful Midwest agribusinesses and legislators behind it.[98]

Ineffective and counterproductive programs like I/M, NSR and ethanol harm ordinary Americans, but they are supported by special interests who gain money and/or power or who advance their ideological agendas through them.

Regulators Regulating Themselves. Perhaps the most damaging aspect of the federal administrative state is that it has no negative feedbacks that would slow down or stop its bureaucratic expansion. In fact, all the feedbacks are positive. Regulators' budgets and powers depend on a public perception that air pollution is a serious and urgent problem. But regulators are also major funders of the health research intended to demonstrate the need for more regulation.[99] Regulators decide what questions are asked, which scientists are funded to answer them and how the results are portrayed in official reports. Thus, environmental health research is not merely a dispassionate scientific enterprise, but is funded with the goal of finding credible ways of maintaining and augmenting public anxiety over air pollution. Regulators also provide millions of dollars a year to environmental groups, who then use the money to foment public fear of air pollution and to agitate for increases in regulators' powers.[100]

"The Environmental Protection Agency, and the scientists it funds, have an incentive to find the air is unhealthy; their jobs and funding depend on it."

Scientific and medical research nominally has more checks and balances than more explicitly political activities, but environmental health research suffers from its own set of pressures to exaggerate or fabricate risks. As previously discussed, studies that report harm from air pollution are more likely to be published and receive press coverage than studies that do not. Government officials fund much of the research, and the funding is provided with the explicit intent to provide evidence of harm from air pollution. Researchers who believe low-level air pollution is a serious threat and who report larger health effects are more likely to attract this research funding. Scientists who choose a career in air pollution health research are also more likely to hold an environmentalist ideology and believe air pollution is a serious problem. Indeed, many environmental health researchers have overtly associated themselves with environmental groups and causes.[101]

Regulators themselves also create fear through their regional air pollution alert systems. These are the "code red" days and "spare the air" days (promoting mass transit use) that regulators declare when they predict air pollution will exceed federal standards on a given day. This constant stream of air pollution warnings maintains anxiety that air pollution is causing great harm. And as the standards are tightened, the number of warnings actually

increases, creating a false appearance of increasing air pollution, even as actual air pollution has declined.

The Clean Air Act charges the EPA with setting air pollution health standards. But this means federal regulators are the ones who decide when their own jobs are finished. Not surprisingly, EPA has never declared the air safe and continues to tighten the standards to whatever extent is politically feasible at any given time. Congress also charges the EPA with evaluating the effectiveness of its own programs. The EPA is therefore like a company that gets to decide how much of its product customers must buy and to audit its own books.

This paper has focused on demonstrating how regulators, activists and scientists routinely provide the public and journalists with false information on air pollution levels, trends and health risks. The incentives built in to the Clean Air Act to keep people scared go a long way toward explaining this behavior.

There are other ways regulatory agencies have missions and goals that are often at odds with the interests of the people they are supposedly protecting. For example, the Clean Air Act Amendments of 1990 and the Intermodel Surface Transportation and Efficiency Act integrated air quality considerations into regional transportation planning via Metropolitan Planning Organizations (MPOs). These are the regional councils of governments that draw up transportation plans for the nation's metropolitan areas. Yet rather than a means to improve air quality, this policy linkage has largely been a pretext for implementing national anti-mobility, anti-suburb policies that are at odds with Americans' lifestyle and travel preferences.

"Regulations should solve real air quality problems rather than enhance federal power."

In fact, many activists, planners and regional transportation plans have the explicit goal of increasing road congestion in order to make driving less convenient and pleasant and to encourage people to use public transit.[102] As with other aspects of Clean Air Act regulation, EPA also funds outside organizations to help carry out these anti-mobility efforts and lobby for greater regulatory powers.[103]

Americans use automobiles for about 88 percent of all travel.[104] Efficient auto-mobility is key to people's economic prosperity and quality of life. And as shown earlier, it is clear that technology in the form of inherently clean automobiles is mitigating transportation-related air pollution without the need to restrict driving. Yet activists and urban planners have been able to hijack air quality laws as a means to override Americans' lifestyle preferences.

Conclusion

Virtually everyone would agree that we need clean air and that people have a right to be free from unreasonable risks imposed by others. But current air pollution standards are already more than stringent enough to protect peo-

ple's health. Regulatory programs are cloaked in the language of public health. But they are really about protecting and expanding the powers of federal and state regulators, creating competitive advantage for businesses that can effectively work the system, and allowing environmental activists to override people's preferences and impose their own values regarding how Americans ought to live, work and travel.

Americans need and deserve an air quality regulatory system that is narrowly tailored to solve real problems, rather than used to expand and perpetuate the power of government bureaucracies, environmental activists and other special interests. The first step to achieving this goal is more realistic public information about air pollution levels, trends and, especially, health risks, as well as greater public understanding that regulators and environmental activists are special interests in same way as other participants in regulatory policy debates, and that they often pursue policies that are at odds with the interests and values of most Americans.

"Journalists should give the public accurate information."

Journalists have so far failed to turn a critical eye on our air pollution regulatory system or to look beneath the surface of activists' and regulators' press releases. Yet among the major providers of public information on the environment, reporters are in the best position to turn the tide of misinformation on air pollution. It would be a breath of fresh air if they took up this challenge.

NOTE: Nothing written here should be construed as necessarily reflecting the views of the National Center for Policy Analysis or as an attempt to aid or hinder the passage of any bill before Congress.

Notes

[1] Here are the sources for all trend data discussed in this section: Trends for CO, NO_2, SO_2, PM_{10} and lead were downloaded from EPA at http://www.epa.gov/airtrends/ on October 8, 2006. The trend for $PM_{2.5}$ is based on a comparison of $PM_{2.5}$ measurements collected in 87 metropolitan areas from 1979 to 1984 by the Inhalable Particulate Monitoring Network (IPMN), an EPA special-study network, with data in the same locations collected from 2000 to 2005. Recent national $PM_{2.5}$ data were downloaded from EPA at http://www.epa.gov/air/data/index.html. IPMN data were retrieved from David Hinton et al., "Inhalable Particulate Network Report: Operation and Data Summary (Mass Concentrations Only), Vol. I, April 1979-December 1982," Environmental Protection Agency, 1984; David Hinton et al., "Inhalable Particulate Network Report: Data Summary (Mass Concentrations only), Vol. III, January 1983-December 1984," Environmental Protection Agency, 1986.

[2] Based on monitoring data from all continuously operated monitoring sites in the Clean Air Status and Trends Network (CASTNET) downloaded from EPA at http://www.epa.gov/castnet. Also see "Acid Rain Program: 2005 Progress Report," Environmental Protection Agency, October 2006; available at http://www.epa.gov/airmarkets/cmprpt/arp05/2005report.pdf.

[3] Compliance with federal air pollution standards is on site-by-site national monitoring data downloaded from EPA's AIRData database, EPA at http://www.epa.gov/air/data/index.html. For detailed charts showing ambient air pollution trends through 2003, see Joel Schwartz and Steven Hayward, "Air Quality in America: A Dose of Reality on Air Pollution Levels, Trends and Health Risks," American Enterprise Institute, April 28, 2004; available at http://www.aei.org/docLib/200404301_schwartzhayward.pdf.

[4] The 8-hour standard did not exist back in 1980. But since we have national ozone monitoring data for 1980 we can go back retrospectively and calculate what the violation rate would have been had the current 8-hour standard existed back then.

[5] This is based on the annual standard of 15 millionths of a gram per cubic meter ($\mu g/m^3$) and the 24-hour standard of 65 $\mu g/m^3$. EPA recently lowered the 24-hour standard to 35 $\mu g/m^3$, which will increase the fraction of monitoring sites violating the standard to about 27 percent. It is likely that nearly the entire nation would have violated this standard back in the early 1980s.

[6] Alan Gertler et al., "Measurements of Mobile Source Particulate Emissions in a Highway Tunnel," *International Journal of Vehicle Design*, Vol. 27, No. 1-4, 2002, pages 86-93; Thomas Kirchstetter et al., "Characterization of Particle and Gas Phase Pollutant Emissions from Heavy- and Light-Duty Vehicles in a California Roadway Tunnel," American Geophysical Union Fall Meeting, San Francisco, Calif., December 13-17, 2004.

[7] Thomas Kirchstetter et al., "Characterization of Particle and Gas Phase Pollutant Emissions from Heavy- and Light-Duty Vehicles in a California Roadway Tunnel," American Geophysical Union Fall Meeting, San Francisco, Calif., December 13-17, 2004.

[8] A. J. Kean, R. F. Sawyer, R. A. Harley et al., *Trends in Exhaust Emissions from In-Use California Light-Duty Vehicles, 1994-2001* (Warrendale, Penn.: Society of Automotive Engineers, 2002); S. S. Pokharel, G. A. Bishop, D. H. Stedman et al., "Emissions Reductions as a Result of Automobile Improvement," *Environmental Science and Technology,* Vol. 37, No. 22, 2003, pages 5,097-101; Joel Schwartz, *No Way Back: Why Air Pollution Will Continue to Decline* (Washington, D.C.: American Enterprise Institute, July 2003), available at http://www.aei.org/docLib/20030804_4.pdf.

[9] D. Bearden, *Air Quality and Vehicle Emission Standards: An Overview of the National Low Emission Vehicle Program and Related Issues* (Washington, D.C.: Congressional Research Service, January 4, 1999), available at http://www.ncseonline.org/nle/crsreports/air/air-23a.cfm; J. G. Calvert, J. B. Heywood, R. F. Sawyer et al., "Achieving Acceptable Air Quality: Some Reflections on Controlling Vehicle Emissions," *Science,* Vol. 261, No. 5117, July 2, 1993: pages 37-45; S. C. Davis and S. W. Siegel, *Transportation Energy Data Book: Edition 22* (Oak Ridge, Tenn.: Oak Ridge National Laboratory, September 2002), available at http://www-cta.ornl.gov/cta/data/Download22.html; Environmental Protection Agency, *Federal and California Exhaust and Evaporative Emission Standards for Light-Duty Vehicles and Light-Duty Trucks* (Washington, DC: February 2000), available at http://www.epa.gov/otaq/cert/veh-cert/b00001.pdf.

[10] Joel Schwartz, *No Way Back*.

[11] "Health Assessment Document for Diesel Engine Exhaust," Environmental Protection Agency, May 2002; "Final Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines," Environmental Protection Agency, May 2004; available at http://www.epa.gov/nonroad-diesel/2004fr/420r04007.pdf.

[12] "Regulatory Announcement: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements," Environmental Protection Agency, December 2000; available at http://www.epa.gov/otaq/highway-diesel/regs/f00057.pdf.

[13] "Final Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines," Environmental Protection Agency,

May 2004.

[14] The "ozone season" means May through September. Ozone formation requires sunlight, and ozone levels are highest during the summer and very low during the winter. Thus, NOx reductions to reduce ozone are focused on the warmer months. See "Charts and Tables for Final Clean Air Interstate Rule," Environmental Protection Agency, March 2005; available at http://www.epa.gov/cair/charts.html.

[15] Ibid.

[16] For the industrial emission reduction requirements, see EPA's Air Toxics Web site at http://www.epa.gov/ttn/atw/mactfnlalph.html.

[17] "Survey of Air Pollution Perceptions: Final Report," Foundation for Clear Air Progress, January 2002; available at http://www.cleanairprogress.org/news/quorum_res_01_14_02.asp; "Clean Air National Survey Results," Foundation for Clean Air Progress, August 2004; available at http://www.cleanairprogress.org/news/quorum_res_01_14_02.asp; Jonathan Rauch, "America Celebrates Earth Day 1970 — for the 31st Time," *National Journal*, Vol. 32, No. 4, April 2000; "The Nation's Worries," Washington Post Poll, November 1999.

[18] "Clearing the Air with Transit Spending," Sierra Club, November 2001.

[19] "Darkening Skies: Trends toward Increasing Power Plant Emissions," Public Interest Research Group, April 2002.

[20] D'Vera Cohn, "Particles as Well as Ozone Foul Region's Air; Lung Association Report Ranks Areas among Worst in U.S.," *Washington Post*, April 29, 2004.

[21] Traci Watson, "Smoggy Skies Persist Despite Decade of Work," *USA Today*, October 16, 2003.

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[38] Joachim Heinrich et al., "Trends in Prevalence of Atopic Diseases and Allergic Sensitization in Children in Eastern Germany," *European Respiratory Journal*, Vol. 19, 2002, pages 1,040-46; Joachim Heinrich et al., "Is the Prevalence of Atopic Diseases in East and West Germany Already Converging?" *European Journal of Epidemiology*, Vol. 14, No. 3, April 1998, pages 239-45.

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[41] Unfortunately, this has not stopped environmental groups from claiming otherwise. For example, in "Impacts of Ozone on Our Health," the Carolinas Clean Air Coalition claims, "Children have a 10 percent decrease in lung function growth when they grow up in more polluted air." See "Impacts of Ozone on Our Health," Carolinas Clean Air Coalition, undated; available at http://003af56.netsolhost.com/Air%20Basics/ozone_impact.htm.

[42] As measured by the volume of air a person can blow out in the first second of an exhalation after a full breath when blowing as hard as he or she can, and based on the total volume of air a person can blow out during an entire exhalation when blowing as hard as he or she can. These are standard measures in lung-function tests.

[43] Alicia Di Rado, "Smog May Cause Lifelong Lung Deficits," *USC Today*, September 8, 2004; available at http://www.usc.edu/uscnews/stories/10495.html.

[44] This analysis assumes that there are no health benefits from additional ozone reductions once the standard is achieved. If benefits continue to accrue as pollution drops below the level of the standard, then total benefits would be as much as five times greater than the values in the text. Bryan Hubbell et al., "Health-Related Benefits of Attaining the 8-Hr Ozone Standard," *Environmental Health Perspectives*, Vol. 113, 2005, pages 73-82; Joel Schwartz, "Rethinking the California Air Resources Board's Ozone Standards," American Enterprise Institute, Working Paper No. 116, September 12, 2005; available at http://www.aei.org/doclib/20050912_Schwartzwhitepaper.pdf.

[45] "Review of the California Ambient Air Quality Standard for Ozone," California Air Resources Board, March 2005; available at http://www.arb.ca.gov/research/aaqs/ozone-rs/ozone-final/ozone-final.htm.

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[50] "Breath-Taking: Premature Mortality Due to Particulate Air Pollution in 239 American Cities," National Resources Defense Council, May 1996; available at http://www.nrdc.org/air/pollution/bt/btinx.asp; Richard Wilson and John Spengler, *Particles in Our Air: Concentrations and Health Effects* (Cambridge, Mass.: Harvard University Press, 1996); Michelle Bell, Francesca Dominici and John Samet, "A Meta-Analysis of Time-Series Studies of Ozone and Mortality with Comparison to the National Morbidity, Mortality, and Air Pollution Study," *Epidemiology,* Vol. 16, No. 4, 2005, pages 436-45.

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[52] Laura Green and Sarah Armstrong, "Particulate Matter in Ambient Air and Mortality: Toxicologic Perspectives," *Regulatory Toxicology and Pharmacology,* Vol. 38, No. 3, December 2003, pages 326-35.

[53] Henry Gong, Jr., Constantinos Sioutas and William S. Linn, "Controlled Exposures of Healthy and Asthmatic Volunteers to Concentrated Ambient Particles in Metropolitan Los Angeles," Health Effects Institute, Research Report No. 118, 2003, pages 1-36; discussion 37-47.

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[102] For general examples, see Steve Inskeep, "Commuting IV: All Things Considered," National Public Radio, May 30, 1997; available at http://www.npr.org/templates/story/story.php?storyId=1039432; and Randal O'Toole, *The Vanishing Automobile* (Bandon, Ore.: Thoreau Institute, 2000), pages 260-61. Additional examples of environmental and smart growth activists promoting increased road congestion include the following: Dom Nozzi, "Traffic Congestion: Friend or Foe?" Walkable Streets, undated, at http://www.walkablestreets.com ["It is a serious strategic blunder for sprawl-busters and other community and environmental advocates to oppose traffic congestion"]; "Fewer Marylanders Using Mass Transit," *Montgomery Journal*, June 4, 2002 ["My hope is that it will get so congested that people will want to invest in public transit," Marie Howland, Professor of Urban Studies, University of Maryland]; "The Automobile and the Environment: MIT Conference Addresses the Costs of Congestion and Looks for Solutions," MIT Center for Environmental Initiatives Newsletter, June 1999, page 7; available at http://lfee.mit.edu/public/CEI_Newsletter_V1N4.pdf ["Mr. Michael Replogle of the Environmental Defense Fund argued that from an environmental point of view, reducing traffic congestion can be counterproductive"]; Michael A. Replogle, "Minority Statement of Michael A. Replogle," in *Expanding Metropolitan Highways: Implications for Air Quality and Energy Use — Special Report 245,* (Washington, D.C.: National Academies Press, 1995), Appendix E, page 358; available at http://www.

nap.edu/books/0309061075/html ["Limiting further highway capacity expansion, reducing highway capacity, and calming traffic (especially in central areas) can be effective strategies for reducing energy use, air pollution, and other environmental problems"].

[103] "Smart-Growth Funding Resources Guide," Environmental Protection Agency and Smart Growth Network, June 2001; available at http://www.smartgrowth.org/pdf/funding_resources.pdf; "Technical Assistance Programs Offered by the Smart Growth Network," Smart Growth Network, July 2006 (revised edition); available at http://www.smartgrowth.org/pdf/SGN_TA_JulyRevision2006.pdf; Randal O'Toole, "EPA Funds Anti-Sprawl Critics with Tax Dollars," Cato Institute, Daily Commentary, February 25, 2000; available at http://www.cato.org/dailys/02-25-00.html.

[104] Americans are not unique in favoring automobiles and suburbs. Europeans use automobiles for 78 percent of all travel. Most Europeans also live in suburbs and nearly all new development in the West is suburban-style development. "National Transportation Statistics 2004," U.S. Department of Transportation, Bureau of Transportation Statistics, January 2005; available at http://www.bts.gov/publications/national_transportation_statistics/2004/index.html; "Panorama of Transport: Statistical Overview of Transport in the European Union, Part 2," European Commission, 2003; available at http://epp.eurostat.cec.eu.int/cache/ITY_OFFPUB/KS-DA-04-001-2/EN/KS-DA-04-001-2-EN.PDF. For population living in suburbs and central cities, see Wendell Cox Consulting, "High-Income World Metropolitan Areas: Core City and Suburban Population Trends," Demographia, June 29, 2004; available at http://www.demographia.com/db-highmetro.htm.

APPENDIX TABLE

Trends in Ambient Levels and Total Emissions of Various Air Pollutants, 1980-2005

Pollutant	Monitored Change in Average Ambient Concentrations	Estimated Change in Total Emissions
Carbon Monoxide (CO)	-74%	-50%
Oxides of Nitrogen (NOx)	*	-30%
Nitrogen Dioxide (NO_2)	-37%	*
Sulfur Dioxide (SO_2)	-63%	-42%
Lead	-96%	-96%
Ozone, 8-hour	-20%	*
Ozone, 1-hour	-28%	*
$PM_{2.5}$	-40%	*
PM_{10}	-25%	-65%
VOCs	*	-47%

Notes: Ozone is not directly emitted, but rather is formed in the atmosphere through chemical reactions involving volatile organic compounds (VOCs) and NOx. The table therefore does not include values for ozone "emissions." VOC includes many different compounds and there are no ambient measurements of total or individual VOC levels that go back as far as 1980. The EPA has only measured PM_{10} since 1990. Trend data for PM_{10} are not available going back to 1980. And, between 1990 and 2005, PM_{10} declined 25 percent. EPA has not estimated $PM_{2.5}$ emissions back to 1980. However, according to EPA, between 1990 and 2005, $PM_{2.5}$ emissions declined 13 percent.

Sources: EPA, Air Emission Trends, http://www.epa.gov/airtrends/econ-emissions.html; EPA, Air Trends, http://www.epa.gov/airtrends/; David O. Hinton et al., *Inhalable Particulate Network Report: Operation and Data Summary (Mass Concentrations Only), Volume I, April 1979 — December 1982* (Research Triangle Park, N.C.: Environmental Protection Agency, 1984); and David O. Hinton et al., *Inhalable Particulate Network Report: Data Summary (Mass Concentrations Only), Volume III, January 1983 — December 1984* (Research Triangle Park, N.C.: Environmental Protection Agency, 1986); Environmental Protection Agency, Air Quality System (AQS) Data, http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqsdata.htm.

About the Author

Joel Schwartz is a visiting fellow at the American Enterprise Institute, where he studies air pollution, transportation, climate change and chemical risks. He has authored numerous studies on air pollution trends, control strategies, health effects and regulatory policy. He is currently at work on the forthcoming book *Air Quality in America*, which will be published by the AEI Press in 2007.

Before coming to AEI, Schwartz directed the Reason Public Policy Institute's Air Quality Project. He also served as Executive Officer of the California Inspection and Maintenance Review Committee, a government agency charged with evaluating California's vehicle emissions inspection program and making recommendations to the legislature and governor on program improvements. Schwartz has also worked at the RAND Corporation, the South Coast Air Quality Management District and the Coalition for Clean Air.

Schwartz holds bachelor's degree in chemistry from Cornell University and a master's degree in planetary science from the California Institute of Technology. He was a German Marshall Fund fellow in 1993, during which he studied European approaches to transportation and air quality policy.

About the NCPA

The NCPA was established in 1983 as a nonprofit, nonpartisan public policy research institute. Its mission is to seek innovative private sector solutions to public policy problems.

The center is probably best known for developing the concept of Medical Savings Accounts (MSAs), now known as Health Savings Accounts (HSAs). The *Wall Street Journal* and *National Journal* called NCPA President John C. Goodman "the father of Medical Savings Accounts." Sen. Phil Gramm said MSAs are "the only original idea in health policy in more than a decade." Congress approved a pilot MSA program for small businesses and the self-employed in 1996 and voted in 1997 to allow Medicare beneficiaries to have MSAs. A June 2002 IRS ruling frees the private sector to have flexible medical savings accounts and even personal and portable insurance. A series of NCPA publications and briefings for members of Congress and the White House staff helped lead to this important ruling. In 2003, as part of Medicare reform, Congress and the President made HSAs available to all non-seniors, potentially revolutionizing the entire health care industry.

The NCPA also outlined the concept of using tax credits to encourage private health insurance. The NCPA helped formulate a bipartisan proposal in both the Senate and the House, and Dr. Goodman testified before the House Ways and Means Committee on its benefits. Dr. Goodman also helped develop a similar plan for then presidential candidate George W. Bush.

The NCPA shaped the pro-growth approach to tax policy during the 1990s. A package of tax cuts, designed by the NCPA and the U.S. Chamber of Commerce in 1991, became the core of the Contract With America in 1994. Three of the five proposals (capital gains tax cut, Roth IRA and eliminating the Social Security earnings penalty) became law. A fourth proposal — rolling back the tax on Social Security benefits — passed the House of Representatives in summer 2002.

The NCPA's proposal for an across-the-board tax cut became the focal point of the pro-growth approach to tax cuts and the centerpiece of President Bush's tax cut proposal. The repeal by Congress of the death tax and marriage penalty in the 2001 tax cut bill reflects the continued work of the NCPA.

Entitlement reform is another important area. With a grant from the NCPA, economists at Texas A&M University developed a model to evaluate the future of Social Security and Medicare. This work is under the direction of Texas A&M Professor Thomas R. Saving, who was appointed a Social Security and Medicare Trustee. Our online Social Security calculator, found on the NCPA's Social Security reform Internet site (www.TeamNCPA.org), allows visitors to discover their expected taxes and benefits and how much they would have accumulated had their taxes been invested privately.

Team NCPA is an innovative national volunteer network to educate average Americans about the problems with the current Social Security system and the benefits of personal retirement accounts.

In the 1980s, the NCPA was the first public policy institute to publish a report card on public schools, based on results of student achievement exams. We also measured the efficiency of Texas school districts. Subsequently, the NCPA pioneered the concept of education tax credits to promote competition and choice through the tax system. To bring the best ideas on school choice to the forefront, the NCPA and Children First America published an *Education Agenda* for the new Bush administration,

policy makers, congressional staffs and the media. This book provides policy makers with a road map for comprehensive reform. And a June 2002 Supreme Court ruling upheld a school voucher program in Cleveland, an idea the NCPA has endorsed and promoted for years.

The NCPA's E-Team program on energy and environmental issues works closely with other think tanks to respond to misinformation and promote commonsense alternatives that promote sound science, sound economics and private property rights. A pathbreaking 2001 NCPA study showed that the costs of the Kyoto agreement to halt global warming would far exceed any benefits. The NCPA's work helped the administration realize that the treaty would be bad for America, and it has withdrawn from the treaty.

NCPA studies, ideas and experts are quoted frequently in news stories nationwide. Columns written by NCPA scholars appear regularly in national publications such as the *Wall Street Journal*, the *Washington Times*, *USA Today* and many other major-market daily newspapers, as well as on radio talk shows, television public affairs programs, and in public policy newsletters. According to media figures from Burrelle's, nearly 3 million people daily read or hear about NCPA ideas and activities somewhere in the United States.

The NCPA home page (www.ncpa.org) links visitors to the best available information, including studies produced by think tanks all over the world. Britannica.com named the ncpa.org Web site one of the best on the Internet when reviewed for quality, accuracy of content, presentation and usability.

What Others Say about the NCPA

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- TIME

"Oftentimes during policy debates among staff, a smart young staffer will step up and say, 'I got this piece of evidence from the NCPA.' It adds intellectual thought to help shape public policy in the state of Texas."

- Then-GOV. GEORGE W. BUSH

"The [NCPA's] leadership has been instrumental in some of the fundamental changes we have had in our country."

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"The NCPA has a reputation for economic logic and common sense."

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