

Institute *for* Policy Integrity
New York University School of Law



The Price of Neglect

The Hidden Environmental & Public Health
Costs of Bad Economics

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Report No. 1
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Executive Summary

After eight years of neglect, the federal system that protects our environment, health, and safety is in dire straights. From clean air to workplace safety, from global climate change to radioactive gases in our basements: across the nation, the Bush Administration has deregulated, delayed, and dissembled—costing the American economy billions of dollars and threatening innumerable lives.

It is important for the next Administration to learn the right lessons from these failures. The Bush Administration came into office ostensibly committed to using cost-benefit analysis and economic principles to forge a smarter regulatory system. However, that commitment was both short-lived and shallow. Instead, we have seen blatant disregard for economic and scientific data, and a paralyzed regulatory system, not a smarter one. The failures of the Bush Administration were not caused by an overuse of economics, but rather because economics was not used enough.

Some regulatory failures lead to spectacular consequences, like the meltdown of the financial system experienced this fall. Others are hidden, diffused across a broad population, taking place largely outside of the media spotlight. This report focuses on those hidden costs of poor regulation.

The following pages identify and discuss a handful of examples of regulatory failures that have imposed enormous costs on the American public. These examples are illuminative, not exhaustive. A complete catalogue of all of the risks ignored or downplayed by the Bush Administration is beyond the scope of this report. However, these examples provide insight into both the price of neglect and how the next Administration can avoid repeating the mistakes of the past:

- In an unprecedented move, the Administrator of the Environmental Protection Agency (EPA) rejected the advice of an independent scientific advisory committee, which had recommended raising air quality standards for particulate matter. EPA failed to consider the possible health benefits of stronger restrictions, including the prevention of premature deaths, bronchitis, and asthma-related complications. Since 2006, this weak EPA standard has cost the United States approximately \$18-20 billion in expenses and 4,000 deaths.
- Without conducting any cost-benefit analyses, the Bush Administration and its allies in Congress pushed for a series of “reforms” to the National Environmental Policy

Act (NEPA). That law requires federal agencies to analyze and disclose the environmental consequences of their actions. But the Administration, with help from Congress, allowed the Forest Service, the Department of the Interior, and other agencies to exempt countless activities from NEPA scrutiny, exposing the environment to government decisions made without the benefit of thoughtful analysis or public review.

- Despite recommendations from EPA's Inspector General to adopt mandatory radon regulations, EPA has refused to regulate, contending "voluntary" measures are adequate. Each year that EPA refuses to act, an estimated 21,000 people die of lung cancer due to radon exposure in their homes and offices.
- The Occupational Safety and Health Administration (OSHA) has failed abysmally to protect workers from exposure to carcinogens like silica and beryllium. Although OSHA acknowledged long ago that its standards for both toxins are insufficient, the agency has taken little action to improve the outdated, weak exposure limits. Meanwhile, hundreds of hardworking Americans continue to die each year from preventable on-the-job exposure to carcinogens.
- It is well documented how the Administration exaggerated the scientific uncertainty around climate change in order to justify its unwillingness to regulate. Less well known is how the Administration ignored data on the sizeable economic benefits of climate change regulation. Recent analysis demonstrates that the regulation of greenhouse gases would not only help avert catastrophic climate change—it would also deliver significant direct benefits to public health and capital investments.
- EPA relaxed a Clean Air Act program called New Source Review (NSR), which requires utilities to install up-to-date pollution controls when they build new plants or "modify" old ones. Narrowing the definition of "modification," EPA allowed plants to install new upgrades without being subject to NSR's stricter pollution standards. Instead of basing this decision on scientific or economic evidence, EPA relied on industry-offered anecdotes and unsupported predictions of benefits. The result: industries can more easily continue operating old, dirty facilities, thereby imposing unknown costs on the environment.

Too often, cost-benefit analysis has been used as a means to justify decisions actually based on political or ideological grounds. Economics and cost-benefit analysis can be a neutral tool to identify and promote effective, welfare-maximizing government action. The next Administration should retake cost-benefit analysis and place it in its correct role of leading to a more rational and efficient regulatory system.

There will be many opportunities for the next President and his Administration to show its commitment to using economic principles to promote a smarter approach to regulation. On issues ranging from climate change to clean air, workplace safety to fuel-efficiency, green energy to clean water, and land use to environmental review, economic principles can be used to restart the regulatory system and achieve maximum environmental and public health benefits at minimal costs. On January 20, 2009, the next Administration will have the opportunity to turn a page of history, away from an antiregulatory ideology and toward a more rational, just, and cost-effective approach to environmental and public health regulation.

Introduction

For many decades, the idea that regulation and economic development are at odds has dominated in American politics. In the past, some held the view that all regulation is bad for the economy—that government only works well when it is shrunk down to the bare minimum. Proponents of this view have actively sought to limit government regulation whenever possible, and championed deregulatory and antiregulatory efforts directed at a variety of environmental and public health programs.

With the recent collapse of the financial sector, many Americans are taking a second look at government regulation. Alan Greenspan, long viewed as one of the strongest supporters of an unregulated marketplace, has acknowledged that inadequate regulation of the financial sector was a mistake.¹ The failure to regulate financial markets has had spectacular consequences, but in many other instances, the scaling back of regulatory efforts has had quieter, though no less significant, impacts.

The Need for Regulation

Most economists now recognize the need for intelligent government involvement in the marketplace. The unregulated market is not a perfect market: sometimes it fails to operate efficiently or fairly. In those cases, government must step in to ensure the economic system continues to run smoothly. Without regulation, inefficiencies and injustices in the marketplace will fester, subverting overall well-being. Though government intervention has its costs, economists can help inform public policy by identifying market failures early, before they become pervasive or irreversible, and by designing fixes that minimize costs and maximize social welfare.

There are several types of market failures that justify government policy. Certain types of public goods will not be adequately provided by private actors. For example, once a country has established a military and secured its borders from foreign invasion, there is no way to exclude anyone within that country from enjoying the benefits of national defense. Therefore, there is inadequate private incentive to provide for national defense, and the government must step in.

Unregulated marketplaces also fail due to the existence of externalities. An externality is an activity of one agent (i.e., an individual or an organization like a company) that affects the well-being of another agent and occurs outside the market mechanism, i.e., the activity is not taken into account by the first agent when making some decision.² Externalities—both

positive and negative—are important because the failure to account for them can lead to distortions in making decisions and reductions in social welfare. The clearest example of a negative externality is in the pollution context. A polluter does not bear the costs that it imposes on the public, and without regulation there would be excessive pollution because there would be no economic or legal incentive to reduce emissions.

There are other potential market failures beyond the generation of public goods and traditional externalities. Inadequate information, limits to how people process information, and transition costs in responding to new economic conditions: all can lead to economically inefficient outcomes. Where these failures exist, there is the potential for beneficial government action.

The key is to ensure that when government acts, it is doing so effectively and efficiently. If the existence of a market failure is replaced with an equal or greater government failure, little has been gained.

Federal Agencies

While Congress often is first to identify areas where government action is needed, the task of designing and implementing environmental, health, and safety laws falls to the federal agencies. They are charged with translating the frequently vague dictates of Congress into real policy.

We rely on federal agencies for several reasons. Perhaps most importantly, federal agencies can employ staff with the expertise needed to carry out complex regulatory programs. To develop smart regulations, agencies must draw on a team of scientists and experts from a variety of disciplines—from ecology to toxicology to economics. Agencies must also be able to identify technical engineering solutions and anticipate how regulation will affect the economy. Congress is usually in a poor position to make these complex and technical decisions, so it delegates this authority to agencies.

The large amount of power delegated to federal agencies raises concerns about democratic accountability. Bureaucrats issue the decrees that shape our lives from deep within the labyrinthine halls of government, often sheltered from scrutiny by the press and public: how can we be sure that they answer to the American people? Given the large amounts of control, autonomy, and privacy that agencies enjoy, there is a persistent concern that delegating too much power to agencies undermines the democratic system. One check on agency power is that agency experts are accountable to the standards of their professions: they cannot make decisions willy-nilly, but rather must employ the language of science and economics to justify their choices.

Cost-Benefit Analysis

Under executive orders that have been in place for nearly 30 years, federal agencies must conduct a cost-benefit analysis of most major rules to ensure that agency decisions are made according to the basic economic tenet that policy should maximize net benefits.

The current Executive Order, put in place by President Clinton (and which has remained in effect with only minor revisions) mandates that all agency decisions concerning “the need for, and consequences of” proposed regulations must be based on “the best reasonably

obtainable scientific, technical, [and] economic . . . information.”³ The Order prescribes additional requirements for any “significant regulatory action,” including rules that may have “an annual effect on the economy of \$100 million or more.”⁴ For such rules, agencies must submit “[a]n assessment of the potential costs and benefits of the regulatory action” for White House approval.⁵ Agencies conduct a preliminary assessment to determine whether the \$100 million threshold is met, triggering the requirement for detailed economic analysis.⁶

Cost-benefit analysis, with its reliance on economic principles and scientific inputs, helps translate complex policy decisions into tractable and discrete sets of issues involving, for example, the dose-response of a toxin, individuals’ preferences regarding risk, or the engineering challenges of avoiding contaminant usage. Each of these questions is complex and potentially contentious; however, cost-benefit analysis provides a generally applicable framework for identifying wealth-maximizing regulation and asking the appropriate empirical questions. While not the ultimate answer, cost-benefit analysis is an extremely useful tool both to structure agency decisionmaking and to ensure that decisions are made on the basis of data, rather than special interests or partisan politics. Cost-benefit analysis, however, is only a beneficial tool when used properly.

Bad Economics

The Bush Administration entered office ostensibly committed to the use of economic principles for decisionmaking. Unfortunately, in the past eight years, administration officials have consistently abused cost-benefit analysis in order to justify deregulation. In so doing, they have imposed enormous costs on the American public through weak or absent regulation of important environmental and public health risks. These costs were imposed not because the Bush Administration used too much economics, but rather because they did not use enough economics.

The Bush Administration has promoted its broad antiregulatory agenda by failing to conduct reasoned analysis before imposing deregulatory measures and by failing to act, even when clear scientific research and sound analysis support regulation.

These failures do not mean that economic or cost-benefit analysis itself is flawed, but that it has been used incorrectly and in biased ways. The answer for the next Administration is not to jettison cost-benefit analysis in a time of financial crisis, but rather to ensure that it is used with balance to identify areas where government action is beneficial and to design regulation in the most economical manner possible.

Failure to Think

In order for cost-benefit analysis to be useful, it must be carried out fairly. However, there are many biases in both the methodology and uses of cost-benefit analysis that tend to produce antiregulatory results. When benefits are under-counted and costs are over-counted, good regulations fail the cost-benefit test, and Americans end up with weak and watered-down regulations that do not maximize their well-being.

Unfortunately, there are many examples of abused or ignored cost-benefit analyses over the last eight years. The implicit promise to uphold professional standards has been broken, and sound science and economics have been mangled by agencies when justifying their decisions. The Bush Administration has twisted science and economics to suit a political will. In some cases, facts and data have been completely ignored.

This “failure to think” not only undercuts the legitimacy of agencies, but it has also resulted in billions of dollars of lost wealth. Good regulations are formulated when informed by the most current scientific research and cutting-edge economic analysis. When these disciplines are distorted or ignored, the American people suffer very real public health, environmental, or economic losses adding up to billions of dollars.

This section discusses several examples of regulations that fell victim to common mistakes agencies make when conducting economic analysis. These “pathologies” include: ignoring ancillary benefits; failing to collect data; ignoring scientific recommendations; regulating without a plan; and regulating at the last minute.

A. Ignoring Ancillary Benefits: Fuel Efficiency Standards

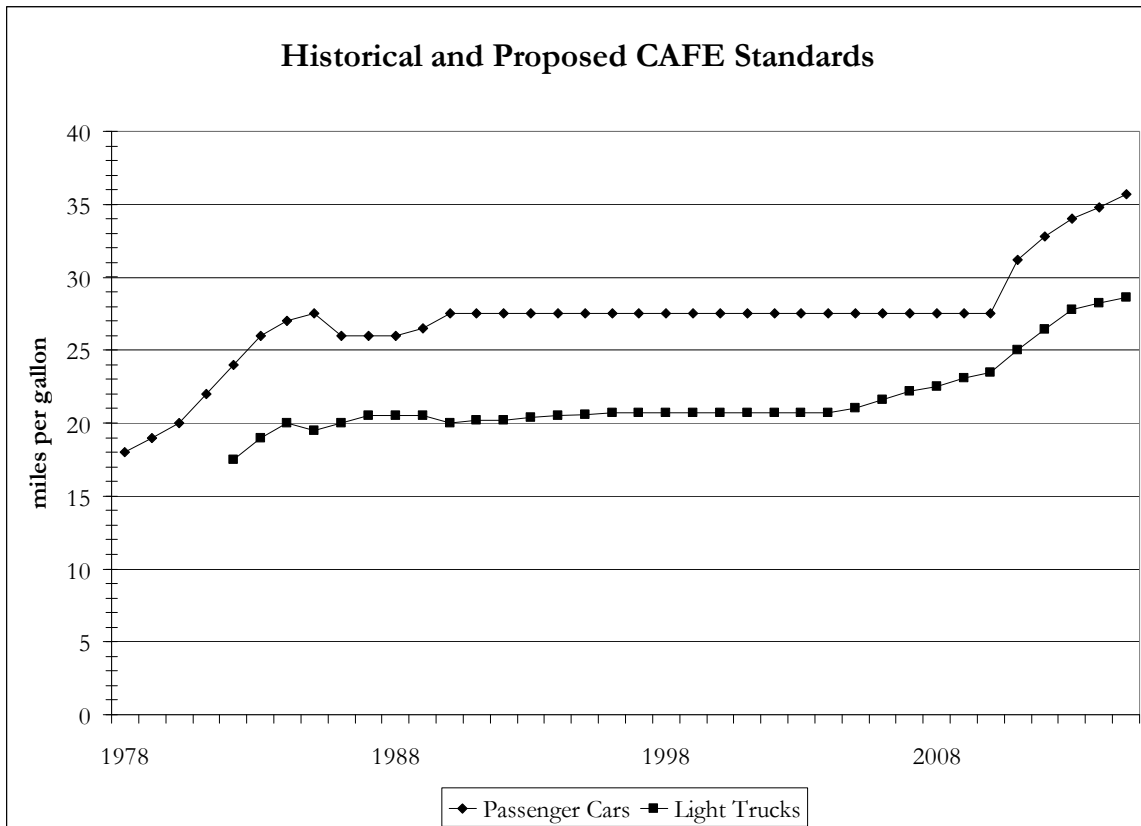
One frequent distortion of cost-benefit analysis—especially during the past eight years—is the failure to count secondary or “ancillary” benefits. Those performing cost-benefit analyses tend to look only at the unintended costs, or “countervailing risks,” without also looking at the unintended benefits. If one is biased to see regulation as bad, then the problem of countervailing risks seems intuitive, while ancillary benefits seem unlikely. When ancillary benefits are ignored, the resulting cost-benefit analysis will be imbalanced against regulation, and tremendous economic and health benefits can be overlooked.

One stark example of an agency ignoring ancillary benefits occurred in the federal government’s regulation of automotive fuel efficiency. These regulations involve a series of computations called the Corporate Average Fuel Efficiency (CAFE) standards, which set limits on maximum fuel consumption per miles travelled by automobiles.

Optimizing those standards hinges on making both accurate assumptions and precise calculations. Unfortunately, in its last two rulemakings, the government botched its economics and ignored the considerable consequences of climate change—mistakes that have resulted in severe under-regulation and that will ultimately result in billions of dollars in environmental and economic costs.

Ignoring Climate Benefits

Congress first designed fuel efficiency standards in the wake of the 1973 Middle East oil embargo, hoping to prevent a similar energy crisis from reoccurring.⁷ The goal was to “decrease dependence on foreign imports, enhance national security, achieve the efficient utilization of scarce resources, and guarantee the availability of domestic energy supplies at prices consumers can afford.”⁸ Yet, as the following chart indicates,⁹ CAFE rates barely budged over the subsequent thirty years, even while an escalating oil addiction pushed the country closer to another energy crisis.¹⁰



What Congress did not understand in 1973—but what the world now knows—is that failure to improve fuel efficiency would help precipitate a second kind of crisis: global climate change.¹¹ Transportation sources are responsible for about 29% of all greenhouse gases—the culprits behind global warming—emitted in the United States.¹² Carbon dioxide

is the principal greenhouse gas emitted by gasoline's production and use.¹³ Higher CAFE standards decrease fuel consumption per mile traveled, thereby reducing emissions and slowing the acceleration of climate change.¹⁴ CAFE standards can help delay or prevent the potentially catastrophic economic, environmental, and political consequences of climate change—but only if they are set correctly.

The National Highway Traffic Safety Administration (NHTSA) is the federal agency responsible for trying to set the correct CAFE rates.¹⁵ Long hampered by legislative freezes, administrative ideologies, technological limitations, and sheer inertia, NHTSA only recently began to nudge CAFE standards gradually higher.¹⁶ In April 2006, NHTSA finalized a rule slightly increasing rates for “light trucks” (i.e., sport utility vehicles, minivans, and pickup trucks).¹⁷

NHTSA relied on cost-benefit analysis to guide its decisions. But cost-benefit analysis is only effective when all the costs and benefits of a regulatory proposal are priced consistently and accurately. For instance, by measuring the marginal impact of the aggregate net cost of one additional ton of carbon dioxide (commonly called “the social cost of carbon”),¹⁸ the climate change benefits of reducing greenhouse gas emissions can theoretically be quantified and assigned a specific dollar value.¹⁹

However, NHTSA felt the social cost of carbon was impossible to quantify.²⁰ The agency further assumed that, even if calculable, the total climate benefits of higher CAFE standards would be negligible,²¹ and so priced the social cost of carbon at \$0 per ton.²² This undervaluation of the social costs of carbon emissions led to a corresponding undervaluation of the social *benefit* of reducing those emissions—an ancillary benefit of the regulation.

If NHTSA had used a more economically sound cost-benefit analysis that took the well-known social costs and benefits of carbon emissions and reductions into consideration, it would have issued a higher miles-per-gallon rate for light trucks.

Judicial Rebuke

Not satisfied by NHTSA's weak standards, eleven states, two cities, and four public interest organizations mounted a legal challenge, arguing in court that NHTSA's regulations were arbitrary, inadequate, and contrary to law.²³ The court agreed. In November 2007, the U.S. Court of Appeals for the Ninth Circuit ordered NHTSA to revise its light truck rule as quickly as possible, chastising the agency for disregarding the climate change implications of vehicle emissions.²⁴

“[T]he values that NHTSA assigns to benefits are critical. Yet, NHTSA assigned no value to the most significant benefit of more stringent CAFE standards: reduction in carbon emissions.”

*Ninth Circuit Court of Appeals,
Ctr. for Biological Diversity v. NHTSA*

The Ninth Circuit rejected the way NHTSA valued climate change in its cost-benefit analysis. Though estimates for the social cost of carbon vary widely, even NHTSA admitted that its \$0 valuation was unsupported, and the court observed a growing consensus that pricing each ton of carbon dioxide at \$13.60 would capture the trillions of dollars of projected climate

change costs.²⁵ Notably, NHTSA’s refusal to price carbon contrasted starkly with its willingness to quantify equally indeterminate costs and benefits, like traffic noise and energy security.²⁶

A National Academy of Sciences report—commissioned by Congress and cited heavily by NHTSA—concluded that combating climate change was the “*most* important” reason to raise CAFE standards.²⁷ Any decision ignoring such considerations was, in the court’s view, arbitrary and capricious and in violation of the Administrative Procedure Act.²⁸

The Ninth Circuit did not invalidate NHTSA’s light truck rule, instead ordering the agency to promulgate new standards, taking into consideration the costs of carbon, “as expeditiously as possible.”²⁹

Little Improvement

In May 2008, NHTSA proposed CAFE increases for all passenger cars and light trucks beginning with model year 2011.³⁰ Though NHTSA obeyed the court and placed a positive value on the social benefits of carbon reduction, serious flaws still plague the agency’s revised rulemaking.³¹

In defiance of a presidential executive order directing interagency cooperation on climate change,³² NHTSA consistently overlooked the analysis and advice of the Environmental Protection Agency (EPA),³³

each time resulting in an under-valuation of the social costs of carbon (and a corresponding under-valuation of the social benefits of carbon reduction):

“NHTSA employed misguided choices to come up with an estimate of the social cost of carbon that consistently and significantly underestimated the benefits of reducing global warming pollution.”

Environmental Defense Fund,
CARBON COUNTS (2008)

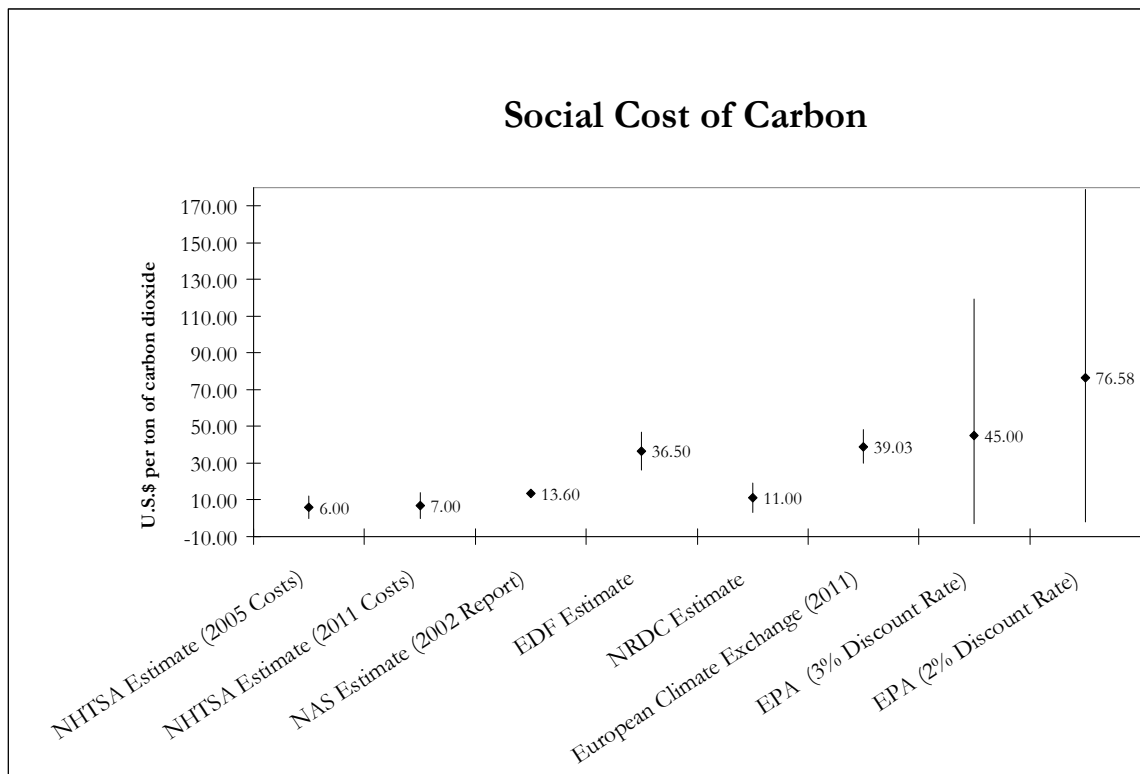
Non-Domestic Costs: NHTSA counted only climate change costs imposed directly on the United States, excluding broader global effects.³⁴ However, as EPA observed, this decision falsely assumes that Americans are unwilling to pay to avoid international damages caused by U.S. emissions and that international impacts will not produce security risks or economic disruptions felt within U.S. borders.³⁵

Non-Domestic Emissions: The gasoline for U.S. cars is largely extracted or refined in foreign countries, and all stages of fuel production emit greenhouse gases.³⁶ But NHTSA assumed that any emissions reductions from a drop in crude oil extraction or refining should not be counted if they occur overseas.³⁷ This practice flouts basic science. As EPA explained, greenhouse gases “mix well in the atmosphere regardless of location”—even if NHTSA wanted to count only domestic benefits, overseas emissions reductions produce domestic benefits.³⁸

Non-Carbon Emissions: Besides carbon dioxide, fuel production and use also emit methane, nitrous oxide, and other greenhouse gases.³⁹ EPA recommends that the effects of each individual gas should be counted separately.⁴⁰ Nevertheless, NHTSA assumed tailpipe carbon dioxide was responsible for nearly all climate change

impacts from fuel production and use, and the agency decided to ignore any other gases.⁴¹ But NHTSA's assumptions were wrong: tailpipe emissions of carbon dioxide actually account for only 78% of total climate impacts, and NHTSA mistakenly ignored other significant emissions reductions.⁴²

Pricing Carbon: NHTSA priced the marginal cost per ton of carbon dioxide at \$7.⁴³ In making this calculation, the agency got its math severely wrong,⁴⁴ made unjustified assumptions,⁴⁵ and used outdated data and economic techniques.⁴⁶ EPA's refined and updated analysis was ignored. The EPA analysis found that the average social cost of carbon was \$77.⁴⁷ EPA cautioned that even such updated figures still "are 'very likely' to be underestimated because they do not include significant impacts that have yet to be monetized."⁴⁸ That means that even a value *11 times higher* than what NHTSA chose is very likely an *underestimate*. In fact, NHTSA's estimate is lower than nearly all other published calculations of the social cost of carbon.⁴⁹



All told, after the Ninth Circuit had ordered NHTSA to give climate change full consideration, the agency instead ignored some 90% of the climate change benefits gained from higher CAFE standards.⁵⁰ It is unclear why NHTSA ignored EPA's scientific and economic recommendations on the benefits of reducing greenhouse gas emissions. Had those ancillary benefits been counted, stricter CAFE standards could have been set, which would have delivered greater climate change benefits. Roughly estimated, NHTSA's under-regulation of passenger car and light truck model years 2011–2015 may cost over \$27 billion in climate change damage.⁵¹

Further, because of design lead-times for car manufacturers, NHTSA left its old light truck rule intact for model years 2008–2010.⁵² Had the agency valued ancillary climate benefits correctly from the start, stricter CAFE standards would instead govern those three model years as well. Based on reasonable assumptions about those hypothetical rates, NHTSA’s original faulty cost-benefit analysis is responsible for generating extra carbon dioxide emissions that will cost at least \$5 billion.⁵³

In total, over \$32 billion will be lost due to NHTSA’s inability or unwillingness to calculate the true cost of carbon in its old and new rules.

B. Failing to Collect Data: New Source Review

Another distortion of economic analysis occurs when agencies fail to collect necessary data. The result is a cost-benefit analysis grounded in unnecessary and potentially inaccurate assumptions. EPA made precisely this mistake when it announced sweeping changes to its air quality control requirements in 2002 and 2003. Claiming it lacked the necessary data to conduct a proper economic analysis, EPA simply guessed at what changes were justified. Unfortunately, the agency guessed wrong and created a dangerous precedent for basing regulatory decisions on stories and wishes, rather than facts and logic.

Modifying “Modification”

In 1977, Congress amended the Clean Air Act to strengthen air quality protections, creating the need for a new program at EPA—called “New Source Review” (NSR)—which requires permits whenever new polluting facilities, like power plants, are built.⁵⁴ These permits stipulate relatively strict pollution control for new facilities as well as for old plants that undergo physical or operational “modifications.”⁵⁵ However, plants built prior to 1977 that have not been modified are governed by more lax regulations.

Because of the costs of complying with the stricter NSR regulations, and the environmental costs of not complying with them, stakeholders—EPA, regulated industries, and environmentalists—have fought over the definition of “modification” since day one of the NSR program.⁵⁶ The definition of modification determines which plants fall under the scope (and restrictions) of NSR and which do not.

Prompted by this debate, EPA began reevaluating NSR in 1992. EPA finally issued a set of revised rules in December 2002,⁵⁷ and again in October 2003.⁵⁸ One of the most important changes was a narrowing of the definition “modification” to allow old plants to install new kinds of upgrades without being subject to NSR’s stricter pollution controls.⁵⁹

EPA argued that the revisions would give industry the flexibility needed to make energy-efficiency improvements at existing facilities.⁶⁰ But environmentalists worried the changes would incentivize industry to continue operating old, dirty facilities not subject to NSR requirements, rather than upgrade to new, modified, cleaner facilities that must comply with NSR’s stricter rules.⁶¹

Relying on Stories

In the face of criticism from the environmental community, EPA stood by its determination that the revisions would decrease compliance costs, reduce administrative burdens, and even improve environmental quality—and ultimately that total benefits would justify the costs.⁶² Unfortunately, EPA refused to conduct a cost-benefit analysis of the new rules and so had no concrete data to support its claims.

As mentioned earlier, under an executive order, agencies are required to conduct a thorough cost-benefit analysis of the consequences of any “significant” regulatory action.⁶³ EPA circumvented this requirement by concluding in a preliminary assessment that the new NSR regulations would not reach the \$100 million threshold for significance.

EPA’s assessment, however, was grounded neither in economic theory nor empirical evidence. According to an investigation by the U.S. General Accounting Office (now called the Government Accountability Office) (GAO), “EPA relied primarily on anecdotal information from industry,” when making this conclusion.⁶⁴

EPA knew that relaxing NSR’s scope would allow industry to make energy-efficiency improvements at its older, dirtier plants without installing pollution controls. If industry took advantage of these new efficiencies by increasing total production or hours of operation, the result could be an increase in emissions from facilities lacking modern pollution controls. But when screening for potential economic effects, EPA used anecdotal evidence to assume that companies would not increase production after completing efficiency projects, and therefore would not increase emissions.⁶⁵ Based on those assumptions and anecdotes, EPA forecasted no emissions increase, and therefore no environmental costs, from its proposed rule changes.⁶⁶

There are in fact good reasons to believe that these changes to NSR would lead to emissions increases and, therefore, to significant environmental and public health impacts that should have been taken into account.⁶⁷ Rather than strictly incentivizing beneficial modernization—as the administration contended—the new rules also reinforced existing incentives to keep old, dirty power plants up and running.

GAO reviewed the 69 anecdotal reports submitted by industry representatives that EPA used to support its assumptions.⁶⁸ Astoundingly, only 33% of those anecdotes actually validated the assumptions and conclusions. Rather than making a reasoned determination based on the best scientific and economic information, EPA seemingly cherry-picked its justification from anecdotal reports and questionable assumptions.⁶⁹

No Data, No Excuse

EPA defended its use of anecdotes by insisting that it lacked the data to conduct a more detailed economic analysis of costs and benefits.⁷⁰ Indeed, the GAO investigation confirmed the many informational deficiencies plaguing EPA’s analysis:

EPA did not maintain comprehensive records of the number and types of facilities that obtain NSR permits;

EPA never systematically studied NSR’s economic effects;

EPA conducted no statistically valid or industry-wide survey of NSR's impacts on investment in energy-efficiency improvements;

EPA never analyzed the reduced air emissions that would be achieved after facilities install pollution controls; and

EPA never investigated the air pollution impacts after facilities implement energy-efficiency programs.⁷¹

However, when an agency has had 10 years to study an issue, it is not a valid excuse simply to claim that it lacked the time or resources to collect the data necessary to avoid shoddy rulemaking. EPA began rethinking NSR in 1992. In 1996, the agency began investigating electricity producers, petroleum refiners, and the paper industry for NSR violations.⁷² Yet in 2002, EPA could not even count how many NSR permits had been issued.⁷³ In its 2003 investigation, GAO recommended that EPA should determine what data was available and then work with state and local air quality agencies to identify ways to fill additional data needs.⁷⁴ EPA could have been doing exactly that all along.

The lack of data collected by EPA means little reliable information is available publicly either, making it difficult to calculate the ultimate costs or benefits of the rule changes.⁷⁵ By regulating in the dark, EPA has created a major incentive for old, dirty power plants to stay on line or even increase their output, and the agency has failed to gather the data needed to assess the environmental impact of its rule.

C. Ignoring Scientific Recommendations: Particulate Matter

Many of the problems that regulation seeks to tackle involve complex scientific issues: the health effects of exposure to environmental contaminants; how climate responds to greenhouse gases; potential engineering solutions for workplace safety risks. Grounding agency decisions in the most accurate and up-to-date science is essential to arriving at smart regulatory choices. Further, estimates of costs and benefits can turn out dramatically different depending on the type of science used.

However, time after time the Bush administration abused or ignored scientific information and the scientific process. A crucial task for the incoming President will be restoring science to its appropriate role in the regulatory process.

Particulate matter is a type of air pollution that has a known relationship with premature death. Under the Clean Air Act, it is the responsibility of EPA to use the best science available to set effective air pollution standards. Unfortunately, in the last round of revisions to the standards for particulate

"EPA has failed in one of its fundamental responsibilities—to protect public health."

*Janice Nolen, Assistant Vice President,
American Lung Association*

matter, EPA ignored the advice of its scientific panel, for the first time in its history. Instead, the agency set more polluter-friendly standards.

The Air We Breathe

The air we breathe is filled with fine particles, called particulate matter or “PM.” PM is a complex mixture of extremely tiny particles and liquids suspended in the air.⁷⁶ The smallest of these particles, those with diameters less than 2.5 micrometers (about 1/30 the diameter of a human hair), are called fine particulate matter, or PM_{2.5}.⁷⁷ Smokestacks, fires, and vehicle tailpipes emit the various acids and chemicals that make up PM_{2.5}.⁷⁸

These fine particles are small enough that they can travel deep into human lungs, reaching the bronchial and alveolar regions; they can even slip directly into the bloodstream.⁷⁹ The small size of the particles allows them to hang in the air and be transported to areas far from where they were generated.⁸⁰

Effects on Our Health

The health risks from the long-term inhalation and deposition of PM are severe: impaired respiratory function, altered cardiovascular function, and premature death.⁸¹ The increased health risks experienced by individuals exposed to elevated PM_{2.5} concentrations are comparable to those expected for a non-smoker who lives with a smoker.⁸² Exposure to an additional 10 µg/m³ of fine particles causes a 16–17% increase in the total risk of mortality and a 12–28% increase in the risk of cardiovascular-related mortality.⁸³

Currently, over 60 million people, or approximately one in five Americans, live in areas with unsafe levels of fine particulate matter.⁸⁴

Regulating PM

EPA first began regulating particulate matter in 1971, but did not issue air standards until 1997.⁸⁵ Standards are set under the Clean Air Act to protect public health and welfare, including sensitive populations.⁸⁶ For fine particulate matter, EPA sets standards for both daily and annual limits.⁸⁷ The Clean Air Act does not require that these standards achieve a zero risk level but rather that they sufficiently protect human health with an adequate margin of safety.⁸⁸

Under the Clean Air Act, EPA’s standards are reviewed every five years and revised as needed. To assist in the setting of air quality standards, EPA appoints an independent scientific committee called the Clean Air Scientific Advisory Committee (CASAC) to review the latest scientific evidence and provide recommendations based on the best available science.⁸⁹ The committee’s role is purely advisory, and the Administrator of EPA makes the final selection of all air quality standards.⁹⁰

Failing to Heed Scientific Advice

In 2005, CASAC’s PM panel completed an extensive review of all the available scientific evidence and concluded that “clear and convincing” new health studies dictated that more stringent limits on PM_{2.5} were necessary to ensure an adequate margin of safety for human

health.⁹¹ Specifically, CASAC recommended the adoption of a daily standard of 30–35 $\mu\text{g}/\text{m}^3$ (micrograms per cubic meter) and an annual standard of 13–14 $\mu\text{g}/\text{m}^3$.⁹²

In 2006, EPA Administrator Stephen Johnson accepted CASAC's advice in part and lowered the daily $\text{PM}_{2.5}$ level to 35 $\mu\text{g}/\text{m}^3$,⁹³ but rejected the advice of the scientific advisory committee on the annual standard, deciding instead to retain the previous level of 15 $\mu\text{g}/\text{m}^3$ that was set in 1997.⁹⁴ This decision marks the first time an EPA Administrator rejected the advice of CASAC in setting an air quality standard.

Twenty of the 22 members of the CASAC PM Panel felt that maintaining the annual standard at 15 $\mu\text{g}/\text{m}^3$ did not provide an adequate margin of safety in protecting human health and that the standard would leave parts of the country at significant risk of adverse health effects.⁹⁵ The other two panel members felt that any decision within a range of 12–15 $\mu\text{g}/\text{m}^3$ —which is both above and below the majority recommendation of 13–14 $\mu\text{g}/\text{m}^3$ —was scientifically acceptable.⁹⁶

“[T]he decision to retain without change the annual $\text{PM}_{2.5}$ standard does not provide an adequate margin of safety . . . [and] leav[es] parts of the population of this country at significant risk of adverse health effects.”

Clean Air Scientific Advisory Committee

The scientific reasoning provided by Administrator Johnson in choosing the less restrictive standard focuses on only a few of the hundreds of studies reviewed by the CASAC.⁹⁷ He did not consider many important studies showing negative health effects at $\text{PM}_{2.5}$ concentrations below the current standard, including one landmark study that was dismissed simply because it was the first study of its kind.⁹⁸ Though Administrator Johnson tried to ground his decision in some scientific basis, the vast majority of independent experts disagreed with him. In fact, one of EPA's senior policy advisors for the Office of Air and Radiation, Jason Burnett, resigned from his position due to his discomfort with EPA's rejection of science in setting the PM standards.⁹⁹

The Costs of Poor Regulation

In 2006, EPA conducted a regulatory impact analysis to estimate the costs and benefits of several proposed $\text{PM}_{2.5}$ air quality standards.¹⁰⁰ Based on conservative estimates, the net benefits of the CASAC-recommended $\text{PM}_{2.5}$ standard (14 $\mu\text{g}/\text{m}^3$) outweigh the net benefits of Administrator Johnson's choice (15 $\mu\text{g}/\text{m}^3$) by \$9–10 billion (1999 dollars) per year.¹⁰¹ The majority of those net benefits are the result of preventing premature mortalities.¹⁰²

Since 2006, this weak EPA standard has already cost the United States an estimated \$18–20 billion in costs—including approximately 3,800 premature deaths, 4,000 cases of adult bronchitis, 11,400 cases of acute bronchitis in children, and 10,400 cases of asthma in children.¹⁰³ And every day this standard stays on the books, these numbers increase.

D. (DE)REGULATING WITHOUT A PLAN: NEPA EXEMPTIONS

When agencies decide to jump into the regulatory arena without an overarching strategy they can end up promulgating slipshod rules and regulations that do not work well together and end up harming environmental and public health. Before taking any action, an agency should always keep in mind its ultimate goal and its potential next steps. This, however, does not always happen.

One example of this pathology is the federal creation of exemptions to the National Environmental Policy Act (NEPA)¹⁰⁴—the first major environmental statute enacted in the 1970s.

NEPA requires federal agencies to analyze the environmental consequences of their actions. Responding to industry and agency criticism that NEPA requirements were overly burdensome, the Bush Administration, together with Congress, engaged in an *ad hoc* program to “reform” NEPA, without conducting economic analysis or developing a justifiable overarching plan. The result of this analysis-free process was the creation of “blind spots” within NEPA—with missing analysis in the reform process begetting less analysis by agencies under NEPA.

How NEPA Works

NEPA requires federal agencies to anticipate how a project is likely to affect the environment¹⁰⁵ and to inform the public in advance of likely environmental impacts.¹⁰⁶ From constructing public facilities to issuing permits for private actors, a broad range of federal activities fall under the scope of NEPA.

While NEPA requires the agency to look, it does not limit the Agency’s ability to leap. “The act dictates procedure, not results.”¹⁰⁷ Under NEPA, agencies can move forward with a project despite the potential environmental consequences, as long as they evaluate and disclose those consequences. In general, there are three levels of analysis under NEPA, depending on the likely impacts of an agency action:

Categorical Exclusion (CE or CX): When considering a “category of actions which do not individually or cumulatively have a significant effect on the human environment,”¹⁰⁸ agencies may bypass NEPA review of environmental impacts.¹⁰⁹

Environmental Assessment (EA): When it is unknown whether an action will have an environmental effect, agencies are required to conduct an EA—a limited examination of environmental impact.

Environmental Impact Statement (EIS): When considering an action likely to “significantly affect” the environment, agencies are required to conduct an EIS—a thorough examination of direct, indirect, and cumulative environmental impacts that also considers alternatives to the proposed action.¹¹⁰

Piecemeal “Reform”

Over the past decade, friends and foes of NEPA alike have suggested changes to the environmental review of federal actions.¹¹¹ Responding to these calls, both Congress and the Council on Environmental Quality (CEQ)—the White House office charged with interpreting the statute—have examined NEPA compliance.

In 2002, CEQ formed a NEPA Task Force¹¹² that developed recommendations for “Modernizing NEPA Implementation.”¹¹³ The resulting Report focused on ways that NEPA implementation could more effectively balance environmental protection and economic growth.¹¹⁴ Although the Report listed some administrative costs of NEPA compliance,¹¹⁵ it did not conduct a cost-benefit analysis.

In 2005, the U.S. House of Representatives Resources Committee convened a Task Force to “Update and Improve NEPA.” After a few months of work and a handful of hearings—and much to the alarm of environmentalists¹¹⁶—the Congressional Committee proposed substantial changes to the NEPA statute.¹¹⁷

Both sets of Tasks Forces failed to conduct thorough analyses of the costs and benefits of NEPA reforms.

Rather than thorough and thoughtful reform of NEPA, Congress and the federal agencies have basically ignored the recommendations of the task force and began scratching random blind spots into NEPA’s lens, rather than refocusing it. In no instance was a statutorily-enacted CE accompanied by a cost-benefit analysis, and the analyses accompanying agency-made CEs ignored many of the relevant costs and benefits. Below are but a few examples of these haphazard exemptions:

“Measures to exempt certain agencies and programs from NEPA, to restrict or eliminate alternatives analysis, or to limit the public’s right to participate in the NEPA process threaten NEPA’s vital role in promoting responsible government decision-making.”

*Former Chairs & Counsels of CEQ,
Letter to U.S House of Representatives,
Task Force on Improving NEPA*

*Healthy Forests Restoration Act of 2003.*¹¹⁸ This law reduced reporting requirements, curtailed judicial review, and expanded categorical exclusions for a number of Forest Service activities including “harvest of live trees not to exceed 70 acres,” “[s]alvage of dead and/or dying trees not to exceed 250 acres,” and approval of “[c]ommercial and non-commercial felling and removal of any trees necessary to control insects or disease on no more than 250 acres.”¹¹⁹ The end result was a bevy of new opportunities for timber harvests that were not reviewable under NEPA.

*Energy Policy Act of 2005.*¹²⁰ This act removed the approval of five categories of oil and gas exploration and drilling activities from the CEQ-guided NEPA rubric. It protected these activities behind a rebuttable presumption of being subject only to a CE. The exempted activities included creating a new surface disturbance on fewer than five acres, drilling a new well where drilling has occurred within the past five years, and adding new pipelines.¹²¹

Department of Interior Regulations. In 2006, the Department of the Interior exempted grazing reauthorizations from thorough NEPA review by instead requiring only CEs.¹²² The Department noted that administrative cost savings would accrue from the change, but made no mention of other benefits or costs.¹²³

Unwise Actions, Lost Opportunities

NEPA plays an extremely important role in ensuring that agencies understand the environmental consequences of their actions. Efforts to reform NEPA should be coordinated, and only grow out of serious analysis of the costs and benefits of changing how NEPA works.

The current *ad hoc* and piecemeal approach is the opposite of rational rulemaking. Congress and federal agencies have carved major federal actions out of NEPA review rather than looking closely at how NEPA can be improved to deliver greater benefits—in terms of smarter environmental decisionmaking—at lower administrative costs. Rather than smart, strategic thinking about how to reform NEPA, we have seen politics and ideological predisposition take over the debate.

E. Midnight Rulemaking: Proposed Risk Assessment Rule

The period between the election and the inauguration of a new President is often a busy time for federal regulators. A recent study found a marked increase in regulatory activity by the lame duck administration during that transition period into a new administration.¹²⁴ As Presidents prepare to leave office, there is a strong motivation to use those last few weeks to cement their legacy and leave a lasting imprint on federal regulation. Often agencies do not fully analyze the consequences of these “midnight” regulations, as they are under significant time pressure from politicians, or their appointees, to finalize the rules.

The Bush Administration’s Flip-Flop

President Bush’s Administration initially signaled that it did not intend to ratchet up the regulatory activity during its waning months. On May 9, 2008, White House Chief of Staff Joshua Bolten directed executive departments and agencies to submit by June 1, 2008, all proposed regulations they wished to finalize before the end of the Bush Administration, except in “extraordinary circumstances.”¹²⁵ This directive explicitly sought to “resist the historical tendency of administrations to increase regulatory activity in their final months.”¹²⁶ The purpose of the deadline was to ensure that agencies did not engage in ill-conceived and expedited rulemakings immediately prior to a change of administration.

Unfortunately, several federal agencies have proposed policies after the June 1 deadline.¹²⁷ Responding to inquiries from the Institute for Policy Integrity about agency disregard of the deadline, Susan Dudley—who directs the White House office responsible for reviewing federal regulations—defended late agencies proposals with the following statement:

[T]he [Bolten] Memorandum was not intended to be a moratorium on proposed regulations, and thus excludes from its terms regulations proposed after June 1, 2008 that are not finalized during this Administration. It further contemplates *some circumstances in which it would be appropriate for individual regulations to proceed without regard to deadlines if approved by [the White House Office of Information and Regulatory Affairs]*, working closely with the heads of the President's policy councils.¹²⁸

The interpretation is clear: federal agencies may propose as many last-minute regulations as they want whenever the White House thinks that circumstances are “appropriate.” The “extraordinary circumstances” test has all but disappeared, leaving the Bush Administration as free as any previous president to pass as many midnight regulations as it wants.

A particularly troublesome midnight rulemaking is one proposed by the Department of Labor (DOL) that would make sweeping changes to the way the agency treats toxic chemical risks in the workplace.¹²⁹ That rule, proposed in August 2008, was extremely controversial and prompted an outcry from the public and Congress. But DOL is pushing it through with little analysis of the potential consequences, despite the rule’s potentially large impact on public health and the economy.

Lower Protections for Workers

DOL’s subagencies, like the Occupational Safety and Health Administration (OSHA), are responsible for setting the standards for maximum exposure levels to toxic substances in the workplace. When regulating such chemicals, one crucial consideration in the risk assessment is the frequency and duration of a worker’s exposure to the health hazard. The total length of employment determines a worker’s lifetime exposure level. Currently, DOL uses a conservative assumption about how long people stay at their jobs, setting toxic substance limits based on a 45-year period of exposure.¹³⁰

The proposed regulation would change that risk assessment procedure. Instead of a uniform, conservative assumption about how long employees are in the workplace, the new rule would instruct DOL’s subagencies to use an industry-by-industry estimate of the average duration of employment.¹³¹ DOL failed to undertake an analysis of the justifications for the current conservative assumption, including the possibility that workers could move between industries, yet be subject to the same types of exposures.

The proposed rule will also add an extra step to the rulemaking process, requiring agencies to publish “advance notice” of their proposals and seek public input on *any data* used in DOL risk assessments.¹³² While providing opportunity for public participation generally adds value, the current rulemaking process already provides extensive opportunity for public comment: public hearings, multiple opportunities for written comment, and the ability to sue in federal court for parties affected by a rule. Stopping the rulemaking process repeatedly for unnecessary public comments on every choice of data inputs is unlikely to significantly improve the quality of the resulting regulations, but will almost certainly cause or exacerbate already significant delays in the regulatory process.

It is possible that the proposed regulations may end up having net social benefits, by reducing compliance expenditures without unduly compromising worker safety. However, DOL has not thoroughly analyzed the consequences of, or the need for, these changes. Until

that is done, there is no way of knowing whether this is a wise rulemaking. Before agencies act, they must think through those actions instead of making assumptions and failing to justify their decisions.

Congressional and Public Outcry

DOL has tried to push through the rule quickly and quietly, despite objections from the public, Congress, scientists, and worker's rights organizations. The rule, then in draft form, was first noticed by a former OSHA policy analyst and then by the *Washington Post* in July 2008.¹³³

The *Post* article prompted a quick response. Representatives wrote letters to DOL warning that the draft rule could dramatically slow the enactment of future health and safety regulations that protect American workers.¹³⁴ Lawmakers were so concerned over the regulation that they introduced a bill in to prevent its finalization.¹³⁵

Despite the chorus of disapproval, on August 29, 2008, the Friday before a holiday weekend, DOL formally published the proposed rule and gave the public a shortened 30-day period during which to comment.

Congressional Representatives and workers' rights organizations wrote letters to DOL asking for a public hearing and an extension of the comment period, but these requests were denied.¹³⁶

Congress held a hearing on proposed the rule,¹³⁷ during which 80 scientists and experts submitted testimony warning that the proposed regulation would hamper OSHA and other agencies from fulfilling their duties to protect workers' health.¹³⁸

“This rule represents a cynical, last-minute move coming at the end of an Administration that, with rare exception, for 7½ years has stubbornly refused to issue health rules . . . to protect workers from harm.”

*AFL-CIO
Comments to DOL on Proposed Rule*

No Cost-Benefit Analysis Required

Rules that potentially reduce compliance costs, like the proposed DOL regulation, should be fully evaluated in the same way as regulations that increase compliance, as they can be just as costly in economic terms. Simply put, less safety regulation will increase public health risks, and often these public health risks can be greater than any benefit gained by savings in compliance costs. In this way, deregulatory moves can often impose a large cost on the American public.

DOL made an end-run around the requirement to conduct a cost-benefit analysis. As mentioned earlier, agencies are required under an executive order to conduct a thorough cost-benefit analysis of the consequences of any “significant” regulatory action.¹³⁹ DOL circumvented this requirement by concluding that the new regulation would not reach the

\$100 million threshold for significance. In a practice all too common among agencies, DOL offered no rationale for its conclusion.

If DOL had performed a preliminary economic analysis, it would have realized that the rule is likely to affect the economy by \$100 million or more. Existing federal workplace safety standards govern essentially every sector of American industry and currently affect the economy by between \$34.1 billion and \$69.1 billion annually, by conservative estimates.¹⁴⁰ That means any procedural change with even a 0.3% effect on OSHA's yearly economic impact would affect the economy by \$100 million.¹⁴¹ The two important changes in risk assessment procedures contemplated in this draft regulation can be expected to have a very large overall impact on the economy, as these changes will affect how *all* future workplace toxin regulations are evaluated.

Pushing through a rule with such significant economic and public health consequences with absolutely no cost-benefit analysis is bound to lead us down the path of regulatory dysfunction.

Consequences

Because of the failure to use good science and sound economics, the Bush Administration has wasted billions of dollars, both in direct economic costs and through unnecessary public health and environmental risks. When government acts in ill-considered or uninformed ways, very real costs are imposed on the American public. Americans deserve a government that acts responsibly and uses the best tools possible when arriving at its decisions.

The next Administration will have to face down tremendous problems. Economic, environmental, and energy challenges have grown in the absence of leadership in Washington for the past eight years. The time has come for a renewed and active role for government, informed by the best information and the highest intentions to improve the well-being of the American public.

The past eight years hold many lessons for both future governments and the American people. One of the most important lessons is that government has an incredible amount of influence over people's lives, and that power can be used for good or ill. Allowing that power to remain idle in the face of very real risks is not a legitimate option.

Newly active and reinvigorated federal agencies need not mean that the approaches of the past are back in vogue. Instead, agencies can embody the innovation they hope to spur in the American economy. Where direct regulation is necessary and justified by sound science and economic analysis, government should move forward. Finding and implementing smart regulation that achieves benefits at the lowest costs is the role of our federal agencies. It is the charge of the next Administration to ensure they fill that role.

Failure to Act

Economic analysis is vital to structuring smart regulatory solutions to environmental and public health threats. Measuring the expected costs and benefits of government action helps ensure that government acts effectively to improve overall well-being, and does not create undue burdens or unjustified expenditures. Sound economic analysis and unbiased scientific evidence are the basis for smart regulation.

But effective government and smart regulation are impossible goals if officials simply fail to act in the face of important risks. For the past eight years, inaction and delay have become pervasive, essentially grinding many federal agencies to a halt. Just as too much regulation can cause economic problems, inaction can cause extremely serious consequences for the American economy and public.

The examples of inaction and delay are far too numerous to address in a single document. A fundamentally important role for the next Administration will be to identify areas where economically efficient regulations are possible and to ensure that swift responsive action is forthcoming. The following section, which touches on risk in our homes and workplaces that have been ignored for at least eight years, underscores the potential of government that is wasted through an idle approach to regulation.

A. Ignoring a Simple Solution: Radon

Radon gas is but one example of a huge public health risk that remains unregulated by the federal government for no rational reason. A naturally-occurring radioactive gas that seeps into homes and buildings from the ground, radon is colorless, odorless, and highly carcinogenic. According to the Environmental Protection Agency (EPA), radon exposure in homes and buildings causes an estimated 21,000 fatal cases of lung cancer per year—almost 60 per day.¹⁴²

The sources of radon exposure are well-known, it is easy and cheap to test for the presence of the gas, and the measures for preventing exposure are effective and fairly affordable. EPA has termed it “the health hazard with a simple solution.”¹⁴³ But that simple solution has languished.

The Silent Killer

Unlike most pollutants, there is no industrial source or human activity to blame for radon. Radon gas is released by the decay of natural elements in the earth's crust.¹⁴⁴ Any underground rock in any part of the country can emit radon gas, which can then seep through the cracked or porous floors and walls of basements and other low-lying rooms. Nearly 1 out of every 15 homes in the U.S. is estimated to have elevated radon levels.¹⁴⁵

Once inhaled, radon gas and its components can remain in the lungs long enough to release radioactive particles that harm cells and cause cancer.¹⁴⁶ Most scientists believe there is no safe exposure level for radon gas.¹⁴⁷ EPA estimates that, after cigarettes, radon is the biggest cause of lung cancer in America.

Radon is not a mysterious problem without any known solution. Cheap and reliable home testing kits are commercially available and can be sent off to laboratories for analysis.¹⁴⁸ Simply making buildings airtight by sealing foundations and drainage pipes can prevent radon exposure;¹⁴⁹ collection and ventilation systems can reduce radon concentrations by 50–90% in dwellings already suffering from exposure.¹⁵⁰ Several cost-benefit studies conducted around the globe suggest that the number of lives saved by mandatory testing and remediation would be well worth the costs.¹⁵¹

A Feeble Attempt

Despite lip service on the issue, sufficient action has not been taken. In 1988, Congress passed the Indoor Radon Abatement Act, authorizing EPA to take action to achieve a national long-term goal: eliminate all concentrated levels of radon within all buildings.¹⁵² EPA responded with a series of voluntary programs to educate the public, encourage radon testing during real estate transactions, and promote the use of radon-resistant construction techniques. EPA also set up a program to distribute grant money to assist state responses, such as the development of building codes.¹⁵³

“A lot of public health problems can't be totally solved. This one—radon—can be solved in two decades.”

*Paul Locke, Associate Professor,
Bloomberg School of Public Health,
Johns Hopkins University*

Two decades after Congress set its ambitious goal, EPA's Inspector General found that the threat of radon is actually growing: EPA's efforts have made “insufficient progress” and “every year EPA falls further behind in achieving [Congress'] long-term goal.”¹⁵⁴ Voluntary testing and mitigation cannot even keep pace with the rate of new housing construction, let alone reach existing homes, and the real estate agents and homebuilders EPA relies on for voluntary measures have little incentive to add time and costs to already lengthy constructions and sale negotiations. Moreover, state efforts and building codes are wildly inconsistent.¹⁵⁵

In short, EPA's voluntary programs are not working. Meanwhile, despite recommendations from its Inspector General to pass mandatory radon regulations, EPA stubbornly insists that Congress' goal is unreasonable, and the agency refuses to exercise its authority to regulate.

The Clock Is Ticking

Theoretically, homeowners could test for and mitigate the threat of radon on their own. However, homeowners seldom have complete information or insight into the radon risks for their specific homes, and real estate agents and homebuilders have little incentive to spend time or money educating buyers or building extra safeguards. This lack of information and incentives undermines a private sector solution to the problem. To control the dramatic public health consequences of radon, government intervention is needed and long overdue.

The cost of EPA's delay and inaction is clear. At 21,000 fatal lung cancers per year,¹⁵⁶ a total of 420,000 deaths from radon exposure have occurred since Congress first instructed EPA to solve the problem over the twenty years ago. In the case of radon, the price of neglect is too high for the country to continue to bear.

B. Paralysis at OSHA: Workplace Toxins

Just as radon remains unregulated in American homes, a number of toxins and hazards remain unregulated in the workplace, exposing our workers to health dangers.

In 1970, Congress charged the Occupational Safety and Health Administration (OSHA) with "assur[ing] so far as possible every working man and woman in the Nation safe and healthful working conditions . . ." ¹⁵⁷ OSHA bears the responsibility of transforming these vague standards set by Congress into concrete rules and regulations that actually improve workplace safety across America.

At least that is the theory. In a properly functioning system, experts at OSHA would use the best scientific, engineering, and economic information to arrive at efficient and intelligent standards, changing and updating them to reflect the most current data and the state of the marketplace.

For a variety of reasons, from understaffing to a failure of political will, many OSHA regulations have languished for decades, even when tighter standards would save thousands of lives. When OSHA ignores its congressional mandate and fails to act, workplaces become less safe and expose American workers to harmful compounds, leading to unnecessary disease and death.

OSHA's lax regulation of silica and beryllium reveal two characteristic and troubling examples of the consequences of this inaction.

Dangerous Carcinogens

Both silica and beryllium are human carcinogens that many workers are exposed to on-the-job:

Crystalline Silica: Long-term inhalation of fine crystalline silica dust can lead to severe lung diseases like silicosis (a lung disease causing inflammation and scarring in the lungs), tuberculosis, or even cancer. Crystalline silica is most commonly found in sand, glass, and concrete. It is an occupational health hazard for workers in iron and steel foundries; metal and coal mining; blasting operations (including sandblasting); paint, clay, glass, stone, and concrete manufacturing; and many construction activities. Over two million workers in the current workforce are exposed to crystalline silica dust.¹⁵⁸

Beryllium: Inhalation of beryllium dust or fumes can lead to acute beryllium disease (which resembles pneumonia), chronic beryllium disease (a debilitating and sometimes fatal condition), and lung cancer.¹⁵⁹ Beryllium is a metal used primarily to strengthen other metals, like copper. It is an occupational health hazard for those working in metal recycling, dental laboratories, alloy manufacturing, nuclear weapons production, defense industries, and metal machine shops.¹⁶⁰ At least 134,000 workers are exposed to beryllium in the United States.¹⁶¹

An Obsolete Silica Standard

In 1971, OSHA set the permissible exposure level for crystalline silica at 100 $\mu\text{g}/\text{m}^3$.¹⁶² This limit was based on a scientific recommendation issued in 1971.¹⁶³

But by 1974, the National Institute for Occupational Safety and Health (NIOSH) published new recommendations for cutting that standard in half—to 50 $\mu\text{g}/\text{m}^3$.¹⁶⁴ NIOSH found the previous level was much too high and dangerous, while the lower proposal could virtually eliminate all new cases of silicosis,¹⁶⁵ and could prevent the nearly 200 yearly deaths from silicosis.¹⁶⁶ Even OSHA admits that the original rate was based on information now “obsolete.”¹⁶⁷

Other than placing the issue on its regulatory agenda, OSHA has done little to move forward with a rulemaking to set safer levels for silica.¹⁶⁸ Instead, for the past thirty years, OSHA has tried voluntary and non-regulatory options for controlling silica. Programs such as the 1996 “Special Emphasis Program” for silica give industry more flexibility and autonomy in the hopes of achieving positive results at lower costs.¹⁶⁹

Over the past few decades, OSHA has devoted increasingly large shares of its resources and budget to voluntary programs, leaving less time and money for OSHA’s enforcement and rulemaking responsibilities.¹⁷⁰ Unfortunately, OSHA has done little to analyze whether its voluntary measures are really effective.¹⁷¹

Meanwhile, cost-effective regulations supported by science—like the lower silica standard—continue to sit on the shelf and hundreds of workers per year continue to contract diseases and die.

A “Taxicab” Beryllium Standard

Beryllium is a valuable material for testing and constructing nuclear reactors and weapons,¹⁷² and early laboratories of the U.S. Atomic Energy Commission (now the Department of Energy) regularly used the metal. In 1949, two scientists taking a taxi to one such laboratory decided they should set an exposure limit for beryllium dust, and after admittedly “flimsy” analysis in the taxi, they settled on 2 µg/m³ as a “tentative” standard.¹⁷³

The so-called “taxicab standard” stuck, and OSHA adopted that exposure limit in 1971.¹⁷⁴ Today, nearly sixty years after it was “tentatively” set, the same standard remains in effect.

Though NIOSH initially supported the 2 µg/m³ standard, by 1975 it more fully understood the cancer risks of beryllium exposure and found no truly safe exposure level existed. In 1977, NIOSH recommended a maximum limit of 0.5 µg/m³.¹⁷⁵ OSHA responded by proposing a slight decrease of the current limit, but the Department of Energy (DOE) and the Department of Defense vehemently objected, claiming stricter OSHA standards on beryllium would threaten national security and the atomic energy program.¹⁷⁶ OSHA then dropped the proposal.

“Probably no compounds known to man give so consistent a carcinogenic response in so many animals as do the compounds of beryllium.”

Edward J. Baier, Deputy Director, NIOSH, Testimony before OSHA in 1977

Since 1977, the defense industry has moved away from dependence on beryllium, and the metal has found new uses in a broad range of U.S. industries, from manufacturing to dentistry. Many scientists now believe that exposure to beryllium above 0.2 µg/m³ is needlessly unsafe.¹⁷⁷ Yet OSHA has done little to move forward on a new, stricter rule.

In 1998, OSHA added beryllium to its regulatory agenda, admitting its current standard was insufficient,¹⁷⁸ and in 2002, it issued a public request for information.¹⁷⁹ That was OSHA’s last concrete step on beryllium.¹⁸⁰

Due to OSHA’s inaction, DOE was forced to finalize its own stricter standard to protect its employees from beryllium-related deaths.¹⁸¹ That rule, issued in 1999, set a 0.2 µg/m³ standard for DOE employees and contractors.¹⁸² Unfortunately, the rule only covers the approximate 1600 workers exposed to beryllium under DOE’s jurisdiction.¹⁸³ This leaves almost 99% of workers exposed to beryllium to rely only on OSHA’s standard—an unscientific, outdated limit only ever intended to be tentative.¹⁸⁴

C. Failing to Find a Solution: Ergonomics

Just as OSHA has failed to act to regulate dangerous carcinogenic toxics in the workplace, OSHA has also left workers unprotected against physical injuries in the workplace by failing to impose ergonomic regulations.

Ergonomic injuries result from imperfect design of an employee's tasks or equipment. For example, an employee's prolonged typing on a poorly positioned computer keyboard can cause carpal tunnel syndrome. Such injuries cost the U.S. economy billions of dollars a year in lost workdays and medical expenses, yet there are easy and cost-effective ways to avoid these injuries. In fact, President Clinton's Administration issued regulations to eliminate preventable ergonomic-related injuries. That rule was voided by Congress and President Bush in 2001, and there has been no effort since to push a new federal ergonomic standard. Because of this inaction, the toll on American workers and the economy continues unabated.

The Cost of Ergonomic Injuries

Ergonomics is the science of promoting healthy and efficient body positions and movements while at work. Repetitive motions, constant vibrations, forceful exertions, heavy lifting, and awkward postures can cause stress and injuries. From desk chairs with no lumbar support to a jackhammer with insufficient safety features, bad ergonomic design at work can cause pain or injuries in the neck, shoulder, elbow, hand, wrist, and lower back such as carpal tunnel syndrome, tendonitis, and arm-vibration syndrome.¹⁸⁵

The cost of ergonomic-related injuries is huge. Ergonomic injuries are the largest single source of job injuries and illnesses, accounting for 34% of total workplace injuries and approximately one-third of all work absences.¹⁸⁶ Costs to employers are estimated at between \$45–\$54 billion each year in lost wages, lost productivity, and compensation costs due to ergonomic injuries.¹⁸⁷

A Cost-Justified Rule

In the 1980s and 1990s, as the number of reported cases of ergonomic injuries began to rise, OSHA began investigating the issue and developing regulations to address the problem.¹⁸⁸ Business interests quickly lined up against the proposed rules, claiming that the scientific support for ergonomics was weak and the cost of complying with OSHA requirements would be prohibitively expensive.¹⁸⁹

In November 2000, OSHA was finally able to promulgate its regulation.¹⁹⁰ Under the rule, employers of all types were required to implement a full ergonomics program whenever any employee suffered an ergonomic-related injury.¹⁹¹ Employers were required to analyze ergonomic risk factors, conduct employee trainings, and compensate workers for time off for repetitive stress injuries.¹⁹²

OSHA estimated that its rule would prevent 4.6 million work-related injuries over ten years,¹⁹³ with a 50% decrease in ergonomic injuries.¹⁹⁴ The rule would also increase the productivity of American workers, with only a minimal expected cost for industry. OSHA estimated the annual cost of compliance for employers at \$4.5 billion, and the annual benefits at \$9.1 billion, determining the rule to be cost-effective.¹⁹⁵

Congress Acts without Thinking

In March 2001, after no congressional hearings, no analysis of costs and benefits, and a minimal amount of debate,¹⁹⁶ Congress passed a joint resolution invalidating OSHA's rule, largely voting along party lines.¹⁹⁷ Some Members of Congress expressed vague concerns

about the rule's costs, like Senator Don Nickels (R-OK) who worried "[t]here is no way to know how much this would cost"—in the face of OSHA's estimates of the costs.¹⁹⁸ No Member offered any rational scientific or economic justification for opposing OSHA's rule.

Silence from OSHA

In the aftermath of congressional invalidation of the ergonomics rule, OSHA has done nothing to begin the process of adopting a new rule.

The Congressional Review Act, the statute under which Congress derived its authority for its action, bars OSHA from adopting a rule that is "substantially similar" to the first ergonomics rule.¹⁹⁹ While the "substantially similar" standard is not well explained in the law, it most certainly does

not mean that OSHA cannot pass *any* ergonomics rule. OSHA could have reconstructed the rule to achieve at least most, if not all, of the intended benefits of the first ergonomics rule. Instead, OSHA has taken a much weaker approach, issuing non-binding guidelines for a random handful of industrial sectors—such as poultry processing industries, shipyards, and nursing homes.²⁰⁰

Congress' action is not an excuse for OSHA's inaction. By failing to develop a new ergonomics standard, OSHA has allowed a net annual benefit of \$4.6 billion on the table.

Consequences

The kind of agency inaction exemplified by OSHA's failure to regulate workplace hazards and EPA's failure to regulate radon is far from rare. In fact, especially in the last eight years, inaction and delay have become far too much the norm for federal agencies. Many agencies operate outside the public eye, with little investigation by the press or average citizens. In some cases, their failures are spectacular and attract attention. In countless other cases—like those discussed above—they go largely unnoticed. But, for the people whose lives, jobs, and well-being are at stake, they are of the utmost importance and deserve scrutiny.

"OSHA did years of research, in an open process, and if Congress does not make a similar effort to find the facts, they should keep their hands off the standard."

*Frank Mirer, Director of Health & Safety,
United Auto Workers*

Failure to Act or Think: Climate Change

Perhaps the most egregious example of policy failure is the federal government's unwillingness to take significant action on climate change.

Thirty years have passed since Congress first called for a federal program to “respond to natural and man-induced climate processes and their implications.”²⁰¹ Since this initial call to action, the federal government has failed to impose any binding limitations on the greenhouse gas emissions that cause global warming and has withdrawn from the international efforts to combat climate change.²⁰² As late as last year, the Environmental Protection Agency (EPA) still insisted it lacked authority to address the issue directly.²⁰³

The consequences of failing to address climate change are dire. There is an overwhelming scientific consensus that a “business as usual” approach will expose societies across the globe to a host of risks, including rising sea levels, more extreme weather patterns, disruptions in agriculture, increases in tropical disease, and wildfires, to name a few. Because of the catastrophic nature of some climate change threats, continuing on the same approach is not a legitimate option.

The federal government has not only failed to act on climate change, but has also completely failed to think—by abusing scientific evidence of the costs of climate change and ignoring the ancillary benefits of regulating the actions that contribute to climate change. Had the government thought through these significant negative consequences and positive benefits, it may have been more compelled to act.

In the wake of this massive federal failure, many local governments have grown impatient and have already started to take action to protect their citizens. Unfortunately, although states have enacted important and successful programs, they cannot be as effective as an appropriate federal (and ultimately global) solution to climate change.

A. Science by Politics

The Bush Administration has interfered with and abused science in order to justify delay and inaction on the issue of climate change. It has routinely treated statistical margins of

error as an invitation to ignore, misinterpret, or rewrite entire scientific bodies of work. Through this political interference with the scientific process, the Bush Administration has delayed and undermined regulations that could have saved the U.S. economy as much as two trillion dollars.

While campaigning in 2000, President Bush promised to cut the carbon dioxide and other greenhouse gas emissions that cause climate change.²⁰⁴ But since taking office in 2001, his administration has interfered with science and manufactured the appearance of scientific uncertainty. Long after the scientific and international communities reached a consensus that climate change was real, man-made, and a significant threat, the Bush administration continued to insist that more research was necessary before the United States could take action.²⁰⁵

A Long History of Interference

Since 2001, just shortly after President Bush took office, political appointees have edited and censored key scientific documents in order to further their political agenda.²⁰⁶ Some of the more notable examples include:

Between 2002 and 2005, Philip Cooney, Chief of Staff for the White House Council on Environmental Quality, censored scientific reports to create doubts about the realities of climate change.²⁰⁷ Cooney went so far as to remove an entire paragraph about how climate change causes mountain glaciers and snowpacks to melt.²⁰⁸

Administration political appointees “reduced, marginalized, and mischaracterized climate change science.”

*NASA Inspector General,
Investigative Summary*

From 2002 to 2007, according to a survey by the Union of Concerned Scientists, 150 government climate scientists personally experienced political interference by the Bush administration on at least 435 separate incidents.²⁰⁹

A few top scientists within the Bush administration have publicly criticized this practice—sometimes registering their complaints by resigning their posts.²¹⁰ Yet despite such publicity and multiple congressional investigations,²¹¹ the Bush administration has continued to interfere with scientific findings, seemingly undeterred.

E-mail, What E-mail?

The White House even went so far as to interfere with EPA’s attempt to abide by a Supreme Court order.

In April 2007, the U.S. Supreme Court ruled in *Massachusetts v. EPA* that the Clean Air Act gives EPA authority to regulate greenhouse gas emissions,²¹² and held that if EPA finds that greenhouse gases endanger the public health or welfare, the agency *must* regulate emissions.²¹³

President Bush responded by promising to follow the decision²¹⁴ and issuing an Executive Order directing the completion of a coordinated government response by the end of 2008.²¹⁵

Meanwhile, EPA began determining how best to regulate greenhouse gas emissions under the Clean Air Act.²¹⁶ By November 2007, EPA was ready to release its “endangerment findings,” documenting the scientific evidence that greenhouse gases did threaten public health and welfare, and concluding that emissions should be regulated under the Clean Air Act.²¹⁷ Bush’s Deputy Chief of Staff, Joel Kaplan, told EPA that the White House supported moving forward with these documents.²¹⁸

However, moments after EPA e-mailed the documents to the White House for review on December 5, 2007, Kaplan called EPA Administrator Stephen Johnson. Kaplan relayed the instructions from the White House: Johnson must retract the e-mail and say the documents were sent in error.²¹⁹ Apparently, several senior officials from Vice President Dick Cheney’s Office, the Office of Management and Budget, the Department of Transportation, and the White House Council on Environmental Quality held a series of meetings with oil industry representatives. Together they decided, according to a recent congressional investigation, that “regulations to reduce greenhouse gas emissions would tarnish the President’s antiregulatory legacy.”²²⁰

“I can state categorically that there never [before] was such White House intrusion into the business of the E.P.A.”

Russell Train, EPA Administrator to Presidents Nixon and Ford

They convinced the Office of the Chief of Staff to reverse course on climate change.

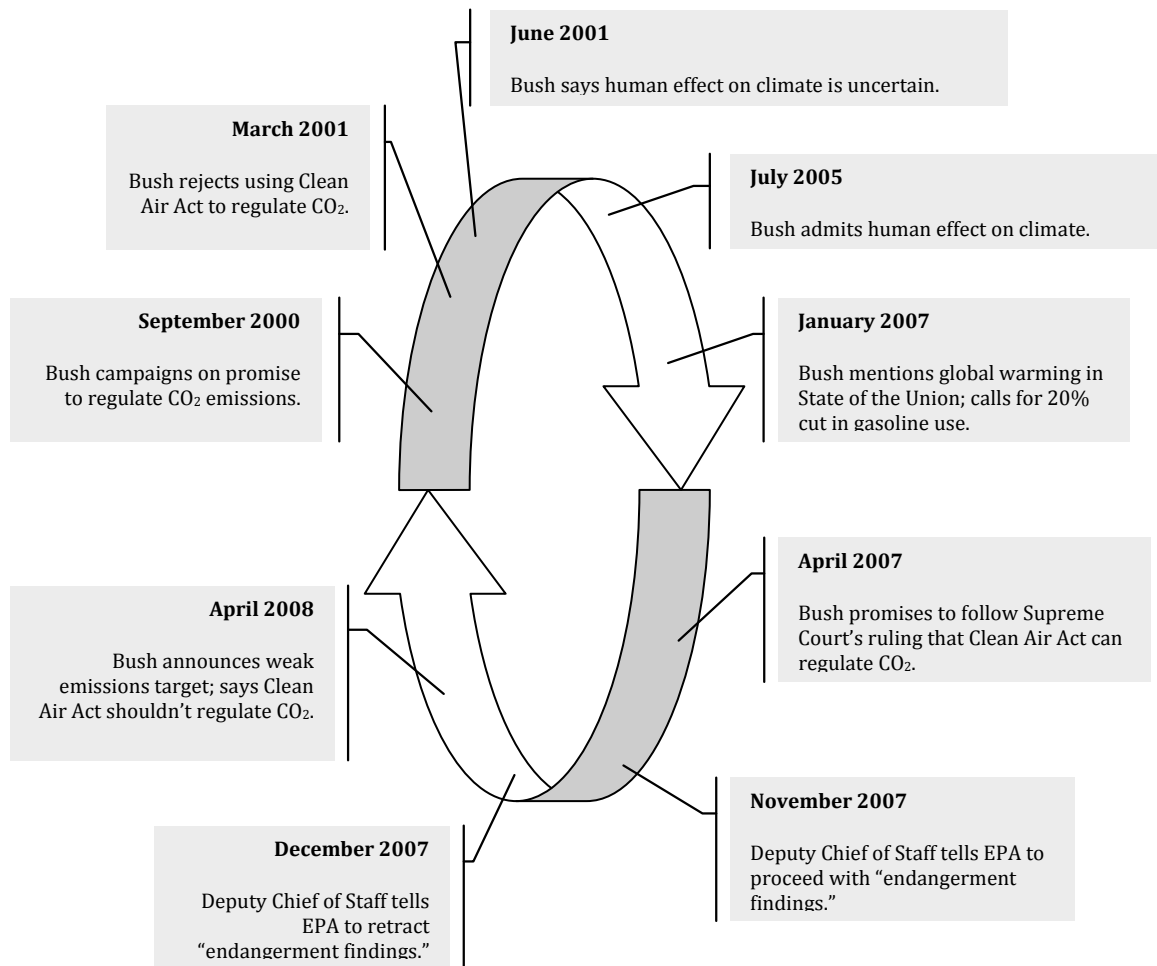
At first Administrator Johnson resisted these efforts to quash the endangerment findings. But by February, according to one senior EPA official, it had become “abundantly clear that the White House did not want to move forward with a response [on climate change.]”²²¹ By spring of 2008, EPA had dropped its plans to propose broad regulation of greenhouse gas emissions from motor vehicles, power plants, and other sources. Instead, the White House wanted EPA to issue “advanced notice” of intentions to propose regulations eventually—an announcement simply to “emphasize the complexity of the challenge,” which would “not establish a path forward or a framework for regulation.”²²²

On July 11, 2008, EPA published the advance notice of proposed rulemaking.²²³ True to White House instructions, the notice made no definitive conclusions and proposed no firm polices, but instead “identifie[d] and discusse[d] possible approaches for controlling [greenhouse gas] emissions under the [Clear Air] Act and the issues they raise.”²²⁴

Yet even EPA’s original draft of this watered-down approach did not escape the red pen of political appointees. The White House Office of Management and Budget had successfully convinced EPA to delete economic and scientific analysis showing that tough regulation of motor vehicle emissions could create benefits of \$500 million to \$2 trillion over the next 32 years.²²⁵

Long Road to Nowhere

The Bush Administration has gone back-and-forth countless times on the state of the science and regulation of climate change.²²⁶ Over the last eight years, most of the developed world has moved forward to address climate change, but the United States continues to lag behind. By exaggerating scientific uncertainty to excuse its failure to regulate, the Bush Administration has taken us full circle—we are no closer to addressing climate change than we were in 2000, but we have wasted eight valuable years that could have been used to build a smarter, greener economy.



B. Health Benefits of Greenhouse Gas Controls

Not only did the Bush Administration ignore and abuse science, but it also ignored the valuable economic benefits that climate change regulation would create by immediately reducing conventional pollutants that affect public health.

According to economic analysis, federal regulation of greenhouse gases would result in between \$540 million and \$3 billion in ancillary health benefits and investment savings for individuals and businesses in a single year. By ignoring these ancillary benefits, the Administration has ignored an important part of the case for strong federal regulation of greenhouse gases.

Identifying the Ancillary Benefits

Regulating greenhouse gas emissions will result in significant and real ancillary benefits that must be accounted for in any impact analysis.

The United States is the world's second largest emitter of carbon dioxide, a greenhouse gas.²²⁷ Power plants are a primary culprit—emitting carbon dioxide when they generate electricity by burning fossil fuels, such as coal. Over half of all electricity in the United States is generated by burning coal, and burning coal accounts for nearly 80% of all greenhouse gas emissions from electricity generation.²²⁸

Power plants can reduce their emissions of greenhouse gases by increasing efficiency in the generation and distribution of electricity, switching to cleaner fuels like natural gas, or deploying pre- or post-combustion controls to capture and sequester emissions before they leave the smokestacks.²²⁹

Power plants also release large amounts other harmful, non-greenhouse gases. Specially, they are responsible for 22% of nitrogen oxide, 11% of fine particulate matter, and over 71% of sulfur dioxide released in the United States.²³⁰ These pollutants are responsible for producing smog, acid rain, and toxic chemicals, and also contribute to water quality deterioration, soil quality deterioration, and severe respiratory disorders in humans.²³¹

Though greenhouse gas regulations are not designed to combat these air pollutants, such regulations will end up reducing emissions of these other harmful, non-target gases as well.

For example, if a power plant improved efficiency and thereby decreased the total amount of fuel needed to produce electricity, the total emissions from all air pollutants from fossil fuels will decrease—including both greenhouse and non-greenhouse gases. Similarly, if a plant were to switch to cleaner fossil fuels, it would reduce its emissions of other air pollutants as well. Natural gas power plants, for instance, only emit 1% the sulfur dioxide of coal power plants.²³² Even certain pre- or post-combustion carbon controls may reduce other air pollutants along with the greenhouse gases they capture and sequester.²³³

Reductions in these other harmful, non-greenhouse gases are ancillary benefits of regulating carbon emissions.

Quantifying Ancillary Benefits

Not only are these benefits real, but they are also massive. A recent, and conservative, economic analysis quantified the ancillary benefits of one type federal greenhouse gas regulations—a carbon tax.²³⁴

The study estimated emissions reductions for the electricity sector under a \$25 or \$75 carbon tax.²³⁵ Under a carbon tax, power plants would be mandated to pay for every ton of

carbon emitted. They would therefore be incentivized to reduce greenhouse gas emissions in order to lower their tax burdens.²³⁶ As facilities employed greenhouse gas control techniques, they would also reduce non-target emissions.²³⁷

The study first calculated the health benefits of ancillary nitrogen oxide reductions (e.g., reduced respiratory symptom days, eye irritation days, asthma attacks, adult and child chronic bronchitis cases, chronic cough cases, emergency room visits, restricted activity days, and hospital admissions).²³⁸ It also calculated how investing in greenhouse gas controls could save companies money when complying with other environmental regulations.²³⁹

In total, the study found that for every ton of carbon eliminated by the carbon tax, an additional \$12–14 would be gained in ancillary benefits alone (i.e., not counting any of the direct climate benefits from reducing greenhouse gases).²⁴⁰ By comparison, the average cost on businesses under a \$25 carbon tax would only be \$12 per ton of carbon reduced.²⁴¹

Altogether, a carbon tax could generate between \$540 million and \$3 billion worth of ancillary health benefits and investment savings in the year 2010 alone.²⁴²

These sizable ancillary benefits should be taken into account, in addition to the direct benefits of carbon reduction, when setting efficient climate change policy. The failure of the Bush Administration to count them shows that in its refusal to move forward with climate change policy, it has been willing to sacrifice short-term gains for the environment and public health as well.

C. States Forced to Act

Given the stunning absence of federal government regulation to control climate change, states have taken the lead to protect themselves, their citizens, and their environment.

Famously called the “laboratories of democracy,”²⁴³ American states are indeed experimenting with inventive approaches to climate change. Every state in the nation has undertaken at least one project with climate benefits, such as financially supporting alternative energies or tightening energy efficiency standards.²⁴⁴ Forty-two states have conducted inventories to estimate and track their own greenhouse gas emissions,²⁴⁵ with 17 states enforcing mandatory emissions reporting requirements on certain businesses.²⁴⁶ Twenty states have announced precise targets for reducing greenhouse gas emissions within their own borders: from Utah’s more modest goal of a 28% reduction by 2020, to the demanding 80% cut New Jersey proposed to achieve by 2050.²⁴⁷ While several of those targets remain mostly aspirational, some states have begun capping emissions for utilities and other industries, and are pursuing stricter regulation of vehicle emissions.²⁴⁸

1. Regional Greenhouse Gas Initiative

The most ambitious and promising state plans involve regional agreements to coordinate the reduction of greenhouse gas emissions. Twenty-three states have signed on to one of

three regional accords (another nine states plus the District of Columbia are “observers” to these accords).²⁴⁹ Though the Western Climate Initiative and the Midwestern Regional Greenhouse Gas Reduction Accord are not yet fully developed and implemented,²⁵⁰ the Regional Greenhouse Gas Initiative (“RGGI”) will be up and running by January 2009.

Under RGGI, ten Northeastern and Mid-Atlantic states—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New Hampshire, New York, Rhode Island, and Vermont²⁵¹—have all committed to cut 10% of their carbon dioxide emissions from power plants by the year 2018.²⁵² Power plants in the region must offset their annual emissions with “allowances” that the states auction off: one allowance covers one ton of carbon dioxide emissions.²⁵³

The total number of allowances available in the region is strictly capped, and over time the cap is lowered. In order to continue covering their carbon dioxide emissions as the supply of allowances decreases, power plants will have to reduce their own emissions, trade for unused allowances bought by more efficient facilities, or invest in projects that decrease emissions outside the electricity sector (such as recovering and sequestering gases emitted by landfills).²⁵⁴

In September 2008, RGGI held its first allowance auction,²⁵⁵ making RGGI the first mandatory cap-and-trade program for carbon dioxide in the United States and the largest carbon dioxide auction program in the world.²⁵⁶

Over the next decade, the RGGI auctions are expected to raise anywhere from \$3.4 billion to \$9.2 billion,²⁵⁷ which state governments plan to reinvest in energy efficiency technologies, renewable energy technologies, and benefits for energy consumers.²⁵⁸ Additionally, RGGI is expected to prevent the emission of at least 47 million tons of carbon dioxide²⁵⁹ and save the planet at least \$4 billion in estimated climate change costs.²⁶⁰

While the efforts of states to combat climate change are laudable, they are ultimately incomplete. Only the federal government is in the position to impose the strict limits that are necessary to transition the U.S. economy away from over-reliance on fossil fuels toward energy efficiency and greener sources of electricity. In addition, the federal government has the power—which states lack—to enter into binding agreements with other countries, the key to long-term success in dealing with this global problem. So while state efforts have been important and have helped lead the way to a lower carbon future, the absence of federal policy on this issue has had enormous consequences.

2. California’s Efforts

California’s energy-efficiency program is another successful example of state regulation in the absence of federal action. Increasing energy efficiency is an important response to climate change—by increasing efficiency, demand for electricity is reduced, and power plants release fewer greenhouse gases. That program also demonstrates the potential for investment in alternative energy and energy efficiency to generate new jobs.

California was among the first states to create energy-efficiency standards for new homes, buildings, and household appliances such as refrigerators and washing machines; the state

still has among the most aggressive standards in the nation.²⁶¹ As a result, the average Californian now uses about 40% less electricity than the average American.²⁶²

From 1972 to 2006, California's environment-friendly policies have saved its citizens about \$56 billion in electricity costs.²⁶³ When consumers and businesses redirected those savings back into the economy to buy goods and services, some 1.5 million new, local jobs were created.²⁶⁴

Recently, California began a plan to reduce its emissions of greenhouse gases. The investment in research and infrastructure necessary to achieve those reductions is expected to create up to 400,000 additional new jobs over the next dozen years and to increase household incomes by up to \$48 billion annually.²⁶⁵

“California’s legacy of energy policies and resulting economic growth provides evidence that innovation and energy efficiency can make essential contributions to economic growth and stability.”

*David Roland-Holst,
Professor of Economics,
University of California at Berkeley*

Smart regulation can be the source of significant economic development. By finding ways to power the economy without causing far-reaching, and unnecessary, public health and environmental costs, smarter regulation can ensure that economic development truly maximizes wealth. Correct levels of regulation ensure that “growth” is not simply transferring money from the public to private investors, and instead results in genuine productivity that increases the well-being of all Americans.

However, other efforts by California to combat climate change have been thwarted by the Bush Administration. In December 2007, California sought to cut automobile emissions of carbon dioxide by 30 percent by 2016. EPA stood in the way, refusing to grant California a waiver from weaker federal regulations governing fuel-efficiency.²⁶⁶ So, even when states have been willing to act, the Bush Administration has used its power to ensure that weaker federal regulations continue to govern.

Consequences

Climate change is seen by many to be the most important environmental issue of our time. Dealing with climate change will require billions of dollars of investment and fundamental changes across a variety of policy arenas, including electricity production, transportation, and house and land use.

Failing to recognize the reality of climate change risks, or refusing to act, is not a legitimate policy option. There is a growing consensus that the risks of climate change and global warming—including rising sea levels, losses to agricultural production, and rising political tensions over natural resources issues—are too great to ignore. Passing these risks to future generations is neither wise, nor moral.

During the past eight years, the United States could have taken significant steps to make progress on reducing emissions of greenhouse gases and becoming a world leader in

building a new lower-carbon economy. Instead, we have abdicated our leadership role on the issue to other developed countries, and must now play “catch-up” at a time of financial difficulty. The Bush Administration’s use of scientific uncertainty to avoid acting on this issue will be remembered as both a colossal failure of political will, and also a failure to place rationality—rather than ideology or political convenience—at the center of federal decisionmaking.

Learning the Right Lessons

Regulations, when well-crafted and competently executed, have the potential to add billions of dollars to the United States economy.

While this report has focused on regulatory failures—both the failure to think and the failure to act—it is important to note that government regulation can have enormously important benefits. The problems discussed above are failures of potential. Government regulation, wisely and judiciously used, has helped save billions of dollars and untold lives. When that potential is underutilized, there is a price to that neglect—in environmental damages, compromised public health, and economic decline.

But just as there is a price to neglect, there is a payoff for effective action. For example, in 1990, Congress created a national Acid Rain Program through a set of amendments to the Clean Air Act. The program utilized innovative and flexible regulatory tools that enabled companies to pursue the most cost-effective means of cutting down on sulfur dioxide emissions responsible for acid rain.²⁶⁷

The Program requires industries to offset their annual emissions of sulfur dioxide by obtaining “permits” for sulfur dioxide emissions. Regulators establish an initial allocation of permits.²⁶⁸ Companies that can cheaply and efficiently reduce their emissions will have permits leftover. They can then sell their extra permits on the market for a profit to other businesses that cannot control their emissions as cost-effectively.²⁶⁹ This tradable permit scheme creates a financial incentive to control pollution, thus achieving total emissions reductions at the lowest possible costs.

The Acid Rain Program has turned out to be more cost-benefit justified than anyone expected. Initially, EPA estimated that the annual cost to industry of complying with the emissions reductions would be \$5.7

“The Acid Rain Program has been an enormous success story in America's efforts to ensure that emissions reductions go hand in hand with economic well-being. This program has delivered cleaner air faster and with less expense than anybody anticipated.”

*Christine Todd Whitman,
Former EPA Administrator*

billion.²⁷⁰ Some ridiculed that figure as overly optimistic, predicting instead that costs might rise to \$25 billion per year.²⁷¹ However, the flexible, market-based mechanisms built into the program worked as planned, and actual annual costs are estimated at only \$3 billion.²⁷² In addition, while costs and emissions stayed low, utility plants both increased production and kept retail electricity prices stable.²⁷³

On the benefits side, the program has had even greater success. Sulfur dioxide emissions reductions fell to 9.4 million tons, 40% lower than 1990 emissions rates;²⁷⁴ and nitrogen oxide emissions fell to 3.3 million tons, over 40% lower than 1995 emissions.²⁷⁵ In total, the environmental and health benefits have been valued at \$122 billion per year.²⁷⁶ The public health benefits alone exceed the program's estimated costs by a margin of 40:1.²⁷⁷

Given those cost-benefit ratios, it is likely that even stricter emissions controls would have been justified from the start. Although the Acid Rain Program is also an example of the problems of overestimating compliance costs and underestimating benefits, it clearly shows that smart government intervention is possible and can deliver staggering benefits at extremely low costs.

It is important that the Obama Administration, and the public, learn the right lessons from the failures of the Bush years. As the success of the Acid Rain Program shows, the correct lesson is *not* that government action is doomed to fail. In fact, smart action can generate enormous net benefits to society. The mishandling of regulation during the past administration should not serve as evidence in a more general indictment of all government action.

Nor is the lesson to be learned that too much economics leads to bad regulation. Given the ostensible embrace of the Bush Administration of an "economic" approach to regulation—one that promoted "smarter regulation" rather than less regulation—the failures of the Bush years could be seen as failures of economic analysis. That would be an unfortunate misreading of the evidence. The truth is, the Bush Administration simply failed to use economic analysis properly, adopting the evidence when it suited its political interests or ideological proclivities, and rejecting the evidence when it did not.

The regulatory failures of the past eight years have come about because the Bush Administration used too little economics, not too much. Strong regulation is often supported by economic analysis. The benefits of a clean environment, safe workplaces, and functioning financial system often dwarf whatever compliance costs are imposed. When the benefits and costs of regulation are counted properly, active federal agencies, pursuing strong regulatory agendas, are often justified.

Rather than jettisoning cost-benefit analysis at a time of economic crisis—which would both lower the quality of agency decisionmaking and be politically unwise—the next Administration should truly embrace economic principles of regulation. That means looking for opportunities for government to actively improve welfare, fix market failures, and maximize net benefits to society.

Too often, cost-benefit analysis has been used improperly to tie down federal agencies in red tape and delay. The next Administration has a unique opportunity to use the power of economic principles both to free agencies from their current stupor and to set an aggressive and intelligent agenda to reduce the hidden costs that inaction has imposed for too long.

Notes

Quotation, pg. 8, *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 508 F.3d 508, 531 (9th Cir. 2007) (“[T]he values that NHTSA assigns to benefits are critical. Yet, NHTSA assigned no value to the most significant benefit of more stringent CAFE standards: reduction in carbon emissions.”).

Quotation, pg. 9, *MARTHA ROBERTS & NANCY SPENCER, ENVTL. DEFENSE FUND, CARBON COUNTS: INCORPORATING THE BENEFITS OF CLIMATE PROTECTION INTO FEDERAL RULEMAKING 14* (2008) *available at* http://www.edf.org/documents/8733_CarbonCounts.pdf (“NHTSA employed misguided choices to come up with an estimate of the social cost of carbon that consistently and significantly underestimated the benefits of reducing global warming pollution.”).

Quotation, pg. 13, Press Release, Earthjustice, Health, Environmental Groups File Court Challenge to EPA Particulate Matter Pollution Standard (Dec. 15, 2006) (“EPA has failed in one of its fundamental responsibilities—to protect public health.”) (quoting Janice Nolen, Assistant Vice President, American Lung Association), *available at* <http://www.earthjustice.org/news/press/006/health-environmental-groups-file-court-challenge-to-epa-particulate-matter-pollution-standard.html>.

Quotation, pg. 15, Letter from Clean Air Scientific Advisory Committee, to Stephen Johnson, Administrator, U.S. Evtl. Prot. Agency (Sept. 29, 2006) (Recommendations Concerning the Final National Ambient Air Quality Standards for Particulate Matter), *available at* <http://www.epa.gov/sab/pdf/casac-ltr-06-003.pdf> (“[T]he decision to retain without change the annual PM_{2.5} standard does not provide an adequate margin of safety . . . [and] leav[es] parts of the population of this country at significant risk of adverse health effects.”).

Quotation, pg. 17, Letter from former Chairs & Gen. Counsels of the President’s Council on Evtl. Quality, to Hon. Cathy McMorris, Chair of U.S. H. R. Comm. on Resources, Task Force on Improving NEPA 2-3 (Sept. 19, 2005), *available at* http://www.law.georgetown.edu/gelipi/research_archive/nepa/CEQChairsLetter.pdf (“Measures to exempt certain agencies and programs from NEPA, to restrict or eliminate alternatives analysis, or to limit the public’s right to participate in the NEPA process threaten NEPA’s vital role in promoting responsible government decision-making.”).

Quotation, pg. 20, Letter from Am. Fed’n of Labor & Congress of Indus. Org., to U.S. Dep’t. of Labor, Comments on Dep’t of Labor’s Proposed Rule on Requirements for DOL Agencies’ Assessment of Occupational Health Risks 1 (Sept. 29, 2008), *available at* http://www.defendingscience.org/case_studies/upload/AFL-CIO-on-RA-Sept-2008.pdf.

Quotation, pg. 23, Telephone Interview with Paul Locke, Associate Professor, Bloomberg School of Public Health, Johns Hopkins University (Oct. 23, 2008) (“A lot of public health problems can’t be totally solved. This one—radon—can be solved in two decades.”).

Quotation, pg. 26, *Occupational Standard for Beryllium: Public Hearing Before the Occupational Health & Safety Admin.*, U.S. Dep't of Labor (1977) (statement of Edward J. Baier, Deputy Director, NIOSH, Ctrs. for Disease Control & Prevention, Dep't of Health, Education and Welfare), *available at* <http://www.cdc.gov/niosh/pdfs/77-bery.pdf> ("Probably no compounds known to man give so consistent a carcinogenic response in so many animals as do the compounds of beryllium.").

Quotation, pg. 28, AFL-CIO, Unions Gear Up to Protect Landmark Ergonomics Rule, <http://www.aflcio.org/aboutus/thisistheafclcio/publications/magazine/ergo.cfm> (last visited Nov. 18, 2008) ("OSHA did years of research, in an open process, and if Congress does not make a similar effort to find the facts, they should keep their hands off the standard.") (quoting Frank Mirer, Director, Health & Safety Dep't, United Auto Workers).

Quotations, Pg 30, NASA OFFICE OF INSPECTOR GEN., INVESTIGATIVE SUMMARY: REGARDING ALLEGATIONS THAT NASA SUPPRESSED CLIMATE CHANGE SCIENCE AND DENIED MEDIA ACCESS TO DR. JAMES E. HANSEN, A NASA SCIENTIST 1 (2008), *available at* http://oig.nasa.gov/investigations/OI_STI_Summary.pdf ("Our investigation found that during the fall of 2004 through early 2006, the NASA Headquarters Office of Public Affairs managed the topic of climate change in a manner that reduced, marginalized, or mischaracterized climate change science.").

Quotation, pg. 31, Russell E. Train, Letter to Editor, *When Politics Trumps Science*, N.Y. TIMES, June 21, 2003 ("Having served as E.P.A. Administrator under both Presidents Nixon and Ford, I can state categorically that there never was such White House intrusion into the business of the E.P.A. during my tenure.").

Quotation, pg. 36, DAVID ROLAND-HOLST, UNIV. OF CAL. AT BERKELEY, ENERGY EFFICIENCY, INNOVATION, AND JOB CREATION IN CALIFORNIA 8 (2008), *available at* http://are.berkeley.edu/~dwrh/CERES_Web/Docs/UCB%20Energy%20Innovation%20and%20Job%20Creation%2010-20-08.pdf ("California's legacy of energy policies and resulting economic growth provides evidence that innovation and energy efficiency can make essential contributions to economic growth and stability.").

Quotation, pg. 38, Press Release, Christine Todd Whitman, Administrator, Env'tl. Prot. Agency, Nov. 20, 2002, *available at* <http://yosemite.epa.gov/opa/admpress.nsf/963707f9ea3c005d85257359003d480a/e3850259eaf2264285256c76007244bf!OpenDocument> ("The Acid Rain Program has been an enormous success story in America's efforts to ensure that emissions reductions go hand in hand with economic well-being. This program has delivered cleaner air faster and with less expense than anybody anticipated.").

¹ See *The Financial Crisis and the Role of Federal Regulators: Hearing Before the H. Comm. on Oversight and Government Reform*, 110th Cong. (2008) (testimony of Alan Greenspan, former Chairman, Federal Reserve), available at <http://oversight.house.gov/documents/20081023100438.pdf>.

² Many economics textbooks provide a definition of externalities. This one is drawn from HARVEY S. ROSEN & TED GAYER, *PUBLIC FINANCE* (McGraw-Hill Irwin, 8th ed. 2008).

³ Exec. Order No. 12,866 § 1(b)(7), 58 Fed. Reg. 51,735 (1993). See also *id.* § 1(b)(6) (“adopt a regulation only upon a *reasoned determination* that the benefits of the intended regulation justify its costs”) (emphasis added).

⁴ *Id.* § 3(f)(1). Several other types of regulatory actions also qualify as “significant,” including those that may “adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities” and those that may “[r]aise novel legal or policy issues.” *Id.* § 3(f).

⁵ *Id.* § 6(a)(3)(B)(ii). Such assessments are submitted to the White House Office of Management and Budget (OMB) (specifically, to the Office of Information and Regulatory Affairs).

⁶ See, e.g., U.S. GEN. ACCOUNTING OFFICE, GAO-03-947, EPA SHOULD USE AVAILABLE DATA TO MONITOR THE EFFECTS OF ITS REVISIONS TO THE NEW SOURCE REVIEW PROGRAM 4, 10 (2003), available at <http://www.gao.gov/new.items/d03947.pdf> (noting that OMB offers no guidelines on how to conduct such screening analyses, but that EPA policy, for example, allows such preliminary analyses to be purely qualitative or to rely on limited data).

⁷ See Energy Policy & Conservation Act of 1975, Pub. L. No. 94-163, 89 Stat. 871 (1975) (directing the Department of Transportation to devise fuel efficiency standards); CONG. RESEARCH SERV., RL 33413, *AUTOMOBILE AND LIGHT TRUCK FUEL ECONOMY: THE CAFE STANDARDS 2* (2008), available at http://assets.opencrs.com/rpts/RL33413_20080507.pdf (“The Arab oil embargo of 1973-74 and the subsequent tripling in the price of crude oil brought into sharp focus the fuel inefficiencies of U.S. automobiles.”).

⁸ S. CONF. REP. NO. 94-516 (1975), reprinted in 1975 U.S.C.C.A.N. 1956, 1957.

⁹ Data adapted from NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., *AUTOMOTIVE FUEL ECONOMY PROGRAM: ANNUAL UPDATE CALENDAR YEAR 2003*, 5 (2004), available at <http://www.nhtsa.dot.gov/CARS/rules/CAFE/FuelEconUpdates/2003/AFEPannualupdate2003.pdf>; see *Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015*, 73 Fed. Reg. 24352 (proposed May 2, 2008).

¹⁰ See *Ctr. for Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 508 F.3d 508, 514 (9th Cir. 2007) (“These goals are more pressing today than they were thirty years ago: since 1975, American consumption of oil has risen from 16.3 million barrels per day to over 20 million barrels per day, and the percentage of U.S. oil that is imported has risen from 35.8 to 56 percent.”).

¹¹ Congress did not hold its first hearing on climate change until June 1988, when then-Senator Al Gore organized one. In its 2007 Report, the United Nation’s Intergovernmental Panel on Climate Change (IPCC) concluded with “very high confidence” that human activity, such as vehicle emissions, is contributing to climate change. See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *CLIMATE CHANGE 2007: SYNTHESIS REPORT 37* (2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

¹² U.S. Env’tl. Prot. Agency, Transportation and Climate, <http://www.epa.gov/oms/climate/index.htm> (last updated Sept. 18, 2008) (providing figure for 2006 emissions).

¹³ See *id.*

¹⁴ Better fuel efficiency may also encourage drivers to travel more miles, but even accounting for this “rebound effect,” the net result of higher CAFE standards is an emissions decrease. *See* Average Fuel Economy Standards Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,407 (discussing rebound as caused by lower fuel costs per mile).

¹⁵ NHTSA has authority to establish fleetwide CAFE standards. The U.S. Environmental Protection Agency (EPA) calculates the average fuel economy for individual manufacturers and models. *See* NHTSA, CAFE Overview, <http://www.nhtsa.gov> (follow to Frequently Asked Questions: CAFE Overview) (last visited Oct. 13, 2008).

¹⁶ *See, e.g.*, Average Fuel Economy Standards for Light Trucks; Model Years 2008-2011, 70 Fed. Reg. 51,414, 51,415 (proposed Aug. 30, 2005) (discussing increased CAFE rates since model year 2004 from the “frozen” levels set by statute by Congress).

¹⁷ Average Fuel Economy Standards for Light Trucks, Model Years 2008-2011, 71 Fed. Reg. 17,566 (Apr. 6, 2006) (codified at 49 CFR pt. 533).

¹⁸ EPA has calculated dollar figures to represent the costs imposed by each additional ton of carbon dioxide emitted into the atmosphere. Known as the “social cost of carbon,” this dollar figure assigns each ton its proportional share of the likely economic, environmental, and political consequences of climate change. *See* U.S. ENVTL. PROT. AGENCY, TECHNICAL SUPPORT DOCUMENT ON BENEFITS OF REDUCING GHG EMISSIONS 5 n.9 (2008), *available at* <http://www.regulations.gov/fdmspublic/component/main?main=DocumentDetail&o=09000064806b1d94>.

¹⁹ *See id.* at 12 (listing various monetary estimates for the social cost of carbon).

²⁰ *See Ctr. for Biological Diversity*, 508 F.3d at 524-25 (“NHTSA acknowledged the estimates suggested in the scientific literature . . . but concluded: ‘[T]he value of reducing emissions of CO₂ and other greenhouse gases [is] too uncertain to support their explicit valuation and inclusion among the savings in environmental externalities.’”).

²¹ *See id.* at 535.

²² *See id.* at 532-33.

²³ *See id.* at 513.

²⁴ The court also ordered the agency to reapply certain statutory factors, to reconsider the rule’s scope, and to conduct a full Environmental Impact Statement. *See id.* at 514.

²⁵ *Id.* at 533 (“[W]hile the record shows that there is a range of values, the value of carbon emissions reduction is certainly not zero. NHTSA conceded as much during oral argument when, in response to questioning, counsel for NHTSA admitted that the range of values begins at \$3 per ton carbon.”); *id.* at 533-34 (noting that “several commenters and the [National Academy of Sciences] committee recommended the same value: \$50 per ton carbon,” which is equivalent to \$13.60 per ton of carbon dioxide).

²⁶ *See id.* at 534-35.

²⁷ *See id.* at 517 (citing NAT’L ACAD. OF SCIENCES, EFFECTIVENESS AND IMPACT OF CORPORATE AVERAGE FUEL ECONOMY (CAFE) STANDARDS (2002)) (emphasis added).

²⁸ *See id.* at 535; *see also* Administrative Procedure Act, 5 U.S.C. § 706(2)(a) (2006).

²⁹ *See Ctr. for Biological Diversity*, 508 F. 3d at 513. One month after the court’s ruling, Congress also passed significant legislation instructing NHTSA to set an accelerated path toward tighter fuel economies. *See* Energy Independence & Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (2007).

³⁰ Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. 24,352 (proposed May 2, 2008).

³¹ Besides undervaluing the social cost of carbon, other problems with NHTSA's cost-benefit analysis include: heavy reliance on outdated and potentially biased industry data; insufficient consideration of the potential for technological advancements and production processes to lower costs, especially hybrid technologies; severe underestimation of future fuel prices, demonstrated by the remarkable claim that gasoline will cost \$2.36/gallon in 2020, gradually rise to \$2.51/gallon by 2030, and *hold steady* at \$2.51 through 2050; arbitrary estimation of military security benefits at \$0; and insufficient consideration of secondary economic benefits of a robust market for vehicle efficiency technologies.

³² Executive Order 13,432 directs agencies working on regulations with climate impacts to consider all "information and recommendations provided by the other agencies" like EPA. Exec. Order No. 13,432, 72 Fed. Reg. 27717 (May 16, 2007) (entitled "Cooperation Among Agencies on Protecting the Environment with Respect to Greenhouse Gas Emissions from Motor Vehicles, Nonroad Vehicles, and Nonroad Engines").

³³ EPA's *Technical Support Document on Benefits of Reducing GHG Emissions*, though not publicly released until June 2008, was specifically summarized for NHTSA in December 2007 to assist the preparation of the new CAFE standards. See EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18, at 1 n.1.

³⁴ Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,414. The agency contends this restriction is dictated by consistency, since no other non-domestic costs or benefits were measured. *Id.* However, the Office of Management and Budget—the federal agency charged with overseeing cost-benefit analyses—specifically permits consideration of significant international costs and benefits. U.S. OFFICE OF MGMT. & BUDGET, CIRCULAR A-4, 15 (2003) ("When you choose to evaluate a regulation that is likely to have effects beyond the borders of the United States, these effects *should be reported* separately.") (emphasis added), available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

³⁵ See EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18, at 11.

³⁶ See Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,412 (implying that 95% of U.S. oil is originally extracted overseas, and 50% of U.S. oil is refined overseas; also discussing emissions from the four stages of fuel production and distribution).

³⁷ See *id.* ("We tentatively assume that reductions in imports of refined fuel would reduce criteria pollutant emissions during fuel storage and distribution only. Reductions in domestic fuel refining using imported crude oil as a feedstock are tentatively assumed to reduce emissions during crude oil transportation and storage, as well as during gasoline refining, distribution, and storage, because less of each of these activities would be occurring. Similarly, reduced domestic fuel refining using domestically-produced crude oil is tentatively assumed to reduce emissions during all phases of gasoline production and distribution."); see also *id.* at 24,413 ("NHTSA currently estimates the reductions of CO₂ emissions during each phase . . . using the previous assumptions [for criteria pollutants] about how fuel savings are reflected in reductions in each phase.").

³⁸ See EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18, at 1-2 ("emissions in other countries will contribute to climate change impacts in the U.S."). Rough calculations indicate NHTSA arbitrarily ignored about half of all pre-tailpipe carbon dioxide emissions, causing the agency to overlook nearly 10% of total climate impacts. NHTSA predicts that 50% of fuel savings generated by this regulation will decrease imports of refined fuel and 50% will decrease domestic refining operations (90% of which use imported crude oil). See Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,412. According to the International Energy Agency, feedstock production emits 20.5% of all upstream carbon dioxide (CO₂); feedstock transportation emits 5%; fuel production emits 71%; and fuel distribution emits 3.5%. See INT'L ENERGY AGENCY, AUTOMOTIVE FUELS FOR THE FUTURE: THE SEARCH FOR ALTERNATIVES 41-42 (2000). For the 50% of fuel savings from imported fuel, NHTSA only counts fuel transportation emissions, meaning

96.5% of emissions were ignored ($50\% * 96.5\% = 48.25\%$). For the remaining 50%, 90% of operations use imported crude, meaning NHTSA ignored the 20.5% of emissions from feedstock productions ($50\% * 90\% * 20.5\% = 9.22\%$). NHTSA therefore did not count 57.47% ($48.25\% + 9.22\%$) of all upstream CO₂ emissions. A model commissioned by the Department of Energy to show the full lifecycle of Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET), reveals that 84% of pre-combustion greenhouse gas impacts are CO₂ emissions, and 20.6% of total greenhouse gas impacts are pre-combustion. See ARGONNE NAT'L LAB., GREET MODEL 1.8 (2008), available for download at http://www.transportation.anl.gov/modeling_simulation/GREET/index.html. Thus, NHTSA overlooked 9.94% ($20.6\% * 84\% * 57.47\%$) of all greenhouse gas impacts by ignoring overseas upstream CO₂.

³⁹ These gases occur in lower volumes but have greater global warming potentials than carbon dioxide: 25 times as much for methane, 298 times for nitrous oxide. See ARGONNE NAT'L LAB., *supra* note 38.

⁴⁰ EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18 at 18 n.40 (noting that “gas-specific marginal benefits estimates should be used”).

⁴¹ 73 Fed. Reg. at 24413 nn.135 & 137 (“[C]arbon dioxide from final combustion itself accounts for nearly 97 percent of the total CO₂-equivalent emissions from petroleum production and use.”).

⁴² NHTSA based its calculation on an EPA inventory of *United States* emissions, Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,413 n.137 (citing U.S. EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, 1990-2006 (2008), available at http://epa.gov/climatechange/emissions/downloads/08_CR.pdf); but since nearly all fuel undergoes some *overseas* production phase, see *supra* note 36, calculations based on U.S.-only data are misleading. According to the same data sources cited in note 38, non-CO₂ gases account for nearly 5% of all greenhouse gas impacts (once the low volumes of non-CO₂ gases are adjusted for their higher global warming potentials). Tailpipe CO₂ accounts for 78%, and pre-combustion CO₂ for 17%. See ARGONNE NAT'L LAB., *supra* note 38. NHTSA also misses an emissions *increase* of a non-carbon greenhouse gas resulting from its CAFE standards: hydrofluorocarbon emissions from leaking car air conditioners will increase due to the rebound effect (i.e., more miles traveled leads to more air conditioner use).

⁴³ More precisely, NHTSA calculated the Year 2011 social cost of carbon will be \$7/tCO₂. Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,414. Emissions produce larger incremental damages over time as physical and economic systems become more stressed, so estimates for the social cost of carbon must be adjusted upward by an annual growth rate. NHTSA chose a growth rate of 2.4% per year. *Id.*

⁴⁴ To calculate the social cost of carbon, NHTSA relied on a 2005 study by Richard Tol, but the agency did its math incorrectly. See Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,414. Using Tol's average estimate of \$12/ton of carbon dioxide (/tCO₂) and a 2.4% growth rate, NHTSA calculated that Year 2011's social cost of carbon could be as high as \$14/tCO₂. Unfortunately, NHTSA only applied the growth rate from the publication date of Tol's study (2005), ignoring that Tol's decades-old data meant his figures reflected 1995 climate costs and 1995 dollars. Though not obvious on the face of Tol's study, these time issues were not difficult to discover: EPA simply contacted Tol and asked, and reported its results in its *Technical Support Document*. See EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18, at 14 n.36. Accurately translated into 2011 costs and 2006 dollars, the estimate is closer to \$23/tCO₂—NHTSA was off by 64%. See *id.* at 14-15 (EPA extrapolates Tol's data to 2007; adjusting EPA's figures by the growth rate of 2.4% gives year 2011 costs).

⁴⁵ The inaccurate \$14/tCO₂ figure, see *supra* note 44, became NHTSA's upper bound for the range of U.S.-only climate costs, since surely any global estimate would exceed the domestic climate costs. Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed.

Reg. at 24,414. But while an *upper* global estimate should exceed an *upper* U.S. estimate, there is no reason to think that Tol's *average* estimate for global costs would automatically exceed the *highest* estimate of U.S. costs. NHTSA's arbitrary assumptions continued when it set \$0 as the lower bound, reasoning that a non-zero global cost of carbon "does not necessarily rule out low or zero values for the benefit to the U.S." *Id.* NHTSA cited no study or theory for support. Recall that the Ninth Circuit already ruled \$0 was an arbitrary figure. *See Ctr. for Biological Diversity*, 508 F.3d at 535 ("NHTSA's decision not to monetize the benefit of carbon emissions reduction was arbitrary and capricious."). Moreover, NHTSA gave no indication whether it would raise this lower bound over time to account for a growth rate, or whether it would hold at \$0.

⁴⁶ NHTSA set the social cost of carbon at the range's midpoint: \$7/tCO₂ for Year 2011, a startlingly low figure compared to other recommendations. Tol's study—and therefore NHTSA's estimate—was based on old data, unrefined economic analysis, an unreasonably low growth rate, and the largely-abandoned practice of discounting future benefits by 7%. The practice of discounting costs and benefits that will accrue to future generations is morally suspect, since it assumes that the current generation's preferences and valuations of resources are worth more than those of future generations. Though discounting costs and benefits by 7% over a single individual's lifetime is often justified, the same economic principles do not translate into the inter-generational context. Consequently many—including the authors of this report—advocate against using any discount rate for the costs and benefits of climate change; however, EPA, OMB, and most published economists support using a rate of 3% or lower. Few, if any, besides NHTSA still use a 7% discount rate for climate change.

⁴⁷ *See* EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18, at 12, table 1 (figure adjusted for year 2011 by a growth rate of 3%). EPA generated those figures by refining Tol's methods, analyzing a more current dataset, using a 3% growth rate, and adopting a 2% discount rate. *Id.*

⁴⁸ *Id.* at 15.

⁴⁹ In the "Social Cost of Carbon" Chart, the data points reflect the following estimates of the social cost of carbon. "NHTSA Estimate: 2005 Costs" represents the range and midpoint NHTSA calculated for year 2005 costs, based on Tol's 2005 study. Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,414. "NHTSA Estimate: 2011 Costs" represents NHTSA's range and midpoint after adjusting by a growth rate through the Year 2011. *Id.* "NAS Estimate (2002 Report)" represents the figure calculated by the National Academy of Sciences in 2002 as an average, and cited by the Ninth Circuit Court of Appeals. *Ctr. for Biological Diversity*, 508 F.3d at 517 n.11. "EDF Estimate" represents the Environmental Defense Fund's interpretation of a study conducted by the United Kingdom Department for Environment, Food, and Rural Affairs. *Id.* at 532 n.44. "NRDC Estimate" represents a range calculated by the Natural Resources Defense Council based on values assigned by the California Public Utilities Commission, the Idaho Power Company, and the European Union (EU) carbon trading program. *Id.* at 531. Countries in the European Union have various greenhouse gas emissions restrictions that their industries must meet by purchasing "credits" for each ton of carbon dioxide emissions. Those credits are traded on a market. *See* Europa, Climate Change Emission Trading Scheme, http://ec.europa.eu/environment/climat/emission/index_en.htm (last visited Nov. 18, 2008). "European Climate Exchange" represents the range of prices for trades during 2008 on the European Climate Exchange's futures market. *See* European Climate Exchange, Prices and Volumes: ECX EUA Futures Contracts, [http://www.europeanclimateexchange.com/uploads/documents/ECXEUAFutureContract-15October2008\(1\).xls](http://www.europeanclimateexchange.com/uploads/documents/ECXEUAFutureContract-15October2008(1).xls) (last visited Nov. 18, 2008). EPA calculated estimates for the average social cost of carbon at both a 3% discount rate and a 2% discount rate. Using EPA's growth rate of 3%, "EPA (3% Discount Rate)" and "EPA (2% Discount Rate)" represent the high, low, and average costs projected for year 2011. *See* EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18, at 12.

⁵⁰ *See infra* note 53 (calculating actual benefits compared to NHTSA's claimed benefits).

⁵¹ Using a 3% discount rate—the highest permitted by EPA—NHTSA placed total benefits for its rule at \$108 billion. Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,449 n.165 & 168 (\$36 billion + \$72 billion = \$108 billion). The agency's breakdown of benefits suggests that about 3.3% of total benefits is attributable to climate change alone, or \$3.56 billion (percentage estimated based on NHTSA's breakdown of benefits at the 7% discount rate, *id.* at 24449). But NHTSA only considered 85.4% of greenhouse gas impacts (i.e., it did not count 9.9% worth of impacts from pre-combustion CO₂ and 4.7% worth from non-CO₂ gases), so the total should have been closer to \$4.17 billion (\$3.56 billion ÷ 85.4%). EPA conservatively calculated a social cost of carbon at a 3% discount rate of \$45/tCO₂, *see* EPA, TECHNICAL SUPPORT DOCUMENT, *supra* note 18, at 12, table 1 (figures adjusted for year 2011 by a growth rate of 3%), about 6.4 times the figure used by NHTSA. Adjusted by that rate—which EPA considers an underestimate—benefits now total \$26.82 billion. NHTSA only calculated \$2.9 billion in climate benefits, Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,449, a mere 10.8% of the actual total. The advocacy group Environmental Defense created a model, *see infra* note 53, which predicts that an accurate cost-benefit analysis would have led to CAFE rates twice as strict, producing more than double the emissions reductions. Assuming that model holds true, NHTSA's under-regulation cost roughly over \$27 billion in climate change damages.

⁵² *See* Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, 73 Fed. Reg. at 24,353.

⁵³ In comments submitted publicly and cited by the Ninth Circuit's ruling, *see Ctr. for Biological Diversity*, 508 F.3d at 535 (citing Environmental Defense's calculation of how monetizing carbon would affect CAFE rates and total benefits), the advocacy group Environmental Defense estimated—based on its social cost of carbon valuation of \$13.60 per ton of carbon dioxide (/tCO₂) and other considerations—that increasing CAFE standards by 4% per year was feasible and cost-benefit justified for light truck model years 2008-2011. *See* Letter from Eric M. Haxthausen, Economist for Environmental Defense, to Jacqueline Glassman, Acting Administrator of NHTSA (Mar. 10, 2006). At twice the rate of NHTSA's planned increases, that proposal would generate by 2020 more than double the emissions reductions from those four model years. *See* Letter from Kevin Mills, Director of Environmental Defense's Clean Car Program, to Jacqueline Glassman, Acting Administrator of NHTSA (Nov. 22, 2005) (“[S]uch a standard would...achieve a cumulative reduction of 320 million metric carbon-equivalent tons by [2020], more than double the amounts offered by NHTSA's current proposal.”) Valuing those reductions at \$13.60/tCO₂ and a discount rate of 3% (a commonly accepted valuation at the time of NHTSA's original rulemaking, though now considered by EPA as a drastic underestimate, *see supra* notes 47-48 and accompanying text), Environmental Defense calculated cumulative climate benefits of its plan at \$19.7 billion by 2020. *See* Letter from Kevin Mills, (presenting calculations in attachment to letter). Assuming a roughly linear relationship between emissions and cumulative benefits, the additional benefits of Environmental Defense's proposal over NHTSA's rule are approximately \$9.85 billion (i.e., half). Model Year 2011 was covered by NHTSA's new regulations, but benefits from Model Years 2008-2010 can still be safely estimated as at least half that total (about \$5 billion) but probably not over three-fourths (about \$7.5 billion), since 2011 trucks would achieve the greatest reductions. That said, EPA would consider all these figures to be extreme underestimations, since the likely social cost of carbon is actually much, much higher, perhaps \$77/tCO₂ or more by year 2011.

⁵⁴ U.S. Evtl. Prot. Agency, New Source Review, <http://www.epa.gov/NSR> (last visited Nov. 18, 2008).

⁵⁵ Clean Air Act Amendments of 1977, Pub. L. No. 95-95, 91 Stat. 685 (codified as amending 42 U.S.C. § 7411). Only major stationary sources are covered (as opposed to mobile sources, like automobiles). “Modification” is defined as “any physical change in, or change in the method of operation of, a stationary source which increases the amount of any air pollutant emitted by such source or which results in the emission of any air pollutant not previously emitted.” Covered

pollutants include sulfur dioxide, nitrogen oxides, lead, carbon monoxide, ozone, and particulate matter. The fundamental logic behind the program is that construction and modification are economically efficient times to incorporate modern pollution controls into the physical or operational changes at the industrial facility. *See* U.S. GEN. ACCOUNTING OFFICE, GAO-03-947, CLEAN AIR ACT: EPA SHOULD USE AVAILABLE DATA TO MONITOR THE EFFECTS OF ITS REVISIONS TO THE NEW SOURCE REVIEW PROGRAM 1-7 (2003), available at <http://www.gao.gov/new.items/d03947.pdf>.

⁵⁶ *See, e.g.,* *New York v. EPA* (I), 413 F.3d 3, 10 (D.C. Cir. 2005).

⁵⁷ Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Baseline Emissions Determination, Actual-to-Future-Actual Methodology, Plantwide Applicability Limitations, Clean Units, Pollution Control Projects, 67 Fed. Reg. 80,186 (Dec. 31, 2002) (to be codified at 40 CFR pts. 51, 52).

⁵⁸ Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Equipment Replacement Provision of the Routine Maintenance, Repair and Replacement Exclusion, 68 Fed. Reg. 61,248 (Oct. 27, 2003) (to be codified at 40 CFR pts. 51, 52).

⁵⁹ For example, NSR requirements are triggered when a modification increases emissions of air pollutants. Determining whether an increase has occurred requires comparison with historical emission rates. EPA's new rules gave industry greater flexibility in measuring those baseline emissions: instead of always having to use the most recent two-year period, industry now could select from a range of periods. This flexibility let industry better account for economic cycles that may have artificially depressed emissions in recent years, giving them more leeway to increase emissions above current rates without triggering NSR. Other changes to baseline calculations were also made, along with: a revised test to determine increases; exemptions for companies that already use state-of-the-art pollution controls; exemptions for modifications designed specifically to control some air pollutants (even if the modification increases other air pollutants); a mechanism to allow companies to control emission on a plant-wide level, offsetting increases at some units with decreases at others; and, in October 2003, exempting as routine maintenance, repair, and replacement any replacement of components with identical or functionally equivalent components that do not exceed 20% of the replacement value of the entire process unit. *See* Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Baseline Emissions Determination, Actual-to-Future-Actual Methodology, Plantwide Applicability Limitations, Clean Units, Pollution Control Projects, 67 Fed. Reg. 80,186 (Dec. 31, 2002) (to be codified at 40 CFR pts. 51, 52); Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Equipment Replacement Provision of the Routine Maintenance, Repair and Replacement Exclusion, 68 Fed. Reg. 61,248 (Oct. 27, 2003) (to be codified at 40 CFR pts. 51, 52). Some of these specific provisions were later vacated by the courts. *See New York v. EPA* (I), 413 F.3d at 3 (vacating the state-of-the-art pollution control exemption and the pollution control project exemption); *New York v. EPA* (II), 443 F.3d 880 (D.C. Cir. 2006) (vacating the routine maintenance exemption).

⁶⁰ *See* Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Baseline Emissions Determination, Actual-to-Future-Actual Methodology, Plantwide Applicability Limitations, Clean Units, Pollution Control Projects, 67 Fed. Reg. at 80,189.

⁶¹ *See, e.g., New York v. EPA* (I), 413 F.3d at 3.

⁶² Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Baseline Emissions Determination, Actual-to-Future-Actual Methodology, Plantwide Applicability Limitations, Clean Units, Pollution Control Projects, 67 Fed. Reg. at 80,189 (“reduce burden, maximize operating flexibility, improve environmental quality, provide additional certainty, and promote administrative efficiency”).

⁶³ *See supra* notes 3–6 and accompanying text.

⁶⁴ U.S. GEN. ACCOUNTING OFFICE, GAO-03-947, CLEAN AIR ACT, *supra* note 55, at 16; *see also id.* at 10 (“[S]taff relied primarily on their professional judgment in estimating the rule’s economic impacts . . . as well as public [and industry] comments.”).

⁶⁵ *Id.* at 23 (citing an EPA official responsible for the analysis). EPA further assumed that companies would at least decrease production at less efficient facilities if they increased production at more efficient facilities. But EPA never analyzed actual production shifts after facilities make efficiency improvements to confirm its theory. *Id.* at 24.

⁶⁶ Additionally, “EPA assumed that the final rule would not impose significant economic costs on companies because the rule created voluntary options,” and companies do not voluntarily incur costs. *Id.* at 11.

⁶⁷ Jonathan Remy Nash & Richard L. Revesz, *Grandfathering and Environmental Regulation: The Law and Economics of New Source Review*, 101 NW. U. L. REV. 1677 (2007).

⁶⁸ U.S. GEN. ACCOUNTING OFFICE, GAO-03-947, CLEAN AIR ACT, *supra* note 55, at 17. Only 23 of the submissions predicted that the proposed efficiency projects would decrease emissions; 11 actually predicted an increase, 2 predicted no change, and 33 lacked sufficient data to determine any emissions impact. *Id.* at 23-24.

⁶⁹ Executive Order 12,866 § 1(b)(6), 58 Fed. Reg. 51735 (1993), requires agencies to “adopt a regulation only upon a *reasoned determination* that the benefits of the intended regulation justify its costs.” A violation of the executive order is not legally actionable, but environmentalists did challenge EPA’s rulemaking in court as arbitrary and capricious under the Administrative Procedure Act. While the court did strike down several provisions as contrary to the Clean Air Act, *see New York v. EPA (I)*, 413 F.3d at 3, on the claim that EPA’s rules were based on incomplete, unverified, and inconclusive support, the District of Columbia Circuit Court of Appeals was sympathetic but ultimately had to defer to the agency’s judgment. *See id.* at 31.

⁷⁰ Also, EPA claimed it was unable to create an economic model of how often and when the new options created by its rules would be used, because it could not model case-specific, multifactor-dependent voluntary decisions. *See* U.S. GEN. ACCOUNTING OFFICE, GAO-03-947, CLEAN AIR ACT, *supra* note 55, at 11. But EPA did in fact conduct some analysis. The agency conducts periodic analysis of the total costs and benefits of the entire Clean Air Act, but does not breakout costs and benefits by individual programs like NSR. *Id.* at 11 n.5. In 2001, EPA attempted to estimate emissions reductions at NSR-permitted facilities, but the analysis only included facilities located in areas that met federal air quality standards and did not distinguish between new and existing facilities. *Id.* at 11-12. (These problems seem easy to overcome, especially since EPA’s rule changes only affected areas that met federal air quality standards for the first three years anyway: “During the first 3 years of implementation, the final rule will only affect regulatory agencies and companies in jurisdictions that meet the federal air quality standards. According to EPA, about 10 to 12 percent of all affected companies are located in such areas. Other jurisdictions are not required to revise their NSR programs to accommodate the final rule until 2006.” *Id.* at 14 n.7.) In November 2002, EPA issued a supplemental analysis, using six case studies to find emissions reductions or volatile organic compounds, but the method was not statistically valid. *Id.* at 13-14. In February 2003, EPA responded to requirements under the Paperwork Reduction Act for assessment of record-keeping burdens, and estimated that 14 facilities would use the final rule’s provisions during each of the first three years of implementation. *Id.* at 14-15. Thus, it appears EPA was able to create some sort of model for analysis after all.

⁷¹ *See id.* at 11, 12, 16, 23-24 (also noting that EPA does not keep such records because it was not statutorily required to do so).

⁷² *See id.* at 8.

⁷³ *Id.* at 11.

⁷⁴ *Id.* at 25.

⁷⁵ The courts stayed and then struck down some of the proposed changes before they could take effect, so the negative costs imposed by those rules will be zero. *See, e.g., New York v. EPA (II)*, 443 F.3d 880 (D.C. Cir. 2006) (noting the routine maintenance rule change had been stayed by the court, and then vacated). But the elimination of certain provisions from the rule changes actually complicates the calculation of costs for the remaining provisions of the proposed rule. *See New York v. EPA (I)*, 413 F.3d at 31 (noting the importance of monitoring future effects, since the court vacated two provisions that might have been responsible for the net environmental benefits projected by EPA).

⁷⁶ U.S. Env'tl. Prot. Agency, Particulate Matter, <http://www.epa.gov/oar/particlepollution/> (last visited Nov. 19, 2008).

⁷⁷ U.S. Env'tl. Prot. Agency, Particulate Matter: Basic Information, <http://www.epa.gov/air/particlepollution/basic.html> (last visited Nov. 19, 2008).

⁷⁸ *Id.*

⁷⁹ WILLIAM C. HINDS, *AEROSOL TECHNOLOGY : PROPERTIES, BEHAVIOR, AND MEASUREMENT OF AIRBORNE PARTICLES* (2d ed. 1999).

⁸⁰ Jay R. Turner & David T. Allen, *Transport of Atmospheric Fine Particulate Matter: Part 1-Findings from Recent Field Programs on the Extent of Regional Transport within North America*, 58 J. AIR WASTE MGMT. ASS'N. 254 (2008).

⁸¹ *See* C. Arden Pope III & Douglas W. Dockery, *Health Effects of Fine Particulate Air Pollution: Lines that Connect*, 56 J. AIR WASTE MGMT. ASS'N. 709 (2006).

⁸² Sarah E. Hill et al., *Mortality among Lifelong Nonsmokers Exposed to Secondhand Smoke at Home: Cohort Data and Sensitivity Analyses*, 165 AM. J. EPIDEMIOLOGY 530 (2007).

⁸³ Francine Laden et al., *Reduction in Fine Particulate Air Pollution and Mortality: Extended Follow-Up of the Harvard Six Cities Study*, 173 AM. J. OF RESPIRATORY & CRITICAL CARE MED. 667 (2006); C. Arden Pope, III et al., *Cardiovascular Mortality and Year-Round Exposure to Particulate Air Pollution: Epidemiological Evidence of General Pathophysiological Pathways of Disease*, 109 CIRCULATION 71 (2004). Studies using improved spatial resolution in determining intra-city exposures to PM_{2.5} suggest that the risk of premature mortality may be two to three times higher than previously reported. Kristin A. Miller et al., *Long-Term Exposure to Air Pollution and Incidence of Cardiovascular Events in Women*, 356 NEW ENG. J. MED. 447 (2007); Michael Jerrett et al., *Spatial Analysis of Air Pollution and Mortality in Los Angeles*, 16 EPIDEMIOLOGY 727 (2005). In addition to causing premature mortality, long-term exposure to PM_{2.5} also causes respiratory impairment and decreased lung function. Long-term studies carried out in California demonstrate that children living in areas with higher annual concentrations of PM_{2.5} experience less growth in lung function as compared to children in areas with cleaner air. W. James Gauderman et al., *The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age*, 351 NEW ENG. J. MED. 1057 (2004). Research studies have also shown that the incidence and severity of lung disease in children is also increased as a result of chronic exposure to elevated concentrations of PM_{2.5}. Rob McConnell et al., *Prospective Study of Air Pollution and Bronchitic Symptoms in Children with Asthma*, 168 AM. J. OF RESPIRATORY & CRITICAL CARE MED. 790 (2003).

⁸⁴ *See* AM. LUNG ASS'N, *STATE OF THE AIR: 2008* (2008), available at <http://www.lungusa.org/sota08>. The 60 million individuals who live in areas with unsafe annual PM_{2.5} concentrations include around 50 million living in areas with annual concentrations above 15 µg/m³ and over 11 million living in areas with annual concentrations above 14 µg/m³ (the upper-bound of the Clean Air Scientific Advisory Committee's recommend range of 13-14 µg/m³). More than half of these individuals are especially susceptible to the health effects of long-term exposure to fine particles. *Id.* These include

over 15 million children, almost 7 million elderly, 1.5 million children with asthma, 3.5 million adults with asthma, almost 2 million people with chronic bronchitis, less than 1 million people with emphysema, almost 15 million people with cardiovascular disease, and over 3 million diabetics. *Id.* at 7.

⁸⁵ U.S. Env'tl. Prot. Agency, Particulate Matter: PM Standards, <http://www.epa.gov/air/particlepollution/standards.html> (last visited Nov. 19, 2008).

⁸⁶ Section 109 of the Clean Air Act (42 U.S.C. 7409) directs EPA's Administrator to propose and promulgate "primary" and "secondary" national ambient air quality standards for particle pollution, as well as ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Section 109 (b)(1) defines a primary standard as one "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." Secondary standards are designed to protect welfare including buildings, visibility, ecology, and agriculture.

⁸⁷ U.S. Env'tl. Prot. Agency, Particulate Matter: PM Standards, <http://www.epa.gov/air/particlepollution/standards.html> (last visited Nov. 19, 2008).

⁸⁸ *Lead Indus. Ass'n v. EPA*, 647 F.2d 1153, 1156 n. 51 (7th Cir. 1987).

⁸⁹ Section 109 of the Clean Air Act directs the Administrator to establish this committee to review the criteria and standards promulgated, and to provide other related scientific and technical advice. CASAC is composed of seven members and, according to § 109(d) of the Clean Air Act, must include at least one member of the National Academy of Sciences, one physician, and one person representing state air pollution control agencies. U.S. ENVTL. PROT. AGENCY, CLEAN AIR SCIENTIFIC ADVISORY COMMITTEE CHARTER (2007), *available at* <http://yosemite.epa.gov/sab/sabproduct.nsf/WebCASAC/currentcharter?OpenDocument>.

⁹⁰ *Lead Indus. Ass'n*, 647 F.2d at 1161-62.

⁹¹ *See* Letter from the Clean Air Scientific Advisory Comm., U.S. Env'tl. Prot. Agency, to Stephen Johnson, Administrator, U.S. Env'tl. Prot. Agency (Sep. 29, 2006) (Recommendations Concerning the Final National Ambient Air Quality Standards for Particulate Matter) (discussing the Committee's 2005 recommendations), *available at* <http://www.epa.gov/sab/pdf/casac-ltr-06-003.pdf>.

⁹² *Id.*

⁹³ National Ambient Air Quality Standards for Particulate Matter, 71 Fed. Reg. 61,144 (Oct. 17, 2006) (to be codified at 40 C.F.R. pts. 53, 58).

⁹⁴ *Id.*

⁹⁵ Letter from the Clean Air Scientific Advisory Comm., U.S. Env'tl. Prot. Agency, to Stephen Johnson, Administrator, U.S. Env'tl. Prot. Agency (Mar. 21, 2006) (Recommendations Concerning the Final National Ambient Air Quality Standards for Particulate Matter), *available at* <http://www.epa.gov/sab/pdf/casac-ltr-06-002.pdf>. The PM Panel consists of the seven members of CASAC plus an additional 15 technical experts.

⁹⁶ *Id.*

⁹⁷ The scientific reasoning for rejecting the advice of the CASAC focused on the average fine particle concentrations of the cities studied in the two main surveys used by the CASAC (i.e., the Harvard Six Cities Study and the ACS study). The average annual concentrations were above 15 $\mu\text{g}/\text{m}^3$ (18 $\mu\text{g}/\text{m}^3$ and 17.7 $\mu\text{g}/\text{m}^3$ respectively) in these two studies. Administrator Johnson argued that the certainty of a causal relationship is strongest near the mean and therefore these studies did not necessitate that an annual standard be set below the current level of 15 $\mu\text{g}/\text{m}^3$. National Ambient Air Quality Standards for Particulate Matter, 71 Fed. Reg. 61,144.

⁹⁸ The Children’s Health Study carried out in California was the first long-term prospective cohort study that measured growth in lung function as a health endpoint. Administrator Johnson rejected the use of this study as a basis for setting the annual standard since no other study had been carried out looking at the same health endpoint. *Id.*

⁹⁹ See Interview with Jason Burnett, former Senior Policy Advisor, Office of Air & Radiation, U.S. Evtl. Prot. Agency, by H. Select Comm. on Energy Independence & Global Warming, 110th Cong., by telephone (July 15, 2008), *available at* <http://media.washingtonpost.com/wp-srv/nation/documents/burnett071808.pdf>.

¹⁰⁰ U.S. ENVTL. PROT. AGENCY, REGULATORY IMPACT ANALYSIS OF THE PROPOSED NATIONAL AMBIENT AIR QUALITY STANDARDS FOR PARTICULATE MATTER (2006), *available at* <http://www.epa.gov/ttn/ecas/ria.html> (scroll to “2006 National Ambient Air Quality Standards for Particle Pollution: The Regulatory Impact Analysis”). In that study, 2015 was chosen as the base year of analysis because it is a reasonable estimate of the date by which states would have actually implemented controls to attain the revised standard.

¹⁰¹ *Id.* at 9-2-9-3. The net benefits are derived by using an effect estimate based on the concentration-response function developed from the study of the American Cancer Society cohort reported in Pope et al (2002), which has previously been reported as the primary estimate in recent regulatory impact analyses.

¹⁰² *Id.*

¹⁰³ *Id.* at 5-67- 5-70.

¹⁰⁴ National Environmental Policy Act, Pub. L. No. 91-190, 83 Stat. 852 (codified as amended at 42 USC §§ 4321-47).

¹⁰⁵ *Id.* § 4332(2)(c).

¹⁰⁶ Baltimore Gas & Electric Co. v. NRDC, 462 U.S. 87, 97 (1983); *see also* LINDA LUTHER, CONG. RES. SERV., THE NATIONAL ENVIRONMENTAL POLICY ACT: BACKGROUND AND IMPLEMENTATION 1 (2008). An agency is prohibited from using a NEPA review to “rationalize or justify decisions already made.” 40 C.F.R. § 1502.5 (2008); *see also* 40 C.F.R. § 1501.2 (2008).

¹⁰⁷ KRISTINA ALEXANDER, CONG. RES. SERV., OVERVIEW OF NEPA REQUIREMENTS 1 (2007), *available at* <http://ncseonline.org/NLE/CRSreports/07May/RS20621.pdf>. Two Supreme Court rulings completed NEPA’s conversion from a law thought to impose substantive requirements to one held only to impose procedural ones. *See* Strycker’s Bay Neighborhood Council v. Karlen, 444 U.S. 223 (1980); Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 351 (1989).

¹⁰⁸ 40 CFR § 1508.4 (2008).

¹⁰⁹ Exceptions to this exemption were created with a 1992 rule, after which an item could be categorically excluded only if “there are no extraordinary circumstances related to the proposed action.” National Environmental Policy Act; Revised Policy and Procedures, 57 Fed. Reg. at 43,208 (Sept. 18, 1992).

¹¹⁰ The statute calls for an EIS to discuss: the environmental impact of the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, alternatives to the proposed action, the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. 42 U.S.C. § 4332(2)(C)(2006). Several of these statutory terms have been elucidated further by courts and then codified by the White House Council on Environmental Quality. *See, e.g.*, Hanley v. Kleindienst, 471 F.2d 823 (2d Cir. 1972), *cert. denied*, 412 U.S. 908 (1973) (defining “significantly”); Natural Resources Defense Council v. Morton, 458 F.2d 827 (D.C. Cir. 1972) (defining

“alternatives”); 40 C.F.R. § 1502.14 (2008) (elaborating requirements for consideration of “alternatives”).

¹¹¹ See, e.g., Harvey Black, *NEPA at 35 Years: Imperfect Protection*, 112 ENVTL. HEALTH PERSPECTIVES A294 (2004); Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government's Environmental Performance*, 102 COLUM. L. REV. 903 (2002); James T.B. Tripp & Nathan G. Alley, *Streamlining NEPA's Environmental Review Process: Suggestions for Agency Reform*, 12 N.Y.U. ENVTL. L.J. 74 (2003); Michael B. Gerrard & Michael Herz, *Harnessing Information Technology to Improve the Environmental Impact Review Process*, 12 N.Y.U. ENVTL. L.J. 18 (2003); COUNCIL ON ENVTL. QUALITY, *THE NATIONAL ENVIRONMENTAL POLICY ACT: A STUDY OF ITS EFFECTIVENESS AFTER 25 YEARS* (1997) (“NEPA process is often triggered too late to be fully effective.”), available at <http://www.nepa.gov/nepa/nepa25fn.pdf>.

¹¹² National Environmental Policy Act Task Force, 67 Fed. Reg. 45,510 (July 9, 2002).

¹¹³ NEPA TASK FORCE, REPORT TO CEQ: MODERNIZING NEPA IMPLEMENTATION (Sept. 2003), available at <http://ceq.hss.doe.gov/ntf/report/finalreport.pdf>. Broadly speaking, CEQ's report put forth the premise that “NEPA should serve as a planning decision-making tool, engaging people from the get-go to find out what their issues are and begin to work through those issues from the inception of project planning.” James Connaughten, Chair of the President's Council on Environmental Quality, *Modernizing the National Environmental Policy Act: Back to the Future*, Keynote Address at the Colloquium on New Approaches to Environmental Review (Apr. 10, 2003), in 12 N.Y.U. ENVTL. L.J. 1, 6 (2004).

¹¹⁴ NEPA TASK FORCE, REPORT TO CEQ, *supra* note 113. See also Daniel A. Bronstein et al., *The National Environmental Policy Act at 35*, 7 ENVTL. PRACTICE 3 (2005). Similarly, CEQ Chair James Connaughten expressed the conviction that “Congress got it right in 1969 when it articulated the national goal under NEPA,” namely sustainable development that balanced environmental preservation with the demands of economic growth. Connaughten, *supra* note 113, at 2.

¹¹⁵ For instance, CEQ noted that a typical EIS ranged from 200 to 2000 pages in length, took one to six years to prepare, and cost between \$250,000 and \$2 million. NEPA TASK FORCE, REPORT TO CEQ, *supra* note 113, at 66.

¹¹⁶ See, e.g., Suzi Parker, *Task Force Takes Aim at NEPA, Freaks out Environmentalists*, GRIST, Aug. 4, 2005, <http://www.grist.org/news/maindish/2005/08/04/parker-nepa/index.html>.

¹¹⁷ See TASK FORCE ON IMPROVING THE NATIONAL ENVIRONMENTAL POLICY ACT & TASK FORCE ON UPDATING THE NATIONAL ENVIRONMENTAL POLICY ACT, H. COMM. ON RESOURCES, 109TH CONG., INITIAL FINDINGS AND DRAFT RECOMMENDATIONS (2005).

¹¹⁸ Healthy Forests Restoration Act of 2003, Pub. L. No. 108-148, 117 Stat. 1887 (codified at 16 U.S.C. §§ 6501-6591).

¹¹⁹ National Environmental Policy Act Documentation Needed for Fire Management Activities; Categorical Exclusions, Part V, 68 Fed. Reg. 33,814 (June 5, 2003); see also ROSS W. GORTE, CONG. RESEARCH SERV., *WILDFIRE PROTECTION IN THE 108TH CONGRESS* (2005), available at <http://ncseonline.org/NLE/CRS/abstract.cfm?NLEid=157>.

¹²⁰ Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (codified at 42 U.S.C. §§ 15801-16538).

¹²¹ In the words of the Department of the Interior: “The use of the new statutory CXs is not dependent on the . . . CEQ process for approving new CXs. Additionally, the CXs established by Section 390 are not subject to the requirement in 40 CFR 1507.3 that would preclude their use when there are extraordinary circumstances. This is because the CXs addressed in this guidance are established by statute and not under CEQ procedures.” *Use of Section 390 Categorical Exclusions for*

Oil and Gas Development, Attachment 2, in Dep't of Interior, Instruction Memorandum No. 2005-247, Sept. 30, 2005.

¹²² Grazing Administration–Exclusive of Alaska Part II. 71 Fed. Reg. 39,402 (Jul. 12, 2006) (to be codified at 43 C.F.R. pt. 4100).

¹²³ BUREAU OF LAND MGMT., DEP'T OF THE INTERIOR, JUSTIFICATION FOR TWO NEW PROPOSED CATEGORICAL EXCLUSIONS FOR ISSUANCE OF GRAZING PERMITS AND LEASES AUTHORIZED BY THE BUREAU OF LAND MANAGEMENT (2005), available at <http://www.doi.gov/oepc/cxreports/CX%20Report%20-%20Grazing.pdf>. The White House Office of Management and Budget did not determine the change to be a “significant regulatory action,” such as would require a cost-benefit analysis. Grazing Administration–Exclusive of Alaska Part II. 71 Fed. Reg. at 39,500; see also *supra* notes 3-6 and accompanying text.

¹²⁴ Patrick McLaughlin, *Empirical Tests for Midnight Regulations and Their Effect on OIRA Review Time* (Mercatus Ctr., Working Paper No. 08-40, 2008), available at http://www.mercatus.org/uploadedFiles/Mercatus/Publications/WPPDF_Empirical%20Tests%20for%20Midnight%20Regulations.pdf.

¹²⁵ Memorandum from Joshua B. Bolten, White House Chief of Staff, to Heads of Executive Dep'ts and Adm'r of Office of Info. & Regulatory Affairs 1 (May 9, 2008), available at http://www.whitehouse.gov/omb/inforeg/cos_memo_5_9_08.pdf.

¹²⁶ *Id.*

¹²⁷ See, e.g., Interagency Cooperation Under the Endangered Species Act, 73 Fed. Reg. 47,868 (Aug. 15, 2008) (to be codified at 50 C.F.R. pt. 402); Ensuring that Department of Health and Human Services Funds Do Not Support Coercive or Discriminatory Policies or Practices in Violation of Federal Law, 73 Fed. Reg. 50,274 (Aug. 26, 2008) (to be codified at 45 C.F.R. pt. 88); Requirements for DOL Agencies' Assessment of Occupational Health Risks, 73 Fed. Reg. 50,909 (Aug. 29, 2008) (to be codified at 29 C.F.R. pt. 2).

¹²⁸ Letter from Susan E. Dudley, Adm'r, Office of Information & Regulatory Affairs, to Dean Richard Revesz, Faculty Director, Institute for Policy Integrity (Oct. 9, 2008) (emphasis added), available at <http://www.policyintegrity.org/news/documents/10.31.08GreenwireMidnightRegulations.pdf>.

¹²⁹ Requirements for DOL Agencies' Assessment of Occupational Health Risks, 73 Fed. Reg. 50,909 (Aug. 29, 2008) (to be codified at 29 C.F.R. pt. 2).

¹³⁰ *Id.* at 50911-13.

¹³¹ *Id.* at 50915. While more flexible and finely-tuned standards are generally a smart and efficient way to regulate, in the case of workplace toxins it may be a reckless and deadly choice. Workers frequently move between multiple jobs and through multiple industries. Imagine a worker has three different jobs, each lasting 15 years and each involving the same workplace hazards. Under the old risk assessment model, each employer would have to minimize exposure levels so that the employee would not suffer a material health impairment from 45 years of exposure. But under the new model, each employer might only have to safeguard employees assuming 15 years of exposure. The daily exposure limits to protect a worker over 15 years will be much more lenient than those to protect over 45 years; yet the worker's level of risk and length of exposure have not really changed. Employers will not need to set as rigorous controls under the proposed regulations, and the employees' health will likely suffer as a result.

¹³² *Id.*

¹³³ Celeste Monforton, *Secret Rule on OSHA Risk Assessment?*, THE PUMP HANDLE, July 8, 2008, <http://thepumphandle.wordpress.com/2008/07/08/secret-rule-on-osha-risk-assessment/>; Carol

Leonning., *U.S. Rushes to Change Workplace Toxins Rules*, WASH. POST, July 23, 2008. The many irregularities in DOL's rulemaking process include: the rule's appearance on the White House Office of Management and Budget's website in July, before DOL had formally proposed the rule in the *Federal Register*; a failure to include the rule in DOL's Unified Agenda of Federal Regulatory and Deregulatory Actions published in April 2008; a violation of a White House directive that no agencies propose regulations after June 1, 2008; the rule's origination in the DOL's Office of Policy as opposed to from the agency's scientific experts; and decisions not to hold a public hearing and to only hold a shortened 30-day notice-and-comment period.

¹³⁴ Letter from Rep. George Miller & Sen. Edward Kennedy, to Elaine L. Chao, Sec'y of Labor (July 23, 2008), available at http://kennedy.senate.gov/newsroom/press_release.cfm?id=57AA61A4-3763-4DC3-9D39-2AA3A9F88260.

¹³⁵ See Prohibiting the Department of Labor's Secret Rule Act, H.R. 6660, 110th Cong. (2008). The bill was referred to House Committee on Education and Labor on July 30, 2008.

¹³⁶ See Letter from Leon R. Sequeira, Asst. Sec'y for Policy, Dep't of Labor, to Rep. George Miller (Sept. 25, 2008), available at http://www.defending-science.org/case_studies/upload/Sequeira-to-Miller-Extension-9-25-08.pdf.

¹³⁷ *Secret Rule: Impact of the Department of Labor's Worker Health Risk Assessment Proposal: Hearing Before the Subcomm. on Workforce Protections of the H. Comm. on Education and Labor*, 110th Cong. (Sept. 17, 2008), available at <http://edlabor.house.gov/hearings/wp-2008-09-17.shtml>.

¹³⁸ *Id.* (testimony of Celeste Monforton, George Washington University School of Public Health), available at <http://edlabor.house.gov/testimony/2008-09-17-CelesteMonforton.pdf>.

¹³⁹ Exec. Order No. 12,866, 58 Fed. Reg. 51,735, 51,738 (Sept. 30, 1993). See also *supra* notes 3–6 and accompanying text.

¹⁴⁰ See Harvey S. James, Jr., *Estimating OSHA Compliance Costs*, 31 POL'Y SCI. 321, 331 (1998) (estimating that the cost of OSHA rules in 1993 was between \$23.1 billion and \$46.7 billion annually). James's estimate, when converted into 2008 dollars, would be approximately \$34.1 billion to \$69.1 billion. This estimate, however, only includes the costs of these regulations. It does not include the benefits (e.g. lives saved, lowered disease rates, improved worker health). Assuming all OSHA regulations are cost-benefit justified, and the benefits are at least as great as the costs, the effect on the economy of OSHA regulations would be at least twice as high as these projected numbers. Additionally, this number does not account for OSHA regulations issued between 1993 and 2008. Thus, the estimate of a \$34.1 to \$69.1 billion impact is extremely conservative.

¹⁴¹ \$100 million is 0.29% of \$30.2 billion.

¹⁴² EPA lists the uncertainty range for annual deaths at between 8,000 and 45,000. More information can be found in U.S. ENVTL. PROT. AGENCY, EPA 402-R-03-003, EPA ASSESSMENT OF RISKS FROM RADON IN HOMES (2003), available at <http://www.epa.gov/radon001/pdfs/402-r-03-003.pdf>.

¹⁴³ U.S. Env'tl. Protection Agency, Radon, <http://www.epa.gov/radon/> (last visited November 19, 2008).

¹⁴⁴ LEONARD A. COLE, ELEMENT OF RISK: THE POLITICS OF RADON 8 (1993) (discussing findings of studies by the National Council of Radiation Protection and Measurements (NCRP) and the National Academy of Sciences (NAS)).

¹⁴⁵ U.S. ENVTL. PROTECTION AGENCY, EPA 402-K-07-009, A CITIZEN'S GUIDE TO RADON: THE GUIDE TO PROTECTING YOURSELF AND YOUR FAMILY FROM RADON (2007), available at <http://www.radon.com/pubs/citguide.html>.

¹⁴⁶ *Id.* at 8-9.

¹⁴⁷ Large-scale studies validate the dangers of radon. *See, e.g.*, Daniel Krewski et al., *Residential Radon and Risk of Lung Cancer*, 16 EPIDEMIOLOGY 137 (2005) (pooling all available radon studies); R. William Field et al., *Residential Radon Exposure and Lung Cancer*, 12 J. OF EXPOSURE ANALYSIS & ENVTL. EPIDEMIOLOGY 197 (2007) (finding that accounting for subject mobility and locations of radon readings within houses explains why some analyses have underestimated radon risks); *see also* U.S. ENVTL. PROT. AGENCY, EPA ASSESSMENT OF RISKS FROM RADON IN HOMES, *supra* note 142 (describing in great detail the findings of radon studies). Some debate on the danger of radon persists. In particular, some dispute the characterization of radon as a non-threshold carcinogen. *See, e.g.*, Richard E. Thompson et al., *Case-control Study of Lung Cancer Risk from Residential Radon Exposure in Worcester County, Massachusetts*, 94 RADIATION SAFETY J. 228 (2008) (disputing the non-threshold assumption and also identifying a hormetic effect at low concentrations).

¹⁴⁸ *See* EPA, A CITIZEN'S GUIDE TO RADON, *supra* note 145, at 5. Conducting an internet search of the term "radon test kits" will generate a number of results on prices and companies.

¹⁴⁹ Elevated radon concentrations are most likely to occur in homes that are mostly but not completely air-tight: radon gas seeps in but cannot naturally circulate out. More porous homes—mostly older constructions—allow more natural ventilation and prevent buildup. *See id.* at 4.

¹⁵⁰ U.S. ENVTL. PROTECTION AGENCY, EPA-402-K-06-094, CONSUMER'S GUIDE TO RADON REDUCTION 7, 16 (2006), available at <http://www.epa.gov/radon/pdfs/consguide.pdf>. It is cheaper to construct a new radon-resistant house than it is to equip an existing dwelling to mitigate radon. For a new home, estimated installation costs range from \$300-500 dollars; for remediation in an existing home, EPA lists \$1200 as the average price of installation. With the additional expenses of keeping up a radon mitigation system, the total net present cost is about \$2000.

¹⁵¹ The Czech government has paid for remediation when indoor radon levels exceed 1000 Bq/m³, or just over 27 pCi/L. Joseph Thomas et al., *Cost-Effectiveness of Countermeasures against Radon in the Czech Republic: Preliminary Report*, 130 RADIATION PROTECTION DOSIMETRY 18, 19 (2008). Though very limited in scope—39 houses at the time of the study—this policy is estimated to cost about \$4,350 per life-year saved. *Id.* at 19. The United Kingdom's intervention program is much like that of the United States, but targeted rather than nationwide. Thomas Coskeran et al., *A New Methodology for Cost-Effectiveness Studies of Domestic Radon Remediation Programmes*, 366 SCI. OF THE TOTAL ENV'T 32, 33 (2006). One study from the United Kingdom determined that it would be cost-effective to target any area where 5% of homes had elevated radon concentrations. Antony Denman et al., *Evaluating the Health Benefits and Cost-Effectiveness of the Radon Remediation Programme in Domestic Properties in Northamptonshire, UK*, 73 HEALTH POL'Y 139, 147 (2005). In the United States, this would mean targeting counties in all 50 states. A 2003 Norwegian study concluded that a program to test and mitigate every home in Norway would save 892 lives at a cost of \$238M, or \$270,000 per life. Hein Stigum et al., *Should Radon be Regulated in Homes? A Cost-Effect Analysis*, 84 HEALTH PHYSICS 227 (2003). EPA's own 1992 documents estimate that lung cancer deaths from radon would be averted at the cost of approximately \$700,000 each. U.S. ENVTL. PROT. AGENCY, EPA 400-R-92-011, TECHNICAL SUPPORT DOCUMENT FOR THE 1992 CITIZEN'S GUIDE TO RADON (1992). One comprehensive analysis by suggests that this number would be even lower under various scenarios. Chia-yu Lin et al., *Analysis of Local Decisions Using Hierarchical Modeling, Applied to Home Radon Measurement and Remediation*, 14 STAT. SCI. 305, 307, 312 (1999) (projecting over 30 years and assuming a 20-year lag between exposure and death, but not discounting benefits). A recent Danish study found that an intervention program would save lives at a value of \$3.8 million each. Mads Lyngby Peterson & Thommy Larsen, *Cost-Benefits Analyses of Radon Mitigation Projects*, 81 J. OF ENV'T'L MGMT. 14, 24 (2006). That is below the Danish value of statistical life, but above U.S. estimates.

¹⁵² Indoor Radon Abatement Act, 15 U.S.C. § 2661 (2004) ("The national long-term goal of the United States with respect to radon levels in buildings is that the air within buildings in the United States should be as free of radon as the ambient air outside of buildings."). EPA is authorized under the Act to: Issue such regulations as may be necessary to carry out statutory provisions; Administer grants to

help States establish radon programs, conduct radon surveys, develop public information on radon, and conduct demonstration and mitigation projects; Report on studies of radon in federally-owned buildings; Conduct a study of the extent of radon contamination in the Nation's school buildings and report on the results of this study; Create a Citizens Guide to radon; Develop model construction standards and techniques; Establish regional radon training centers; Provide technical assistance to States; and Establish proficiency programs for firms offering radon-related services. *Id.*

¹⁵³ OFFICE OF INSPECTOR GENERAL, U.S. ENVTL. PROT. AGENCY, REPORT NO. 08-P-0174, MORE ACTION NEEDED TO PROTECT PUBLIC FROM INDOOR RADON RISKS 6(2008), *available at* <http://www.epa.gov/oig/reports/2008/20080603-08-P-0174.pdf>.

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *See supra* note 142.

¹⁵⁷ Occupational Safety and Health Act, 5 U.S.C. § 651(b) (1970).

¹⁵⁸ *See* Dep't of Labor, Semiannual Regulatory Agenda, 70 Fed. Reg. 27163, 27199 (May 16, 2005) (codified at 29 C.F.R. § 1926.36).

¹⁵⁹ The International Agency for Research on Cancer classified beryllium and beryllium compounds as carcinogens, and the National Institute for Occupational Safety and Health classified beryllium as a carcinogen and beryllium compounds as probable human carcinogens. Occupational Safety and Health Admin., Dep't of Labor, Occupational Exposure to Beryllium; Request for Information, 67 Fed. Reg. 70707, 70709 (Nov. 26, 2002) (codified at 29 CFR pt. 1910).

¹⁶⁰ *Id.* at 70708-10.

¹⁶¹ Agency for Toxic Substances & Disease Registry, Dep't of Health & Human Servs., *Beryllium Toxicity: Who Is at Risk of Exposure to Beryllium?*, http://www.atsdr.cdc.gov/csem/beryllium/bewhosat_risk.html (last visited Nov. 19, 2008) (citing a 2004 study).

¹⁶² Air Contaminants, 29 C.F.R. § 1910.1000(c) (1971). In 1980, the Mine Safety and Health Administration adopted the same silica standard for mine atmospheres. *See* Respirable Dust Standard, 30 C.F.R. § 71.100 (1980).

¹⁶³ This standard was recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), a professional organization that develops and publishes consensus occupational health standards. *See* AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS, SILICA, CRYSTALLINE-QUARTZ - THE DOCUMENTATION OF THE THRESHOLD LIMIT VALUES AND BIOLOGICAL EXPOSURE INDICES (2001).

¹⁶⁴ *See* NATIONAL INST. FOR OCCUPATIONAL SAFETY & HEALTH, OCCUPATIONAL EXPOSURE TO CRYSTALLINE SILICA (1974).

¹⁶⁵ *Id.* at 74-75.

¹⁶⁶ Between 1995 and 2004, silicosis caused 242 to 166 deaths per year. It is likely that many more cases simply went undetected. Ctrs. for Disease Control & Prevention, Silicosis: Number of deaths by sex, race, age, and median age at death, U.S. residents age 15 and over, 1995-2004, <http://www2a.cdc.gov/drds/WorldReportData/FigureTableDetails.asp?FigureTableID=535&GroupRefNumber=T03-01> (last visited Nov. 19, 2008).

¹⁶⁷ Dep't of Labor, Semiannual Regulatory Agenda, 70 Fed. Reg. at 27199-27200.

¹⁶⁸ *See, e.g., id.*

¹⁶⁹ Memorandum from Joseph A. Dear, Asst. Sec'y of OSHA, Special Emphasis Program for Silicosis (May 8, 1996), *available at* http://www.osha.gov/SLTC/etools/silica/spec_emph_prog/

spec_emph_prog.html. This program was later revised as a National Emphasis Program. See Occupational Safety and Health Admin., Directive No. CPL 03-00-0007, National Emphasis Program - Crystalline Silica (Jan. 24, 2008), available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=3790.

¹⁷⁰ See U.S. GENERAL ACCOUNTING OFFICE, GAO-04-378, WORKPLACE SAFETY AND HEALTH: OSHA'S VOLUNTARY COMPLIANCE STRATEGIES SHOW PROMISING RESULTS, BUT SHOULD BE FULLY EVALUATED BEFORE THEY ARE EXPANDED 21 (2004), available at <http://www.gao.gov/new.items/d04378.pdf> ("The resources OSHA devotes to its voluntary compliance strategies consume a significant and growing portion of the agency's limited resources"). See also Stephen Labaton, *OSHA Leaves Worker Safety in Hands of Industry*, N.Y. TIMES, April 25, 2007 at A1 ("Instead of regulations, [OSHA head Edwin G. Foulke Jr.] and top officials at other agencies favor a 'voluntary compliance strategy,' reaching agreements with industry associations and companies to police themselves By the end of 2001, OSHA had withdrawn more than a dozen proposed regulations.").

¹⁷¹ GAO, WORKPLACE SAFETY AND HEALTH: OSHA'S VOLUNTARY COMPLIANCE STRATEGIES, *supra* note 170 at 25-33.

¹⁷² T.A. TOMBERLIN, IDAHO NAT'L ENGINEERING & ENVTL. LABORATORY, BERYLLIUM – A UNIQUE MATERIAL IN NUCLEAR APPLICATIONS 1 (2004), available at <http://www.inl.gov/technicalpublications/Documents/2808485.pdf>.

¹⁷³ See Wendy E. Wagner & Lynn E. Blais, *Emerging Science, Adaptive Regulation, and the Problem of Rulemaking Ruts*, 86 TEX. L. REV. 1701, 1726-27 (2008); David Michaels, *Doubt Is Their Product*, SCI. AM., June 2005, at 98.

¹⁷⁴ Air Contaminants, 29 C.F.R. § 1910.1000(b) & Table Z-2 (1971) (mandating that beryllium concentration to be at or below an average of 2 µg/m³ for an eight-hour period, and that no worker be exposed to more than 25 µg/m³).

¹⁷⁵ *Occupational Standard for Beryllium: Hearing Before the Dep't of Labor, Occupational Safety and Health Administration* 1 (1977) (statement of Edward J. Baier, Deputy Dir., NIOSH, Ctrs. for Disease Control & Prevention), available at <http://www.cdc.gov/niosh/pdfs/77-bery.pdf>.

¹⁷⁶ In 1975, OSHA proposed a rule that would have reduced beryllium concentration to 1 µg/m³. Occupational Exposure to Beryllium, 40 Fed. Reg. 48814, 48818 (Oct. 17, 1975) (codified at 29 C.F.R. pt. 19190).

¹⁷⁷ See Dep't of Energy, Office of Environment, Safety and Health, Chronic Beryllium Disease Prevention Program, 64 Fed. Reg. 68854, 68855 (Dec. 8, 1999) (codified at 10 C.F.R. pt. 850).

¹⁷⁸ Dep't of Labor, Semiannual Regulatory Agenda, 63 Fed. Reg. 22164, 22217-22275 (Apr. 27, 1998).

¹⁷⁹ Dep't of Labor, Occupational Exposure to Beryllium; Request for Information, 67 Fed. Reg. 70707.

¹⁸⁰ Since 1998, OSHA has continued to place the beryllium rule on its agenda, but the agency routinely pushes back the deadline for a completed risk assessment. Under OSHA's most recent agenda, the assessment is due November 2008. 73 Fed. Reg. at 24723. Although the May 2005 agenda refers to the insufficiency of the current beryllium standard, that language is curiously lacking in recent agendas. Compare Dep't of Labor, Semiannual Regulatory Agenda, 70 Fed. Reg. 27163, 27195 (May 16, 2005) (codified at 20 C.F.R. § 1910) with Dep't of Labor, Semiannual Regulatory Agenda, 72 Fed. Reg. 70087, 70091 (Dec. 10, 2007), and Dep't of Labor, Semiannual Regulatory Agenda, 73 Fed. Reg. 24719, 24723 (May 5, 2008).

¹⁸¹ Chronic Beryllium Disease Prevention Program, 64 Fed. Reg. at 68855 ("Until OSHA completes its rulemaking, DOE has decided to implement an aggressive, two-pronged exposure reduction and minimization program that is expected to further protect DOE federal and contractor workers from the hazards associated with exposure to beryllium.").

¹⁸² *Id.* at 68862.

¹⁸³ *Id.*

¹⁸⁴ 1,600 is 1.1% of 134,000. Although the first number is from a 1999 rule, *see supra* note 183, and the second is from a 2004 study, *see supra* note 161, the exposure rates of beryllium should not vary significantly between the years.

¹⁸⁵ *See* NAT'L INST. FOR OCCUPATIONAL SAFETY & HEALTH, U.S. DEP'T OF HEALTH & HUMAN SERV., MUSCULOSKELETAL DISORDERS AND WORKPLACE FACTORS (1997), *available at* <http://www.cdc.gov/niosh/docs/97-141/pdfs/97-141a.pdf>. That report also discusses the impacts of psychological/social factors on musculoskeletal disorders, such as intensified workload, monotonous work, limited job control, low job clarity, and low social support. *Id.* at 7-1-7-10. OSHA likewise found strong evidence of causation. OSHA Ergonomics Rule, 65 Fed. Reg. 68,262, 68,439 (November 14, 2000) (codified at 29 C.F.R. pt. 1910).

¹⁸⁶ *Id.* at 68,263, 68,549 (1.88 million total). OSHA estimated that a total of 647,344 workdays were lost due to musculoskeletal disorders in 1996 and 592,500 workdays in 1998. *Id.* at 68262, 68549, 68550.

¹⁸⁷ OMB Watch, Congress Votes to Repeal Ergonomics Standard, Mar. 7, 2001, <http://www.ombwatch.org/article/articleview/199/1/68> (quoting a study by the National Academy of Sciences).

¹⁸⁸ EDWARD RAPPAPORT, CONG. RES. SERV., ERGONOMICS IN THE WORKPLACE: IS IT TIME FOR AN OSHA STANDARD? (2002) *available at* https://www.policyarchive.org/bitstream/handle/10207/442/97-724_20020507.pdf?sequence=2.

¹⁸⁹ Steven Greenhouse, *Battle Lines Drawn Over Ergonomic Rules; Business Pitted Against Washington*, N.Y. TIMES, Nov. 18, 2000; *see also* OMB Watch, *supra* note 187.

¹⁹⁰ OSHA Ergonomics Rule, 65 Fed. Reg. 68,262 (November 14, 2000) (codified at 29 C.F.R. pt. 1910).

¹⁹¹ *Id.* at 68,262. The action trigger is defined as “a work-related [musculoskeletal disorder] involving either (1) one or more days away from work, (2) one or more days of limitations on the work activities of the employee, (3) medical treatment beyond first aid, or (4) 7 days of persistent [musculoskeletal disorder] signs or symptoms.” *Id.* at 68305.

¹⁹² The only exception to this was an option dubbed the “Quick Fix” scenario, which could be implemented by an employer who was able to fully mitigate the ergonomics hazard within 90 days. *Id.*

¹⁹³ *Id.* at 68,262.

¹⁹⁴ *Id.* at 68,772. When the rule was first proposed, 64 Fed. Reg. 65768, 66002, it predicted a 67% decrease in musculoskeletal disorders, but the final rule speaks of annual reductions by half.

¹⁹⁵ OSHA Ergonomics Rule, 65 Fed. Reg. at 68,262.

¹⁹⁶ *See* OMB Watch, *supra* note 187.

¹⁹⁷ *See* S.J. Res. 6, 107th Cong. (2001) (enacted); 29 C.F.R. § 1910.900. (2001). Congress derived its authority under the Congressional Review Act, which stipulates that a rule will not take effect if Congress passes a joint resolution disapproving the rule. 5 U.S.C. § 801 (b)(1) (1996).

¹⁹⁸ 147 CONG. REC. S1831-08, S1834 (2001) (daily ed. Mar. 6, 2001).

¹⁹⁹ 5 U.S.C. § 802 (1996). Section 802 specifies the disapproval procedure, which was followed in S.J. Res. 6, 107th Cong. 5 U.S.C. § 802 (g) declares action in accordance to the section is a congressional exercise of rulemaking power, and as such supersedes any other rules.

²⁰⁰ In 2004 OSHA published a guideline for poultry processing industry. OCCUPATIONAL SAFETY AND HEALTH ADMIN., OSHA 3213-09N, GUIDELINES FOR POULTRY PROCESSING: ERGONOMICS FOR THE PREVENTION OF MUSCULOSKELETAL DISORDERS (2004), *available at* <http://www.osha.gov/ergonomics/guidelines/poultryprocessing/poultryprocessing.html>. In 2008 a guideline for shipyards was issued. OCCUPATIONAL SAFETY AND HEALTH ADMIN., OSHA 3341-03N, GUIDELINES FOR SHIPYARDS: ERGONOMICS FOR THE PREVENTION OF MUSCULOSKELETAL DISORDERS (2008), *available at* <http://www.osha.gov/dsg/guidance/shipyard-guidelines.html>. OSHA also made a draft version of guidelines for nursing homes available. OCCUPATIONAL SAFETY AND HEALTH ADMIN., DRAFT GUIDELINES FOR NURSING HOMES: ERGONOMICS FOR THE PREVENTION OF MUSCULOSKELETAL DISORDERS, *available at* <http://www.osha.gov/ergonomics/guidelines/nursinghome/draft/index.html>.

²⁰¹ National Climate Program Act, Pub. L. No. 95-367, §3, 92 Stat. 601 (1978) (requiring the President to establish such a program).

²⁰² On the international front, in 1997, the U.S. Senate passed the Byrd-Hagel Resolution expressing the sense of the Senate that the United States should not be a signatory to the Kyoto Protocol, the intergovernmental agreement to cut greenhouse gas emissions. S. RES. 98, 105th Cong. (1997). Since taking office, President George W. Bush has refused to submit the Kyoto Protocol to the Senate for ratification. *See* Letter from the President to Senators Hagel, Helms, Craig, and Roberts (Mar. 13, 2001), *available at* <http://www.whitehouse.gov/news/releases/2001/03/20010314.html>. Meanwhile, Congress has consistently voted down or refused to take up climate change legislation: for example, the 2003 Climate Stewardship Act was defeated in the Senate by a 55-43 vote, *see* Roll Call Vote on S. AMDT. 2028 to S. 139, 108th Cong. (Oct. 30, 2003), *available at*, http://www.senate.gov/legislative/LIS/roll_call_lists/roll_call_vote_cfm.cfm?congress=108&session=1&vote=00420, and countless bills have languished in committee. *See* Pew Ctr. on Global Climate Change, Climate Action in Congress, http://www.pewclimate.org/what_s_being_done/in_the_congress (last visited Oct. 13, 2008).

²⁰³ *See* Massachusetts v. EPA, 549 U.S. 497, 127 S. Ct. 1438, 1460 (2007) (citing EPA's argument that "Congress did not intend [the agency] to regulate substances that contribute to climate change").

²⁰⁴ *See, e.g.*, Seth Borenstein, *Bush Changes Pledge on Emissions*, PHILA. INQUIRER, Mar. 14, 2001, *available at* <http://www.globalpolicy.org/socecon/envronmt/bore0314.htm> ("In Saginaw, Mich., on Sept. 29 [2000], Bush announced his energy policy and said: 'We will require all power plants to meet clean-air standards in order to reduce emissions of sulfur dioxide, nitrogen dioxide, mercury and carbon dioxide within a reasonable period of time.'"); *id.* (noting that a few months later, after taking office, Bush wrote "I do not believe, however, that the government should impose on power plants mandatory emissions reductions for carbon dioxide, which is not a 'pollutant' under the Clean Air Act.").

²⁰⁵ *See, e.g.*, Andrew C. Revkin, *Panel of Experts Faults Bush Plan to Study Climate*, N.Y. TIMES, Feb. 26, 2003 ("The president has said that more research is needed before the administration can even consider mandatory restrictions on heat-trapping greenhouse gases linked to global warming. The expert panel, convened by the National Academy of Sciences at the administration's request, said some of the [President's] proposals for new research seemed to rehash questions that had already been largely settled....For example, the [panel] said, far more is already known about human activity's contribution to global warming than is suggested by the administration's plan, which, the panel said, expresses too much uncertainty about the question."); U.S. HOUSE OF REPRESENTATIVES MINORITY COMM. ON GOV'T REFORM, 109TH CONG., THE ADMINISTRATION'S ASSAULT ON CLIMATE CHANGE SCIENCE 2 (2005), *available at* <http://oversight.house.gov/documents/20050921131322-08678.pdf> ("An internal EPA memorandum circulated during the editing process noted that after [White House] changes, [the EPA's *Draft Report on the Environment*] 'no longer accurately represents scientific consensus on climate change.'"); *see also* John Carey, *President Bush's Climate Plan is Expected to Fall Short*, BUS. WEEK: GREEN BUS., Apr. 15, 2008 ("President Bush has a habit of promising action on climate change—and then not delivering. In his campaign, he came out in support of mandatory

curbs on carbon dioxide emissions from power plants, only to quickly backtrack after becoming President. In 2002, he offered a 'plan' to fight global warming, but it was a meager collection of support for technology and voluntary targets. In May 2007, he issued an executive order calling for regulatory steps to reduce greenhouse gas emissions from vehicles by 2008, but his agencies never came out with an actual proposal for accomplishing those reductions.”).

²⁰⁶ See, e.g., *id.* at 2 (“Politics, not the complexities of science, led to the deletion of the section on global warming.”); *id.* at 4 (noting that in response to a White House decision to cancel the Department of Agriculture’s attempt to reprint a brochure on ways to reduce agricultural emissions of greenhouse gases, one government official said “[I]t is not just a case of micromanagement, but really of censorship of government information.”).

²⁰⁷ See *id.* at 1 (“Phillip A. Cooney, who is a lawyer with no scientific training, reviewed and altered government scientific reports on global warming. Mr. Cooney’s edits systematically weakened the government’s conclusions on global warming. Prior to working at the White House, Mr. Cooney was an oil-industry lobbyist at the American Petroleum Institute tasked with the job of fighting tighter restrictions on greenhouse gas emissions.”); *id.* at 2 (“Mr. Cooney consistently undermined conclusions in other draft reports by injecting unwarranted uncertainty into affirmative statements (e.g., changing ‘is’ to ‘may’).”); see also Tim Dickinson, *The Secret Campaign of President Bush’s Administration to Deny Global Warming*, ROLLING STONE, June 28, 2007; Andrew Revkin, *Bush Aide Edited Climate Reports*, N.Y.TIMES, June 8, 2005.

²⁰⁸ See U.S. H.R. MINORITY COMM. ON GOV’T REFORM, *supra* note 205, at 1 (Cooney removed the information from an October 2002 by the U.S. Climate Change Science program, because he felt the findings were “speculative”); see also Revkin, *Bush Aide Edited Climate Reports*, *supra* note 207. Two days after allegations of censorship came to light in 2005, Cooney resigned his government job and accepted a position with Exxon Mobil. See Andrew Revkin, *Editor of Climate Reports Resigns*, N.Y.TIMES, June 10, 2005, at A9; Andrew Revkin, *Former Bush Aide Who Edited Climate Reports Is Hired by Exxon*, N.Y.TIMES, June 15, 2005, at A21.

²⁰⁹ See Deborah Zabarenko, *US Climate Scientists Allege White House Pressure*, REUTERS, Jan. 30, 2007, available at <http://www.commondreams.org/headlines07/0130-10.htm>.

²¹⁰ For example, former Senior Associate with the U.S. Climate Change Science Program Rick Plitz resigned in March 2005, stating “[t]he White House so successfully politicized the science program that I decided it was necessary to terminate my relationship with it.” Rick S. Plitz, *Censorship and Secrecy: Politicizing the U.S. Climate Change Science Program*, June 1, 2005, available at <http://www.climatewatch.org/index.php/csw/details/censorship-and-secrecy/>. Former associate deputy administration of the EPA, Jason Burnett, is also a prominent example of a resignation over political interference. See Interview with Jason Burnett, former Senior Policy Advisor, Office of Air & Radiation, U.S. Env’tl. Prot. Agency, by H. Select Comm. on Energy Independence & Global Warming, 110th Cong., by telephone (July 15, 2008), available at <http://media.washingtonpost.com/wp-srv/nation/documents/burnett071808.pdf>.

²¹¹ See, e.g., U.S. H.R. MINORITY COMM. ON GOV’T REFORM, *supra* notes 205; NASA OFFICE OF INSPECTOR GEN., INVESTIGATIVE SUMMARY: REGARDING ALLEGATIONS THAT NASA SUPPRESSED CLIMATE CHANGE SCIENCE AND DENIED MEDIA ACCESS TO DR. JAMES E. HANSEN, A NASA SCIENTIST, 18, 47 (2008), available at http://oig.nasa.gov/investigations/OI_STI_Summary.pdf. The NASA investigation was conducted in response to a request by fourteen senators to investigate allegations that the Bush administration had interfered with NASA scientists’ efforts to publicly discuss and report effects of climate change.

²¹² *Massachusetts v. EPA*, 127 S.Ct. at 1460-61. Though the ruling focused on a section of the Clean Air Act covering motor vehicle emissions, even most officials within EPA believed the logic of the ruling would apply to all greenhouse gas emissions, including those from stationary sources like power plants. See Interview with Jason Burnett, *supra* note 210, at 8.

²¹³ *Massachusetts v. EPA*, 127 S.Ct. at 1462 (“If EPA makes a finding of endangerment, the Clean Air Act requires the agency to regulate emissions of the deleterious pollutant from new motor vehicles Under the clear terms of the Clean Air Act, EPA can avoid taking further action only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine whether they do.”).

²¹⁴ See Fanny Carrier, *Environmentalists Hail US Supreme Court Ruling as Bush Says Issue Serious*, AGENCE FRANCE-PRESSE, Apr. 2, 2007 (quoting President Bush as saying “It’s the new law of the land.”).

²¹⁵ Exec. Order No. 13,432, 72 Fed. Reg. 27717 (May 14, 2007) (entitled “Cooperation Among Agencies on Protecting the Environment with Respect to Greenhouse Gas Emissions from Motor Vehicles, Nonroad Vehicles, and Nonroad Engines”).

²¹⁶ While most everyone at EPA would have preferred if Congress had passed new legislation specifically on climate change, they were prepared to use the Clean Air Act to regulate greenhouse gas emissions for stationary sources as well as motor vehicles. See Interview with Jason Burnett, *supra* note 210, at 32.

²¹⁷ See *id.* at 37. For selected quotes from the EPA endangerment findings, see U.S. Senate Comm. on Env’t & Pub. Works, EPA Endangerment Analysis and Finding, http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=bf7bcd30-9939-4e5e-81d4-3929348723ad (last visited Oct. 20, 2008) (“[I]n [the Administrator’s] judgment, the elevated, combined atmospheric concentrations of the six greenhouse gases are reasonably anticipated to endanger public welfare.”).

²¹⁸ See Interview with Jason Burnett, *supra* note 210, at 38.

²¹⁹ See *id.* The White House claimed this sudden change in policy was necessitated by the pending congressional energy legislation.

²²⁰ SELECT COMMITTEE ON ENERGY INDEP. & GLOBAL WARMING MAJORITY STAFF, 110TH CONG., INVESTIGATION OF THE BUSH ADMINISTRATION’S RESPONSE TO *MASSACHUSETTS V. EPA* 2 (2008). In particular, Vice President Cheney’s energy advisor, F. Chase Hutto, and Office of Management and Budget General Counsel, Jeffrey Rosen, were most vocal in their opposition to regulation; and Exxon Mobile, the American Petroleum, and the National Petrochemical and Refiners Association had made their opinions known to EPA and the White House. See Darren Samuelsohn, *Former EPA Official Details White House Retreat on GHG Regs*, E&E DAILY, July 18, 2008.

²²¹ See Interview with Jason Burnett, *supra* note 210, at 41. Jason Burnett, former associate deputy administration of EPA, resigned his position in 2008 over frustrations with political interference in EPA’s work on climate change. *Id.*

²²² *Id.* at 41-42.

²²³ See U.S. EPA, REGULATING GREENHOUSE GAS EMISSIONS UNDER THE CLEAN AIR ACT (2008), available at <http://www.epa.gov/climatechange/emissions/downloads/ANPRPreamble.pdf> (published July 11, 2008; later placed in the *Federal Register* as an advance notice of proposed rulemaking at 73 Fed. Reg. 44,354).

²²⁴ 73 Fed. Reg. at 44,397.

²²⁵ See Felicity Barringer, *White House Refused to Open E-Mail on Pollutants*, N.Y. TIMES, June 25, 2008, at A15; SELECT COMM. ON ENERGY INDEP. & GLOBAL WARMING, *supra* note 220, at 30-31 (comparing pre- and post-OMB-edited drafts, and noting the draft submitted to OMB referenced \$2 trillion in benefits). Even after the OMB edits, EPA’s advance notice still admitted that stricter motor vehicle standards would generate \$340-\$830 billion in fuel saving alone, not even considering any climate benefits from the reduction in greenhouse gases. See REGULATING GREENHOUSE GAS EMISSIONS UNDER THE CLEAN AIR ACT, *supra* note 223, at 240.

²²⁶ The Chart depicts just some of the highlights of Bush's many vacillations on climate policy. See Borenstein, *supra* note 204; Darren Samuelsohn, *Will Much-Maligned EPA Reg. Blueprint Emerge As 'Climate Change Bible'?*, GREENWIRE, Aug. 7, 2008; Andrew Revkin, *Agency Affirms Human Influence on Climate*, N.Y. TIMES, Jan. 10, 2007, at A16 (“[Bush] first expressly accepted that humans were contributing to global warming in a news conference in Denmark in July 2005 on the way to an economic summit in Scotland, saying, ‘Listen, I recognize that the surface of the Earth is warmer and that an increase in greenhouse gases caused by humans is contributing to the problem.’”); Press Release, White House, *President Bush Delivers State of the Union Address*, Jan. 23, 2007, <http://www.whitehouse.gov/news/releases/2007/01/20070123-2.html> (“the serious challenge of global climate change”); Fanny Carrier, *Environmentalists Hail US Supreme Court Ruling as Bush Says Issue Serious*, AGENCE FRANCE-PRESSE, Apr. 2, 2007; Jim Snyder, *Bush Climate Goals Don't Impress*, THE HILL, Apr. 16, 2008; Interview with Jason Burnett, *supra* note 210.

²²⁷ Netherlands Environmental Assessment Agency, *China Now No. 1 in CO₂ Emissions; USA in Second Position*, June 19, 2007, <http://www.mnp.nl/en/service/pressreleases/2007/20070619Chinanowno1inCO2emissionsUSAinsecondposition.html>; Nicola Jones, *China Tops CO₂ Emissions*, NATURE NEWS, June 20, 2007, available at <http://www.nature.com/news/2007/070618/full/news070618-9.html>.

²²⁸ See U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2006 ES-2, ES-9, ES-16, fig. ES-6 (2008), available at http://www.epa.gov/climatechange/emissions/downloads/08_ES.pdf. Electricity generation accounted for 34% of all U.S. greenhouse gas emissions in 2006 (besides carbon dioxide, other greenhouse gases included methane, nitrous oxide, ozone, water vapor, and chlorofluorocarbons). Transportation and industry also account for significant greenhouse gas emissions, but emissions from the agricultural, commercial, and residential sectors are difficult to regulate. Stationary power plants are an easy target for regulation, and so will be responsible for achieving most greenhouse gas reductions.

²²⁹ See U.S. DEP'T OF ENERGY, THE SMART GRID: AN INTRODUCTION 6 (2008), available at http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages.pdf (stating that if the nation's electricity production and distribution grid “were just 5% more efficient, the energy savings would equate to permanently eliminating the fuel and greenhouse gas emissions from 53 million cars.”); U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-601R, ECONOMIC AND OTHER IMPLICATIONS OF SWITCHING FROM COAL TO NATURAL GAS AT THE CAPITOL POWER PLANT AND AT ELECTRICITY-GENERATING UNITS NATIONWIDE 2 (2008) (stating that natural gas generates about half as much carbon dioxide as coal); OFFICE OF FOSSIL ENERGY, U.S. DEP'T OF ENERGY, CARBON SEQUESTRATION TECHNOLOGY ROADMAP AND PROGRAM PLAN 17-18 (2007), available at http://www.netl.doe.gov/technologies/carbon_seq/refshelf/project%20portfolio/2007/2007Roadmap.pdf (“Post-combustion CO₂ capture is primarily applicable to conventional coal-fired power generation, but may also be applied to gas-fired generation using combustion turbines. In a typical coal-fired power generation system, fuel is burned with air in a boiler to produce steam; the steam drives a turbine to generate electricity The boiler exhaust, or flue gas, consists mostly of nitrogen (N₂) and CO₂. [Carbon dioxide can be absorbed by injecting chemical solvents like amines into the flue gas; the absorbed carbon dioxide can then be captured and sequestered.] Pre-combustion CO₂ capture relates to gasification plants, where fuel is converted into gaseous components by applying heat under pressure in the presence of steam. In a gasification reactor, the amount of air or oxygen (O₂) available inside the gasifier is carefully controlled so that only a portion of the fuel burns completely. This “partial oxidation” process provides the heat necessary to chemically decompose the fuel and produce synthesis gas (syngas), which is composed of hydrogen (H₂), carbon monoxide (CO) and minor amounts of other gaseous constituents. The syngas is then processed in a water-gas-shift (WGS) reactor At this point, the CO₂ has a high partial pressure (and high chemical potential), which improves the driving force for various types of separation and capture technologies. After CO₂ removal, the H₂ rich syngas can be converted to electrical or thermal power.”). Power plants can

also reduce emissions indirectly by investing in “offset” projects, such as the capture of methane from agricultural facilities.

²³⁰ See Energy Information Administration, Emissions of Greenhouse Gases in the United States 2006, at 1 (2007), available at <ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057306.pdf>; U.S. Env'tl. Prot. Agency, National Multipollutant Emissions Comparison by Source Sector in 2002, <http://www.epa.gov/air/emissions/multi.htm> (last visited Nov. 18, 2008). Though nitrogen oxide also traps heat from solar radiation and therefore plays a role in the global greenhouse effect, it is also regulated as a non-greenhouse gas due to its direct relationship to acid rain and other environmental and health effects. Fossil fuel-based power plants also emit many other harmful pollutants, such as mercury, carbon monoxide, and so forth.

²³¹ See U.S. Env'tl. Prot. Agency, Health and Environmental Impacts of Nitrogen Oxides, <http://www.epa.gov/air/urbanair/nox/hlth.html> (last visited Nov. 18, 2008); U.S. Env'tl. Prot. Agency, Health and Environmental Impacts of Sulfur Dioxide, <http://www.epa.gov/air/urbanair/so2/hlth1.html> (last visited Nov. 18, 2008); U.S. Env'tl. Prot. Agency, Particulate Matter: Health and Environment, <http://www.epa.gov/air/particlepollution/health.html> (last visited Nov. 18, 2008).

²³² U.S. Env'tl. Prot. Agency, Clean Energy: Air Emissions, <http://www.epa.gov/solar/energy-and-you/affect/air-emissions.html> (last updated Dec. 28, 2007) (“The average emissions rates in the United States from natural gas-fired generation are: 1135 lbs/MWh [megawatt-hour] of carbon dioxide, 0.1 lbs/MWh of sulfur dioxide, and 1.7 lbs/MWh of nitrogen oxides The average emission rates in the United States from coal-fired generation are: 2,249 lbs/MWh of carbon dioxide, 13 lbs/MWh of sulfur dioxide, and 6 lbs/MWh of nitrogen oxides.”).

²³³ NAT'L ENERGY TECH. LAB., U.S. DEP'T OF ENERGY, PROJECT FACTS: HYBRID COMBUSTION-GASIFICATION CHEMICAL LOOPING COAL POWER TECHNOLOGY DEVELOPMENT (2006), available at <http://www.netl.doe.gov/publications/factsheets/project/Proj329.pdf> (describing an innovative carbon capture technology being funded by the U.S. Department of Energy that claims to “have the potential to capture all carbon dioxide emissions, while also exceeding all current environmental regulations (e.g. nitrogen oxides, sulfur oxides, etc.)”).

²³⁴ Dallas Burtraw et al., Ancillary Benefits of Reduced Air Pollution in the United States from Moderate Greenhouse Gas Mitigation Policies in the Electricity Sector (Resources for the Future Discussion Paper No. 01-61, 2001). See *infra* note 238 on how consideration of health benefits may result in underestimation of total ancillary benefits. See *infra* note 239 on how consideration of investment savings may result in underestimation of total ancillary benefits. The study also makes “relatively modest forecasts regarding increases in renewable electricity technologies,” Burtraw et al., *supra* note 234, at 11, and uses \$3.8 million (1997 dollars) as the value of a statistical life, instead of the \$5.9 million (1997 dollars) figure preferred by the U.S. Environmental Protection Agency, *id.* at 13. As a result, “the estimates we obtain in many cases are smaller in terms of ancillary benefits per ton of carbon reduced, but we feel they inspire a greater level of confidence than the previous literature in the main finding that ancillary benefits should weigh importantly in the consideration of climate policy.” *Id.* at 30.

²³⁵ \$25 and \$75 are modest prices to set for a carbon tax. The U.S. Energy Information Administration estimates that a tax of \$348 per metric ton of carbon would be necessary to achieve the greenhouse gas reductions contemplated by the Kyoto Protocol (the international agreement setting greenhouse gas reduction targets). *Id.* at 11. Carbon taxes are somewhat controversial. U.S. Representative John Dingell of Michigan, the chair of the U.S. House Energy and Commerce Committee, has said “I sincerely doubt that the American people will be willing to pay what [a carbon tax] is really going to cost them.” Robert Hahn & Peter Passell, *Time to Change U.S. Climate Policy*, ECONOMISTS' VOICE, Nov. 2007, at 1, 2. Most proposals for federal greenhouse gas regulations follow the more accepted cap-and-trade approach. But purely as an economic model, the carbon tax is a useful tool for estimating emissions reductions.

²³⁶ The study's focus on the electricity sector is "not especially limiting" because the electricity sector will be responsible for about three-fourths of all planned carbon reductions under most cost-effective, economy-wide climate policies. *See* Burtraw, *supra* note 234, at 4.

²³⁷ For example, a \$25 carbon tax makes new natural gas plants much more competitive with both new and old coal plants. *Id.* at 15. Use of natural gas has both climate change and ancillary health benefits versus use of coal.

²³⁸ For a \$25 carbon tax, the study calculated about \$8 (1997 dollars) in health benefits per metric ton of carbon reduced. *Id.* at 2. Health effects from air emissions make up about 82-93% of all quantifiable environmental and public health effects from the entire electricity fuel cycle, and it is difficult to deal with the impacts of sulfur dioxide, ozone, and other pollutants in a consistent manner. Therefore, the study only addresses direct health effects of nitrogen oxides. As a result, "estimates may be a lower bound of the estimates that would be achieved if a complete analysis was possible." *Id.* at 3-4.

²³⁹ Sulfur dioxide emissions are already limited by a nationwide cap: companies need to purchase "allowances" in order to emit sulfur dioxide, and only so many allowances are sold. *See* U.S. Envtl. Prot. Agency, Clean Air Markets: Allowance Trading Basics, <http://www.epa.gov/airmarkt/trading/basics.html> (last visited Nov. 18, 2008). If a power plant achieves ancillary sulfur dioxide reductions while responding to the carbon tax, it will need fewer allowances. The leftover allowances will become available for another company to purchase, allowing it to emit extra sulfur dioxide. Therefore, total emissions of sulfur dioxide are not necessarily reduced. However, that second company now can comply with the sulfur dioxide cap by purchasing extra allowances rather than investing in expensive emissions control technologies. The money saved on those investments is another ancillary benefit. Burtraw et al., *supra* note 234, at 9 ("Under the [sulfur dioxide] cap, a facility that reduces its sulfur dioxide emissions makes emissions allowances available for another facility, displacing the need for abatement investment at that facility.") Investment in nitrogen oxide controls may similarly decrease. For a \$25 carbon tax, the study calculated about \$4-7 (1997 dollars) per ton of carbon in reduced investment in nitrogen oxide and sulfur oxide abatement technologies. *Id.* at 2. Because of the study's methodologies, the "estimate of the compliance cost savings resulting from a carbon tax would be likely to underestimate savings." *Id.* at 10.

²⁴⁰ Ancillary benefits could be as high as \$20 per ton of carbon reduced. *Id.* at 22 (noting the results of a sensitivity analysis).

²⁴¹ However, the study notes that marginal ancillary benefits are not greater than marginal costs of a \$25 tax. *Id.* at 2. Presumably, marginal direct benefits plus marginal ancillary benefits would be greater than marginal costs. At a \$75 carbon tax, the average cost of compliance goes up to about \$37.5 per ton of carbon, and though total ancillary benefits increase under a \$75 carbon tax, the value of ancillary benefits per each ton of carbon avoided remains at \$12. *Id.*

²⁴² These figures were calculated by multiplying the estimated carbon reductions, *id.* at 15, by the estimated total ancillary benefits per ton of carbon reduced, *id.* at 22. The exact figure depends on what assumptions about the baseline/status quo are made in terms of direct regulation of nitrogen oxides and sulfur dioxide. The range given here represents benefits under either the \$25 or \$75 tax.

²⁴³ *See* *New State Ice Co. v. Liebmann*, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting) ("It is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory, and try novel social and economic experiments.").

²⁴⁴ *See* PEW CTR. ON GLOBAL CLIMATE CHANGE, CLIMATE CHANGE INITIATIVES AND PROGRESS IN THE STATES (2008), available at <http://www.pewclimate.org/docUploads/States%20table%203%2027%2008.pdf>. In fairness, the federal government has passed similar indirect measures as well; but only the states have acted thus far regulated greenhouse gas emissions directly.

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- ²⁴⁵ See Pew Ctr. on Global Climate Change, Greenhouse Gas Inventories, http://www.pewclimate.org/what_s_being_done/in_the_states/inventories_map.cfm (last updated Apr. 9, 2008).
- ²⁴⁶ See Pew Ctr. on Global Climate Change, Greenhouse Gas Reporting and Registries, http://www.pewclimate.org/what_s_being_done/in_the_states/reporting_map.cfm (last updated Oct. 7, 2008).
- ²⁴⁷ See Pew Ctr. on Global Climate Change, Greenhouse Gas Emissions Targets, http://www.pewclimate.org/what_s_being_done/in_the_states/emissionstargets_map.cfm (last updated Sept. 25, 2008).
- ²⁴⁸ See Pew Ctr. on Global Climate Change, Carbon Cap or Offset Requirements for Power Plants, http://www.pewclimate.org/what_s_being_done/in_the_states/cap_and_offset_map.cfm (last updated July 10, 2008); Pew Ctr. on Global Climate Change, Vehicle Emissions Standards, http://www.pewclimate.org/what_s_being_done/in_the_states/vehicle_ghg_standard.cfm (last updated Apr. 23, 2008). California recently finalized its formal plans for achieving its ambitious greenhouse gas reductions. See CAL. AIR RES. BD., CLIMATE CHANGE PROPOSED SCOPING PLAN: A FRAMEWORK FOR CHANGE (2008), available at <http://www.arb.ca.gov/cc/scopingplan/document/psp.pdf>. For the greenhouse gas standards for motor vehicles developed by California and adopted by other states to take full effect, the states need an EPA waiver, which has so far been consistently denied. See Press Release, Cal. Office of the Governor, U.S. EPA Rejects California's Tailpipe Emissions Waiver Request (Dec. 19, 2007), available at <http://gov.ca.gov/index.php?/press-release/8353/>.
- ²⁴⁹ See Pew Ctr. on Global Climate Change, Regional Initiatives, http://www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm (last updated Oct. 1, 2008). Some Canadian provinces have signed on to the Western Climate Initiative and the Midwestern Regional Greenhouse Gas Reduction Accord. Florida has its own cap-and-trade program but is seriously considering trying to join one of the regional accords. See Daniel Cusick, *Florida Warms to the Idea of Joining Regional Trading Groups*, CLIMATEWIRE, Oct. 17, 2008.
- ²⁵⁰ The Midwestern Regional Greenhouse Gas Reduction Accord seeks to develop a framework cap-and-trade agreement by the end of 2008 and to achieve full implementation in 2010. See Midwestern Regional Greenhouse Gas Reduction Accord, Nov. 15, 2007, available at <http://www.wisgov.state.wi.us/docview.asp?docid=12497>. The Western Climate Initiative recently proposed its cap-and-trade design recommendations. See Western Climate Initiative, <http://www.westernclimateinitiative.org> (last visited Oct. 15, 2008).
- ²⁵¹ See RGGI Inc., Participating States, <http://www.rggi.org/states> (last visited Oct. 15, 2008).
- ²⁵² See RGGI INC., OVERVIEW OF RGGI CO₂ BUDGET TRADING PROGRAM 2 (2007), available at http://rggi.org/docs/program_summary_10_07.pdf
- ²⁵³ See *id.* The program covers fossil fuel-fired power plants with generating units of 25 megawatts or more. About 225 such facilities operate in the region, and they are responsible for about 95% of carbon dioxide emissions in the regional electricity sector. The compliance period begins January 1, 2009. *Id.*
- ²⁵⁴ See *generally id.* Initially, offset projects will be allowed to cover 3.3% of a unit's compliance obligations.
- ²⁵⁵ See Press Release, RGGI Inc., RGGI States' First CO₂ Auction Off to a Strong Start (Sept. 29, 2008), available at http://www.rggi.org/docs/rggi_press_9_29_2008.pdf. The September 2008 auction was a pre-compliance auction, with purchased allowances eligible for use in 2009.
- ²⁵⁶ See RGGI INC., EXECUTIVE SUMMARY (2008), available at http://www.rggi.org/docs/RGGI_Executive_Summary.pdf.

²⁵⁷ Between 2009-2018, RGGI will auction off a total of 1,833,750,516 allowances (starting with an initial cap in 2009 of 188,076,976 tons of carbon dioxide). See RGGI INC., OVERVIEW OF RGGI CO₂ BUDGET TRADING PROGRAM, *supra* note 252, at 3. RGGI sets a minimum price for allowances of \$1.86, see RGGI INC., EXECUTIVE SUMMARY, *supra* note 256, and 1,833,750,516 allowances * \$1.86 per allowance = \$3,410,775,966. But that minimum price was well exceeded at the September 2008 auction, where the clearing price was \$3.07. See Press Release, RGGI States' First CO₂ Auction Off to a Strong Start, *supra* note 255. The clearing price is the price where multiple bids cause cumulative demand to exceed supply; in other words, allowances were only sold to those bidding \$3.07 or more. The U.S. futures markets for carbon dioxide allowances trades at around \$5. See, e.g., Chicago Climate Exchange, CCX CFI Market Data Charting Tool, <http://www.chicagoclimatex.com/market/data/summary.jsf> (showing 2010 futures trading between \$2 and \$7 for most of 2008, averaging around \$5). At that average price, RGGI's total allowances through 2018 would generate \$9,168,752,580 (1,833,750,516 * \$5).

²⁵⁸ See RGGI INC., EXECUTIVE SUMMARY, *supra* note 256, at 1. Because the auction will place additional costs on utilities, retail electricity rates are expected to increase by 1-3%; but projected increases should be offset by redistributed auction revenue. *Id.* at 2.

²⁵⁹ RGGI allowances are capped at just over 188 million tons of carbon dioxide for years 2009-2014. See RGGI INC., OVERVIEW OF RGGI CO₂ BUDGET TRADING PROGRAM, *supra* note 252, at 2. Though that cap is actually slightly more than the total amount of carbon dioxide projected to be emitted by the regional utilities in 2009, see *id.* at 2 n.4, historically emission rates in the utility sector tend to increase over time in the absence of any emissions regulation. In other words, at least by 2015 (when allowances are cut by nearly half a million tons), RGGI's cap should actually restrict power plants' emissions rates compared to business-as-usual practices. Calculating the difference between the reduced caps and the initial cap for years 2015-2018 yields 4,701,924 total tons of carbon dioxide. See *id.* at 3.

²⁶⁰ EPA has calculated dollar figures to represent the costs imposed by each additional ton of carbon dioxide emitted into the atmosphere. Known as the "social cost of carbon," this dollar figure assigns each ton its proportional share of the likely economic, environmental, and political consequences of climate change. See U.S. ENVTL. PROT. AGENCY, TECHNICAL SUPPORT DOCUMENT ON BENEFITS OF REDUCING GHG EMISSIONS 5 n.9 (2008), available at <http://www.regulations.gov/fdmspublic/component/main?main=DocumentDetail&o=09000064806b1d94>. The \$4 billion is derived by using the expected emissions reductions achieved by RGGI and the EPA's valuation of the social cost of carbon at a 2% discount rate and a 3% growth rate: 4,701,924 tons reduced * \$86 per ton for 2015; 9,403,849 tons reduced * \$89 per ton for 2016; 14,105,773 tons reduced * \$91 per ton for 2017; and 18,807,698 tons reduced * \$94 per ton for 2018.

²⁶¹ Compare CAL. PUB. RES. CODE §§ 25213, 25218(e), 25402(a)-(c) & 25960 (granting statutory authority for promulgation of energy efficiency rules for appliances) & CAL. CODE REGS. tit. 20 §§ 1601-08 (detailing Appliance Efficiency Regulations), with Energy Energy Conservation Program for Consumer Products Other Than Automobiles, 42 U.S.C. §§ 6291-6309 (2006) & 10 CFR 430.32 (detailing federal standards for water and energy conservation in various appliances).

²⁶² DAVID ROLAND-HOLST, UNIV. OF CAL. AT BERKELEY, ENERGY EFFICIENCY, INNOVATION, AND JOB CREATION IN CALIFORNIA 6 (2008), available at http://are.berkeley.edu/~dwrh/CERES_Web/Docs/UCB%20Energy%20Innovation%20and%20Job%20Creation%2010-20-08.pdf

²⁶³ *Id.* at 20.

²⁶⁴ *Id.* at 40.

²⁶⁵ *Id.* at 7.

²⁶⁶ U.S. Env'tl. Prot. Agency, California Greenhouse-Gas Waiver Request, <http://www.epa.gov/OTAQ/ca-waiver.htm> (last visited Nov. 18, 2008).

²⁶⁷ See Clean Air Act of 1990, tit. VI, 40 U.S.C. 7651 (creating Acid Deposition Control program); Paul L. Joskow & Richard Schmalensee, *The Political Economy of Market-Based Environmental Policy: The U.S. Acid Rain Program*, 41 J.L. & ECON. 37, 41 (1998).

²⁶⁸ The Clean Air Act allocates allowances based on historic fuel consumption and specific emission rates prior to the start of the program. U.S. ENVTL. PROT. AGENCY, ACID RAIN AND RELATED PROGRAMS: 2006 PROGRESS REPORT 3 (2006), available at, <http://www.epa.gov/airmarkets/progress/docs/2006-ARP-Report.pdf>.

²⁶⁹ See ENVTL DEF., FROM OBSTACLE TO OPPORTUNITY: HOW ACID RAIN EMISSIONS TRADING IS DELIVERING CLEANER AIR 5 (2000).

²⁷⁰ *Clean Power Act: Hearing on S. 556 Before the Comm. on Env't & Pub. Works*, 107th Cong. 57, 59 (2001) (statement of Christine Todd Whitman, Administrator, EPA), available at <http://www.epa.gov/air/clearskies/final.pdf>.

²⁷¹ Richard A. Kerr, *Acid Rain Control: Success on the Cheap*, 282 SCIENCE 1024, 1025 (1998) (noting that EPA was criticized for being “overly optimistic” in testimony to Congress regarding expectations for the program).

²⁷² CLEAN AIR MKT. PROGRAMS, U.S. ENVTL. PROT. AGENCY, ACID RAIN PROGRAM BENEFITS EXCEED EXPECTATIONS 1 (2006), available at <http://www.epa.gov/airmarkt/cap-trade/docs/benefits.pdf> (last visited Oct. 26, 2008)

²⁷³ ENVTL. DEF., *supra* note 269, at 16.

²⁷⁴ U.S. ENVTL. PROT. AGENCY, ACID RAIN AND RELATED PROGRAMS, *supra* note 268, at 3. In 2007, emissions were reduced to 8.95 million, which was the permanent cap the Acid Rain Program had set for 2010. *Id.* at 7.

²⁷⁵ See U.S. Env'tl. Prot. Agency, Clean Air Markets: Data and Maps, <http://camddataandmaps.epa.gov/gdm/> (last visited Nov. 18, 2008).

²⁷⁶ CLEAN AIR MKT. PROGRAMS, *supra* note 272, at 1.

²⁷⁷ Initially, the Acid Rain Program had focused on environmental benefits, not taking into account the massive health benefits that would result from regulation. However, health valuation models have since been developed and has been incorporated into the Program's cost-benefit analyses. NAT'L SCI. & TECH. COUNCIL, NAPAP REPORT TO CONGRESS: AN INTEGRATED ASSESSMENT 36, 64 (2005).

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