

# The Clean Air Act's Economic Benefits *Past, Present and Future*



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## Acknowledgements

This report is the product of a collaborative effort by Small Business Majority and The Main Street Alliance.

Small Business Majority is a national nonprofit small business advocacy organization focused on solving the biggest problems facing America's 28 million small businesses. We conduct extensive opinion and economic research and work with small business owners, policy experts and elected officials nationwide to bring nonpartisan small business voices to the public policy table.

The Main Street Alliance is a national network of small business coalitions in 15 states supporting small business owners to bring their values into the public dialogue on pressing policy issues. Members of the alliance network share a vision of public policies that work for small business owners, their employees and the communities they serve. The alliance and its member coalitions create opportunities for small business owners to speak for themselves on issues of common concern.

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## Introduction

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In 1970, the United States Congress enacted the Clean Air Act (CAA)—one of the nation’s most important environmental laws. The CAA directs the U.S. Environmental Protection Agency (EPA) to develop and enforce regulations addressing a wide range of air quality problems and challenges. According to EPA and independent assessments, the economic and public health benefits of the Act have far outweighed the costs imposed on businesses.



As we mark the 40<sup>th</sup> anniversary of this historic legislation, EPA’s authority under the CAA is coming under threat from members of Congress that would delay or limit the Agency’s ability to regulate greenhouse gas emissions and other pollution. This has negative implications for many businesses, large and small, that have enacted new practices to reduce their carbon footprint as part of their new business models. It could also hamper the growth of the clean energy sector of the economy—a sector that a majority of small business owners view as essential to their ability to compete.<sup>1</sup>

It is in this context that this paper examines the legacy of the CAA, its cost and benefits to the American economy (including an analysis showing that the costs of compliance have been greatly overestimated time and again), and the important innovations spurred by the Act. The record shows:

1. The Clean Air Act has proven to be a very good investment. Studies show that the economic benefits of the Act have far exceeded the costs of controlling air pollution emissions. According to the Office of Management and Budget, the total economic benefits of the Clean Air Act are estimated at more than four to eight times the costs of compliance.

2. The CAA has fostered a long period of economic growth and development by protecting public health and the environment. In the last two decades, emissions of the most common air pollutants have declined by 41 percent, while Gross Domestic Product (GDP) has increased by more than 64 percent.

3. The CAA has spurred important technological innovations, such as catalytic converters, that have helped fuel job growth in the U.S. economy. The environmental technology industry—spurred by environmental regulations and particularly the Clean Air Act—led to the creation of 1.3 million total jobs between 1977 and 1991.

## **The Economic Benefits of the Clean Air Act**

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The U.S. Environmental Protection Agency (EPA) is required, under Section 812 of the 1990 Clean Air Act Amendments (CAAA), to periodically conduct scientifically reviewed studies that assess the costs and benefits of the CAA. EPA has completed two such studies. According to Alan Krupnick, a PhD economist and former senior economist on the President's Council of Economic Advisers, "[t]hese studies are probably the most intensive and expensive cost-benefit analyses ever done at the agency. Under the auspices of the agency's Science Advisory Board, both studies were scrutinized throughout the decade-long preparation by at least three expert committees of outside economists, air quality modelers, epidemiologists, and other health experts."<sup>2</sup> The table below presents the estimates of benefits and costs developed in the two studies.

Monetized Benefits and Costs of the Clean Air Act			
Study	Benefits	Costs	Benefit-Cost Ratio
CAA 1970 through 1990 <i>EPA retrospective study (1990 dollars)</i>	\$22.2 trillion*	\$523 billion	42:1
CAAA 1990 through 2010 <i>EPA prospective study (1990 dollars)</i>	\$690 billion*	\$180 billion	4:1
Stratospheric Ozone Protection <i>EPA prospective study (1990 dollars)</i>	\$530 billion*	\$27 billion	20:1

\* Central estimate.

The first of these studies was retrospective, and examined the costs and benefits of the CAA from 1970 to 1990.<sup>3</sup> The analysis compares the state of the environment and public health under two scenarios: (1) a scenario which reflects historical economic and environmental conditions observed with the CAA in place; and (2) a hypothetical scenario which projects the economic and environmental conditions which would have prevailed without the federal, state, and local programs developed pursuant to the 1970 and 1977 Clean Air Acts.

This study concludes that the benefits of the CAA, in the form of improved worker productivity, increased agricultural yields, reduced mortality and illness, and other economic and public health benefits, far exceed the costs of compliance.

Between 1970 and 1990, the CAA yielded (relative to the no-control scenario), an estimated \$22.2 trillion in economic benefits (this is EPA’s central estimate; benefits were estimated to range from \$5.6 to \$49.4 trillion). By comparison, the compliance costs to achieve these pollution reductions were estimated at \$523 billion—a cost-to-benefit ratio of more than 40:1, with net economic benefits of \$21.7 trillion dollars.

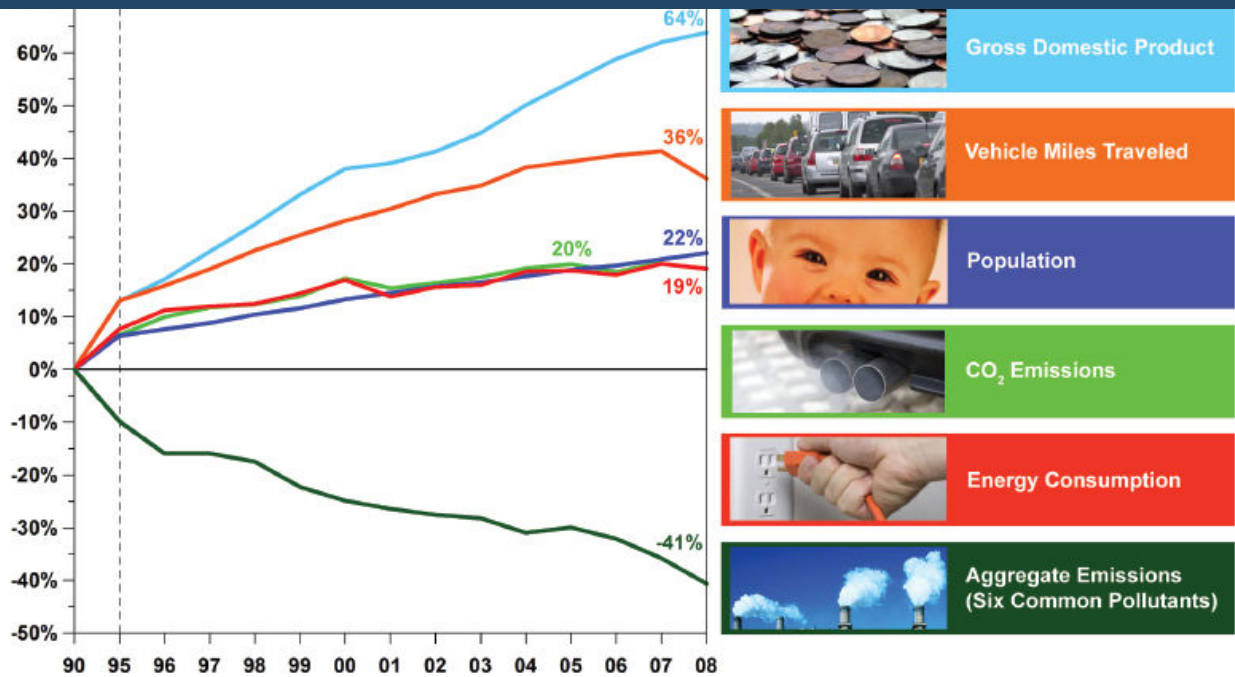
The benefits of the CAA stem from the significant reductions in air pollution emissions achieved by the Act. Sulfur dioxide (SO<sub>2</sub>) emissions declined 40 percent as a result of the Clean Air Act; nitrogen oxide (NO<sub>x</sub>) emissions were reduced by 30 percent; volatile organic compound (VOC) emissions were reduced by 45 percent; carbon monoxide (CO) emissions were reduced by 50 percent; particulate matter (PM) emissions were reduced by 75 percent; and lead emissions were reduced by an astonishing 99 percent. The EPA notes that these substantial reductions were

achieved “during a period in which population grew by 22.3 percent and the national economy grew by 70 percent.” These reductions led to corresponding reductions in the atmospheric concentrations of these pollutants, and resulting byproducts, such as ground-level ozone and the sulfates and nitric acids that contribute to acid rain.

EPA’s prospective study of the Clean Air Act focuses on the effects of the 1990 Clean Air Act Amendments from 1990 through 2010 by estimating the incremental benefits of the 1990 Amendments.<sup>4</sup> The analysis finds the CAAA resulted in further emissions reductions, improvements in air quality, and economic and public health benefits.

To calculate the economic benefits of the CAAA, EPA monetized the public health benefits of pollution reductions, effects on worker productivity, visibility, and crop yields, and two selected ecological effects: freshwater acidification and its impacts on recreational fishing, and tree growth and its negative impacts on commercial timber harvesting. Altogether, the study finds

Over the last 20 years, total emissions of the six principal air pollutants have decreased by more than 41 percent, while the Gross Domestic Product has increased by more than 64 percent.



Source: U.S. Environmental Protection Agency, Our Nation’s Air - Status and Trends through 2008, February 2010.

that the cumulative economic benefits of the CAAA (Titles I-V) from 1990 through 2010 would total \$690 billion (in 1990 dollars, discounted at 5%), while the compliance costs would total \$180 billion—a 4:1 cost-benefit ratio.<sup>5</sup> The measures aimed at protecting the stratospheric ozone layer were estimated over a much longer time period—1990-2075 for costs, and 1990-2165 for benefits—and these were estimated at \$530 billion in benefits and \$27 billion in costs.

In the 2010 post-CAAA scenario, SO<sub>2</sub> emissions were reduced by 31 percent; NO<sub>x</sub> emissions were reduced by 39 percent; VOC emissions were reduced by 35 percent; CO emissions were reduced by 23 percent; primary PM<sub>10</sub> emissions were reduced by 3 percent; PM<sub>2.5</sub> emissions were reduced by 4 percent, and mercury emissions were reduced by 42 percent.

Others have also concluded that the benefits of the CAA far outweigh the costs. The Office of Management and Budget (OMB), for example, estimated a range in the monetary benefits of regulation from 1992 through 2002 to be approximately \$121 to \$193 billion, and a range of costs to be \$23 to \$27 billion. This translates to \$4 to \$8 in benefits for each dollar invested in clean air.<sup>6</sup>

The acid rain program (ARP) has an even higher cost-to-benefit ratio—in 2005, researchers from Stratus Consulting estimated that the benefits exceed the costs of the ARP by more than 40:1 in 2010.<sup>7</sup>

## **The Clean Air Act has Generally Cost Less than Predicted**

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Not only do the economic benefits of the CAA far outweigh its costs, these costs have consistently been lower than initially predicted—by industry, and even by EPA itself. The SO<sub>2</sub> portion of the CAA's acid rain program provides a good example of this. The initial cost estimates for a 10 million ton reduction in SO<sub>2</sub> (approximately equal to the reductions required under Phase I of the acid rain program by 1995) were:

- \$2.4 billion per year (ICF Consulting, for the National Wildlife Federation)
- \$3.9 billion per year (Peabody Coal)

- \$3-4 billion per year (Office of Technology Assessment)
- \$4-5 billion per year (Edison Electric Institute)<sup>8</sup>.

In contrast, the Energy Information Administration (EIA) calculated the annualized costs of achieving compliance with the Phase I SO<sub>2</sub> emissions requirements at just \$836 million—well below early cost estimates.<sup>9</sup>

Similarly, key industry groups during the 1990 reauthorization of the CAA estimated that controls for volatile organic compounds (VOCs) would cost \$14.8 billion per year. However, due to technology innovation and other factors, EPA estimates that the costs of control will be no more than \$962 million in 2010.<sup>10</sup>

### Overestimating the Costs of Compliance

Industry and government economists alike have overestimated the costs of the Clean Air Act, anywhere from 500% to more than 1,000%.

EPA itself has routinely overstated the future costs of its regulations—including portions of the CAA. Harrington, Morgenstern and Nelson examined EPA's cost projections and found that in 14 cases, the costs of implementing the rules was less than predicted; costs were higher in only 3 cases.<sup>11</sup>

## Compliance Spawns Innovative Solutions and Lowers Costs

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Analysts have repeatedly overestimated the costs of the CAA in part because of the innovative compliance solutions that have emerged only after EPA regulations have been established. When the CAA was enacted in 1970, many of the control technologies necessary to reduce emissions did not exist yet, or existed only as prototypes. Innovations spurred by the emissions reductions required by the CAA, such as catalytic converters in automobiles, are now ubiquitous.

A report by the Northeast States for Coordinated Air Use Management (NESCAUM)<sup>12</sup> examines in detail the technological innovations spurred by environmental regulations, such as the Clean Air Act, with case studies of vehicle and power plant control technologies. The CAA's vehicle emissions standards have led to numerous innovations including three-way catalysts, direct fuel



injection, oxygen sensors and onboard diagnostic systems. These innovations have had profound results—cars have dramatically lowered their emissions over the past several decades

NESCAUM concludes that strong regulatory drivers—such as the Clean Air Act—can lead to technological innovation and lowering of compliance costs. In fact, these regulatory drivers are necessary to keep research and development going and new, lower-cost technologies being developed.

The innovations fueled by more stringent regulations, in turn, fuel the U.S. economy. According to a report prepared by ICF Consulting<sup>13</sup>, the environmental technology industry—spurred by environmental regulations and particularly the Clean Air Act—led to the creation of 1.3 million total jobs between 1977 and 1991. Such innovations also allowed the U.S. to become a world leader in environmental control technologies—exports of environmental technologies grew by 130 percent between 1993 and 2003, and were valued at \$30 billion in 2004.

## Conclusion

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The Clean Air Act has left an important legacy of widespread economic benefits across both urban and rural communities and businesses large and small. Furthermore, the Act has led to environmental advancements which improve public and worker health. It has also led to the creation of millions of jobs, and has spurred important technological innovations and new industries that have been exported around the world. Despite the progress, important challenges remain. As the success of the CAA continues to take shape and be fully implemented, the economic advantages it provides will be felt for many years to come.

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