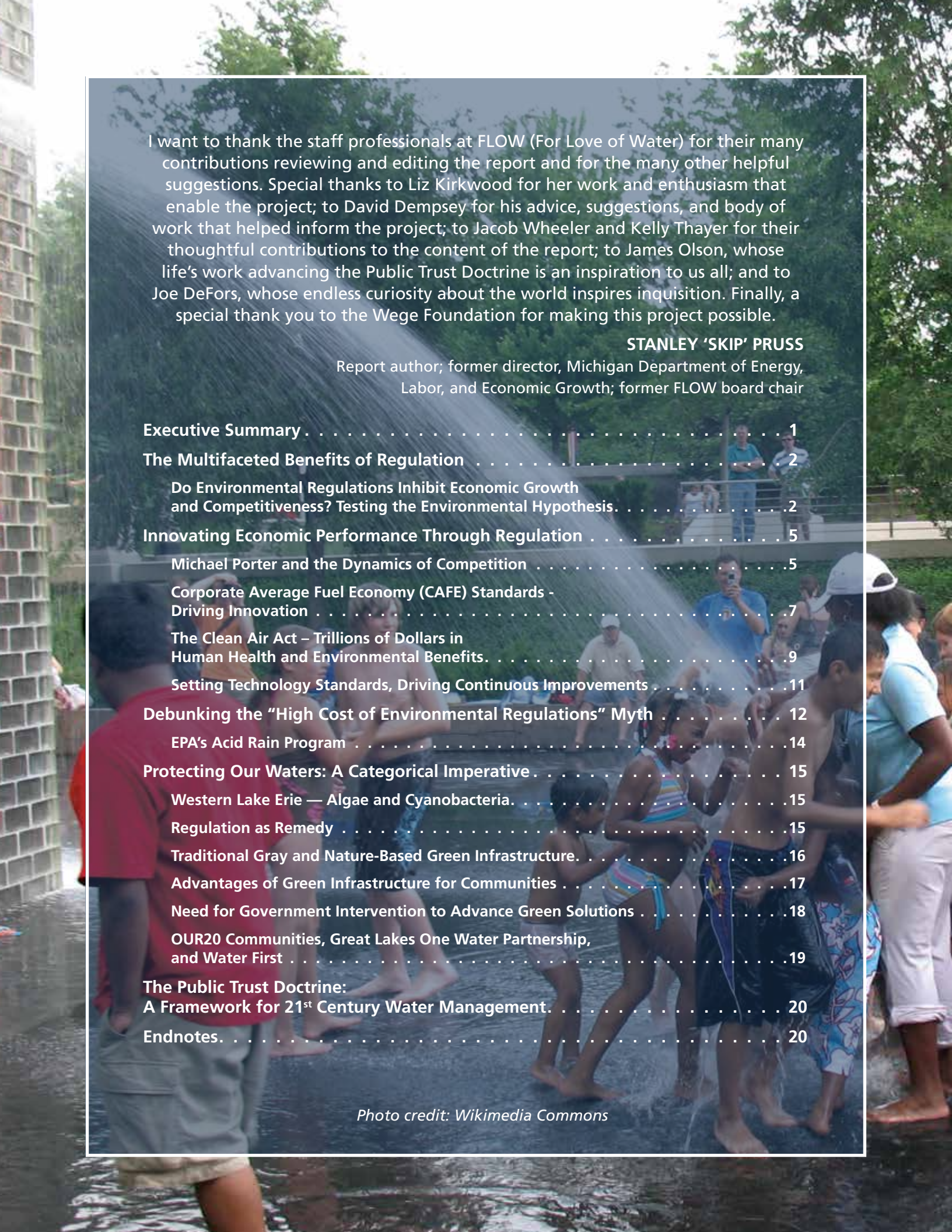




RESETTING EXPECTATIONS

// THE MULTIFACETED BENEFITS OF REGULATION
FOR THE ECONOMY AND ENVIRONMENT



I want to thank the staff professionals at FLOW (For Love of Water) for their many contributions reviewing and editing the report and for the many other helpful suggestions. Special thanks to Liz Kirkwood for her work and enthusiasm that enable the project; to David Dempsey for his advice, suggestions, and body of work that helped inform the project; to Jacob Wheeler and Kelly Thayer for their thoughtful contributions to the content of the report; to James Olson, whose life's work advancing the Public Trust Doctrine is an inspiration to us all; and to Joe DeFors, whose endless curiosity about the world inspires inquisition. Finally, a special thank you to the Wege Foundation for making this project possible.

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EXECUTIVE SUMMARY

This paper examines the evidence regarding the effect government regulations have on economic activity. Common to the understanding of economic conservatives is the notion that government regulations interfere with “free markets,” serve as a brake on economic activity, and stifle innovation and competition. The term “regulation” itself suggests to many burdensome “red tape” and unnecessary interference in the market economy.

The evidence proves quite the opposite. Regulations, properly designed and implemented, can be a powerful force fostering innovation in product design, advanced materials, and manufacturing processes. Regulations can reduce manufacturing costs for industry and business, enhance competition, reduce business risks, and expand and create new markets for goods and services.

Environmental regulations, in particular, have created a huge global market for environmental technology, goods, and services. The result is not only marked improvement in the quality and vitality of ecological systems, but health benefits accruing to the public that are valued at *trillions* of dollars.

Environmental regulations, in particular, have created a huge global market for environmental technology, goods, and services. The result is not only marked improvement in the quality and vitality of ecological systems, but health benefits accruing to the public that are valued at trillions of dollars. Environmental regulations can catalyze needed change in otherwise stagnant areas.



Environmental regulations and water protection improve communities and quality of life.

Environmental regulations can catalyze needed change in otherwise stagnant areas in business, agriculture, and government. The protection of the Great Lakes freshwater system is a case in point.¹ Billions of dollars have been invested in the management of wastewater and stormwater through the creation of a network of sewers, drains, pipes. New integrated water management systems that include nature-based solutions are proving to be more protective, cost-effective, and sustainable than conventional systems.

Yet investment in superior “green infrastructure” is sorely lagging as both local government and the business community remain fixed on investing in conventional “grey infrastructure.” This paper provides a menu of possible regulatory interventions to address this problem.

Newly formed constituencies focused on policy innovation and educating community leaders on the value and benefits of enlightened water management practices are on the rise. Initiatives like “OUR20 Communities,” the Great Lakes Water One Partnership, and Water First all share a vision of aligning community values around a commitment to protecting water.

Integration of the Public Trust Doctrine into local decision-making could, over time, imbue an ethic of enlightened water stewardship, creating a proactive culture to protect and safeguard commonly held resources.

THE MULTIFACETED BENEFITS OF REGULATION

A long-standing and persistent political narrative assumes that there is a tradeoff between protecting the environment and strong economic performance. The assumption is that strong environmental laws and regulations will slow business activity, hamper economic performance, reduce employment, and undermine overall competitiveness. Under this theory, protections for human health and the environment have indirect costs beyond their price tag; the safeguards dampen the economy by rendering business activity more expensive and less efficient. The theory assumes that environmental regulations will impede economic activity and reduce profits as corporations must redirect capital to protecting human health and natural resources while receiving little or no return on the capital invested.

Based upon this theory, it follows that states with more rigorous environmental regulations should lag in economic performance behind states with less onerous environmental regulations. States with stronger environmental and health regulations should experience slower economic growth, higher unemployment, and weaker employment growth. Business failure rates should be expected to be greater if stronger environmental regulations result in making businesses less competitive. Per capita and household income growth should also be expected to trail states with fewer regulations.

Decades of research, however, do not substantiate the claim that more rigorous environmental regulations negatively affect economic growth or employment. While a few studies have found negative impacts on employment and wages, most studies conclude that greater protections for the environment and public health have little overall effect on business performance, business growth, or employment, while providing an array of public health and environmental benefits.

THE MYTHOLOGY OF "FREE MARKET" ECONOMICS

It remains a common trope to laud the efficiencies and superior outcomes of "free markets" and to decry burdensome regulations and government interference. The mythology of free markets – the exchange of goods and services unhindered by government controls with prices set purely on supply and demand – has endured despite the absence of such an economic system existing anywhere in the modern world.

All national economies are reliant on a complex architecture of financial rules, regulations, and requirements imposed by governments, banks and financial institutions, stock exchanges, international trade rules and treaty obligations. All governments levy taxes and determine tax treatments in the form of incentives, credits, exemptions, and subsidies. Laws, universal in developed economies, restrict or ban child labor, limit working hours, prescribe humane working conditions, limit insider trading and anti-trust activities, and impose numerous other regulations in all spheres of market activity.

The reality is that private and government-based limitations on "free markets" have lifted citizens out of poverty, generated wealth, and ensured a modicum of justice and fairness in social and economic policy – all while protecting human health and the environment.

Do Environmental Regulations Inhibit Economic Growth and Competitiveness? Testing the Environmental Hypothesis

Twenty-five years ago, Massachusetts Institute of Technology (MIT) political scientist Stephen Meyer pondered the widely held belief that deregulation would bring an array of positive effects to the economy. Meyer asked the question: What exactly are the economic gains we should expect from environmental deregulation? He speculated that deregulation would likely result in trade-offs – progress relating to cleaner air, water, and land would be

slowed or reversed if environmental protections and safeguards were weakened. Meyer wondered to what extent the economic gains credited to deregulation would offset the losses from diminished environmental protections.

Meyer found that there was an absence of evidence in the academic literature supporting the proposition that deregulation would have positive impacts on the economy. Meyer observed that "credible evidence supporting this

policy shift is virtually non-existent.”² Accordingly, Meyer set out to design a study to determine to what extent environmental laws and regulations impaired economic performance. He decided to compare the relative economic performance of states with the most rigorous environmental laws and regulations against the states with the weakest environmental laws and regulations. Meyer examined four key indicators: (1) annual gross state product growth, (2) annual non-farm employment growth, (3) annual manufacturing employment growth, and (4) annual business failure rates, comparing the 10 states with the most rigorous environmental laws with the 10 states with the weakest environmental laws over the period 1982 through 1989.

Meyer found no evidence that gross state product growth was depressed by strong environmental policies. In fact, state product growth was higher in states with stronger environmental laws. The 10 states with the strongest environmental policies also experienced annual employment growth rates almost 0.6% above those of the 10 states with the weakest environmental policies. States with stronger environmental policies also tended to have marginally lower business failure rates.

Meyer concluded that his findings “consistently and unambiguously fail to support the argument that states with stronger environmental policies suffer an economic penalty.” Meyer was careful to explain that correlation is different from causation. While it could not be concluded that robust environmental laws *cause* stronger economic growth, the evidence showed that more rigorous environmental laws and policies do not impair or diminish economic performance.

Since Meyer’s work in the 1990s, academic focus on the relationship between environmental laws and economic activity has expanded. New, more nuanced, questions have been tested. Does compliance with new environmental regulations that require large capital expenditures result in job loss? To what extent do regulatory asymmetries — differences in the stringencies of environmental regulations — result in the migration of jobs to other locations with weaker rules or move jobs offshore: the so-called “pollution haven effect?”

There are studies that show that the imposition of environmental and public health safeguards may marginally affect productivity and employment. A study by Berkeley economist W. Reed Walker found that firms impacted by the 1990 Clean Air Act Amendments lost jobs and reduced worker compensation by up to 20 percent, but also determined that job and wage losses were negligible compared to the public health benefits of the amendments valued at

“Consequently, those who hope to improve their state’s business climate, economic competitiveness, and employment picture by rolling back environmental statutes are misinformed and are in for great disappointment. The evidence is compelling that this strategy will not produce any meaningful economic gains, while imposing real environmental losses.”

~Stephen Meyer, *The Economic Impact of Environmental Regulations* (1995)

between \$160 billion and \$1.6 trillion over two decades.³

Another study examined employment and production output in pollution-intensive industries during the first 15 years after the enactment of the Clean Air Act (1972-1987), comparing industrial facilities in areas that were designated as “non-attainment” with air quality standards to facilities located in areas with cleaner air. The study found a loss of jobs over the period and a reduction in output. However, the study did not determine whether the jobs and economic output were actually lost or transferred to areas with cleaner air.⁴

Other studies have found environmental compliance has had no meaningful effect on employment or international competitiveness. When Los Angeles sharply strengthened air quality regulations to reduce nitrogen oxide (NOx) emissions and combat smog, refineries were required to deploy large amounts of capital to install pollution control equipment. Despite these large mandated expenditures there was no evidence of “substantially reduced employment, even when allowing for induced plant exit and dissuaded plant entry.”⁵ Other studies have found no statistically significant changes in employment due to environmental regulations.

A recent meta-analysis of the hundreds of scientific studies on the impact of environmental regulations on business competitiveness applying more sophisticated analytical tools is now available to researchers to affirm the early findings.



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“Some 20 years ago, in their review of the literature on the competitiveness impacts of environmental regulation in the United States, Jaffe et al. (1995) concluded that ‘there is relatively little evidence to support the hypothesis that environmental regulations have had a large adverse effect on competitiveness.’ Since then, through hundreds of studies that have used ever larger datasets with increasingly fine levels of disaggregation, employing up-to-date econometric techniques, and covering a wider set of countries, this conclusion has only become more robust.”⁶

Government-sanctioned studies are largely in accord. Since 1993, the U.S. Environmental Protection Agency (EPA) has been required to conduct “regulatory impact assessments” (RIAs) to determine the impact that major regulations will have on the economy and employment.⁷ These detailed analyses, which monetize both the social costs and social benefits of proposed regulations, indicate that some environmental regulations result in increased employment from the design, manufacture, installation, and maintenance of the pollution control equipment.⁸

Nor is the “pollution haven effect” supported by the data. There is little evidence to suggest that more stringent environmental regulations result in shifting investment to Mexico or other countries.⁹ Reduced labor costs are, and have always been, the primary motivation for outsourcing jobs from the United States.¹⁰

Interestingly, recent research shows that the carbon tax imposed in British Columbia has resulted in positive economic effects relative to other Canadian provinces. An econometric analysis of the impact of British Columbia’s revenue-neutral carbon tax found that almost all businesses appeared to benefit except for the most carbon-intensive industries. The carbon tax generated a small, but sta-

“JOB-KILLING REGULATIONS”

That environmental laws and regulations are “job-killers” is an all too common political trope. President Ronald Reagan repeatedly excoriated “job-killing regulation.” After winning the Illinois Republican presidential primary, Mitt Romney warned that “Day by day, job-killing regulation by job-killing regulation, bureaucrat by bureaucrat, this president is crushing the dream.” Speaker of the House John Boehner denounced President Obama’s “job-killing regulatory agenda.” In the 2012 presidential debates, Minnesota representative Michele Bachmann suggested that the Environmental Protection Agency should be renamed “The Job-Killing Organization of America.” Then Texas Governor and now Secretary of Energy Rick Perry lamented, “it’s the regulatory world that is killing America.”

~ Alana Semeuls,
“Do Environmental Regulations Really Kill Jobs?”

tistically significant, 0.74 percent *increase* in employment in British Columbia relative to other (free of carbon taxes) provinces over the 2007–2013 period.¹¹

By and large, while environmental regulations can have myriad effects on the costs of production, productivity, and employment, the effects are very limited and overwhelmed by the considerable health and environmental benefits regulatory safeguards bring to the public. Moreover, there is ample evidence that regulations can foster innovation, reduce business costs, and create new markets for goods and services.

INNOVATING ECONOMIC PERFORMANCE THROUGH REGULATION

In 2005, the leaders of European environmental protection agencies jointly issued a paper analyzing the relative merits of modern environmental regulations. The report, *The Contribution of Good Environmental Regulation to Competitiveness*, found that rather than being “sand in the cog of the economy...environmental regulation is integral to successful markets, an essential ingredient of a vibrant, modern economy.”¹²

The analysis determined that environmental regulations:

- Reduce costs for industry and business
- Create markets for environmental goods and services
- Drive innovation
- Reduce business risk and increase the confidence of the investment markets and insurers
- Assist competitive advantage and create competitive markets
- Create and sustain jobs
- Improve the health of the workforce and the wider public
- Protect natural resources on which business and we all depend

“We conclude that there is now significant evidence from international research that good environmental management and regulation does not impede overall competitiveness and economic development. On the contrary, it



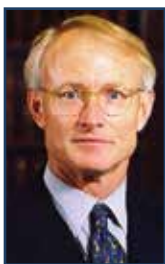
A 2005 paper titled, “The Contribution of Good Environmental Regulations to Competitiveness,” by the leaders of European environmental protection agencies found that rather than being “sand in the cog of the economy...environmental regulation is integral to successful markets, an essential ingredient of a vibrant, modern economy.”

can be beneficial by creating pressure that drives innovation and alerts business about resource inefficiencies and new opportunities.”¹³

The finding that environmental regulations not only safeguard and protect human health and the environment, but also are integral to a thriving economy is well supported by both research and practical experience, yet is anathema to conservative political leaders who instinctively embrace the proposition that the economic effect of government regulation is overwhelmingly negative. That regulatory interventions actually can enhance economic performance may seem counter-intuitive; there are, however, ample empirical evidence and abundant, case-specific examples of how regulatory requirements can catalyze innovation, improve products and services, avoid waste, and reduce costs.

Michael Porter and the Dynamics of Competition

Harvard Business School professor Michael Porter is a renowned international expert on competition and its implications for corporations, nations, and cities. He is the founder of the Institute for Strategy and Competitiveness (ISC), which provides guidance to the business community, leaders, and policymakers worldwide on improving economic performance, job growth, wages,



Michael Porter

and the standard of living through strategic applications of time-tested principles of competition. Globally, Porter is the most cited author on the subject of business and competition, having written 19 books and numerous articles on business and competitive strategies that are taught in business schools around the world.¹⁴

An early central thesis advanced by Dr. Porter is that properly crafted regulations can spur innovation and improve business competitiveness in six different ways.

Regulations:

1. Can inform corporations about resource inefficiencies, technological improvements, and the advantages of eliminating waste, particularly in the area of the use of hazardous substances.
2. Can lead to self-initiated environmental improvements and lower costs by raising corporate awareness, including policies that require corporations to gather information such as the EPA's Toxics Release Inventory.
3. Reduce the uncertainty that environment-related investments will be worthwhile as they become mandates of general application across industry.
4. Motivate innovation and progress helping to overcome organizational inertia and foster creative thinking and competition for improvement among competitors.
5. Level the competitive landscape by ensuring that all companies operate in accordance with the same rules so that no advantage can be gained by avoiding environmental investment.
6. Spur innovation through reconfiguring products and processes with more stringent regulations sometimes being more effective than lax regulations.¹⁵

Like Stephen Meyer's findings that U.S. states with the strongest environmental laws performed better economically than states with weaker environmental laws, Porter found that countries with the most rigorous environmental laws were more economically competitive than countries with weaker laws.

Porter found numerous examples of regulations lowering product costs, improving product safety, reducing production waste, and resulting in material savings, including:

Standards produce benefits that are so manifest, multifaceted, and quantitative that the business community, at times, overcomes its reticence in acknowledging government regulation as an impelling force for positive change.



When the Montreal Protocol and the U.S. Clean Air Act required Raytheon to eliminate ozone-depleting chlorofluorocarbons (CFCs), the company adopted a new cleaning process for its printed electronic circuit boards that resulted in an increase in product quality and lower operating costs.

- **Raytheon** - required by the Montreal Protocol and the U.S. Clean Air Act to eliminate ozone-depleting chlorofluorocarbons (CFCs), it adopted a new cleaning process for its printed electronic circuit boards that resulted in an increase in product quality and lower operating costs.
- **Hitachi** - responded to a recycling law by redesigning products to reduce disassembly time. In the process, the number of parts in a washing machine fell 16 percent, and the number of parts in a vacuum cleaner fell 30 percent.
- **Ciba-Geigy** - met new environmental standards for its wastewater streams through process innovations that boosted yield by 40 percent but also eliminated wastes, resulting in annual cost savings of \$740,000.
- **Robbins Company** - compliance with new regulatory requirements lead to the adoption of a closed-loop system that purified and recycled water, saving \$115,000 per year in water, chemicals, disposal costs, and lab fees and reducing water usage from 500,000 gallons per week to 500 gallons per week.

Government-mandated standards driving technological innovation and improving environmental health and safety are rarely acknowledged by industry and are largely invisible to the public. Yet government requirements that drive research and development and yield outcomes that improve the environment, as well as the economy, are commonplace. Often initially resisted by business and industry, these standards produce benefits that are so manifest, multifaceted, and quantitative that the business community, at times, overcomes its reticence in acknowledging government regulation as an impelling force for positive change.

Corporate Average Fuel Economy (CAFE) Standards - Driving Innovation

In August 2012, much to the consternation of the domestic automobile industry, the Obama Administration used its regulatory powers to require auto manufacturers to produce vehicles that are more fuel efficient and less polluting. In finalizing landmark Corporate Average Fuel Economy (CAFE) standards for cars and light-duty trucks, manufacturers were required to annually increase the fuel efficiency for cars by 5 percent and light-duty trucks by 3.5 percent, with the combined fleet having an average fuel economy of 54.5 miles per gallon by 2026.

The higher CAFE standards sparked waves of innovation within the automobile industry, catalyzing the rapid development of new fuel-efficient technologies, creating an estimated 288,000 new jobs,¹⁶ stimulating \$76 billion in new investment,¹⁷ and buttressing U.S. leadership in electric and autonomous vehicle development. Projections indicated that consumers would realize \$6,000 in fuel savings while the compliance cost to meet the CAFE standards are estimated at \$1,200 per vehicle — a 5-to-1 benefit accruing to the average car owner.¹⁸

Nic Lutsey, Program Director for U.S. Policy and Electric Vehicle Research at the International Council on Clean Transportation, and Dan Sperling, Distinguished Blue Planet Prize Professor of Engineering and Environmental Science at the



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University of California, Davis, have documented the progress of the auto manufacturers in attaining the Obama CAFE standards.

*"Next time you're walking through parking lots or sitting in traffic, take a look at the backs of the cars and trucks you pass. You'll see branding for all sorts of new fuel-efficient technologies, such as BMW's Efficient Dynamics, Ford's EcoBoost, General Motors' EcoTec, Hyundai's Blue Drive, Mazda's SkyActiv, Nissan's Pure Drive, and Toyota's Hybrid Synergy Drive. These include more advanced engines, transmissions, and hybrid systems that eke more miles out of each gallon of fuel. Continually ratcheting up CAFE standards ensures the transition from R&D to commercial scale production happens, and happens broadly across the market."*¹⁹

Although 13 automobile manufacturers eventually agreed to the Obama administration's CAFE standards, the American manufacturers did so reluctantly, and later lobbied the Trump administration for relief from the standards. Relief came in the form of new rules that freeze CAFE standards, roll back penalties for non-compliance, and scuttle the efforts of California and 12 other states to set higher requirements.²⁰

The Trump rollbacks are projected to result in the loss of



The higher CAFE standards sparked waves of innovation within the automobile industry.

250,000 U.S. jobs by 2035 and will work to the detriment of U.S. consumers as they forego estimated future cost fuel savings ranging from \$193 billion to \$236 billion, depending on the cost of fuel.²¹ Efforts to curb greenhouse gas emissions will suffer; under the Trump rules, vehicles will emit an additional 32 to 114 million metric tons of carbon dioxide into the atmosphere, the equivalent of 10 to thirty-six 500 megawatt coal plants.²² Electric vehicle (EV) market penetration also will be stymied as auto manufacturers lose the incentive to meet CAFE standards through the production of EVs with high MPG equivalent ratings.

The future innovation foregone by the Trump administration striking down Obama's CAFE requirements likely will have the long-term effect of making domestic automakers less competitive as other countries are adopting more aggressive fuel-efficiency standards. But the story has not ended with the Trump administration's rollback of CAFE standards.

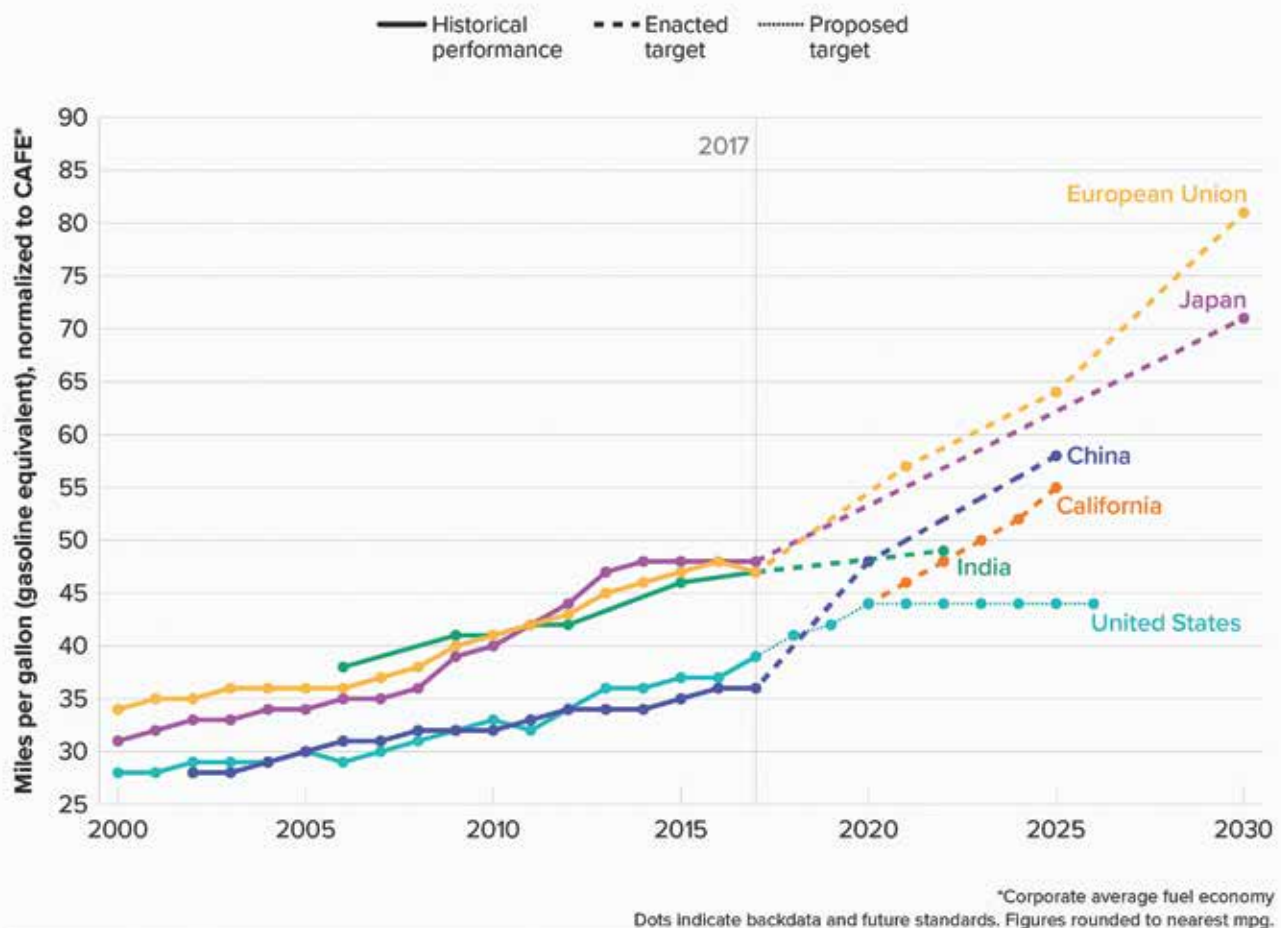
On July 25, 2019, Ford Motor Company, Volkswagen, BMW, and Honda reached a new agreement with the California Air Resources Board to achieve mileage and emission reduction standards very close to the original CAFE requirements under the Obama administration. Honda released a statement extolling the new agreement:

*"The framework provides regulatory stability, greater environmental benefits and reduced compliance costs. As a leader in producing efficient, low and zero-emission vehicles, Honda believes this is a win for our customers and the environment."*²³

Upset with the resistance to lowering fuel efficiency standards, the Trump administration has threatened the state of California with legal action as well as asserting that the auto companies' accord with California may violate antitrust laws.²⁴

U.S. Could Lag on Fuel Economy Behind E.U., China

U.S. trajectory assumes EPA finalizes proposed freeze on standards





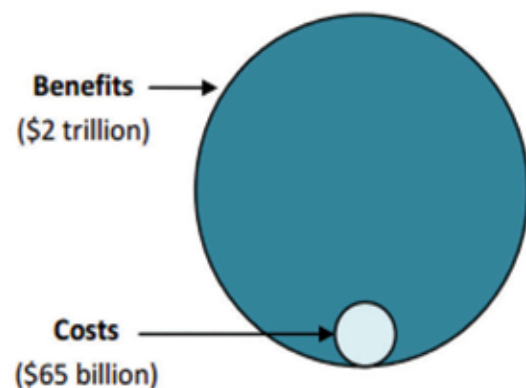
Fewer premature deaths and illnesses mean Americans experience longer lives, better quality of life, lower medical expenses, fewer school absences, and better worker productivity.

The Clean Air Act – Trillions of Dollars in Human Health and Environmental Benefits

Since the enactment of the Clean Air Act in 1970, Congress and executive agencies have required periodic studies to evaluate and determine its costs and benefits to the public. The results of these studies are nothing less than astonishing. Authoritative studies overwhelmingly show that the environmental and public health benefits resulting from more rigorous environmental safeguards are substantial and, measured in economic terms, yield trillions of dollars in benefits. The Clean Air Act has resulted in massive reductions in emissions of heavy metals like lead and mercury, acid gases like carbon monoxide and nitrogen oxides, particulate matter – small particles in dust, dirt, soot, and smoke that causes asthma and respiratory illnesses,²⁵ and volatile organic compounds from cleaning agents, fuels, and degreasers that can impair lung, liver, and kidney functions.²⁶

According to EPA's regulatory analysis, the direct benefits of the Clean Air Act emission reductions for the period 1970-1990, when quantified and monetized, had an estimated economic value ranging from \$5.6 trillion to \$49.4 trillion in 1990 dollars, with a mean estimate of \$22.2 trillion. Compliance costs totaled \$538 billion over the same period, with benefits exceeding compliance costs by a factor of 43 to 1.²⁷ Total pollu-

Economic Costs vs. Economic Benefits of CAA Amendments



Source: EPA, 2011

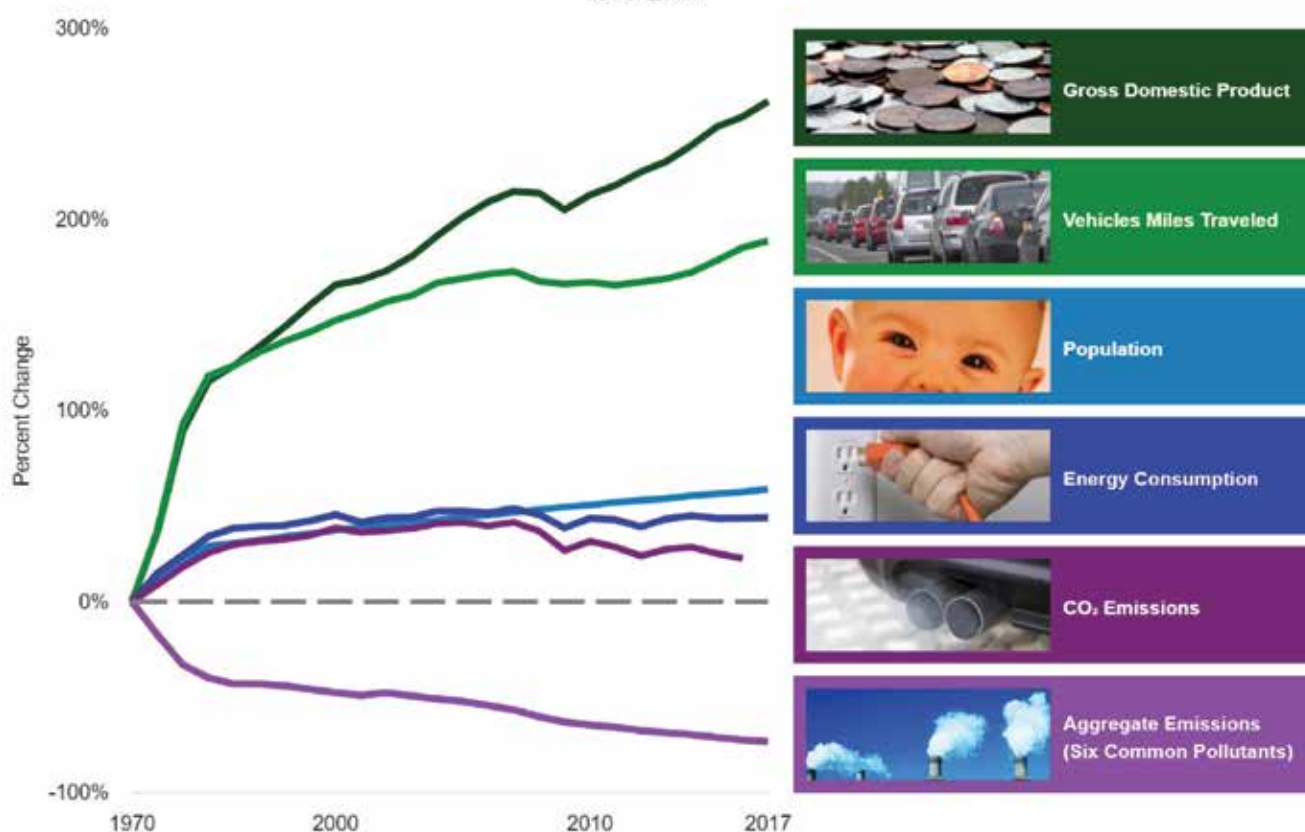
tion abatement spending by manufacturers has been less than one percent of revenue.²⁸ "Peer-reviewed studies show that the Act has been a good economic investment for America. Fewer premature deaths and illnesses means Americans experience longer lives, better quality of life, lower medical expenses, fewer school absences, and better worker productivity."²⁹

FOR NEARLY 50 YEARS, THE CLEAN AIR ACT HAS CUT POLLUTION AS THE U.S. ECONOMY HAS GROWN

- Americans breathe less pollution and face lower risks of premature death and other serious health effects.
- Environmental damage from air pollution is reduced.
- The value of Clean Air Act health benefits far exceeds the costs of reducing pollution.
- New cars, trucks, and nonroad engines use state-of-the-art emission control technologies.
- New plants and factories have installed modern pollution control technology.
- Power plants have cut emissions that cause acid rain and harm public health.
- Interstate air pollution has been reduced.
- Mobile and industrial pollution sources release much less toxic pollution to the air than in 1990.
- Actions to protect the ozone layer are saving millions of people from skin cancers and cataracts.
- The scenic vistas in our national parks are clearer due to reductions in pollution-caused haze.
- EPA has taken initial steps to limit emissions that cause climate change and ocean acidification.
- The Act has prompted deployment of clean technologies, and has helped provide impetus for technology innovations that reduce emissions and control costs.

Source: EPA

Comparison of Growth Areas and Declining Emissions
1970-2017



Between 1970 and 2017, combined emissions of six common pollutants (PM_{2.5} and PM₁₀, SO₂, NO_x, VOCs, CO and Pb) dropped by 73%, while the U.S. economy continued to grow, Americans drove more miles and population and energy use increased. (Source: Environmental Protection Agency, 2018)

Setting Technology Standards, Driving Continuous Improvements

How did Clean Air Act regulations accomplish so much so fast?

The Clean Air Act has attained these dramatic reductions in air pollutants and the attendant benefits to society through regulations that drive innovation by imposing new standards that pollution emitting factories must achieve. Under the act, the EPA has established National Ambient Air Quality Standards (NAAQS) for six harmful pollutants that are intended to protect human health, children, the elderly, and property: sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter.³⁰ The rules are based upon the latest scientific data and information and are periodically reviewed by the Clean Air Scientific Advisory Committee, one of the 22 scientific committees that advise the EPA.³¹

The NAAQS inform EPA's New Source Review (NSR) program which requires new industrial plants, as well as existing plants that undergo major modifications, to employ pollution prevention and control technologies based upon whether the location of the plant is in an "attainment" or "non-attainment" area in meeting air pollution standards. The rules do not necessarily prescribe a particular technology, but rather require pollution-reduction technologies that are reasonably available. The standards are known as:

- **RACT**, or Reasonably Available Control Technology, is required on existing sources in areas that are not meeting national ambient air quality standards (i.e., non-attainment areas).
- **BACT**, or Best Available Control Technology, is required on major new or modified sources in clean areas (i.e., attainment areas).
- **LAER**, or Lowest Achievable Emission Rate, is required on major new or modified sources in non-attainment areas.

Rather than mandating a specific control technology, the EPA's regulatory requirements drive innovation by ensuring that pollution emitting industries employ the latest and best technologies — a process that continuously stimulates a search for newer, better and more cost-effective technologies. The rules ensure a level playing field for all industries while incentivizing innovation and cost-saving solutions. To assist industry, EPA administers the RACT/BACT/LAER Clearinghouse, or RBLC, a central database of pollution reduction technology information, as well as a database of all permits issued as a reference and source of information on the technologies that have been employed within industries to date.

"Opposition persists, based on anticipated costs, to new regulations intended to reduce pollution emissions, save money, and increase the country's energy security. History shows, however, that these cost-based assumptions focus on and overstate adverse economic impacts while devaluing societal benefits. Policymakers should account for any environmental and human health benefits as well as opportunities for economic growth presented by new or proposed regulations. Research shows that regulation routinely fosters innovation and promotes economic competitiveness."

Pew Research Center, Government Regulation: Costs Lower, Benefits Greater Than Industry Estimates (2015)

The environmental technology sector is prodigious and thriving. The global market for environmental technologies and services is estimated at \$1.05 trillion (2015) and \$330 billion in the U.S. alone.³² Domestically, 1.6 million jobs exist in the U.S. environmental services sector — the largest environmental technology sector in the world.³³ Continuous technological innovation helps ensure that competitive advantages are secured. In the words of Michael Porter, "the only way to sustain a competitive advantage is to upgrade it— to move to more sophisticated types."³⁴ Navigating the process of implementing regulatory requirements results in new design concepts and innovation in products as well as manufacturing processes. Product improvements can lead to increased productivity, and cost reductions that in many cases can be credited to governmental protections and safeguards but largely go unacknowledged by industry.

DEBUNKING THE “HIGH COST OF ENVIRONMENTAL REGULATIONS” MYTH

The foundational environmental laws enacted in the early 1970s imposed large, unplanned costs on businesses and capital expenditures that were particularly unwelcomed because they did not offer the prospect of a return on investment. The business community regarded these “social costs” as unwarranted and unfair abridgements of the free market. Air and water were free to use and industrial processes that may foul the air or discharge pollutants in water were “externalities” or outside factors that heretofore had rarely been accounted for. Pollution was the price of prosperity and improved socio-economic conditions.

The early years under the Clean Air Act witnessed repeated high-stakes battles between industry and the EPA over requirements to reduce emissions and improve air quality. Suddenly faced with unfamiliar and unprecedented demands to reduce and abate pollution from manufacturing products and processes, business and industry felt under siege. High profile faceoffs between industry and EPA regulators played out before Congress and the American public.



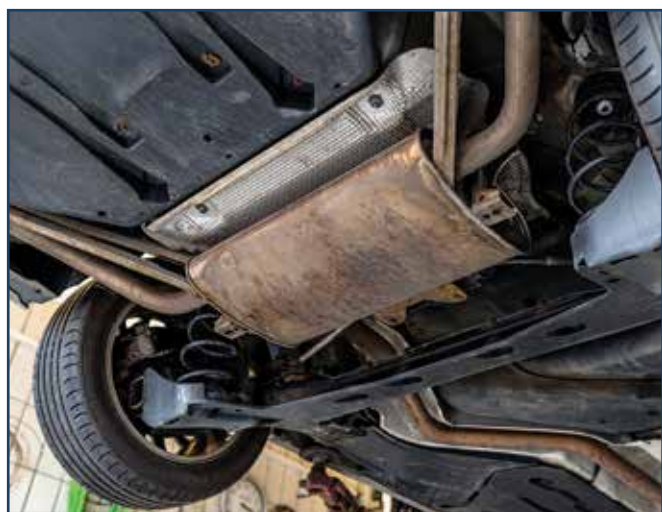
For the business community, pollution was the price of prosperity and improved socio-economic conditions.

New automobile safety and emission reduction requirements were particularly contentious. EPA's requirements under the Clean Air Act called for reductions of hydrocarbons and carbon monoxide by 95 percent and 86 percent, respectively, through the use of catalytic converters.³⁵ Auto manufacturers characterized new requirements as being costly, economically inefficient, and technically infeasible, portraying the new rules as existential threats to the automobile industry as a whole.

Ford Motor Company's testimony before Congress assailed the EPA's new rules, predicting economic impacts that would be nothing less than catastrophic for the industry and the country. Lee Iacocca, Ford Motor Company's president and CEO, predicted the requirement to reduce hydrocarbon and carbon monoxide emissions through the use of catalytic converters would cause a national economic meltdown, shutting down the auto industry, reducing gross national product by \$17 billion, wiping out 800,000 jobs, and decreasing tax receipts of \$5 billion at all levels of government so that some local governments would become insolvent.³⁶

A General Motors Vice-President's testimony was similarly bleak:

“If GM is forced to introduce catalytic converter systems across the-board on 1975 models, the prospect of an



EPA's requirements under the Clean Air Act called for reductions of hydrocarbons and carbon monoxide through the use of catalytic converters.

unreasonable risk of business catastrophe and massive difficulties with these vehicles in the hands of the public must be faced. It is conceivable that complete stoppage of the entire production could occur, with the obvious tremendous loss to the company, shareholders, employees, suppliers, and communities."³⁷

The auto industry claimed that catalytic converters, being both economically and technically infeasible, would not last and would have to be replaced after 50,000 miles.

Actual experience quickly demonstrated that the technology not only lasted for the life of the vehicle, catalytic converters also reduced fuel consumption by up to 30 percent.³⁸ Moreover, industry estimates for the costs of adding catalytic converters were \$860 per vehicle. A review by the National Academy of Sciences later determined the actual cost at \$288 per vehicle.

Historically, the automobile industry has consistently overstated the cost of safety and environmental regulations. Automakers estimated the per vehicle cost of air bags at \$800 per vehicle. The actual cost was closer to \$300 per vehicle — and air bags saved 25,782 lives from 1987 to 2008. Automakers objected to the requirement of mandatory seat belts. Implementation is estimated to have saved 226,000 lives between 1975 and 2006.³⁹



Automakers also objected to the requirement of mandatory seat belts. Implementation is estimated to have saved 226,000 lives between 1975 and 2006.

The Pew Research Center has surveyed and compared the initial predicated costs of regulations of various kinds to the actual accounting of the costs after the regulations were implemented and given effect. Time and time again, industry cost estimates relating to the implementation of government mandated standards have been significantly higher than actual proven costs.

The Pattern of Overestimating the Costs of Regulation

Pre- and post-regulation cost estimates for reducing pollutant emissions

Pollutant	Pre-regulation cost estimate	Post-regulation cost or revised estimate
Asbestos	\$150 million (total for manufacturing and insulation sectors)	\$75 million
Benzene	\$350,000 per plant	Approximately zero dollars per plant
CFCs in car air conditioners	\$650 to \$1,200 per new car	\$40 to \$400 per new car
Coke oven emissions, 1970s (OSHA regulation)	\$200 million to \$1 billion	\$160 million
Coke oven emissions, 1980s (EPA regulation)	\$4 billion	\$250 million to \$400 million
Cotton dust	\$700 million a year	\$205 million a year
Halons	1989: phaseout not possible	1993: phaseout considered technologically and economically feasible
Landfill leachate	Mid-1980s: \$14.8 billion	1990: \$5.7 billion
Surface mining	\$6 to \$12 per ton of coal	50 cents to \$1 per ton of coal
Vinyl chloride	\$109 million a year	\$20 million a year

Source: Economic Policy Institute, "Falling Prices: Cost of Complying With Environmental Regulations Almost Always Less Than Advertised" (1997), 4, <http://www.epi.org/publication/bp69>.

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One of the most successful government mandates of all time is the regulation of the acid rain-causing gases sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Emissions from SO₂ and NO_x from fossil fuel-fired power plants have many harmful effects on public health, the economy, and the environment.



EPA's Acid Rain Program

One of the most successful government mandates of all time is the regulation of the acid rain-causing gases sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Emissions from SO₂ and NO_x from fossil fuel-fired power plants have many harmful effects on public health, the economy, and the environment. Transported in the atmosphere where the gases react with water vapor and other oxidants and then deposited as acid rain, the acid gases result in increases in respiratory illnesses, premature deaths, lost productivity, and the acidification of lakes, rivers, streams, and ocean waters.

Though the proposed 1990 regulations to control SO₂ were market-based cap and trade rules, they were nevertheless opposed by electric utilities that indicated the rules would "jeopardize electricity reliability and thwart development of clean coal technologies."⁴⁰ Utilities estimated that implementing the rules would cost \$5 billion annually and increase to \$7.1 billion a year in 2000.⁴¹

A 2003 report from the Office of Management and Budget found that the benefits gained from reduced health impacts, including fewer premature deaths and reductions in workdays lost to illness, saved \$118 billion to \$177 billion annually while the additional costs to ratepayers was \$1.1 billion to \$1.8 billion a year.⁴²

SO₂ emissions have been reduced by 91 percent and NO_x emissions by 87 percent since 1990.⁴³ The result is cleaner air and improved visibility, better health outcomes, and healthier lakes and forests, and by extension, enhanced fisheries, forest

BENEFITS OF ABATING LEAD IN PAINT

Reducing the health and cognitive threats to children from exposure to lead in paint had an estimated cost of \$1–\$11 billion. The benefits of reduction attributed to each cohort of children 6 years of age or under:

- Health care (\$11–\$53 billion)
- Lifetime earnings (\$165–\$233 billion)
- Tax revenue (\$25–\$35 billion)
- Special education (\$30–\$146 million)
- Attention deficit–hyperactivity disorder (\$267 million), and the direct costs of crime (\$1.7 billion).

Result: Each dollar invested in lead paint hazard control results in a return of \$17–\$221 or a net savings of \$181–269 billion.

Source: E. Gould, Economic Policy Institute, 2009

productivity, and tourism.⁴⁴ While reductions in SO₂ and NO_x have measurably improved air quality and public health, the Great Lakes — the largest and most valuable fresh surface water system in the world — faces renewed challenges on multiple fronts.

PROTECTING OUR WATERS: A CATEGORICAL IMPERATIVE

Clean air and water sustain all life. The health and vitality of all living systems are dependent on the availability of clean air and water. The environmental history of the Great Lakes Region is one of ruin and recovery; a pattern of human interventions that disrupt natural systems followed by the realization that flourishing natural systems enrich all life and are an essential public good.

Our system of laws and regulations is a carefully crafted architecture of rewards, incentives, and sanctions designed to ensure the availability of clean air and water, as well as the functional integrity of natural systems. The federal Clean Water Act (CWA) was enacted to “restore and maintain the chemical, physical, and biological integrity of the nation’s

waters.” The CWA, through its regulations and the cognate rules administered by states, establishes health-based safe wastewater standards that set limits for contaminants like lead, arsenic, and microbials; provides protections for source waters — lakes, rivers streams, and wetlands; and prescribes the management of wastewater, pollution, and stormwater. Like the Clean Air Act, the CWA sets technology-based standards requiring the “best available technology” (BAT) for end-of-pipe “point sources” like industrial and municipal effluent outfalls. The CWA also addresses non-point sources of pollution from fertilizers, oil, solvents, and agricultural wastes by establishing water quality standards to attain the goal of making all waters “swimmable, drinkable, and fishable.”

Western Lake Erie — Algae and Cyanobacteria

A now annually recurrent phenomenon, outbreaks of algae and the presence of cyanobacteria in Western Lake Erie, are a growing regional health, environmental and economic crisis. Agricultural wastes from concentrated animal feeding operations (CAFOs), and, to a lesser extent, point source discharges from municipal wastewater treatment systems are contributing far too much phosphorus to Lake Erie. The result: Harmful algal blooms (HABs) are severely impairing water quality, threatening public health, and harming regional tourist dependent communities and businesses. While inroads are being made in reducing phosphorus loads from municipal wastewater treatment systems, “non-point source” agricultur-

al wastes from CAFOs continue to contribute excess nutrients within the watersheds for Western Lake Erie.

Both Michigan and Ohio officially have declared the waters of Western Lake Erie “impaired,” a designation under the CWA that requires more government action to determine the sources of the excess nutrients and the identification of measures to reduce phosphorus loading. Both Michigan and Ohio have EPA-approved “Domestic Action Plans” (DAP) to address nutrient loadings from watersheds within Michigan that empty into Lake Erie, but the generation and disposition of CAFO waste remains an intractable problem that may, unfortunately, be beyond the reach of the DAP.

Regulation as Remedy

Proven, effective mitigation measures are available but require government appropriations and political will, the latter of which has been sorely lacking. A significant mitigation measure would be a strict prohibition on the application of manures on agricultural fields during the winter or in anticipation of storm events, when there is a high potential for animal wastes to be washed into receiving drains, rivers, and streams. These measures are strongly encouraged today but they should be prohibited by law. Enhanced regulations could prescribe more exacting measurement and control of nutri-

ents in soils — phosphorus and nitrates — with enforceable limits on applications on lands that are already saturated with nutrients.

An effective method of reducing nutrient loading is to limit crop production along water bodies in order to provide a buffer that protects rivers, streams and drains. The Conservation Reserve Program (CRP),⁴⁵ administered by the Farm Service Agency within the U.S. Department of Agriculture, provides funding to agricultural producers who agree to “remove environmentally sensitive land from agricultural production and

plant species that will improve environmental health and quality.”

In Michigan, the Department of Agriculture and Rural Development (MDARD) administers the Conservation Reserve Enhancement Program (CREP)⁴⁶ that also provides funding to pay crop producers to maintain filter strips and riparian buffers and, in some cases, wetland restoration projects that protect sensitive water bodies. The federal and state agencies also provide helpful assistance in recommending plant species and planting techniques that optimize the uptake of nutrients. Contracts for land enrolled in CREP are typically 15 years in length but reenrollment is voluntary and dependent on continued program funding. Michigan farmland enrolled in CREP is limited and has fallen significantly, making the effort to reduce algae propagation in Western Lake Erie more challenging.⁴⁷



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Traditional Gray and Nature-Based Green Infrastructure

The CRP and CREP programs administered by federal and state agencies to protect sensitive waters through the use of vegetative filter strips and riparian buffers mimic natural systems — the key to their effectiveness. In nature, plants are integral to virtuous ecological cycling, drawing nutrients from soil to produce food, while absorbing carbon dioxide, water, and sunlight to produce oxygen through photosynthesis, and sequestering carbon in soils. The CRP and CREP programs and practices take advantage of these natural processes to protect lakes, rivers and streams.

The use of natural systems to protect and manage water can be in many ways superior to conventional systems, and could provide numerous benefits to urban and rural communities as well. New approaches are now available for managing stormwater based upon natural processes that store, filter, and purify water and are proving to be functionally superior and more cost-effective than conventional “gray infrastructure.”

Since the 19th century, U.S. cities, towns and villages have relied upon a system of drains, sewers, pipes, and pumps to move stormwater and treat wastewater. This “gray infrastructure” designed to treat wastewater and move water away from the built environment to rivers, streams, and lakes has always been, and is today, the means by which society super-

DEFINITION OF GREEN INFRASTRUCTURE

Green infrastructure is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. While single-purpose gray stormwater infrastructure—conventional piped drainage and water treatment systems—is designed to move urban stormwater away from the built environment, green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits.

Source: EPA⁵¹

intends and disperses excess water.

The conventional system of managing stormwater has many downsides. Stormwater concentrates and transports oils, pesticides, dirt, and grime into waterways, polluting the receiving waters. Nutrients from fertilizers carried from lawns and landscapes alter the chemistry of the water, destabilizing

aquatic environments, advantaging some aquatic plants and organism over others, propagating algae, depleting dissolved oxygen, and accelerating eutrophication. Fast moving waters scour and erode streambanks, washing soils away, stripping riparian vegetative cover and redistributing streambed sediments to the detriment of benthic communities.⁴⁸

Excess stormwater can overwhelm sewer systems resulting in “combined sewer overflows” (CSOs) that transport untreated human waste, bacteria, and pathogens to rivers,

streams, and lakes, fouling beaches and creating public health challenges. Since 2008, an average of 5.7 billion gallons of untreated sewage have flowed annually into Michigan waterways polluting our lakes, rivers and streams. Sixty-four rivers that drain 84 percent of Michigan’s Lower Peninsula have tested positive for human sewage.⁴⁹ Michigan needs an estimated \$2.07 billion over the next 20 years to address the public health and environmental threats posed by stormwater and combined sewer overflows infrastructure.⁵⁰

Advantages of Green Infrastructure for Communities

Two recent reports by the Urban Land Institute document the environmental and economic advantages of nature-based systems for managing stormwater: *The Business Case for Green Infrastructure: Resilient Stormwater Management in the Great Lakes Region*⁵² and *Harvesting the Value of Water: Stormwater, Green Infrastructure, and Real Estate*⁵³ find that “green infrastructure” (GI) can be more economically efficient and inherently more resilient than manufactured pipes, drains, and pumps. Designed to mimic natural systems, GI naturally captures and stores excess stormwater, slowly releasing it to the surrounding landscape and recharging groundwater. Using catchment systems based upon nature to distribute and store excess water — rain gardens, bioswales, urban wetlands, ponds, and green open spaces — nature-based GI implementations create aesthetic amenities for communities that increase property values and enhance the appeal, resiliency, and sustainability of communities.

GI helps avoid and mitigate the damages associated with storm events which are expected to become more severe and frequent in a warming climate.⁵⁴ By more optimally managing wet weather to reduce flood risks, green infrastructure can help limit claims for flood damage against local governments, as well as reduce insurance

rates for property owners and government entities. Using nature-based systems to manage stormwater and wastewater can be less expensive than gray infrastructure both in initial capital expense and in lower operational and maintenance costs. A survey conducted by the American Society of Landscape Architects found GI projects resulted in either no additional costs or cost savings 77 percent of the time.⁵⁵



The conventional system of managing stormwater does not take advantage of the ability of natural systems to absorb heavy flows.

BENEFITS OF GREEN INFRASTRUCTURE:

- Improved water quality
- Reduced municipal water use
- Groundwater recharge
- Flood risk mitigation for small storms
- Increased resilience to climate change impacts such as heavier rainfalls and higher temperatures
- Reduced ground-level ozone
- Reduced particulate pollution
- Reduced air temperatures in developed areas
- Reduced energy use and associated greenhouse gas emissions
- Increased or improved wildlife habitat
- Improved public health from reduced air pollution and increased physical activity
- Increased recreation space
- Improved community aesthetics
- Cost savings
- Green jobs
- Increased property values

Source: EPA, *City Green*, 2016

Need for Government Intervention to Advance Green Solutions

Unfortunately, there are barriers to implementing green infrastructure solutions. A suite of new cost-efficient water management tools and practices to address runoff and stormwater are now available to communities, yet are underutilized. Local units of government, developers, and financial institutions remain largely unfamiliar with the benefits and opportunities GI provides. When planning construction projects, stormwater management strategies easily default to conventional gray infrastructure solutions. To local officials and planners unfamiliar with green infrastructure, stepping outside of status quo brings fear of risk and failure. Local leaders are obligated to responsibly steward public dollars but often have little technical knowledge, data, or experience with GI solutions. Moreover, existing codes and ordinances are likely to prescribe the use of conventional water management strategies; in such cases, green infrastructure solutions would entail revisions of local laws.

Local, state, and federal governments could institute a variety of measures that would facilitate consideration or implementation of green infrastructure solutions. Some measures could offer pathways that educate and inform local officials of the advantages and benefits of green infrastructure by conditioning eligibility for grants, loans, or tax incentives on evaluating green infrastructure options. A more direct pathway would prescribe implementation of GI solutions over gray infrastructure by law. A middle-ground approach could require a process by which both GI options and conventional water



Using systems like rain gardens, nature-based GI implementations create aesthetic amenities for communities that increase property values and enhance the appeal, resiliency, and sustainability of communities.

management approaches are analyzed, compared, and scored pursuant to prescribed criteria such as capital cost, resiliency, operation and maintenance costs, reduction of future capital outlays, energy costs, and aesthetics.

Progress is being made, albeit slowly. The Department of the Environment, Great Lakes and Energy (EGLE), which administers the Water Pollution Control Revolving Fund that provides low-interest, long-term funding for water pollution control, has announced that it will fund eligible green infrastructure projects in 2020.⁵⁶ Northwest Michigan community organizations have been exploring ways of identifying and implementing GI solutions. Opportunities to plan, incentivize, and deploy green infrastructure projects are the focus of recent collaborations among diverse stakeholders aimed at protection of the Great Lakes and their tributary rivers, streams, and wetlands.

REGULATORY STRATEGIES ACCELERATING THE ADOPTION OF GREEN INFRASTRUCTURE

- Require comparative evaluation of green infrastructure project designs – laws or regulations could require that projects that implicate stormwater management having a capital value over \$1 million evaluate GI as an option as compared to grey infrastructure.
- Designate green infrastructure approaches as best management practices (BMPs).
- Provide additional “points” in scoring grant and loan applications or “Requests for Proposals” that integrate GI solutions.
- Condition eligibility for grants, loans, and tax incentives on evaluation or implementation of GI solutions.
- Add GI requirements and performance standards to the National Pollutant Discharge Elimination System (NPDES) permits issued and administered by EGLE for combined sewer system (CSS) and urban area municipal separate storm sewer systems (MS4) discharges. EGLE could also designate GI measures as required BMPs in NPDES permits.
- The EPA could promulgate rules requiring states to evaluate or require GI measures in state delegated permitting programs and federally funded loan and grant programs.

OUR20 Communities, Great Lakes One Water Partnership, and Water First

Maintaining the biological integrity of the largest fresh surface water system in the world is an environmental and economic imperative. The population of the Great Lakes Region, and particularly coastal communities, has become aware of the critical importance of protecting the region's water heritage to ensure its health and vitality, maximizing resilience and the wide array of benefits our waters provide.

New innovative collaborations have arisen to promote and integrate the best science-based solutions, focusing on nature-based solutions and green infrastructure. Environmental non-profits, watershed organizations, community health agencies, and philanthropy are working in concert to identify the best-integrated water management practices, revamp, promote and implement integrated watershed plans, and recommend better policies and programs to community leaders and local elected officials.

- **The OUR20 Communities Initiative** seeks to foster an abiding water stewardship ethic in Great Lakes coastal communities by prioritizing the protection of water resources in local government planning, project development and decision-making. For Love of Water (FLOW) collaborated with the University of Michigan's School for Environment and Sustainability (SEAS) to "develop a model framework to assist Great Lakes coastal communities in placing water at the center of their planning and practices, and in building capacity and resiliency to face the profound challenges of managing freshwater resources in the 21st Century."⁵⁷
- The **Great Lakes One Water Partnership** is a collaboration among coastal communities to "advance a new era of water management to benefit people and businesses in the Great Lakes Basin efforts in protecting the region's fresh-water resources." Sponsored by the Council of Michigan Foundations and the Great



The Great Lakes as seen from space.

Lakes Protection Fund, the multi-year initiative supports regional community foundation efforts to equip coastal communities with new, innovative approaches to water management.

- The **Water First Coalition** will focus on the development of innovative water policies and green infrastructure in the eight Northwest Michigan counties. Administered in Northwest Michigan by Networks Northwest, the initiative aims to re-focus decision-making processes in the Upper Lake Michigan region on green infrastructure policy and implementation.

OUR20 Communities, the Great Lakes One Water Partnership, and Water First Coalition all share a vision of aligning community values around a commitment to protecting water. The initiatives seek to empower coastal communities to realize the substantial environmental and economic benefits and opportunities that state-of-the-art water stewardship practices can bring. Green infrastructure — infiltrating bioretention basins, rain gardens, bioswales, green roofs, tree plantings, and porous pavement — can provide environmental, economic and aesthetic value to communities, but need to be integrated into existing planning processes.

THE PUBLIC TRUST DOCTRINE: A FRAMEWORK FOR 21ST CENTURY WATER MANAGEMENT

State governments have at hand a unifying set of principles based in law, grounded in science, and embodying the values that the public places on the protection of water. The Public Trust Doctrine holds that government is responsible for managing water for the benefit of the public who, by law, own all the navigable waters in the Great Lakes freshwater system. The Public Trust Doctrine places government in a role as a sentinel that protects not only against impacts that impair, degrade, or pollute water, but also imposes a duty on lawmakers and local officials to evaluate projects and proposals that may significantly alter landscapes and affect water quality or water quantity.

Integration of the Public Trust Doctrine into local decision-making could, over time, imbue an ethic of enlightened water stewardship, creating a proactive culture to protect and safeguard commonly held resources. It could inform and motivate local governance to use the best management methods and practices to protect water and to embrace and maintain high standards for the protection of natural features. Beyond that, the Public Trust Doctrine could catalyze innovation in

agricultural practices, farming, soil management, septic waste management, and other activities that impact water quality.

Use of the Public Trust Doctrine as a legal paradigm and management framework for the protection of common resources is resurgent around the country. The Doctrine is both a legal and logical means to address the urgency of climate change in anticipation of its far-reaching effects on our freshwater and the hydrological cycle writ large. Indeed, the Doctrine is already being used in an attempt to compel the federal government to take action to reduce greenhouse gas emissions.⁵⁸

We who have the good fortune of living within the largest and most robust freshwater system in the world have the moral and legal responsibility to protect this extraordinary natural endowment for present and future generations. The Public Trust Doctrine is the right vehicle at the right time to animate the policies and programs needed to meet these challenges. Better integrating the Public Trust Doctrine into public decision-making could, over time, instill an ethic of enlightened water stewardship to safeguard commonly held resources.

Endnotes

- 1 IAGLR, Great Lakes Revival: How Restoring Polluted Waters Leads to Rebirth of Great Lakes Communities, 2019. <http://iaglr.org/aocdocs/GreatLakesRevival-2019.pdf>. See also, Healing Our Waters--Great Lakes Coalition, Assessing the Investment: The Economic Impact of the Great Lakes Restoration Initiative, <https://www.healthylakes.org/wp-content/uploads/2018/11/GLRI-Project-Summary-Report-20180924.pdf?ga=2.2452662.727780257.1572289028-521368924.1572289028>
- 2 S. Meyer, The Economic Impact of Environmental Regulation. (1995) <http://bechtel.colorado.edu/~silverst/cven5534/Economic%20Impact%20Environ.%20Regulation.pdf>
- 3 W. Walker, The Transitional Costs of Sectoral Reallocation: Evidence From the Clean Air Act and the Workforce, The Quarterly Journal of Economics, Volume 128, Issue 4, November 2013. <https://doi.org/10.1093/qje/qjt022>; See also, E. Semuels, Do Regulations Really Kill Jobs?, Atlantic, 2017 <https://academic.oup.com/qje/article-abstract/128/4/1787/1849848?redirectedFrom=fulltext>
- 4 M. Greenstone, Journal of Political Economy, The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufacturers, 2002. https://www.jstor.org/stable/10.1086/342808?seq=1#page_scan_tab_contents
- 5 E. Berman and L. Bui, Environmental regulation and labor demand: evidence from the South Coast Air Basin, Journal of Public Economics, 1999. https://econweb.ucsd.edu/~elib/berman_bui2001.pdf
- 6 A. Dechezlepretre and M. Sato, The Impacts of Environmental Regulations on Competitiveness, Review of Environmental Economics and Policy, 2017. <https://doi.org/10.1093/reep/rex013>
- 7 Exec. Order No. 12,866, (1993). <https://www.epa.gov/laws-regulations/summary-executive-order-12866-regulatory-planning-and-review>
- 8 R. Morgenstern Jobs and Environmental Regulation, 2015 <https://media.rff.org/archive/files/sharepoint/Documents/Events/150506-EnviroPolicyJobs-Morgenstern.pdf>
- 9 G. Eskeland and A. Harrison, Moving to greener pastures? Multinationals and the pollution haven hypothesis, Journal of Development Economics, 2003. <https://www.sciencedirect.com/science/article/pii/S0304387802000846?via%3Dihub>
- 10 PRB, Offshoring U.S. Labor Increasing, <https://www.prb.org/offshoring/>
- 11 A. Yamazaki, Jobs and climate policy: evidence from British Columbia's revenue-neutral carbon tax, Journal of Environmental Economics and Management, 2017. <https://www.sciencedirect.com/science/article/abs/pii/S0095069617301870>
- 12 Network of Heads of European Environment Protection Agencies, The Contribution of Good Environmental Regulation to Competitiveness, November, 2005. (PDF) <https://epanet.eea.europa.eu/reports-letters/reports-and-letters/epa-network-paper-good-environmental-implementation-and-competitiveness.pdf/view>
- 13 Ibid.
- 14 Michael Porter -- Bishop William Lawrence University Professor, Harvard Business School: <https://voxeu.org/users/michaelpor0>
- 15 M. Porter and C. van der Linde, Journal of Economic Perspectives, Toward a New Conception of the Environment-Competitiveness Relationship, 1995. <https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.9.4.97>
- 16 Blue Green Alliance, Supplying Ingenuity II: Suppliers of Key Clean, Fuel-Efficient Vehicle Technologies, May, 2017. <https://www.bluegreenalliance.org/wp-content/uploads/2017/05/Supplying-Ingenuity-vFINAL-low-res.pdf>

- 17 Blue Green Alliance, Driving Investment: How Fuel Efficiency is Rebuilding American Manufacturing, January, 2018. <https://www.bluegreenalliance.org/resources/driving-investment-how-fuel-efficiency-is-rebuilding-american-manufacturing/>
- 18 Forbes, Trying to Make Sense of Trump's Rollback of Vehicle Standards, <https://www.forbes.com/sites/danielsperling/2018/08/02/trying-to-make-sense-of-trumps-rollback-of-vehicle-standards/#5b-42cbf7e71a> Accessed August 11, 2019.
- 19 Forbes, By Freezing Vehicle Standards, the Trump Administration Will Grind Innovation to a Halt, Accessed July 30, 2019. <https://www.forbes.com/sites/danielsperling/2018/08/20/by-freezing-vehicle-standards-the-trump-administration-will-grind-auto-innovation-to-a-halt/#733a30aa550e>
- 20 International Council on Clean Transportation, The Trump Administration's vehicle efficiency proposal is not supported by underlying data and runs counter to global trends, August 2, 2018. <https://theicct.org/news/us-cafe-proposal-pr-201808>
- 21 Rhodium Group, Sizing Up A Potential Fuel Economy Standards Freeze, May, 2018. <https://rhg.com/research/sizing-up-a-potential-fuel-economy-standards-freeze/>
- 22 The Center for Media and Democracy Sourcewatch: Estimating carbon tax emissions from coal plants. https://www.sourcewatch.org/index.php/Estimating_carbon_dioxide_emissions_from_coal_plants
- 23 Detroit Free Press, 4 automakers reach emissions deal with California, bucking rollback, <https://www.freep.com/story/money/cars/2019/07/25/ford-vw-honda-bmw-emissions-deal-california/1825186001/> Accessed August 11, 2019.
- 24 LA Times, Trump warns California that its emission deal with automakers may be illegal, <https://www.latimes.com/politics/story/2019-09-06/trump-warns-california-violating-law-auto-emissions> Accessed September 11, 2019.
- 25 EPA, Particulate Matter (PM) Basics, <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>
- 26 EPA, Volatile Organic Compound's Impact on Indoor Air Quality, <https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality>
- 27 EPA, The Benefits and Costs of the Clean Air Act, 1970 – 1990, <https://www.epa.gov/sites/production/files/2015-06/documents/contsetc.pdf>
- 28 U.S. Department of Commerce, Economics and Statistics Administration, April, 2008. <https://www.census.gov/prod/2008pubs/ma200-05.pdf>
- 29 EPA Clean Air Act and the Economy. <https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy>
- 30 EPA, Criteria Air Pollutants, <https://www.epa.gov/criteria-air-pollutants>
- 31 The Trump administration has begun replacing members of the Clean Air Scientific Advisory Committee and other committees with non-scientific affiliates of the regulated industries. The Government Accountability Office has found that some of the appointments have been made without meeting criteria for relevant experience, credentials, conflicts of interest, committee balance, and fidelity to the ethics requirements. GAO, EPA Advisory Committees: Improvements Needed for the Member Appointment Process, July, 2019. <https://www.gao.gov/assets/710/700171.pdf>
- 32 Environmental Technologies Research Reports, https://2016.export.gov/industry/environment/eg_main_086862.asp
- 33 K. Downey, The Impact of Environmental Regulations on Business, February, 2017. <https://www.lawstreetmedia.com/issues/energy-and-environment/impact-environmental-regulations-business/>
- 34 Harvard Business Review, The Competitive Advantage of Nations, 1990. <https://hbr.org/1990/03/the-competitive-advantage-of-nations>
- 35 35 Fed. Reg. 11339 (1970).
- 36 Ford Motor Co., Application for Suspension of 1975 Motor Vehicle Exhaust Emissions Standards, vol. 2, at 5-3, April 5, 1972. Cited in C. Ditlow, Federal Regulation of Motor Vehicle Emissions under the Clean Air Amendments of 1970, Ecology Law Quarterly, 1975. <https://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=1078&context=elq>
- 37 Ibid.
- 38 Ibid.
- 39 Pew Fact Sheet, Government Regulation: Cost Lower, Benefits Greater Than Industry Estimates, May 2015. <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2015/05/government-regulation-costs-lower-benefits-greater-than-industry-estimates>
- 40 Pew Environmental Group, Industry Opposition to Environmental Regulation, <https://www.pewtrusts.org/~media/assets/2011/03/industry-clean-energy-factsheet.pdf>
- 41 House Energy and Commerce Subcommittee on Energy and Power, Hearing on HR 144, HR 1470, HR 2568, HR 2909, HR 3030 and HR 3211, 101st Cong., 1st Session (1990).
- 42 Office of Management and Budget, Informing Regulatory Decisions: 2003 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities, (2003). Cited in Pew Fact Sheet though no longer available on Whitehouse website. <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2015/05/government-regulation-costs-lower-benefits-greater-than-industry-estimates>
- 43 EPA, Power Sector Programs – Progress Report, <https://www3.epa.gov/airmarkets/progress/reports/index.html>
- 44 National Science and Technology Council, National Acid Precitation Assessment Program Report to Congress: An Integrated Assessment, 2005. <https://www.esrl.noaa.gov/csd/aqrsd/reports/napapreport05.pdf>
- 45 USDA, <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/>
- 46 MDARD, https://www.michigan.gov/mdard/0,4610,7-125-1599_1603-9735--,00.html
- 47 MDARD, https://www.michigan.gov/mdard/0,4610,7-125-1599_1603-9645--,00.html
- 48 EPA, National Water Quality Inventory Report to Congress, August, 2017. https://www.epa.gov/sites/production/files/2017-12/documents/305btrc_finalowow_08302017.pdf
- 49 21st Century Infrastructure Report, 2017, citing MDEQ 2014 and Verhougstraete et al. 2014. https://www.michigan.gov/documents/snyder/21st_Century_Infrastructure_Commission_Final_Report_1_544276_7.pdf
- 50 American Society of Civil Engineers, 2017 Infrastructure Report Card, <http://www.infrastructurereportcard.org>
- 51 EPA, <https://www.epa.gov/green-infrastructure/what-green-infrastructure>
- 52 ULI, The Business Case for Green Infrastructure: Resilient Stormwater Management in the Great Lakes Region, 2017, <https://americas.uli.org/wp-content/uploads/sites/2/ULI-Documents/ULI-Great-Lakes-Stormwater-Report.pdf>
- 53 ULI, Harvesting the Value of Water: Stormwater, Green Infrastructure, and Real Estate, 2017, <https://uli.org/wp-content/uploads/ULI-Documents/HarvestingtheValueofWater.pdf>
- 54 Fourth National Climate Assessment, Volume II, Impacts, Risks, and Adaptation in the United States, Report-in-Brief, https://nca2018.globalchange.gov/downloads/NCA4_Report-in-Brief.pdf
- 55 American Rivers, the Water Environment Federation, the American Society of Landscape Architects and ECONorthwest, Banking On Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-wide, April 2012, https://www.asla.org/uploadedFiles/CMS/Government_Affairs/Federal_Government_Affairs/Banking%20on%20Green%20HighRes.pdf
- 56 EGLE, https://www.michigan.gov/egle/0,4561,7-135-3307_3515_4143--,00.html
- 57 Adam Arend, et al., The Blue Communities Initiative: Empowering communities to instill the value of water at the heart of all they do, University of Michigan, 2019. <https://deepblue.lib.umich.edu/handle/2027.42/148657>
- 58 Our Children's Trust, <https://www.ourchildrenstrust.org/juliana-v-us>







FLOW (For Love of Water) is working to build deeper awareness among all stakeholders—including groups, governments, and citizens—regarding the public trust framework that protects the Great Lakes.

ABOUT THIS REPORT

This paper is the third of four policy briefs that elaborate the critical role government policy and government protections play in safeguarding human health and the environment. The first two policy briefs – Resetting Expectations: Government’s Role in Protecting Human Health and the Environment and Resetting Expectations: The Value of Natural Systems and Government’s Role in Protecting Water – demonstrated that the benefits of government protections are both measurable and overwhelmingly favorable in the realm of environmental protection. The quantifiable benefits of protections greatly exceed the costs imposed on business and the economy.

This third brief shows that, rather than interfering with economic activity or stifling growth, government regulations, when properly designed and implemented, can be a powerful force fostering innovation in product design, advanced materials, and manufacturing processes. Regulations can reduce manufacturing costs for industry and business, enhance competition, reduce business risks, and expand and create new markets for goods and services.

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