

Breathe a Little Easier: Why America's Air is Among the Cleanest in the World

Energy is the physical capacity to perform work, e.g., to convey motion, heat, or light. Energy is an attribute of nature existing in many forms: potential, kinetic, thermal, electrical, chemical, nuclear, and mechanical, among others. It is neither created nor destroyed, but rather transferred and transformed. Fundamentally, energy enables us to get things done. When understood and harnessed, it enables human beings to expand our creative potential and accomplish more.

Humans have utilized energy to our advantage throughout our history. Even tools we consider simple were once novel means of doing more. The lever allows us to lift more mass while exerting the same force. The bow allows us to project an arrow at a higher velocity than any human could throw one. With the emergence of civilization, energy—a facilitator of that very process—took on even greater significance. The scope of energy deployment enlarged to meet the growing demand for work at large scales. New, creative uses of energy arose. Water and wind emerged as mainstays of production, turning wheels to mill grain, irrigate or drain plains, and produce textiles.

Marshaling newfound scientific knowledge, 18th century industrial pioneers catalyzed the greatest reshaping of the human experience since the dawn of agriculture. Since that time, the steam engine, the hydroelectric dam, the internal combustion engine, and the nuclear reactor have served

as some of the greatest facilitators of material progress ever known to humanity. The Industrial Revolution and the ensuing prosperity simply would not have occurred without the energy progress that spurred it. The ratio of work to time (power) possible to human beings has never been greater than it is today and the cost of generating that power—the cost of getting things done—has never been lower.

Today, human beings can travel across the planet within a matter of hours; we can lift, construct, and manufacture goods of previously unthinkable durability; we can see with the lightness of day at any hour of our choosing and we can compute and store data on a scale unimaginable even 50 years ago.

Intrinsic to this development of energy is the utilization of that to which we typically refer to as natural resources. This nomenclature, though entrenched, obscures the essence of resources. In a sense, there is nothing natural about them. Of course, they are naturally present in the universe, but their existence *qua resources* is contingent. In reality, there is matter, there is physics, and there is the uniquely human capacity to understand the relationship between the two. Neither coal, nor wind, nor uranium has any inherent value, but they become valuable through the deployment of what Julian Simon deemed the ultimate resource: the human mind. The human mind—which observes, integrates, and creates—enables us to take

matter and transform it into something of use. We ought never to forget that for more than 100 millennia the materials we now take for granted as natural resources sat untouched, their potential—and ours—unrealized.

Contrary to our common parlance, which includes the terms “power generation” and “energy production,” energy is not created out of nothing. Again, it can be neither created nor destroyed, but only transferred from one form to another—potential to kinetic, mechanical to electrical, etc. Similarly, matter can be neither created nor destroyed, but only changed into different forms. In our processes of generating *useful* energy, matter is often transformed in a way that leaves behind material by-products, such as wood ash, greenhouse gases, and nuclear waste. Therein lies the energy paradox. The more energy we have utilized, the greater the volume of by-product left for disposal. This paradox has become the axiom of the environmentalist movement, which seeks to curtail energy freedom as a result. Given the centrality of energy to economic development outlined above, the curtailing of energy freedom is a constraint upon economic development. Deep consideration of the relationship between energy and waste is critical for affirming or rejecting the virtue of economic development.

THEORIES OF DEVELOPMENT

Are economic development and environmental quality at odds? American politicians on both the right and the left assure us that they are not. From the political right we hear that market processes, such as the widespread deployment of hydraulic fracturing to tap natural gas stores, have resulted in a reduction in greenhouse gas emissions in the United States. We hear also that despite more fossil fuel use in almost every sector, U.S. measurements of the criteria pollutants are lower today than 50 years ago. From the

political left we hear that wind and solar mandates are not only beneficial for the environment, but are job creating economic winners as well. Within a few short decades, they say, these technologies will be able to power our entire economy. These assurances allow most people to sleep soundly in the belief that their families, their activities, and their businesses can be part of a harmonious future.

A very different conversation—one which focuses on more fundamental questions—is taking place among academics and popular ethicists.¹ This more fundamental conversation pertains to the very nature of human life and its place in the biosphere. This conversation asks: what is the moral standing of human action as such? Taking the New York Times op-ed pages as representative of popular ethics, the emerging consensus differs sharply from the palliating platitudes of politicians. The present view in popular ethics is that human economic development from as early as the agricultural dawn and most certainly since the industrial revolution is irreparably altering planet earth—and that, therefore, our species is morally suspect.²

At the sharper edge of this discussion rests the argument that human beings are not only an invasive species, but that human beings are the most pernicious invasive species in existence.³ Some commentators go so far as to wish for our species’ termination. Though these views have yet to bubble to the surface of everyday political discussion, they are latent in many of the last half centuries environmental discussions, from population control, to deforestation, to global warming.

In response, proponents of economic development have sought to demonstrate that while human beings have been destructive to the earth, we have the ability to attenuate that destruction, and indeed tend to affect environmental improvements as economic progress is made. Two specific arguments that have drawn support are the concept of an “Environmental Kuznets Curve” and the “Environmental Transition Hypothesis.”

¹ Revkin, Andrew C. “Varied Views (Dark, Light, in Between) of Earth’s Anthropocene Age.” The New York Times. The New York Times, July 15, 2015. <https://dotearth.blogs.nytimes.com/2015/07/15/varied-views-dark-light-in-between-of-earths-anthropocene-age/>.

² May, Todd. “Would Human Extinction Be a Tragedy?” The New York Times. The New York Times, December 17, 2018. <https://www.nytimes.com/2018/12/17/opinion/human-extinction-climate-change.html>.

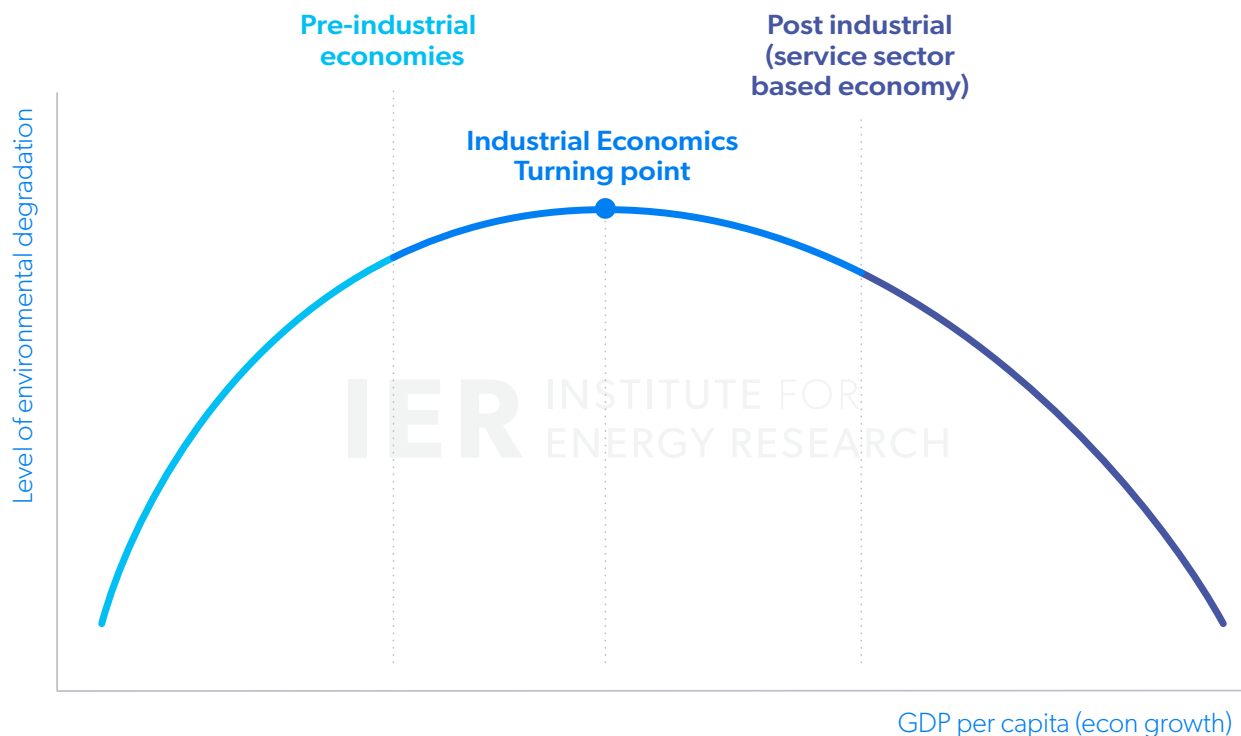
³ Zielinski, Sarah. “Are Humans an Invasive Species?” Smithsonian.com. Smithsonian Institution, January 31, 2011. <https://www.smithsonianmag.com/science-nature/are-humans-an-invasive-species-42999965/>.

ENVIRONMENTAL KUZNETS CURVE

The *Environmental Kuznets Curve* (EKC) argument is an application of economist Simon Kuznets' observations on income inequality to environmental quality. The original Kuznets Curve didn't concern the environment, but rather income inequality. It purported to show that as economies grow from a pre-industrial state into what we know as a developed state, economic inequality initially surges, but eventually levels off and finally falls. The resulting curve takes the form of an upside-down "U." The extension of the Kuznets Curve to environmental quality is that as economies grow from a pre-industrial state into what we know as a developed state, environmental degradation initially surges, but eventually levels off and finally falls.

To the extent that this is an observable pattern, much can be said about its causes. One clear aspect is industrial efficiency gains driven by profit and loss. Using less to achieve more is part and parcel with profitability, so it would make sense that as firms and industries mature, they become better at maximizing their production and minimizing waste. Another causal factor is human environmental tolerance and its status in a values hierarchy. In keeping with Kuznets' inequality curve, it is argued that people are very tolerant of environmental degradation early in the economic development process, but that when income allows for baseline human needs—food, clothing, shelter—to be met, concerns for environmental quality are expressed. This turning point begins the environmental restoration process. At some point consumers become rich enough to use some of their growing income to implicitly "buy" cleaner air, more nature preserves, etc.

Environmental Kuznets Curve



ENVIRONMENTAL TRANSITION HYPOTHESIS

The Environmental Transition Hypothesis (ETH), as argued by Indur Goklany, is similar to the EKC. The ETH observes the same increase, flattening, and then decrease in environmental degradation. There is an abundance of data that supports the EKC and ETH.

What distinguishes the ETH is that Goklany identifies not income *per se* that initiates the environmental transition, but rather the availability of technology. In *The Improving State of the World* Goklany shows that innovation, begotten of economic development, mitigates the environmental problems that can be caused by early state human industrial development.⁴ Technological change rather than income, as proponents of the EKC argue, is the proximate cause of the environmental improvement that the curve displays. Critically, technology can proliferate and positively influence environmental outcomes in countries that may lag behind in economic development allowing them to bypass stages of environmental harm that befell early industrializers.

Goklany illustrates that innovation and technological improvement have allowed human beings to flourish more efficiently than ever before, with particular attention to agricultural yields that have climbed to once-unthinkable levels per hectare thanks to developments like the Haber-Bosch process. Because of such improvements the human population has risen drastically in the past half century without the costs to the earth that were in vogue in the 1970s. Thanks to innovation, today human beings live healthier, wealthier lives without the effects on the land,

water, and air quality that earlier generations precipitated.

Andrew McAfee, principle research scientist at the Massachusetts Institute of Technology's Sloan School of Management, describes this process as "dematerialization." In his book *More from Less* McAfee illustrates the market economy's virtue of material efficiency. Firms, guided by profit and loss, strive to provide goods and services with ever fewer resources. To the surprise of the doomsayers, this "dematerialization" process has proven successful as the world's richest economies have entered the digital age. Consider, for example, the functions of a 21st century smartphone. Weighing scarcely 200 grams, the iPhone 11 can perform tasks that would have required a litany of larger items (telephone, phone book, camera, video editor, radio, encyclopedia, etc.) just two decades ago. The material savings are so immense as to almost be incomprehensible.

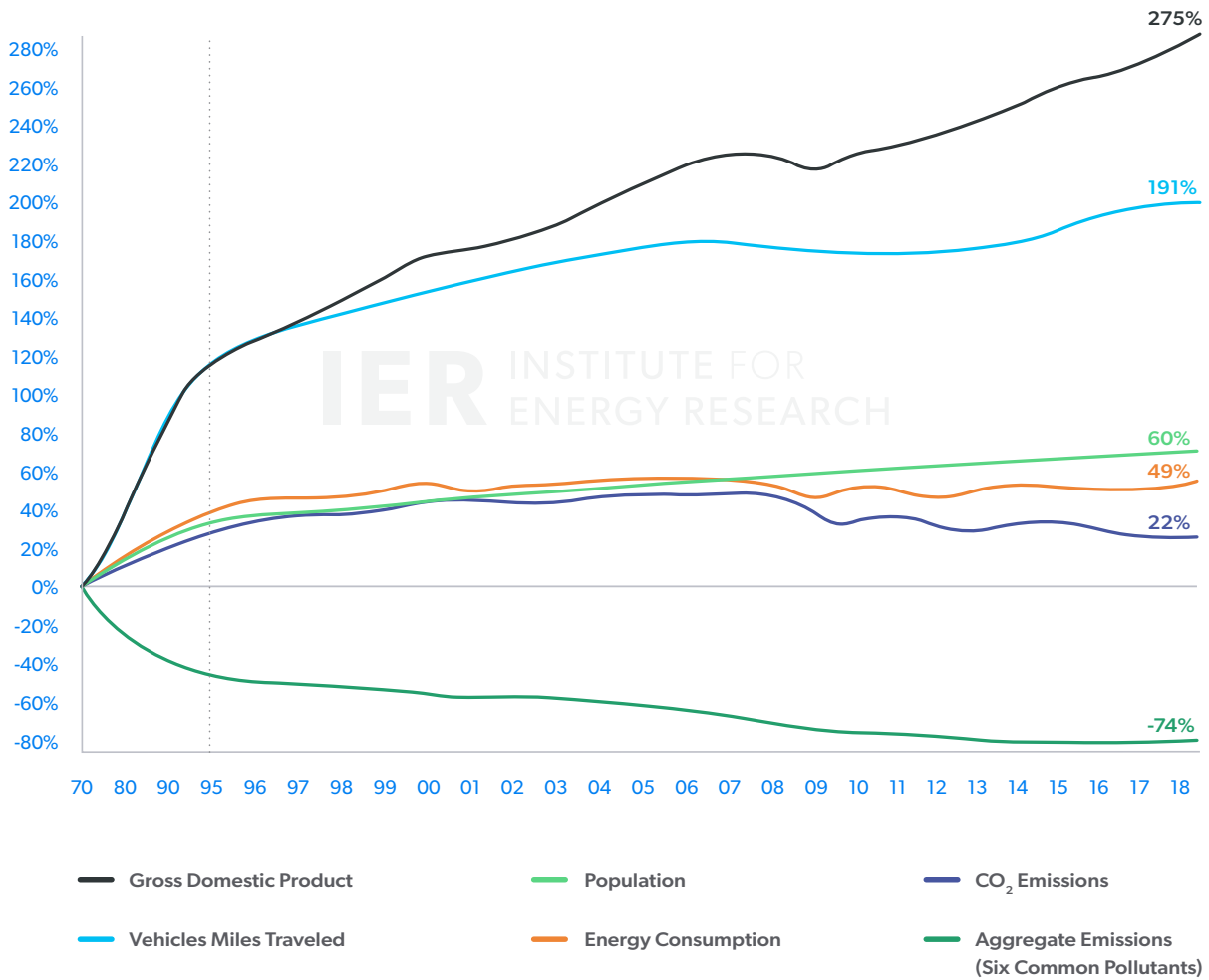
AIR QUALITY AND ENVIRONMENTAL PROGRESS

One of the best pieces of evidence supporting the Environmental Kuznets Curve and the Environmental Transition Hypothesis can be seen in air pollution in the United States. As the chart below shows, between 1970 and 2018, U.S. gross domestic product increased 275 percent, vehicle miles traveled increased 191 percent, energy consumption increased 49 percent, and U.S. population increased by 60 percent. During the same time period, total emissions of the six principal air pollutants dropped by 74 percent.⁵

⁴ Goklany, Indur *The Improving State of the World: Why We're Living Longer, Healthier, More Comfortable Lives on a Cleaner Planet*. Cato Institute, 2007

⁵ "National Air Quality: Status and Trends of Key Air Pollutants." EPA. July 31, 2018. Accessed September 12, 2019. <https://www.epa.gov/air-trends>.

Comparison of Growth Areas and Emissions, 1970-2018⁶



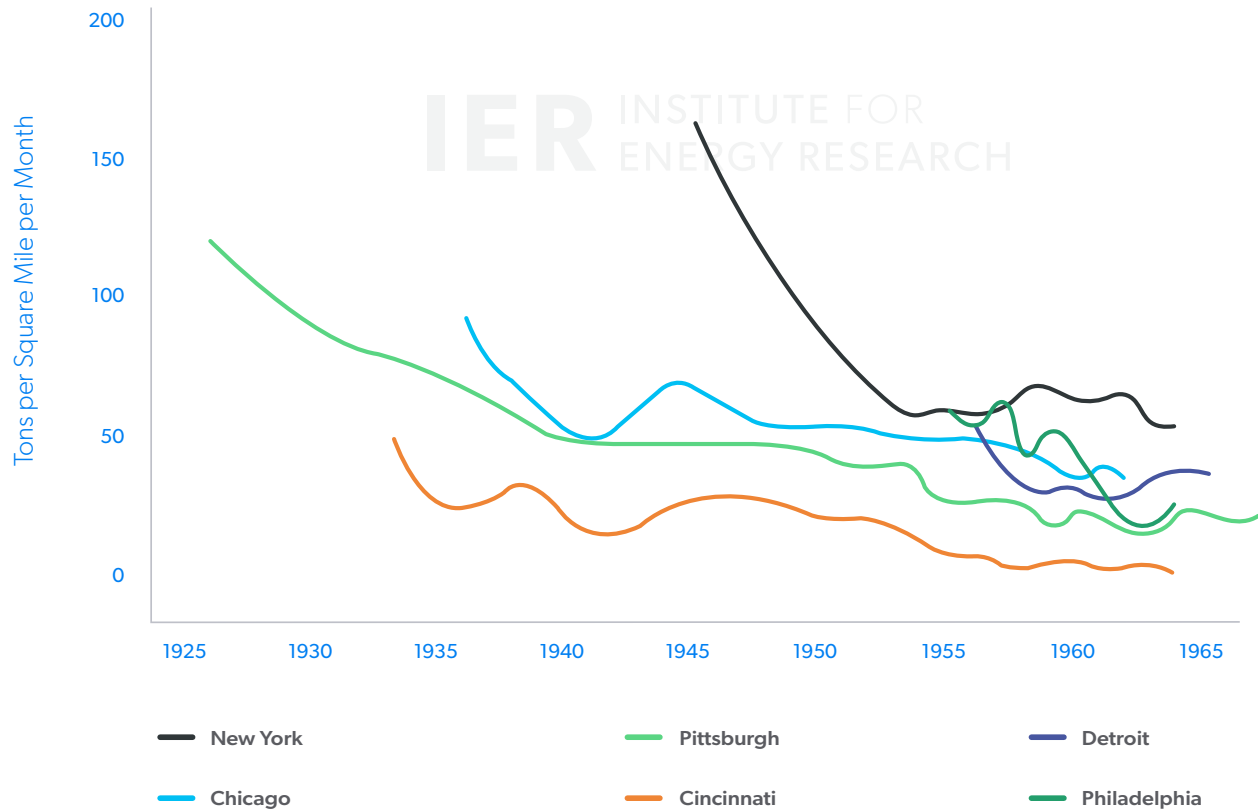
Standard explanations attribute this progress to regulations like the Clean Air Act and the establishment of the Environmental Protection Agency (EPA), but it is important to understand that the trend started decades before Congress passed the Clean Air Act Amendments of 1970.

In their 2007 book *Air Quality in America*, Joel Schwartz and Steven F. Hayward demonstrated that air quality had been improving long before the EPA was established in 1970.⁷ That trend is demonstrated in the graph above.

⁶ Environmental Protection Agency.

⁷ Schwartz, Joel M., and Steven F. Hayward. *Air Quality in America: A Dose of Reality on Air Pollution Levels, Trends, and Health Risks*. Washington, D.C: AEI Press, 2007.

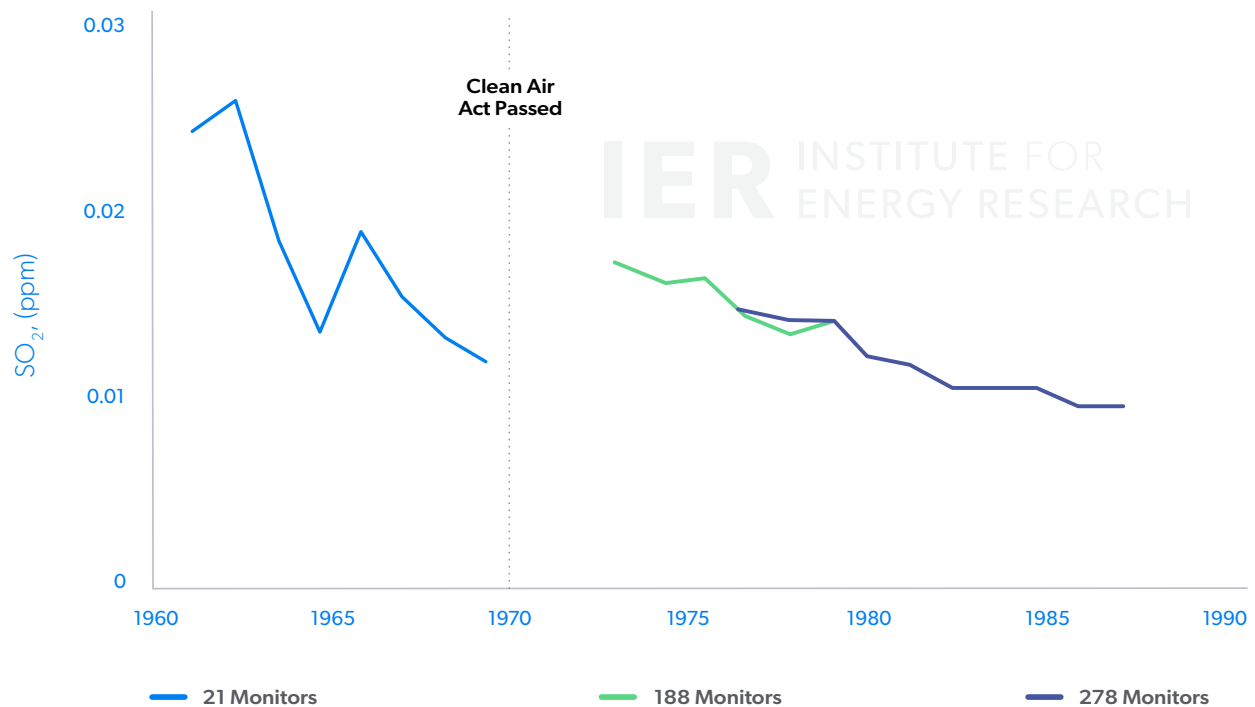
Long-Term Trends in Particulate Matter Levels in Several U.S. Cities⁸



PM is measured here as dustfall—the amount of particulate matter falling on a given area over a given amount of time, measured in tons per square mile per month.

⁸ J.H. Ludwig, G.B. Morgan, and T.B. McMullen, "Trends in Urban Air Quality," *EOS* 51 (1970): 468-75.

National Trend in Average Annual Sulfur Dioxide (SO₂) Levels, 1962-86⁹



As you can see, the decline in particulate matter (particle pollution made up of dust, dirt, soot, and smoke) in several U.S. cities started well before the aggressive expansion of the Clean Air Act in 1970.¹⁰ Additionally, the national trend in sulfur dioxide (a form of emissions that are a precursor to acid rain) follows a similar path.

Hayward and Schwartz attribute the trend to economic development, the emergence of common-law nuisance lawsuits against polluters, and regulation at lower jurisdictions.¹¹ Focusing on economic development, IER's head economist Robert Murphy explained the process of how wealth drives environmental progress in an article published in 2016:

“More generally, as people grow richer they can afford the luxury of a cleaner environment. For any given level of technological know-how and capital equipment, there is a tradeoff between the material standard of living and the cleanliness of the environment. As conventionally measured real GDP increases, people can choose to ‘buy’ cleaner air and water. Other trends of developing economies are the move to shorter workweeks, the elimination of child labor, and increased workplace safety. Yet all of these desirable improvements have a cost,

⁹ Data from Bureau of the Census, *Statistical Abstract of the United States* (Washington, D.C.: U.S. Department of Commerce, 1981); Council on Environmental Quality, *Environmental Quality* (Washington, D.C.: Government Printing Office, 1971); Environmental Protection Agency, *National Air Quality and Emission Trends Report, 1976* (Washington, D.C.: Government Printing Office, 1977). Chart is adapted from L.M. Goklany, *Clearing the Air: The Real Story of the War on Air Pollution* (Washington, D.C.: Cato, 1999).

¹⁰ Ibid.

¹¹ Ibid.

in the sense that material output is lower than it otherwise would be. If a society starts out on the edge of starvation, then its people—even the children—will toil on farms and in factories, and they won't waste money installing filters on smokestacks. But as they grow richer, they shift away from these methods of production. A rich, modern economy can afford to produce large quantities of food, electronics, energy, and houses without pumping soot into the air, and without requiring adults to work 80-hour weeks or kids to fill the factories. The path to such progress is saving and capital accumulation, so that workers have better tools and equipment and thus a higher productivity per hour of labor. If we take a society on the verge of starvation and simply pass laws prohibiting the business practices certain observers find distasteful, we won't magically make these people more productive. Instead we will condemn them to death.”¹²

In addition to the saving and capital accumulation Murphy describes in the context of a single country, as Goklany stresses, developing countries might effectively leapfrog in this process by importing technology originally created in richer countries.

POLITICS AND PESSIMISM AS OBSTACLES TO A HEALTHIER AND WEALTHIER SOCIETY

Since we can establish the fact that air quality was improving well before the Clean Air Act and the creation of the EPA, why then do federal regulations often get all of the credit for improving air quality? Some have argued that

the visibility of the policymaking process plays an important role in this.¹³ For example, during the creation of the Clean Air Act, the visibility of the legislative process was a tangible way for politicians and bureaucrats to meet the political demand for government “to do something” about air quality. In that political environment, the general absence of proponents of invisible hand explanations of environmental progress (such as the Environmental Transition Hypothesis) in the policy debate then allowed regulators to assert the need for these regulations unchallenged.¹⁴ Consequently, the impersonal (less visible) market forces that had been improving air quality long before 1970 went overlooked and continue to be dismissed today. Without a conceptual understanding of how wealth improves health, much of the public has defaulted into a pessimistic position. As this [Gallup poll](#) shows, most people don't believe our environment is improving.

Here, fear and human cognition plays an important role in the public's lack of understanding of the connection between economic growth and environmental progress. Many suggest that the nature of human cognition and the manner in which we gather information cause people to shape a generally pessimistic outlook on things and this negativity bias is heightened by institutional factors.¹⁵ For example, Steven Pinker points to the fact that news reporting focuses on negative events, making it easy for people to ignore positive developments. Additionally, Pinker points out that the human brain tends to overestimate danger due to the availability heuristic, meaning that we tend to recall events based on reasons other than how likely they are to occur. The availability heuristic is a mental shortcut we all use to evaluate the current state of affairs based on the most recent examples or data that come to mind. These factors tend to overshadow positive developments, producing a negativity bias, which helps to explain why people assume that environmental factors such as air quality are declining. In other words, our default pessimism is a major obstacle

¹² Murphy, Robert P. “Did the Federal Government Give Americans Clean Air?” IER. February 28, 2017. Accessed June 18, 2019.

¹³ Watson, Reed. “Giving Credit Where Credit Is Due.” PERC, February 5, 2018. <https://www.perc.org/2016/12/14/giving-credit-where-credit-is-due/>.

¹⁴ The first successful attempt to push back at bureaucratization of environmental policy in public debates didn't come until 1981 when Julian Simon published his book *The Ultimate Resource*.

¹⁵ “Ridley: Why Is It so Cool to Be Gloomy?” Human Progress. Accessed October 28, 2019. <https://www.humanprogress.org/article.php?p=1613>.

to improving the public's understanding of the relationship between wealth and the environment.

However, simply acknowledging the existence of this negative bias does not fully explain the persistence of the doom-and-gloom outlook that most people have toward the environment. In order to develop a deeper understanding, we must also look at how this outlook interacts with different institutions in society. As Matt Ridley notes, good news is gradual and bad news happens suddenly.¹⁶ When you combine this with the availability heuristic, it's easy to see why news organizations tend to promote dire headlines that promote a constant state of fear. Additionally, in a mixed economy, fear is a productive asset for politicians, bureaucracies, and crony-capitalists alike. As Robert Higgs has explained, governments are adept at cultivating and exploiting public fear and negativity:

“By keeping the population in a state of artificially heightened apprehension, the government-cum-media prepares the ground for planting specific measures of taxation, regulation, surveillance, reporting, and other invasions of the people’s wealth, privacy, and freedoms. Left alone for a while, relieved of this ceaseless bombardment of warnings, people would soon come to understand that hardly any of the announced threats has any substance and that they can manage their own affairs quite well without the security-related regimentation and tax-extortion the government seeks to justify.”¹⁷

As the quotation from Higgs makes clear, despite massive improvements in living standards across nearly all aspects of life, our political institutions produce a recurring narrative of despair. Instead of hearing the good news of improving air quality and living standards, people are bombarded with doomsday scenarios that severely discount the power

of human ingenuity and completely ignore the massive improvements in well-being that have taken place in our not-so-recent past. The story of air quality is no different. Air quality in the U.S. has been steadily improving over the past century; these improvements were the result of several factors including changes in technology and local governance that allowed those closest to environmental conflicts to find innovative ways to address the problems through decentralized solutions.¹⁸

CONCLUSION

The data indicate that thanks to technological gains, the improved servicing of human wants and needs does not require ever-expanding resource consumption and waste. Further, it suggests that pessimism about our environmental future is unwarranted. Wealth creation and technological improvements have enabled human beings to minimize waste while expanding production. The very market process that environmentalists deride demands that firms seek ever more efficient (less wasteful and less costly) means of producing goods and services.

Our view is that the EKC and the ETH are informative and important. The EKC and the ETH are descriptive of phenomena that we have seen in the current era. People in the more advanced countries of the world have utilized the means at their disposal to improve efficiency and reduce their environmental impacts. However, across early-industrializing countries the means have included not only income and technological development, but also market interventions by governments.

This trend concerns us. Some analysts who acknowledge the improving state of environmental quality in advanced regions of the world think that government can shrewdly be used to accelerate those processes. Even the data-savvy Andrew McAfee, while celebrating the efficiency demands of the market in his book on “dematerialization,” succumbs

¹⁶ “Ridley: Good News Is Gradual, Bad News Is Sudden.” Human Progress. Accessed October 28, 2019. <https://www.humanprogress.org/article.php?p=1287>.

¹⁷ Higgs, Robert. “Fear: The Foundation of Every Government’s Power: Robert Higgs.” The Independent Institute. Accessed October 28, 2019. <https://www.independent.org/publications/article.asp?id=1510>.

¹⁸ Higgs, R. and Close, C.P. (Eds.) 2005. Re-thinking Green: Alternatives to Environmental Bureaucracy. Oakland, CA: Independent Institute.

to pessimism with respect to some issues, like global greenhouse gas emissions. On that issue, McAfee assumes government as the ultimate helm of problem-solving and market intervention as the needed tool. This hubristic approach sacrifices the very societal qualities that make progress possible: free human choices. Only free human choices express the value that humans attach to ostensible advances, such as improved air quality. Further, the belief that government can accelerate progress defies centuries of observations on what Hayek deems the knowledge problem. Planners falsely believe they can orchestrate a better state of affairs, despite the requisite knowledge being impossible to obtain. Only the market process can demonstrate how individuals make evaluations of the world before them. In a free market, people make decisions that reflect their preferences, including the preference for cleaner air.

A concern for environmental quality is a preference that has been shown to emerge in regions that have industrialized and become wealthy. Individuals hold

that preference, like any other, subjectively. As such, the environmental preference deserves toleration, but no special privilege. Like religion or customs of etiquette, the environmental preference does not have any righteous claim to government intervention, except in cases in which it can be demonstrated with evidence that the activities of some individuals or firms are infringing on the person or property of others.

Defending economic development requires not only showing the upside-down “U” of the Environment Kuznets Curve or deploying the arguments of the Environmental Transition Hypothesis, but also challenging the notion that development has reached its apex, that we are now rich enough, and that government must rein in our actions through environmental regulation. Rather than constraining further economic development we ought to champion the institutions that enable it while respecting environmental quality as well—namely, property rights and the market process. These vital elements are fundamental to human progress, economic and environmental alike.

