

# Air pollution is much worse than we thought

Ditching fossil fuels would pay for itself through clean air alone.

By [David Roberts@drvox.com](mailto:David.Roberts@drvox.com) Aug 12, 2020, 10:10am EDT



A smokestack emits smoke over Interstate 95 in Baltimore, Maryland, on December 17, 2019.  
*Andrew Lichtenstein/Corbis via Getty Images*

In the late 1960s, the US saw regular, choking smog descend over New York City and Los Angeles, 100,000 barrels of oil spilled off the coast of Santa Barbara, California, and, perhaps most famously, fires burning on the surface of the Cuyahoga River in Ohio. These grim images sparked the modern environmental movement, the first Earth Day, and a decade of extraordinary environmental lawmaking and rulemaking (much of it under a Republican president, Richard Nixon).

From the '70s through the beginning of the 21st century, the fight against fossil fuels was a fight about pollution, especially air pollution.



The skyline of downtown Los Angeles, shrouded and obscured by smog, in 1956. *American Stock/Getty Images*

In the ensuing decades, the focus has shifted to global warming, and fossil fuels have largely been reframed as a climate problem. And that makes sense, given the enormous implications of climate change for long-term human well-being.

But there's an irony involved: The air pollution case against fossil fuels is still the best case!

In fact, even as attention has shifted to climate change, the air pollution case has grown stronger and stronger, as the science on air pollution has advanced by leaps and bounds. Researchers are now much more able to pinpoint air pollution's direct and indirect effects, and the news has been uniformly bad.

The evidence is now clear enough that it can be stated unequivocally: It would be worth freeing ourselves from fossil fuels even if global warming didn't exist. Especially now that clean energy has gotten so cheap, the air quality benefits alone are enough to pay for the energy transition.

This conclusion has been reaffirmed by the latest air quality research, presented at a [recent hearing of the House Committee on Oversight and Reform](#) by Drew

Shindell, Nicholas professor of earth science at Duke University (and a lead author on both recent [IPCC reports](#)).

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Shindell’s testimony reveals that the effects of air pollution are roughly twice as bad as previously estimated. That is a bombshell — in a sane world, it would be front-page news across the country.

“The air quality scientific community has [hypothesized this for at least a decade](#), but research advances have let us quantify and confirm this notion, over and over,” says Rebecca Saari, an air quality expert who teaches in civil and environmental engineering at the University of Waterloo. “The air quality ‘co-benefits’ are generally so valuable that they exceed the cost of climate action, often many times over.”

Let’s take a closer look at the evidence for this extraordinary claim, and then we’ll consider its political implications.

### **Science keeps revealing that air pollution is more harmful than previously believed**

Recently, I wrote about an ambitious and detailed new [plan to substantially decarbonize the US economy](#) by 2035 (primarily through electrification) and said that it would bring “transformative social and health benefits.”

Shindell and his team at Duke have attempted to quantify those benefits, drawing on the latest science. They began with the climate model used by NASA’s Goddard Institute and upgraded it “to represent air pollution at relatively high resolution,” [Shindell testified](#), “making this model suitable for simultaneously studying the impact of climate and air quality.”

Using this all-in-one model, Shindell’s team mapped out a pathway from 2020 to 2070 that reduced US greenhouse gas emissions consistent with the world’s pledge to stay below 2°C and attempted to quantify the air quality and climate benefits.

(Note: Though the model and the techniques have been peer-reviewed, Shindell’s crunching of the latest numbers is currently going through peer review. He includes extensive documentation of his methodology in an appendix to his testimony.)

The numbers are eye-popping. Shindell testified: “Over the next 50 years, keeping to the 2°C pathway would prevent roughly 4.5 million premature deaths, about 3.5

million hospitalizations and emergency room visits, and approximately 300 million lost workdays in the US.”

All that prevented death, illness, and lost productivity adds up to a lot of savings:

The avoided deaths are valued at more than \$37 trillion. The avoided health care spending due to reduced hospitalizations and emergency room visits exceeds \$37 billion, and the increased labor productivity is valued at more than \$75 billion. On average, this amounts to **over \$700 billion per year in benefits to the US from improved health and labor alone, far more than the cost of the energy transition.**

Importantly, many of the benefits can be accessed in the near term. Right now, air pollution leads to almost 250,000 premature deaths a year in the US. Within a decade, aggressive decarbonization could reduce that toll by 40 percent; over 20 years, it could save around 1.4 million American lives that would otherwise be lost to air quality.

Of the potential yearly deaths prevented, Rep. Robin Kelly of Illinois remarked at the hearing, “That’s a huge number. That’s nearly three times the number of lives we lose in car accidents every year. It’s twice the number of deaths caused by opioids in the past few years. And it’s even more than the number of Americans we lose to diabetes each year.”

If the numbers are shocking, it’s because the science has been developing rapidly. First, says Shindell, “there’s been a huge upsurge in work in developing countries, in particular China,” which has produced larger data sets and a wider, fuller picture of the real-world effects of exposure.



Smog in Beijing, China, 2013. [Wikipedia](#)

Second, where scientists used to focus almost exclusively on pollution effects for which there is an established and well-understood biological pathway, the recent production of enormous data sets (for instance, the entire population of more than 60 million Medicare patients) has allowed them to uncover new statistical correlations.

With giant data sets, “you can control for socioeconomic status, temperature, hypertension and other existing conditions,” and other variables, says Shindell. “You can convincingly demonstrate that correlation is in fact causal, because you can rule out essentially every other possibility.”

For example, scientists now know that exposure to smog (tiny, microscopic particulates) hurts prenatal and young brains. Even though they don’t yet fully understand the biological mechanism, they know it reduces impulse control and degrades academic performance. Similarly, they know it hurts the kidneys, the spleen, even the nervous system.

“The well-understood pathways, things like strokes, lower respiratory infections, and chronic obstructive pulmonary disease, only seem to capture about half the total,” Shindell says. “When you look at the [new] studies, you find that air pollution seems to affect almost every organ in the human body.”

A recent [study from the national academies of multiple countries](#), including the US, put it this way:



The scientific evidence is unequivocal: air pollution can harm health across the entire lifespan. It causes disease, disability and death, and impairs everyone's quality of life. It damages lungs, hearts, brains, skin and other organs; it increases the risk of disease and disability, affecting virtually all systems in the human body.

“About twice as many people die in total as die just from the pathways we understand,” says Shindell. “We’ve been underestimating all along.”

Alongside these updated estimates of air pollution impacts, Shindell's team developed a **new way of assessing the nationwide health impacts of severe heat**, in order to quantify one of the best-understood effects of climate change. Combining them into one model, Shindell testified, “we find impacts roughly double those that would have been obtained using older evidence.”

While that may sound like a big jump, it is likely a lower bound. On both air pollution and climate change, the study omitted many effects that “are clearly present but cannot yet be reliably quantified.” The true numbers are almost certainly higher.

The implications of this new air quality research are far-reaching. Though the **benefits of the Clean Air Act** were already thought to outweigh the costs, they may be twice as high as previously estimated. The costs of Trump's rollbacks of Obama's **fuel economy standards** and **Clean Power Plan** are up to twice as large as previously estimated.

It is no coincidence that Trump's Environmental Protection Agency is trying to **exclude consideration of co-benefits** (often the largest class of benefits) in its air quality rulemakings. It's no coincidence that it is trying to **exclude consideration of studies with anonymous participants**, a category that encompasses all the latest research Shindell and others draw on. The fossil fuel lobby, which now includes the entire executive branch, has long understood that the science isn't going its way. These rule changes are its last-ditch bid to blind the government to new research.



Donald Trump watches EPA Administrator Andrew Wheeler announce that the National Environmental Policy Act will be gutted on January 9. *Drew Angerer/Getty Images*

## **New air pollution research ought to break the climate policy logjam**

Climate change has often been framed as an intractable problem for international coordination, a matter of shared sacrifice, with every country incentivized to be a “**free rider**,” reaping the benefits without taking on any of the costs.

But the latest air pollution research, coupled with the plunging cost of clean energy, should render that dynamic moot.

It is true that climate change can only be averted with the entire world’s cooperation; if the US reduces its emissions to net zero but the other countries of the world (especially China and India) continue on their current trajectory, it will make almost no difference in temperature. The health benefits of avoided severe heat will not manifest.

However — and this is the crucial fact — the air quality benefits *will* manifest, no matter what the rest of the world does. Shindell’s team ran a version of their scenario in which the US came into compliance with a 2°C pathway but the rest of the world continued with current policies. “We found that US action alone would bring us more than two-thirds of the health benefits of worldwide action over the next 15 years,” Shindell testified, “with roughly half the total over the entire 50-year period analyzed.”

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The air quality benefits arrive much sooner than the climate benefits. They are, at least for the next several decades, much larger. They can be secured without the cooperation of other countries. And, by generating an average of \$700 billion a year in avoided health and labor costs, they will more than pay for the energy transition on their own. Climate change or no climate change, it's worth ditching fossil fuels.

And if this is true in the US — which, after all, has **comparatively clean air** — it is true tenfold for countries like China and India, where air quality remains **abysmal**. A **Lancet Commission study** in 2017 found that in 2015, air pollution killed 1.81 million people in India and 1.58 million in China.

Shindell's research reveals that those estimates may be woefully low. (He hopes to do similar modeling on China at some point.) The true toll may be almost double that, which is why both countries have experienced **mass demonstrations against pollution** in recent years that have left their governments scrambling.



People hold placards as they protest against increasing air pollution in Noida, India, on November 17, 2019. *Yogendra Kumar/Hindustan Times via Getty Images*

“Air pollution remains the leading environmental health risk factor contributing to premature death worldwide, as demonstrated repeatedly by the **Global Burden of Disease studies**,” says Saari. “Health care costs and lost worker productivity are direct economic impacts of air pollution so large they can exceed the costs of climate policy.”

Shindell ended with a call to Congress, testifying that it would be “unconscionable to realize these benefits could be obtained and not attempt to obtain them.”

**Air pollution ought to be seen as a global civil rights crisis**



The extraordinary level of suffering humanity is currently experiencing from air pollution is not necessary for modernity; it could be reduced, at a cost well below the net social benefits, with **clean energy technologies on hand**.

If they are not necessary, then the millions of lives ended or degraded by fossil fuels every year are a choice. And when suffering on this scale, that is this brutally inequitable, becomes a choice, it enters the same ethical terrain as war, slavery, and genocide. The effects are more distributed over time and geography, as are the decision-making and the moral culpability, but the cumulative impact on human well-being — on our longevity, health, learning, and happiness — is comparable, and every bit as much worth fighting.

US policymakers have a chance to kick-start an energy transition that could save 1.4 million American lives over the next 20 years, especially among the most vulnerable, even as it **creates jobs and saves consumers money**. As Shindell says, it would be unconscionable not to act on it.