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How Much Do Health Impacts From Fossil Fuel Electricity Cost The U.S. Economy?

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How much would electricity cost in the [United States](#) if the retail price reflected the health impacts of burning fossil fuels? A paper recently published by researchers at the Environmental Protection Agency finds that accounting for such costs would add an average of 14 to 35 cents per kilowatt-hour to the retail cost of electricity. Nationwide, these hidden health costs add up to as much as \$886.5 billion annually, or 6% of GDP.

The peer-reviewed [study](#), titled "Economic Value of U.S. [Fossil Fuel Electricity Health Impacts](#)," was published online last December in *Environment International* by Sarah Rizk* and Ben Machol of the Clean Energy and Climate Change Office, U.S. EPA Region 9, in San Francisco. (In an interview, Rizk and Machol noted that views expressed in the paper are theirs alone. Rizk recently left the agency to attend business school.)

"There are a lot of reports out there that quantify the total health costs and the total health impact values from fossil fuel energy in the U.S.," said Rizk, "but there are fewer of them that put it into a dollar per kilowatt-hour metric, which is what you see on your utility bill. We wanted to present it in a way that was digestible to the average consumer of electricity."



Why The U.S. Needs A National Climate And Energy Plan

Justin Gerdes
Contributor

To do so, Rizk and Machol gathered data based on state electricity profiles, fuel type, and national averages for the benefits per ton of emissions. The economic value of the health impacts was based on premature mortality, workdays lost, and other direct costs to the healthcare system resulting from emissions of PM2.5, NOx, and SO2. The health impacts valuations presented in the study come from national benefit per ton figures developed from a [Community Multi-scale Air Quality \(CMAQ\)](#) model, which is regularly used in EPA Clean Air Act rulemaking.

"We knew the methodology the EPA traditionally uses in rulemaking, and it hadn't been applied in the way we did here," said Machol. "Where we took a step deeper," he explained, "is that the analyses that we used were based on studies that use [photochemical modeling](#), which allows you to get a

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I'm a San Francisco Bay Area-based independent journalist specializing in energy and the environment, with a focus on energy and climate policy. My work has appeared at Yale Environment 360, MotherJones.com,

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Rizk and Machol found that the dollar value of improved human health from avoided emissions from fossil fuel-fired power plants ranges from a low of a half penny to 1.3 cents per kilowatt-hour in California to a high of 41 cents to \$1.01 per kilowatt-hour in Maryland. (When accounting for imported fossil fuel electricity, California's figures increase to 3 cents to 7 cents per kilowatt-hour – illustrating the importance of the City of Los Angeles' recent [decision to divest from coal-fired electricity](#).)

Rizk and Machol found a similarly wide range for the valuations for health impacts by fuel type: 19 to 45 cents per kilowatt-hour for coal, 8 to 19 cents per kilowatt-hour for oil, and 1 to 2 cents per kilowatt-hour for natural gas. "For coal and oil," Rizk and Machol write, "these costs are larger than the typical retail price of electricity, demonstrating the magnitude of the externality." (The average retail rate for electricity for all sectors in the United States, [as of January 2013](#), was 9.66 cents per kilowatt-hour.)

Combine the average retail cost of electricity to the health impacts from fossil fuels, said Rizk and Machol, and "on average, U.S. consumers of

electricity should be willing to pay \$0.24–\$0.45/kWh for alternatives such as energy efficiency investments or emission-free renewable sources that avoid fossil fuel combustion." They suggest that pricing recognition of these hidden costs could take the form of a so-called "health adder" policy "to more fully account for adverse climate and health impacts associated with fossil fuel usage."

Why \$886.5 billion is a likely underestimate

Rizk and Machol make clear that future analyses will likely find their estimate of the economic value of health impacts from fossil fuel electricity, \$361.7 to \$886.5 billion annually, to be an underestimate. Their study, they note, "does not attempt to include all externalities," nor do they "attempt to complete a full life cycle assessment of all externalities associated with fossil fuel electricity or its alternatives."



A paper recently published by researchers at the EPA finds that accounting for the health impacts of fossil fuel combustion would add an average of 14 to 35 cents per kilowatt-hour to the retail cost of electricity. Credit: U.S. Department of Energy, Office of Science

They omit impacts resulting from extraction and transportation of fossil fuels and impacts on climate change and human welfare. Their findings also do not include other pollutants resulting from fossil fuel combustion: O₃ precursors, NO₂, greenhouse gases, residual or hazardous waste products, and water-borne pollutants.

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have the most confidence in," Rizk said, "is our national estimate because they're using that national benefit per ton and emissions are taking place at the national level." She repeated the estimate for economic impacts: between 14 and 35 cents per kilowatt-hour. "The mid range of that is more than double what people pay for electricity today. We found that quite striking."

"Our real hope in putting out this data is getting people to realize how significant the health costs *are*, and that they can be much more significant than some of the numbers people are putting to carbon dioxide cost valuation methods, and they are potentially higher than the retail cost depending on what your geographic scope is," Rizk said.

A bright spot amid the gloom is that health costs should fall as coal-fired power plants are taken offline. "As older units are retired, and as facility owners in eastern states make strides to address EPA's [Cross-State Air Pollution Rule](#) [on March 29, the U.S. Solicitor General [petitioned](#) the Supreme Court to review the August 2012 D.C. Circuit Court ruling that vacated the CSAPR], health impacts should decrease, often significantly," write Rizk and Machol.

Growing body of research on the cost of health impacts

Rizk and Machol's study joins a growing body of research dedicated to quantifying the health impacts connected to fossil fuel combustion. On March 7, the [Health and Environment Alliance](#), a European NGO, released a [report](#) which found that emissions from Europe's coal-fired power plants cost the continent's citizens up to €42.8 billion (\$54.9 billion) in health costs annually.

The [authors say](#) the study provides the first-ever calculation of the health costs associated with air pollution from coal-fired power plants in Europe. The ledger includes costs associated with premature deaths, medical visits, hospitalizations, medication, and reduced activity, including working days lost.

And on March 27, the [International Monetary Fund \(IMF\)](#) released a [report \[PDF\]](#) calling for the end of \$1.9 trillion in annual global energy subsidies. The [Washington Post's](#) Brad Plumer provides a helpful overview of the report [here](#). The tally includes \$480 billion in direct subsidies to consumers and \$1.4 trillion in what the IMF calls the "mispricing" of fossil fuels. Why mispriced? Because polluters are not forced by governments to pay the full costs associated with fossil fuel combustion on climate change and public health.

**Disclosure: Sarah Rizk recently completed an assignment with the EPA Region 9 Environmental Review Office, the same office where my brother works.*

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fredlinn 2 months ago

Thanks for posting this Justin—important information.

—" Absurd is too polite for this "study." "

As a registered respiratory therapist and certified cardiopulmonary technologist who has worked mainly in intensive care and emergency room situations—I find it to be right on, or even an understatement.

@micheal sondergard , what is your basis for calling it absurd?

Called-out comment

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paulscott 2 months ago

@Michael, it's not important to be exact in the measurement of health impacts to know they exist. It would be absurd to conclude there is no impact. You can argue to what extent, but not that it exists.

Would it be OK with you if only a few thousand people died as a result of this pollution instead of tens of thousands?

Called-out comment

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paulscott 2 months ago

@Michael, first of all, no need to be argumentative, and certainly no need to call us names. You only show a lack of imagination and hurt your cause when you do that.

It's quite possible to replace carbon-based energy with renewable energy. We are on track now to eliminate all coal energy in about 20 years. We'll eliminate

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match that in about 5 years. A new coal plant would have to sell its energy at 7-9 cents/kWh to break even. And that's without a price on carbon. Here in CA, we finally have a cap & trade program that will gradually increase the cost of carbon further accelerating coal's demise.

As far as transporation, I've been driving on sunlight-generated electricity for over ten years. My solar system paid for itself years ago, so for the rest of my life, I get to run my home and car on sunlight for free. I like those economics!

Electric cars are selling for under \$20K after incentives. That's affordable for most Americans now. The price of these vehicles will only get better. The price of oil will only go higher. Those are irrefutable trends.

Smart people who care about their affect on others will be the first to adopt these technologies. Less intelligent people who don't care about their affect on others will be the last ones to adopt these technologies.

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