



AGA Response to Environmental Research Letters Study

A Decade of the U.S. Energy Mix Transitioning Away from Coal: Historical Reconstruction of the Reductions in the Public Health Burden of Energy

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On May 5, 2021, the Journal of Environmental Research Letters published a study, "[A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy.](#)" The study reports the trends of air emissions related to shifts in energy use in selected sectors from 2008 to 2017. AGA has identified several concerns related to the study outlined below.

Key concerns:

1. The study and resulting headlines downplay the enormous benefits of the U.S. moving away from coal and toward natural gas, which has led to demonstrable positive impacts on public health.
2. The study's conclusions about the direct use of natural gas in buildings rest on estimates, not measurements, using data designated by the EPA as "poor" or "below average." The study's findings of health effects related to natural gas combustion in end-use sectors lack real-world credibility and deserve scrutiny.
3. The study focuses on stationary combustion emissions but neglected more important sources, including vehicles, non-combustion industrial processes, agriculture, wildfires and fugitive dust.
4. The findings were not evaluated in the context of existing national-based health standards for PM2.5 or other criteria pollutants.

This is a case of a sophisticated scientific study based on unreliable data and then presented in a slanted manner. Even though the study downplays the benefits of natural gas, it shows that the use of natural gas for power generation and other end uses led to enormous benefits in reducing air pollution and improving public health. Without question, the increased use of natural gas in our nation has led to profound positive impacts on public health, lower greenhouse gas emissions, reduced cost of living and doing business, economic growth, and the increased integration of renewable energy.

Detailed observations about the study:

- The study estimated health impacts from the power sector dropped by 80-85%. The underlying cause is unacknowledged in the study, but is a direct result of the switch from coal to natural gas and the increased integration of renewable energy, which flexible natural gas resources has helped enable.
- One diagram in the study (Figure 1) shows that the impacts of natural gas in the non-power sectors have declined throughout the study period. This observation was not highlighted in the study.
- Another diagram in the study (Figure 12) also shows effects related to gas declining throughout the period. This observation was not highlighted in the study.
- Because natural gas is a gaseous fuel, gas combustion leads to negligible amounts of filterable particulate matter emissions, or "soot." Gas combustion can generate "condensable" particulate matter (PM2.5), which are aerosols that are released as gases and then can later condense to form PM2.5. Any considerations of the difference in health effects between filterable and condensable PM2.5 are not acknowledged in the report.
 - EPA warns users of its National Emissions Inventory to "take caution in using the emissions data for filterable and condensable components of particulate matter (PM10-FIL, PM2.5-FIL and PM-CON), which is not complete and should not be used at any aggregated level."¹

- The study identifies significant impacts of ammonia from gas combustion. However, there is no reference to ammonia in EPA's standard emission reference document (AP-42). The EPA National Emissions Inventory estimates of ammonia from natural gas combustion are based on emissions factors designated with the lowest possible rating ("E" or "poor") and appear to be based on emissions factors first reported in the 1950s and 1960s.²
- The use of advanced gas control and burner-tip technologies does not appear to factor into the estimated or reported emissions or impacts.
- According to the study, at the state level, biomass and wood combustion, not gas, has supplanted coal as the leading sources of mortality impacts from fuel combustion in many states. In 2017, total impacts from mortality from PM_{2.5} exposure have surpassed coal in 20 states and has surpassed or is near equal to coal in all sectors except electricity.
- Direct coal use has not represented a significant part of residential sector energy consumption in decades. However, electricity consumed in the residential sector that is generated with coal is relevant and can lead to changing impacts.
- Notwithstanding the other data problems identified, the study reports projected errors range between 76% underestimation and 88% overestimation. Projection errors for state-level health impacts range between ~100% underestimation and ~390% overestimation for coal, gas, and biomass and wood.
- Agricultural emissions are not accounted in the study but remain a major source of air pollution. Renewable natural gas projects would have a major benefit of reducing emissions these sources.
- The research was supported by the Rocky Mountain Institute and Login5. Rocky Mountain Institute, now RMI, is an organization that has been actively advocating for removing low-cost gas options for consumers and [requiring all-electric appliances](#) in buildings.

The study's findings of significant overall reductions in air pollution due to the switch from coal to natural gas are consistent [with other work](#), showing that between 1990 and 2017, emissions of sulfur dioxide and nitrogen oxides from electricity generation were reduced 92% and 84%. Nationwide, [air quality has improved significantly](#) during the past decades. The period 1990 to 2017 saw an 88% decrease in the national average concentration of SO₂, a 50% decrease in NO₂, a 43% decrease in PM_{2.5}, and a 46% decrease in PM₁₀.

In addition to improved air quality, the availability of low-cost natural gas has led to lower heating prices, [which saves lives in during winter months](#). Households that use natural gas save an average of \$879 per year compared to homes using only electricity.

Beyond air pollution, natural gas substitution for coal has led to a sharp decline in carbon dioxide emissions. It is the single-largest factor in power sector carbon dioxide emissions reductions reaching lowest levels in more than three decades.

Furthermore, natural gas utility distribution systems methane emissions declined 69% from 1990 to 2019, as natural gas utility companies added more than 788,000 miles of pipeline to serve 21 million more customers. Distribution systems owned and operated by local natural gas utilities emit only 0.08% of produced natural gas. This exceptional record can be traced to gas utilities continuing to make safety their top priority and remaining deeply committed to systematically upgrading infrastructure through risk-based integrity management programs.

As an industry, AGA and its members are committed to delivering natural gas safely, reliably and efficiently to the millions of Americans who rely on it every day. The natural gas utility industry invests \$3.9 billion daily in efficiency programs in the U.S. and Canada, investments that are helping customers reduce their carbon footprints, offsetting more than 13.5 million metric tons of carbon dioxide emissions from 2012 to 2018 the equivalent of removing 2.9 million cars off the road for a year.

AGA and the natural gas utility industry is committed to the development of well-founded data and science to inform public understanding drive policy decisions about the role of natural gas and gas infrastructure in our nation's clean energy future.