New Study Casts Doubt On The Climate Benefits Of Natural Gas Power Plants

The emissions and methane leaks from new gas plants zero out the CO2 cuts achieved from closing coal plants, a peer-reviewed analysis found.
Friday, October 09, 2020
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HuffPost

Burning natural gas produces roughly half the carbon dioxide of coal, which is why policymakers across the political spectrum have long billed it as a “bridge fuel” to a safer climate.

But new research suggests the emissions benefits of gas-fired power plants are not what they seem.

U.S. output of carbon dioxide, the primary gas causing climate change, fell 23% between 2000 to 2018 as the electricity sector’s emissions dropped 34%, largely thanks to coal plants retiring.

But if the new fleet of gas plants built over the past decade last as long and are used as often as the coal units they replaced, the projected emissions for the U.S. power sector for the lifespan of the stations will decrease by just 12%, a study published last month in the peer-reviewed journal AGU Advances found. And when the higher-end estimates of how much methane, a potent heat-trapping gas and the main ingredient in natural gas, leaks during the production and burning cycle every year, even those reductions are effectively eliminated.

In other words, trading coal plants for gas plants cut annual emissions, but left the cumulative future pollution — known as “committed emissions” — virtually unchanged.



AES Corp.’s gas-fired Alamitos Energy Center in Long Beach is one of California’s largest power plants. Credit: DAVID MCNEW VIA GETTY IMAGES

The increased reliance on gas plants “has slashed current emissions, but it has extended the runway, and the tradeoffs are negating each other,” said Steven Davis , an earth systems scientist at the University of California-Irvine, who co-authored the study.

“What this really shows is that we maybe shouldn’t be patting ourselves on the back too much for the retirement of old coal plants,” he added. “They were old, they were ready for retirement, and we’ve replaced them with a whole lot of very modern gas plants that are probably going to be with us for decades to come.”

There are only more plants to come. With roughly 2,000 stations already in service, as many 177 of them are under construction or been announced, according to an analysis USA Today published in September 2019.

President Donald Trump has drastically scaled back federal regulations on power plant emissions and boosted government aid to fossil fuel producers and users. As recently as last week, Democratic challenger Joe Biden called natural gas a necessary “bridge” to a cleaner economy.

The new study marked one of the first major attempts to measure the cumulative lifetime emissions from the U.S. power sector since the fracking boom shifted the majority of electricity production to natural gas.

The authors compared the Energy Information Administration's data on power plants' usage and the volume of gas units to the Global Energy Monitor's coal plant database. They assumed new gas plants would last roughly as long as coal units, between 40 and 50 years.

Then they modeled annual methane leakage based on three different scenarios. A low-end guess pegged the industry's annual leakage of unburned methane at 1%. The mid-range estimate used the Environmental Protection Agency's 1.4% per year. The high-end estimate, based on mounting research that suggests the Environmental Protection Agency is undercounting methane leaks, placed the yearly figure at 3%.

"It has slashed current emissions, but it has extended the runway, and the tradeoffs are negating each other," Steven Davis, earth systems scientist at University of California, Irvine.

The U.S. would need to shut down many of its gas plants or dramatically reduce how often it uses them to truly meet the emissions cuts promised under the Paris climate accords, the study found.

"This really calls into question the bridge theory," said Christine Shearer, a scientist at the research outfit Global Energy Monitor and co-author of the study. "If the only way to really reduce emissions with all these gas plants we've added is to significantly reduce their usage, then they didn't reduce the emissions on their own."

The researchers did not model the potential cumulative emissions of gas plants retrofitted with technology to capture and store carbon emissions. Such tools, while slowly gaining traction, remain costly, and seem unlikely to become as cheap as wind and solar equipment.

But gas plants equipped to capture carbon could play a role in the future, said Hank Webster, a policy expert at the Acadia Center, a nonprofit think tank that studies clean energy. Solar and wind should produce the vast majority of the country's electricity, but gas plants could remain as back-ups, able to come online when

renewables can’t meet demand.

“The strategy should be to only keep the most efficient gas plants around and only for the role of intermittency, providing reliability as we continue to march toward renewables,” said Webster, who was not involved with the study. “But we likely won’t need all of the gas plants that are around right now.”

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In the Media
Earth System Science
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