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Water Use in Fracking Soars — Exceeding Rise in Fossil Fuels Produced, Study Says

As drillers compete for oil and natural gas, more fluids are going into and out of each fracking well. Researchers warn it's headed for a tipping point.

BY PHIL MCKENNA FOLLOW @MCKENNAPR

AUG 15, 2018





The amount of water used per well jumped as much as 770 percent between 2011 and 2016, researchers say. As fracking expands, its water and wastewater footprints are forecast to continue to balloon. Credit: Mladen Antonov/AFP/Getty Images

As the fracking boom matures, the drilling industry's use of water and other fluids to produce oil and natural gas has grown dramatically in the past several years, outstripping the growth of the fossil fuels it produces.

A **new study** published Wednesday in the peer-reviewed journal *Science Advances* says the trend—a greater environmental toll than previously described—results from recent changes in drilling practices as drillers compete to make new wells more productive. For example, well operators have increased the length of the horizontal portion of wells drilled through shale rock where rich reserves of oil and gas are locked up.

They also have significantly increased the amount of water, sand and other materials they pump into the wells to hydraulically fracture the rock and thus release more hydrocarbons trapped within the shale.

The amount of water used per well in fracking jumped by as much as 770 percent, or nearly 9-fold, between 2011 and 2016, the study says. Even more dramatically, wastewater production in each well's first year increased up to 15-fold over the same years.

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"This is changing the paradigm in terms of what we thought about the water use," Avner Vengosh, a geochemist at Duke University and a co-author of the study, said. "It's a different ball game."

Monika Freyman, a water specialist at the green business advocacy group Ceres, said that in many arid counties such as those in southern Texas, freshwater use for fracking is reaching or exceeding water use for people, agriculture and other industries combined.

"I think some regions are starting to reach those tipping points where they really have to make some pretty tough decisions on how they actually allocate these resources," she said.

Rapid Water Expansion Started Around 2014

The study looked at six years of data on water use, as well as oil, gas and wastewater production, from more than 12,000 wells across the U.S.

According to Vengosh, the turning point toward a rapid expansion of water use and wastewater came around 2014 or 2015.

The paper's authors calculated that as fracking expands, its water and wastewater footprints will grow much more.

Wastewater from fracking contains a mix of the water and chemicals initially injected underground and highly saline water from the shale formation deep underground that flows back out of the well. This "formation water" contains other toxics including naturally radioactive material making the wastewater a contamination risk.

Hydraulic Fracturing at a Glance

Domestic oil and gas production has surged as a result of hydraulic fracturing, which blasts sand and chemicals under high pressure into rock formations to release hydrocarbons. The

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The contaminated water is often disposed of by injecting it deep underground. The wastewater injections are believed to have caused **thousands of relatively small-scale earthquakes** in Oklahoma alone in recent years.

Projected Water Use 'Not Sustainable'

Jean-Philippe Nicot, a senior research scientist in the Bureau of Economic Geology at the University of Texas at Austin, said the recent surge in water use reported in the study concurs with similar increases he has observed in the Permian Basin of West Texas and New Mexico, the largest shale oil-producing region in the country.

Nicot cautioned, however, against reading too much into estimates of future water use.

The projections used in the new study assume placing more and more wells in close proximity to each other, something that may not be sustainable, Nicot said. Other factors that may influence future water use are new developments in fracking technology that may reduce water requirements, like developing the capacity to use brackish water rather than fresh water. Increased freshwater use could also drive up local water costs in places like the Permian basin, making water a limiting factor in the future development of oil and gas production.

"The numbers that they project are not sustainable," Nicot said. "Something will have to happen if we want to keep the oil and gas production at the level they assume will happen in 10 or 15 years."

PUBLISHED UNDER:
NATURAL GAS AND FRACKING
HEALTH

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