



Without water, U.S. oil and natural gas production would be impossible. And with world energy consumption expected to increase 56% by 2040, it's clear that our need for energy – as well as a safe environment with clean, drinkable water – will continue to rise. That's why it's vital we find new, innovative ways to produce energy that preserve and protect our water. **Because they both matter.**

TIME TESTED AND PROVEN TECHNIQUE

Hydraulic fracturing and horizontal drilling have been safely unlocking vast U.S. reserves of oil and natural gas found in shale and other tight-rock formations for decades. Developing energy using the latest horizontal drilling technologies allows producers to access reserves once thought impossible to reach.

Widely used in the oil and natural gas industry since the 1940s, hydraulic fracturing has produced more than 600 trillion cubic feet of natural gas and 7 billion barrels of oil. And while increased domestic oil and natural gas production has raised questions about groundwater safety in recent years, hydraulic fracturing remains an invaluable production technique.

IN THE U.S. HYDRAULIC FRACTURING PRODUCES

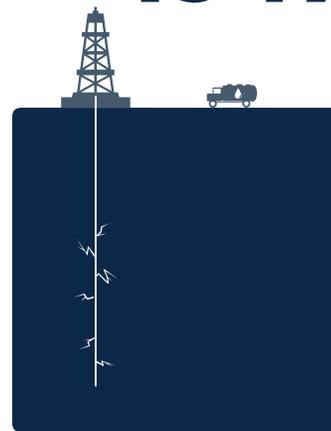
53 BILLION CUBIC FEET OF NATURAL GAS

AND

4.3 MILLION BARRELS OF OIL PER DAY



THE FIRST WELL TO BE HYDRAULICALLY FRACTURED WAS IN 1947



PROTECTING GROUNDWATER

In addition to stringent cementing and casing procedures, Oklahoma's oil and natural gas producers adhere to many federal and state regulations. Key federal regulations governing shale development include: Clean Water Act; Clean Air Act; Safe Drinking Water Act; National Environmental Policy Act; Resource Conservation and Recovery Act; Emergency Planning and Community Right to Know Act; Endangered Species Act and the Occupational Safety and Health Act.



EXPLORING WATERLESS FRACTURING TECHNIQUES

The average hydraulically fractured well can require approximately 2 million gallons of water for the hydraulic fracturing process. Operators are working on new technologies that reduce required fresh water volumes as well as waterless well fracturing.

Water-free fracturing still remains an early-stage technology, but as oil and natural gas producers focus more on water sustainability practices, more investment and research is being conducted for this technology.

The industry often uses nitrogen and carbon dioxide (CO₂) in so-called “energized” or “foamed” fracturing fluids to reduce water usage, but current research is focusing on the use of CO₂ to completely eliminate water used in the process.

While waterless fracturing is still in the early stages of development, it is a technology producers are actively researching and refining for the future of hydraulic fracturing.

EMERGING POSSIBILITIES

Researchers are studying how a chilled form of CO₂ known as a “super-critical fluid” – neither a liquid nor a solid – could be used as the new industry standard for hydraulic fracturing.

Researchers are also trying to find the best viscosity, or thickness, for the CO₂ at its chilled state to effectively carry proppant.

Collecting CO₂ as a power generation byproduct and using it to fracture wells would help reduce greenhouse gas emissions. Ideally, a well’s owner would be able to re-use CO₂ at the next well it fractures, since nearly all CO₂ injected would return to the surface.

As new technologies for oil and natural gas production emerge, protecting fresh water – and the rest of the natural environment – will always remain a high priority.

LEARN MORE

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