**DryFrac™ Waterless Fracturing Technology**

**Improve Production. Eliminate Water.**

At Praxair, we’re always looking for innovative ways to help our customers be more productive. We now offer DryFrac waterless fracturing technology, a process that completely replaces water in hydraulic fracturing with CO₂. This process also improves the productivity, reliability, and safety of your oil & gas efforts.

**An Improved Fracturing Process**
Praxair’s DryFrac technology mixes the CO₂ and sand which is then pumped into the well by a service company. Praxair’s CO₂ blenders technology integrates directly with the service companies’ high pressure pumping equipment, keeping the project running smoothly and on schedule. We’ve reduced the mechanical complexity of the system to help improve operability, reliability and safety.

**Enhanced Oil and Gas Production**
The use of CO₂ instead of water could improve initial production in water sensitive formations by 30-50%.* A 100% CO₂ fracture can result in improved productivity of the well for the following reasons:

**Lower viscosity:** CO₂ viscosity is lower than that of water resulting in more complex fractures and improved fracture connectivity.

**Reduced capillary fluid retention:** Low viscosity and interfacial tension means the CO₂ readily flows out of the fracture network.

**Readily miscible with oil:** CO₂ reduces the interfacial tension and viscosity of oil, enhancing initial flowback.

**Energized flowback:** Upon flowback, gaseous CO₂ provides the energy to push fluids out of the fractures and well bore.

**Reduced formation damage:** CO₂ eliminates clay swelling, reducing blockage in fractures, and leaves a residue free proppant pack.

**Proppant placement:** The fluid dynamics of CO₂ combined with proper flowback control help you ensure proppant placement and retention.

*SPE paper 119265

**The right process for the right well**
In water sensitive or pressure depleted formations, a pure carbon dioxide fracture will flow more readily, enabling the initial production rate and ultimate recovery to be higher than it is with water or foam mixtures. The use of CO₂ reduces formation damage and water blockage, helping you increase production and recovery rates in the well.
A Leader in Safety
Safety is our priority. As a non-flammable fracturing fluid, CO₂ is a safer alternative to other waterless fracturing fluids such as propane, butane or diesel fuel. Praxair has safely provided CO₂ pumping services for oil and gas and mining applications since the late 1970s. With over 40 years of experience supplying industrial gases to well sites, choose Praxair to be your trusted CO₂ supplier for oil and gas extraction.

A Reliable Choice
With Praxair, you not only get expertise in the use of CO₂ for waterless fracturing, you also get a leading, nationwide network for liquid CO₂ delivery. That includes a robust supply chain to deliver CO₂ for fracturing on a commercial scale.

Additionally, the technology is specially designed to seamlessly integrate with service company fracturing equipment to ensure jobs run smoothly and remain on schedule.

Conserving Water
Hydraulic fracturing can use a large amount of water for each job. Praxair’s DryFrac technology eliminates many of the major challenges associated with hydraulic fracturing.

Production Improvements with CO₂
With Praxair’s DryFrac waterless fracturing technology: safety + productivity + reliability + sustainability = greater profitability. CO₂ is a premium fluid that provides premium results. For example, the following chart estimates that in a tight, water sensitive sandstone formation, CO₂ could provide a 5-month payback.


In short, Praxair’s DryFrac waterless fracturing technology can provide these benefits:
- No need to find and compete for water
- No need to treat and dispose of fracturing water

In a growing world where the need for energy is ever expanding, Praxair helps you extract oil & gas while making our planet more productive.

To learn more about Praxair’s DryFrac waterless fracturing technology and how it can increase productivity, reliability, and safety at your sites, talk with your Praxair representative, visit us at www.praxair.com/frac, or call us at 1-800-PRAXAIR.