

N2 Fracturing Fluids Substituted with CO2 to Meet Net Zero Carbon Emissions

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Summary (All headings should be Arial 12pt bold)

CO2 fracturing has a rich history, particularly in Canada, but has been used in a dozen countries around the world. This higher cost fluid, with restrictions on supply in most of the world, is mostly used in the food and beverage industry which limits the use in the traditional oilfield. Given the carbon net zero impacts worldwide, the production and economic incentive of carbon dioxide disposal has changed and carbon dioxide injected beneath the surface is guaranteed to happen. Instead of injecting CO2 at only a cost, there are several fracturing technologies as well as the use of conventional fracturing equipment and procedures that can serve to generate enhance production. CO2 based fracturing fluids and CO2 energized fluids have advantages over nitrogen based or energized fluids in terms of production, and while CO2 needs to be disposed of to reach net zero carbon, nitrogen does not. Nitrogen being inert has little to no interaction with geology in wells in Canada where CO2 does have beneficial impacts. Therefore, this presentation will highlight the economic advantages of switching to CO2 versus N2 use in fracturing to meet our nation's and the world's ambition for net zero carbon.

Theory / Method / Workflow

The use of CO2 was much more prevalent in the past with conventional wells as well as extremely water sensitive gas wells. Due to expense and limited companies having all of the CO2 fracturing options from 100% CO2 with proppant to 5% energized wells. Through production case studies, we show how the CO2 energized fracs perform better than the nitrogen energized fracs. In each of 3 formations examined, we have shown the equations of state calculations for the density and compression advantage of CO2 over N2.

Results, Observations, Conclusions

CO2 had 2 to 5 times the expansion of N2, speeding the recovery of post-frac flowback.

CO2 had wells groups that were 23.5% more production compared to fracs using non-energized and nitrified fluids.

CO2 costs have significantly dropped, and injecting CO2 is necessary for net zero carbon, thus using it for fracturing and EGR/IOR/EOR has become much more economic.

The conventional equipment to use CO2 is more readily available compared to N2 equipment.

Novel/Additive Information

ESG aspect is present in this paper

Acknowledgements

References

Reference Style (use Arial 9pt normal)