# LNG and the CO2 business – What impact?

By **Sam A. Rushing**, gasworld magazine on Apr 29, 2015

The carbon dioxide ($CO_2$) industry continues to evolve in the US and internationally. Specific to the US, the acquisition of EPCO Carbon Dioxide by Air Products and the further purchase of Continental Carbonic by MATHESON have largely taken out most of the independent network of $CO_2$ supply to the markets.

What remains are a few regional independent suppliers, most of whom are not significant producers and suppliers of the commodity and largely remain only as resellers.

The gas companies at large in North America supplied $CO_2$ to the frac trade for decades, until the rapid growth of hydraulic fracturing (fracking), at least to a high degree. Fracking has experienced numerous problems, beginning with environmental concerns and extending to performance-based issues, where again there is more $CO_2$ being sold essentially as a waterless form of frac – and as a means of eliminating problems often associated with such water-based techniques.

When thinking of $CO_2$ and LNG, from a downstream perspective, a common factor which ties the two together would be sales of the gases, along with other industrial gases to the markets at large. On the upstream end of things, historically $CO_2$ was sold in significant sums to the markets in North America, predominantly to the Southeast, Southwest, Plains, Rockies, Mid-Atlantic, and Alberta markets. $CO_2$ fracs were a matter of course, and a significant part of what was sold for fracturing gas and some oil wells, sometimes in conjunction with foam, sand, and other materials.

Then there is the trend in hydraulic fracking, which is still going strong; however, there is a significant amount of bad press surrounding fracking. Since many of these fracs are well below the aquifers which supply potable water, there have been many cases of breakthrough into the aquifers with methane and more, when performing hydraulic fracs. Further, in addition to the subject of contaminating potable water, further complaints and problems stem from – sometimes – a lack of sufficient water for these hydraulic fracturing jobs to start; disposal of the spent water and spillage are further concerns which are often brought about by environmental enforcement agencies. Even further still, states such as California are doing their best to prohibit hydraulic fracturing, for all the reasons mentioned.

In the end, like many other processes, fracking is an imperfect process, with multiple inherent problems. The issue of fracking is highly debatable, particularly since the end result represents the current oil and gas output of the US reaching new level, with expectations that the US will become the dominant producer. On the negative side, of course, are the issues mentioned – including potable water contamination, disposal of spent water, and often water shortages in regions where this practice is observed.

New rules will soon apply to US federal lands for frac work soon, which are believed to eventually apply to the industry at large. In a worst case scenario, as a result of enforcement of new rules, it would represent an economic impact on a frac job of less than 0.5% of overall well costs; insignificant by some standards. Further, by many estimates up to 90% of all new land-based wells in the US utilise frac technologies.

**Re-evaluating CO2 use for fracs**

The use of CO2 in frac work is returning in some cases, not just for clean-up operations but for full and longer-term frac jobs. The use of CO2 in frac operations is simply not allowed at this time, as per many operators in Canada, so nitrogen is chosen as a cryogenic fluid for many for Canadian jobs. Apparently, with Canada's environmental and greenhouse gas regulations, using CO2 in this application does not represent sequestration as it would be in enhanced oil recovery (EOR) jobs, since in frac jobs the product is returned to the atmosphere; at least in part.

There has been an increase in re-evaluating CO2 use for fracs in the US, as well as actually using more CO2 for frac work once again. A significant push has returned by some of the gas suppliers; where a major draw is to replace water, sometimes in short supply. Further, the often challenged realities of disposing or recycling water are then largely eliminated, when going down the CO2 frac route.

In the longer-term, there are many advantages of CO2 versus hydraulic fracturing. As with EOR jobs, the miscibility of CO2 with oil is an advantage for oil fracs. Given the nature of CO2, it provides 'energised' properties; meaning in a gaseous form there is essentially energy produced to force out fluids from fractures, often when it is returned in a gaseous form. Many additional advantages exist when CO2 is in contact with clay within a formation, such as reduced swelling of the clay and improved flow. Therefore, as have been advantages in the use of CO2 with frac work some years ago, there is now more of a return to this technology as opposed to hydraulic fracturing today and in the future. I see this application as one which will strengthen as precious water reserves are depleted, and where adequate solutions for recycling and disposal of spent water simply do not exist or are not adequate.

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**Outlook**

In the end, with respect to LNG, much of today's natural gas is produced by fracturing technologies of one form or another, particularly in the US.

As mentioned some years ago, very significant sums of CO2 were used for frac work, sometimes in conjunction with other materials; however, the tonnage was significant. Today, more natural gas is produced than ever, and there seem to be infinite problems associated with the use of water in hydraulic fracturing, starting with unavailable water supplies and right through to the often daunting challenges in disposal or recycling of spent water. With CO2 the water borne issues disappear, just as they do with (hydraulic) fracking, while improved flow, yield, and performance occur with this type of frac. In this respect, using CO2 for the production or enhanced production of natural gas, which is fed into the LNG market, is important since LNG is a hot issue today, and will likely continue to be for some time to come.

For the gas suppliers this is important where there should be a resurgence in CO2 use for frac purposes, particularly in cases where the physical properties become ever-more valuable as an energised fluid, and a solvent, for improved frac. This can represent a growing market for the gas producers and suppliers; going hand-in-hand with the ultimate product to the market in the form of LNG.

Further to other world markets, I can only imagine the value of CO2 compared to hydraulic fracturing being realised in regions with threatened water reserves or disposal issues; thus there lies an opportunity for CO2 market growth globally in conjunction with global LNG growth projections.


**About the author**

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