CCS- Is it the key to O&G's transition to carbon neutral?

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There is a growing recognition that renewables are not the answer to decarbonization in Europe and the US as well as Canada.

Increasingly, there are calls for natural gas to be part of the story with Ottawa insiders saying that even the current government realizes the importance of natural gas in the decarbonization mix, renewing hope for industrial Carbon Capture and Sequestration (CCS). The central aim of the Paris Accord is to keep global warming this century well below 2 degrees Celsius above pre-industrial levels. According to a 2018 European Academies Science Advisory Council (EASAC) study on negative emission technologies, it will be "more difficult, a lot more expensive, and a lot more delayed" without CCS. Fatih Birol, the executive director of the IEA, also called CCS a "critical technology" to fight climate change, identifying CCS as essential to decarbonizing the natural gas sector globally in a Sept 2020 IEA report saying "Carbon capture is critical for ensuring our transitions to clean energy are secure and sustainable."

At home in Alberta, CCS, which was previously utilized for EOR reinvigoration of aging oil and gas wells, has also been increasingly viewed as key to tackling climate change. According to the Alberta government's current natural gas vision and strategy, natural gas is envisioned as "helping meet the growing global demand for sustainable energy." Extracting blue hydrogen from natural gas is important to reinvigorating the Albertan and the Canadian economy and producing blue hydrogen involves the extraction or capture of CO2 from natural gas with the option of CO2 sequestration underground.

With Canada being one of the top five producers of natural gas globally and about two-thirds of this production coming from Alberta, Alberta has both supply and existing CCS technologies and projects that are positioned to succeed. CCS has been a huge win for the oilsands when you look at both Wolf Midstream's Alberta Carbon Trunk Line and Shell's Quest CCS project which use CO2 from oilsands upgraders. (ACTL also uses CO2 from Nutrien's nitrogen fertilizer process). With the success of its Quest CCS project, Shell Canada is contemplating more carbon capture projects in Alberta as Quest hit a 5 million tonne milestone this summer- the equivalent to taking about 1.25 million cars off the road. They have been able to achieve considerable cost optimization, reducing the cost to operate Quest, at about 35 percent less than originally forecast in 2015.

"Quest's CCS milestone is the perfect example of how the use of game-breaking technology will enable Alberta to build on our existing energy foundation, as we also pave the way for emerging sectors to grow and succeed," according to Alberta Energy Minister Sonya Savage.

To put the opportunity for future CCS projects in perspective, in 2019 110 million tons of hydrogen were produced globally. That production was responsible for 830 Mega Tons CO_2 production per annum, (830 mtpa) released to the atmosphere. This means that for every 1mt of hydrogen, you have to dispose of roughly 7.5 mt of CO_2. So Alberta needs to develop more disposal if they actually want to be a blue hydrogen leader and potential exporter. Currently, Quest captures ~1.5 mtpa of CO_2. ACTL captures approximately the same amount, so Alberta is currently capturing 3 mtpa of the total possible 830 mtpa of global CO_2 production. Both Quest and ACTL were 70-75% government-subsidized, so cost is a key driver for new CCS project development.

Pietro Di Zanno, President of Di Zanno & Associates Inc. has expertise with the hydrogen value chain, be it grey, blue, or green, and with the CO_2 value chain. He has been working on CCS now for over 20 years and thinks that it is very important to understand that CCS development in Alberta does not face technological issues. He sees two basic issues with CCS – the cost issue and a legal framework issue. In terms of cost, he says companies will have to spend a lot of capital and will incur significant operating costs to put CO_2 into the ground so that they do not pay penalties- carbon taxes and levies.

Mr. Di Zanno also points out that there is also a need for a regulatory framework that fits with Alberta's current liability management regime. Increasing costs, coupled with the upcoming clean fuel standard (and how it is defined) create the need for a clear framework to attract CCS participants. He says there is a need for clarification of which industries will be impacted by taxation or penalties and to what degree industries will be incentivized. He says CCS technology is developed and ready to be applied and expects that blue hydrogen will cost less to produce than green hydrogen for the foreseeable future.

Certain areas of North America have the right geological formations that are perfect for carbon sequestration and they happen to occur in large areas of Alberta and Saskatchewan. So, Alberta ends up being blessed with both a huge capacity to produce hydrocarbons and enough capacity to sequester CO_2 on a massive scale. In his book, Carbon Capture, Howard J. Herzog, a pioneer in carbon capture research expresses the capacity for carbon capture as a promising but much-overlooked path to climate change mitigation. Alberta has the means to offer oil and gas companies the chance to offset carbon levies by producing blue hydrogen; using its capacity for CCS for climate change mitigation.

Analysts are increasingly advocating for blue hydrogen using CCS as the way to decarbonize since green hydrogen is currently three times more expensive than blue hydrogen to produce. However, CCS projects producing blue hydrogen from natural gas have a long way to go. Current CCS projects got off the ground with help from provincial and federal government funding. The industry will be interested if they can get a reasonable return on investment which would require similar funding. It

makes sense for smaller companies to go forward sooner with CCS for EOR because CO2 is one of the best mechanisms for removing oil from depleted reservoirs and the process is cost-effective.

Larry Buzan, President of BuzanLC Consulting sees a greater incentive for CCS development for EOR due to the dual nature of CO2.

"What we are finding for CCS is it has become CCUS. (Carbon capture utilization and sequestration) There is tremendous movement of CO2 both in and out of the storage reservoir because EOR projects need CO2. CO2 isn't just a waste product- it's a useful product. The US has used large volumes of CO2 for EOR for years."

According to Buzan, as carbon prices increase, the profitability of sequestration increases for producers seeking carbon credits. However, he sees challenges as the spread between carbon prices and the cost to sequester CO2 widens.

"For example, as carbon prices increase, a company may be able to get a $90 carbon credit per ton with the cost to sequester the corresponding amount of only $30 per ton. The potential for leakage in carbon credits is huge. If the producer claiming credit is not a Canadian company, then all the credits will flow outside of Canada to other jurisdictions".

The challenge of financing new CCS projects in the post-pandemic economy is also a factor for development timelines with governments carrying record levels of debt. As Canada and the world contemplates "the Great Reset" perhaps the greatest reset that Canadian companies and Canadians in general may have to face is that our ability to fund future projects has dramatically changed due to huge Covid response debt.

As result, our hopes, expectations, and timelines for a green energy future, as described by the UN WEF or the Paris Accord may have to be adjusted to reflect our post-pandemic fiscal reality and concerns of affordability.

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