Premises and a Road-Map for Carbon Capture Utilization and Storage Projects in Kansas and Mid-Continent Region

Eugene Holubnyak[1], Jennifer Hollenbach[1], Franciszek Hasiuk[1], Tiraz Birdie[2], Charles Steincamp[3]

[1]Kansas Geological Survey; [2]TBirdie Consulting - Geological Fluids & Carbon Management; [3]Depew Gillen Rathbun &McInteer LC

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Abstract

Increased urgency to combat climate change has put a lot of pressure on energy and other industry sectors to transform their practices and become more sustainable. The government incentive known as 45Q tax credits, that expanded in February 2018, re-generated interest in carbon capture, utilization, and storage technology (CCUS) from various Kansas industry sectors. These industries include oil and gas, ethanol, electrical power generation, pipeline and infrastructure, and agriculture. Kansas is a strategic region for these developments and could become a hub for carbon dioxide (CO2) capture, transportation, CO2 Enhanced Oil Recovery (EOR), and storage. The expanded 45Q tax credits could make EOR economically attractive for investors and operators. The International Energy Agency's (IEA) 2015 report, Storing CO2 through Enhanced Oil Recovery, estimates a large potential for geologic storage. When an oil field is flooded with CO2 to release additional oil, a significant portion of CO2 remains in the geologic formation. It is estimated that 360 gigatonnes of CO2 could be stored globally and the Kansas potential for storing CO2 via EOR is up to 750 megatonnes. IEA estimates that oil recovered via EOR reduces carbon emissions by more than 30%. CO2 delivered to oil fields in Kansas as a result of 45Q could increase Kansas oil production by 10 million barrels of oil/year (28% increase), adding $600 Million gross revenue annually ($60/barrel oil price), and provide additional revenue for Kansas ethanol facilities, a source of CO2. Passage of 45Q is driving large-scale capture of CO2 from ethanol plants in the Midwest and transportation of that CO2 to oil

fields for EOR. Ethanol plants produce pure CO2 as a byproduct of fermentation and is the least expensive industrial CO2 to capture. 45Q incentives have made CO2 capture potentially cost effective from large sources, such as power plants and refineries. California's Low Carbon Fuel Standard and similar legislation further enhance the economic feasibility of CO2 capture at ethanol plants. Much of the CO2 captured from ethanol plants could be transported to West Texas, where CO2 EOR has increased oil production since 1972, and is currently responsible for 80 Million barrels of oil per year. Pipeline routing would be through Kansas, where a significant portion of that CO2 could be used for EOR. Pipeline construction and operation would add significant jobs in Kansas. The Kansas Geological Survey (KGS) and industry partners have demonstrated in multiple projects over the past 15 years that Kansas oil fields are amenable to CO2 EOR, but lack sources of CO2 for implementation. Additional oil production at these fields could be possible with the newly available CO2. This new production would be a lower carbon footprint oil.