# A Data Driven Approach to Estimating the Impact of Risk on the Investment of Carbon Capture Sequestration and Utilization Operations


## Abstract

Over the years the increase in $CO_2$ emission has caused an increase in greenhouse gas emissions and climate change. This increase has majorly been influenced by fossil fuel combustion in the production of energy and for other industrial activities. To mitigate or reduce this emission into the atmosphere, several technologies can be applied, one of them being the underground $CO_2$ sequestration and $CO_2$ utilization where applicable. The capture and storage of $CO_2$ can reduce these greenhouse gases released into the atmosphere effectively, while achieving the climate and energy goals outlined by IEA in 2019. There are already several existing sequestration projects around the world, but to meet the goals of the Paris Agreement which states that emissions should be reduced by at least 55% by 2030 from the 1990 levels , more projects must be embarked on. Despite the need for the increase in $CO_2$ projects, these projects have not been undertaken because of the risks associated with the market as well as the high level of infrastructure required to execute a project. Several investors have shown interest in the $CO_2$ market, however there is still a huge gap from where we are to the goal. Much of that investment was driven by non-traditional investors—oil companies, governments and others—who participated in nearly two-thirds of all deals. The industry has received relatively little funding from venture capital in recent years, despite startup investors' frothy backing of electric vehicles and related technology. To fully understand this, there is need to wholly understand the risks associated with the market and model them. This paper aims to show how the different risks involved in the Carbon, Capture, Utilization and Sequestration (CCUS) industry has affected the overall investment in the industry considering several financing sectors. To estimate this, a data driven approached is deployed using a Bayesian network risk assessment model while considering data such as the physics-based model of the system, the past failure details of the system, the future potential of the system. The case study for this work is an ongoing carbon project in Oklahoma. Based on the results of the work, key areas with high risks are indicated and the overall impact of this on the risk attitude of the investor and feasibility of the project is estimated.