

THE COSTS AND BENEFITS OF CARBON CAPTURE AND STORAGE

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For more than two decades, Canada has been developing a significant unconventional oil industry. As of 2007, it was producing nearly 1.5 million barrels of daily oil from the oil sands resources in Alberta. The size of the industry has been projected to increase significantly, with production reaching as much as 4.5 million barrels per day by 2020. In recent years, the United States has made large steps in developing its own unconventional industry similar to Canada's but based on the oil shale deposits in the Western United States. However, the size of this industry will be restricted by the environmental impact, especially that of carbon dioxide (CO₂) emissions. To mitigate this impact, the industry is exploring various CO₂ capture and sequestration options. This invites the question: how much will it cost to capture and sequester the CO₂ produced by the industry?

A source – to – sink analysis was done to estimate the total cost of capturing and transporting CO₂ from a variety of industrial sources to sequestration sites. This analysis was conducted on sources which produce a concentrated stream of CO₂, as well as those sources which produce a less-concentrated stream. The sinks include value options such as enhanced oil recovery and pressure maintenance in gas reservoirs as well as sequestration options including depleted oil and gas fields, brine aquifers, and other geologic media. To support this analysis, a pipeline tariff model was developed and used to estimate transportation costs.

This paper will discuss the various CO₂ capture technologies which are currently in use. It also discusses different options for industrial use of CO₂ as well as the various geological media suitable for sequestration. In addition, the paper will provide estimates of CO₂ pipeline transportation costs at different source – to – sink distances. Finally, the paper will discuss the total cost at which the captured CO₂ can be sold to operators of enhanced oil recovery projects or other industries which can utilize the CO₂. This analysis concludes that CO₂ can be economically captured and transported up to 100 miles.