Exploring the potential of carbon capture and storage-enhanced oil recovery as a mitigation strategy in the Colombian oil industry

Edgar Yáñez, Andrea Ramírez, Vanessa Núñez-López, Edgar Castillo, André Faaij

International Journal of Greenhouse Gas Control, 2020, https://doi.org/10.1016/j.ijggc.2019.102938

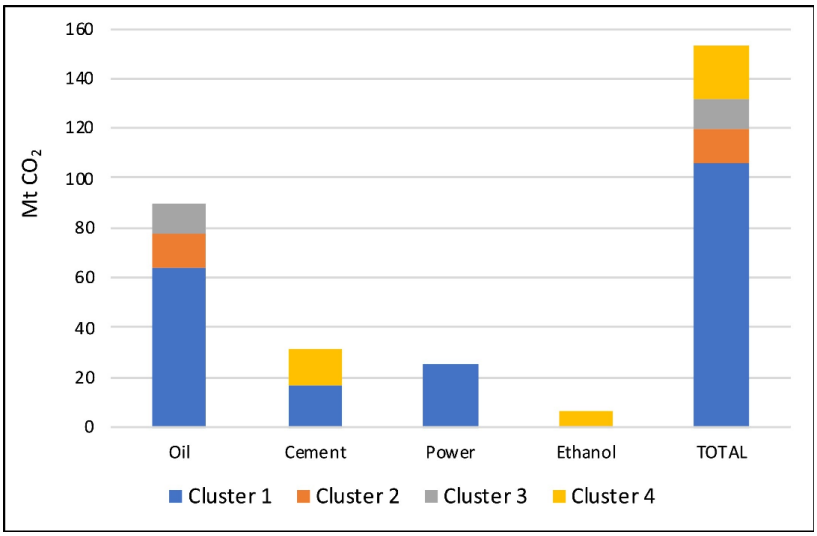

Figure 1 shows the CO_2 emissions from various industrial sectors in Colombia from 1990 to 2012.

Study Summary

The use of CO_2 for enhanced oil recovery (CO_2-EOR) is a promising alternative for reducing the cost of carbon capture and storage (CCS). In this study, the technoeconomic potential of integrated CCS-EOR projects for reducing greenhouse gas emissions in the Colombian oil industry is estimated. For this purpose, a source–sink matching process is carried out, including CO_2 capture potentials in sources from the petroleum, cement, power generation, and bioethanol industries, as well as from CO_2 storage in oil fields suitable for EOR. The results indicate that a total of 142 million tons of carbon dioxide (tCO_2) could be stored and would deliver 465 million barrels through five CCS-EOR projects in four clusters identified around the country. The levelized cost for capture ranged between 12 and 209 Euros (€) per tCO_2, the cost of CO_2 during EOR operations ranged between 24 and 59 €/tCO_2, and finally, the cost of CO_2 transport ranged from 1 to 23 €/tCO_2. The CO_2 mitigation potential of CCS-EOR represents 25 percent of forecasted oil industry emissions in Colombia for the period 2025–2040. Compared with the intended nationally determined contribution target set by the Colombian government, CCS-EOR projects could contribute 7 percent of the total accumulated emissions reductions by 2040.

Why is this research important and why do the results matter?

- The country of Colombia accounts for 0.4 percent of global emissions but is committed to reduce their contribution by 20 percent by 2030.
- Besides the transport sector, the power generation, oil, and cement industries in Colombia emit the most CO_2 and can be considered as potential sources of CO_2 for EOR projects in Colombia.
- CO_2-EOR is an attractive option to reduce emissions, as it allows for the use and storage of captured CO_2 while maintaining oil production. Under the proposed scenarios, the study found that CCS-EOR projects could mitigate 24 percent of the CO_2 emissions for the oil sector in 2030, mitigating between 6 percent and 7 percent of the total accumulated emissions by 2040.

Link(s)
www.gulfcoastcarbon.org

Bureau of Economic Geology
The University of Texas at Austin
P. O. Box X, Austin, Texas 78713-8924
Telephone:(512) 471-1534
http://www.beg.utexas.edu/

BUREAU OF ECONOMIC GEOLOGY