«GREENER» HYDROCARBONS: MYTH OR REALITY?

Name(s) of author(s): Roman Berenblyum[1], Vit Hladik[2]
Affiliation: [1]International Research Institute of Stavanger, [2]Czech Geological Survey
Corresponding author's e-mail address: roman.berenblyum@iris.no

Keywords: CCS, CO2-EOR, CO2 storage, greenhouse gas emissions

ABSTRACT

The greenhouse gasses produced in industrial processes are currently mostly vented into the atmosphere. Among all possible scenarios of dealing with CO_2 emissions, accumulating it in the atmosphere is the currently preferred and the worst way. Storing CO_2 underground should be a preferred solution allowing for long and safe storage of the carbon dioxide. CCS is identified an essential part of reaching the climate targets (see Figure 1) by many stakeholders including IEA[1] and IPCC.

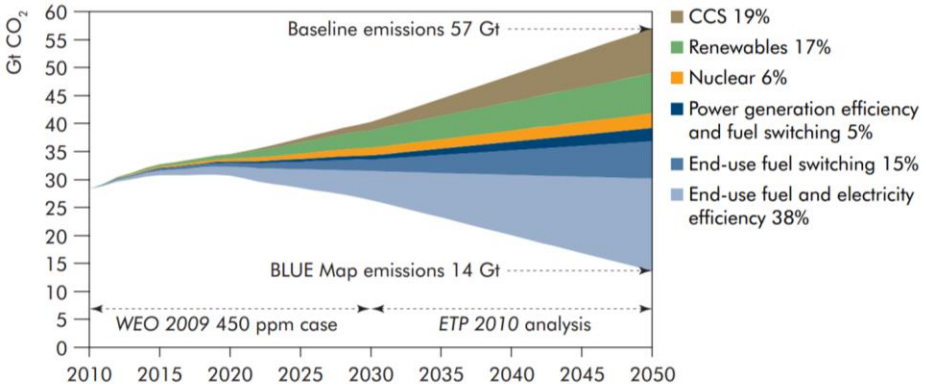

Figure 1 *Key technologies for reducing CO_2 emissions under BLUE Map scenario[1].*

Commercial utilization of CO_2 is one of the foreseeable mechanisms to create a business case for the storage process. CO_2-EOR, currently, is the only commercially ready process allowing for utilisation and storage of industrial-scale volumes of carbon dioxide.

According to IEA we would need hydrocarbons at least till 2050. In general, extending hydrocarbons field life and utilizing existing infrastructure through Enhanced Oil Recovery also means saving on materials and energy use. CO_2-EOR is the only enhanced oil recovery technique that allows for production of greener hydrocarbons, i.e. storing CO_2 during late oil production phase and allowing for smooth transition into CO_2 storage. Additional benefit is also coming from the fact that the CO_2 stream from emitters will be compressed. Injecting the carbon dioxide underground without utilization in fact means wasting this compression energy. And finally, among other gases (nitrogen or hydrocarbon, for example), CO_2 is often miscible with oil at lowest temperatures and pressures, see Figure 2, offering the highest potential recovery.

[1] IEA Energy Technology Perspectives 2010 analysis report available at https://www.iea.org/publications/freepublications/publication/etp2010.pdf

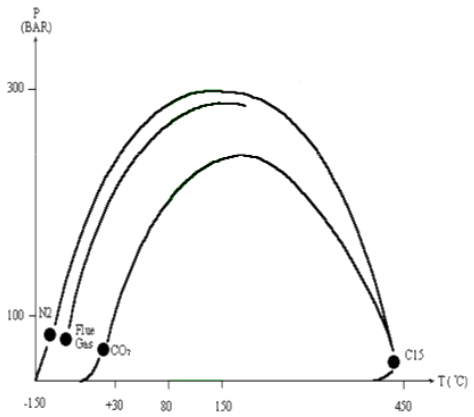

Figure 2. *Phase diagram showing single phase (fully miscible) region (above corresponding curve) largest for CO_2 followed by flue gas and nitrogen.*

IRIS, CGS and 5 other organizations in the Czech Republic have joined forces and recently completed the REPP-CO_2 project (Preparation for a pilot project of a CO_2 geological storage in Czech Republic)[2] financed through Norway Grants. The project, among other activities, investigated a possibility of combining EOR with permanent storage. Our evaluations have shown that a considerable amount of additional oil could be recovered. If followed by CO_2 storage, all emissions related to oil both produced historically and forecasted to be produced during the EOR process could be compensated for, rendering the process carbon neutral and even carbon negative, see Figure 3.

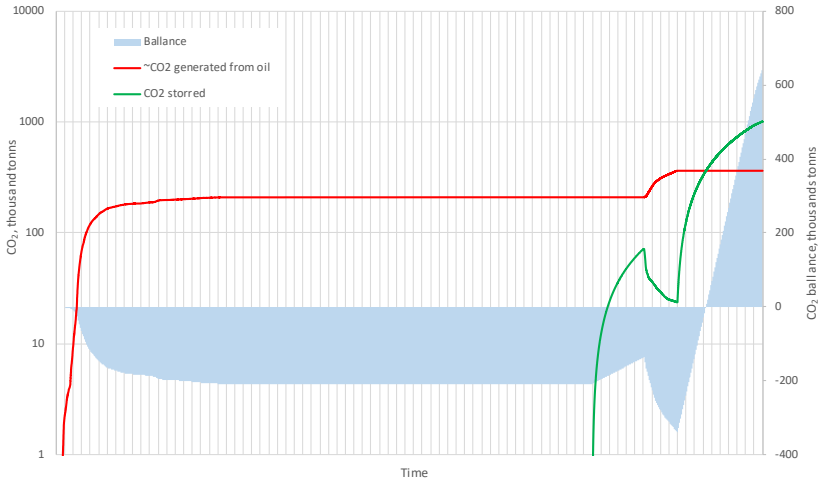

Figure 3 *Estimated tonnage of CO_2 generated*

The REPP-CO2 project is supported by a grant from Norway grants. Special thanks are given to the MND, a.s. for providing the LBr-1 archive site data.

[2] REPP-CO2. (2016, May 23). *Preparation of a Research Pilot Project on CO2 Geological Storage in the Czech Republic.* Retrieved from http://www.geology.cz/repp-co2/english