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CCUS at refineries. Problems and prospects of the implementation of CCUS in the refining sector

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Abstract

The amount of carbon emissions in the air is increasing dramatically year by year. Therefore, the change in concentrations causes warming and is affecting various aspects of climate, including surface air, ocean temperatures, and sea levels. Hence, the Paris Climate Agreement was signed in 2016, and industries, including the oil sector, should act and achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases by 2050. CCUS is one of the potential technologies to reduce the CO_2 emissions of fossil energy carriers. Refineries have several units that emit CO_2, such as steam methane reformers, produce hydrogen, and catalytic crackers. Thus, the refining sector is responsible for 15% of total energy-related greenhouse gas (GHG) emissions. Moreover, CCUS has many advantages, such as the ability to directly capture CO_2 from the source, other pollutants (NO_x or sulfur dioxide gases) can be removed at the same time, and the social cost of carbon can be reduced. This research provides the main information related to CCUS and the challenges of implementation of CCUS in the refining sector. Also, solutions and prospects of carbon dioxide capture and utilization technology are discussed. The development of CCUS can allow refineries to reduce the amount of CO_2 and meet the Paris Climate Agreements.

Keywords: CCUS, refining sector, emissions, enhanced oil recovery