Editorial
Volume 10:8, 2021

Industrial Engineering & Management

ISSN: 2169-0316 **Open Access**

CO_2 Emissions-Challenges and Perspectives

Surya Dudi*
Department of Chemical Engineering, Andhra University Vishakhapatnam, India

Carbon Capture and Utilization (CCU) is attracting considerable attention as a new method of reducing greenhouse gas emissions into the atmosphere while increasing CO_2 value through the production of environmentally friendly fuels and chemicals. In the past few decades, major efforts have been made to develop and demonstrate large-scale capture of CO_2 from industry and energy. To speed up implementation, more efforts are being made to reduce energy losses and energy costs, as well as expand promising solutions. However, one of the main obstacles to implementation remains the fate of these huge carbon dioxide flows. Although CO_2 storage has been proven to be the main option to ensure permanent storage of the amount of CO_2 to be captured, the integration of CO_2 capture and storage may be a challenge, especially in the short term, due to the distance between the source and the sink. The time and scale required for such geological sinks do not match. Although it is not expected to be as effective as CO_2 storage, the use of CO_2 is still an interesting sink of captured CO_2 because it creates opportunities for new sources of income. In addition, consider using CO_2 for small flows, which makes it an interesting solution for early deployment. There are many possible ways to convert carbon dioxide into useful and hopefully more sustainable chemicals and fuels. For example, converting carbon dioxide into polyols can produce more sustainable elastomers, fibers, flexible foams, adhesives, sealants, inks, paints and coatings. Another route that can be considered is to convert CO_2 into valuable energy carriers, such as methane, methanol, etc. This may be an attractive CCU solution, while also solving global warming and hydrogen or renewable energy storage issues. However, for all routes and destination products, it is important to ensure that the CCU approach provides the following three aspects:

- A sustainable base solution.
- An economically viable solution.
- A scalable solution.

In this research topic, our goal is to understand current progress in the field of CO_2 capture and conversion technology. In particular, a technical and economic evaluation of the adsorption enhanced dimethyl ether (DME) synthesis process was proposed as an innovative method to produce fuel grade DME from carbon dioxide and green H_2. They found that for a relatively small-scale 23 kt / year production plant, the production cost of dimethyl ether was about € 1.3 per kilogram. Although higher than the current market price of fossil-based dimethyl ether, the results show that the potential of this route is more promising than other studies on the production of dimethyl ether from CO_2 through the traditional process of synthesis of dimethyl ether. The impact of carbon allocation on the emission intensity of the co-production of low carbon products in facilities that jointly process biological and fossil raw materials and apply carbon capture, utilization and storage technology is discussed. They considered an integrated steel plant that injects biomass into a blast furnace, captures carbon dioxide for storage, and ferments carbon dioxide from blast furnace gas into ethanol, achieving overall emissions reductions of up to 27% and 47% in the short term and long-term future, respectively., and confirmed that the choice of distribution plan greatly affects the emission intensity of cogeneration products. It is proposed to pass a techno-economic study to evaluate calcium cycle capture for natural gas combined cycle, and to evaluate a simple and advanced calcium cycle process for CO_2 capture. Analysis shows that the calcium recycling process is not competitive with the MEA-based CO_2 capture reference process used for this application and requires significant improvements in equipment capital costs, plant efficiency, and annual adsorbent costs.

The use of solid adsorption adsorbents to capture CO_2 from the atmosphere through direct air capture was studied, and the possibility of continuous adsorption processes using discontinuous and continuous operation modes in radial flow contactors was evaluated. It was found that the capture efficiency of the continuous process was reduced by 15-25%, which confirmed that batch processing is the first choice under most operating conditions. The research topic ended with the research of Castel et al. Who gave an interesting guide on the possibilities and limitations of using membrane technology to capture carbon dioxide directly from the air. They found that a basic requirement to make this technology competitive is the use of highly selective membranes, which can ensure a higher level of productivity, even if the specific energy requirements are higher than the adsorption and absorption processes on a global scale. Invited editors would like to thank all authors for their valuable contributions and all reviewers for their tremendous efforts to ensure a high-quality review process in order to make the most appropriate decision on the evaluated manuscript.

***Address for Correspondence:** Surya Dudi, Department of Chemical Engineering, Andhra University Vishakhapatnam, India, E-mail: dudisurya.98@gmail.com*

Received 19 August 2021; **Accepted** 23 August 2021; **Published** 30 August 2021

How to cite this article: Surya Dudi. "CO_2 Emissions-Challenges and Perspectives." *Ind Eng Manage* 10 (2021): 308.