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Techno-environmental feasibility analysis of CO₂ capture and reutilization from alcoholic fermentation processes: The CO₂-AFP strategy

Abdessamad Gueddari, Santiago Garcia-Yuste, Carlos Alonso-Moreno, Jesus Canales-Vazquez and Jorge E Zafrilla
University of Castilla-La Mancha, Spain

A novel Carbon dioxide utilization approach is proposed based on the use of the emitted by-product biogenic CO₂ from alcoholic fermentation processes to produce soda ash. This product is one of the most demanded commodities in the chemical industry. In global terms, researchers report that the implementation of this strategy will produce over 30, 6 Mt of Na₂CO₃ by capturing 12, 7 Mt of CO₂ and 56 Mt of CO₂ negative emissions per year, without generating any by-products. The chemical process selected to achieve this utilization is based on a chemical reaction between gaseous CO₂ and saturated sodium hydroxide solution (NaOH 50% wt.). The feasibility of this approach was discussed

following the CO₂ Chem network approach. In order to evaluate the possibility of implementing the CO₂-AFP Strategy, it has been analyzed from a technical and environmental perspectives applied to a real business model. On one hand, the technical feasibility study is divided into three different phases: (1) Characterization of the CO₂ emissions, (2) CO₂ capture and design of the distribution system and (3) the chemical processing plant. On the other hand, the environmental feasibility is analyzed on determining the footprint scope 1 and 2. Finally, global projection results are obtained based on techno-environmental feasibility performance.

Biography

Abdessamad Gueddari is a PhD candidate and research worker leading a pioneering business R&D project. His doctoral research investigates sciences and technologies applied to industrial engineering at the University of Castilla-La Mancha. Specifically, he is researching new engineering techniques and strategies to capture and transform carbon dioxide into value-add products. He earned a Bachelor of mechanical engineering, and a Master of industrial engineering. He belongs to the 3D Enermat Research Group at the Renewable Energy Research Institute. He is interested in improving the industry footprint by developing new sustainable processes and implementing new methodologies related to carbon dioxide utilization strategies.

abdessamad.gueddari@uclm.es