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## TRENDS IN CO<sub>2</sub> CONVERSION AND UTILIZATION: A REVIEW FROM PROCESS SYSTEMS PERSPECTIVE

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### Abstract

Carbon capture and storage (CCS) community has been struggling over the past few decades to demonstrate the economic feasibility of CO<sub>2</sub> sequestration. Nevertheless, in practice, it has only proven feasible under conditions with a market for the recovered CO<sub>2</sub>, such as in the beverage industry or enhanced oil/gas recovery. The research community and industry are progressively converging to a conclusion that CO<sub>2</sub> sequestration has severe limitations for the value proposition. Alternatively, creating diverse demand markets and revenue streams for the recovered almost-pure CO<sub>2</sub> may prevail over CO<sub>2</sub> sequestration option and improve the economic feasibility of this climate change mitigation approach. As such, research in the carbon capture and management field is seen to be shifting towards CO<sub>2</sub> utilization, directly and indirectly, in energy and chemical industries.

In this paper, we critically reviewed the literature on carbon capture, conversion, and utilization routes and assessed the progress in the research and developments in this direction. We discussed both physical and chemical CO<sub>2</sub> utilization pathways and probed the literature in addressing the process integration scenarios and the performance assessment benchmarks. The literature was critically reviewed, and principles of key CO<sub>2</sub> utilization routes were identified.

### Abbreviation list

Ar	Argon
ASU	Air separation unit

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