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Review

# Advances in $CO_2$ capture technologyâ€”The U.S. Department of Energy's Carbon Sequestration Program â˜†

JosÃ© D. Figueroa [a] ✉ ... Rameshwar D. Srivastava [b]

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## Abstract

There is growing concern that anthropogenic carbon dioxide ($CO_2$) emissions are contributing to global climate change. Therefore, it is critical to develop technologies to mitigate this problem. One very promising approach to reducing $CO_2$ emissions is $CO_2$ capture at a power plant, transport to an injection site, and sequestration for long-term storage in any of a variety of suitable geologic formations. However, if the promise of this approach is to come to fruition, capture costs will have to be reduced. The Department of Energy's Carbon Sequestration Program is actively pursuing this goal. $CO_2$ capture from coal-derived power generation can be achieved by various approaches: post-combustion capture, pre-combustion capture, and oxy-combustion. All three of these pathways are under investigation, some at an early stage of development. A wide

variety of separation techniques is being pursued, including gas phase separation, absorption into a liquid, and adsorption on a solid, as well as hybrid processes, such as adsorption/membrane systems. Current efforts cover not only improvements to state-of-the-art technologies but also development of several innovative concepts, such as metal organic frameworks, ionic liquids, and enzyme-based systems. This paper discusses the current status of the development of $CO_2$ capture technology.

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## Keywords

Carbon dioxide capture; Post-combustion; Pre-combustion; Oxy-combustion

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