Carbon capture and storage: Carbon dioxide pressure dissipates in underground reservoirs

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The debate surrounding carbon capture and storage intensifies as scientists from the Earth Sciences Division at the Lawrence Berkeley National Laboratory (Berkeley Lab) examine the capacity for storing carbon dioxide underground, in a study published today in the new journal *Greenhouse Gases: Science & Technology*.

The study debates some of the conclusions drawn in an earlier study by Ehlig-Economides and Economides1, countering their claims that carbon dioxide cannot feasibly be stored underground. These earlier findings, according to the Berkeley Lab researchers, only considered closed-system subsurface formations, with limited mechanisms for relieving the pressure.

Carbon capture and storage (CCS) is controversial in the eyes of the general public. Pressure build-up in the subsurface induced by the injection of carbon dioxide from industrial-scale projects is a key constraint for the amount of carbon dioxide that can be safely stored underground.

In their paper, the Berkeley Lab researchers considered a full-scale deployment scenario in which enough carbon dioxide is stored to make relevant contributions to climate change mitigation. Modeling studies illustrating the scale and magnitude of pressure build-up are presented for hypothetical CCS projects in two representative basins currently

being investigated for future deployment of carbon dioxide storage in the US.

According to lead researcher Dr. Quanlin Zhou, although large-scale pressure build-up may have a limiting effect on storage capacity, it is not as significant as claimed previously by Ehlig-Economides and Economides. Dr. Zhou and fellow researcher Dr. Jens Birkholzer considered three different types of storage reservoirs: closed, partially closed and open. They indicate that the storage of carbon dioxide deep underground will occur mainly in partially closed or open formations, where pressure build-up is relieved naturally by movement of native saline waters into regions far away from where carbon dioxide injection occurs.

The authors conclude that CCS can still be considered as a practical means of mitigating carbon dioxide emissions as there is more capacity to store carbon dioxide underground than suggested in the study of Ehlig-Economides and Economides.

The study also concludes that pressure management strategies may feasibly be undertaken to relieve a pressurized system.

"This investigation furthers our understanding of the extent and magnitude of pressure build-up induced by large-scale underground carbon storage," said Dr. Zhou. "Using natural open and partially open formations will help attenuate such pressure build-up to a manageable degree."

More information: [1] Ehlig-Economides C and Economides MJ. Sequestering carbon dioxide in a closed underground volume. *J Petrol Sci Eng* 70, 123-130 (2010)

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