

A “storage climate club”: An innovative way to promote underground carbon storage¹



Source: ©Shutterstock/Rangsarit Chaiyakun.

Note: The equipment of oil refining.

Storing carbon underground can advance climate goals, but faces barriers

Carbon capture and storage (CCS) is essential for reducing carbon dioxide emissions from industrial sectors with hard-to-abate emissions, such as steel, cement, and chemicals. It is a process that involves capturing CO₂ from industrial and energy sources and compressing and transporting it to geological sites for storage. Underground storage occurs in deep geological formations and is the key stage of the process (Figure 1). Deployed on a large scale, underground storage can help countries meet international climate goals to limit the rise in global temperatures to below 1.5-2°C, in line with the recommendations of the United Nations Intergovernmental Panel on Climate Change (IPCC).

Yet CCS technology faces major barriers to deployment, including a lack of financial incentives, high up-front costs, and protracted development timeframes. The proposed “storage climate club” is an innovative idea that can help overcome these barriers by supporting the scaling up of CO₂ geological storage and the use of CCS technologies worldwide.

The bottom line

- A KAUST² researcher and his colleague propose creating a “storage climate club,” involving a coalition of countries, to promote geological storage of CO₂ and CCS technologies on a large scale and help limit global warming.
- The proposed club would help operationalize a novel class of investment assets, “carbon storage units,” that could be traded globally under the market mechanisms of the Paris Agreement.³
- The club would support and incentivize countries’ efforts to develop geological storage of CO₂ and undertake CCS projects to meet international climate goals.
- This initiative would make deploying CCS technologies more accessible and appealing to lower-income countries, which currently are underrepresented in global deployment.



The storage climate club would promote adoption of CCS

The storage climate club could be set up as a new international organization aimed at promoting underground CO₂ storage and incentivizing member countries to invest in CCS projects to meet international climate goals.

Members of the club can buy and sell stored carbon

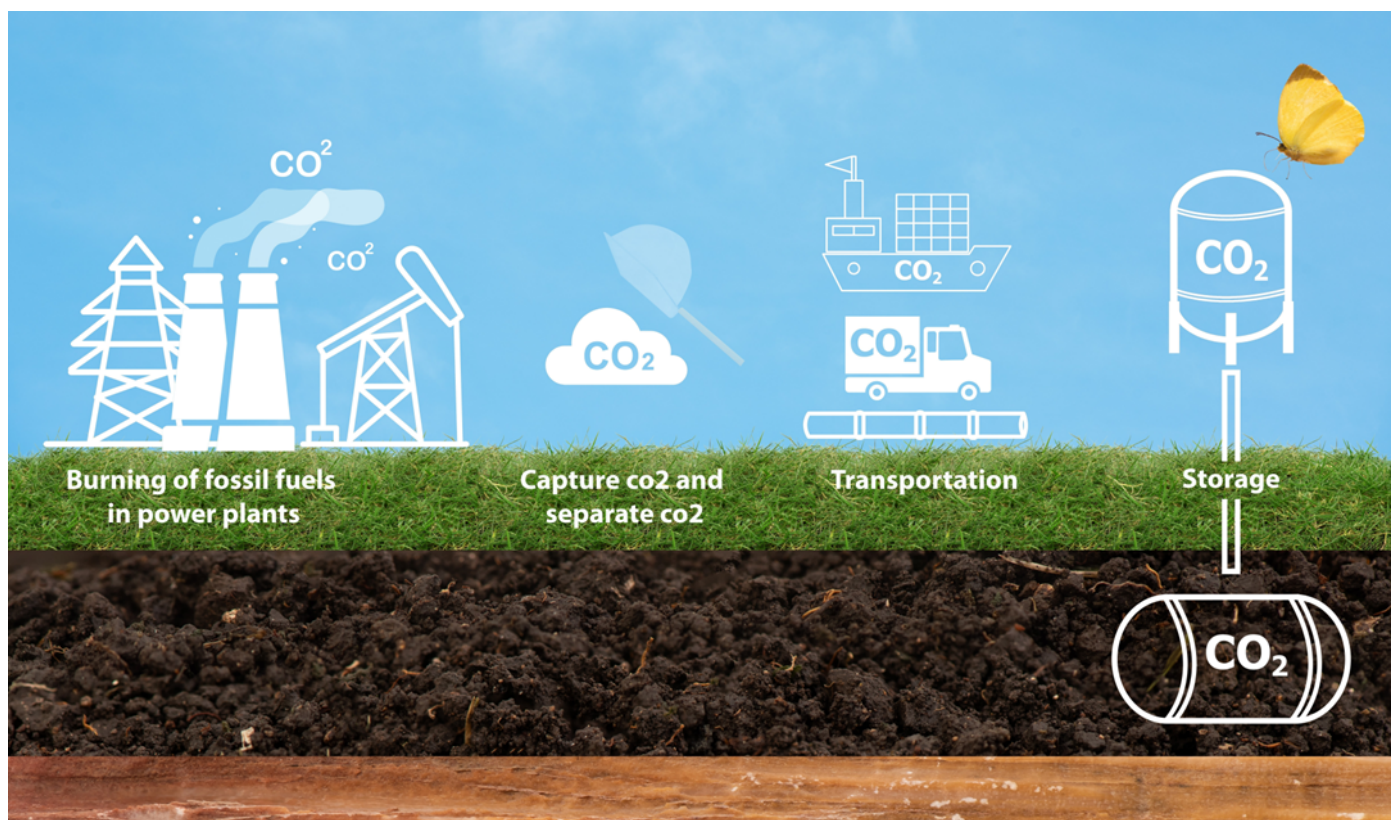
The market mechanisms in Article 6 of the Paris Agreement³ establish a framework for a global carbon market, enabling countries to collaborate in achieving climate goals more cost-effectively. With these mechanisms in place, stocks of geologically stored carbon can be marketed internationally using "carbon storage units" (CSUs) — a novel concept first introduced by researchers in 2019.⁴ CSUs represent the removal or storage and sequestration of carbon: One CSU corresponds to one ton of geologically stored carbon. Trading CSUs under Article 6 can boost all types of CCS technologies by allowing countries to buy and sell credits for storing CO₂ as international climate contributions.

The club would also strengthen carbon-storage policy and regulation

In addition, the club would provide an organizational framework, supporting policies such as effective national strategies and incentives, as well as the development of emissions trading for CCS. It would support high-integrity certification of CSUs that would be tradable on global carbon markets. The framework would also help address key issues such as the monitoring of carbon storage and long-term legal and financial guarantees.

The club would provide greater certainty for investors with concerns about the high up-front costs and long timeframes of these projects. It would foster financial collaboration and provide technical expertise to drive large-scale joint initiatives, with a focus on developing nations in the Southern Hemisphere. It would also support capacity-building, such as mapping out the potential for CO₂ underground storage. Finally, a club would help raise the visibility of, and address public perceptions surrounding, geological storage of CO₂ as a critical mitigation technology.

Fig. 1 Underground CO₂ storage is the end stage in the carbon capture and storage process.



Source: ©Shutterstock/Wasanajai.

Note: CCS process: Burning fossil fuels followed by CO₂ capture, transportation, and storage in a geological formation.



Membership would address inequities in CCS deployment and support developing countries

Currently, CCS technology is concentrated in a few geographic areas, mainly in higher-income countries in the Northern Hemisphere and the Middle East.

The club's market would expand the global use of carbon storage

Carbon markets can correct the geographic imbalances in CO₂ underground storage by connecting the geological storage capacity of developing countries with global demand for storage. This approach would establish a more equitable landscape for CCS and revenue generation globally.

Member countries can transfer or jointly develop CCS technology

Countries newly deploying CCS technology would need support from technology transfers. Transfers can take place through existing mechanisms under the Paris Agreement or new joint development ventures among club members. Financing projects would require investment strategies that minimize risk, as well as continued support from multilateral and international organizations.

The club would tap into substantial unused CO₂ geological storage capacity

Expanding the community of countries using CCS technology would leverage the world's large available capacity to store CO₂ underground. Promising sites for carbon storage include depleted oil and gas reservoirs and deep saline aquifers. Depleted oil and gas reservoirs, for example, have an estimated storage capacity of 675–900 gigatons of CO₂ (GtCO₂). By comparison, the United States emitted 5,960 GtCO₂ in 2023. Deep saline aquifers may have a storage capacity of another 1,000 GtCO₂ or more. The immense scale of underground storage resources shows that the world possesses the physical capacity to store carbon underground, provided the technology is deployed at scale.

Summing up

The researchers propose the creation of a storage climate club, an international organization that would help member countries scale up geological storage of CO₂ and CCS technology globally. The club would be led by a group of "enthusiastic" or "first mover" countries and could sit under the Clean Energy Ministerial.⁵ By standardizing CO₂ storage through CSUs, the club would incentivize investment in CCS technologies, address global carbon storage inequalities, and accelerate progress toward international climate goals.



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1. This Policy Brief summarizes findings from Mohammed Al Juaied and Elizabeth Carey, "Unlocking the Potential of Geological Storage of CO₂: What Role for a Storage Climate Club?" *Frontiers in Sustainable Energy Policy*, 13, October 2025, Sec. Policy and Environmental Impact, Volume 4 – 2025, <https://doi.org/10.3389/fsuep.2025.1524409>. All rights and any third-party permissions remain with the respective rightsholders.
2. King Abdullah University of Science and Technology (KAUST).
3. The Paris Agreement is an internationally binding agreement signed by 195 parties in 2015. See United Nations, "The Paris Agreement," at <https://unfccc.int/process-and-meetings/the-paris-agreement>.
4. For the original concept of CSUs, see Heidug, W, and Zakkour, P. (2019). A Mechanism for CCS in the Post Paris Era. KAPSARC. <https://devtws.kapsarc.org/our-offerings/publications/a-mechanism-for-ccs-in-the-post-paris-era/>.
5. The CEM describes itself as "a high-level global forum to promote policies and programmes that advance clean energy technology, to share lessons learned and best practices, and to encourage the transition to a global clean energy economy. Initiatives are based on areas of common interest among participating governments and other stakeholders" intended to "...bring together a community of the world's largest and leading countries, companies and international experts to achieve one mission –accelerate clean energy transitions." See Clean Energy Ministerial, "Who We Are," at <https://www.cleanenergyministerial.org/who-we-are/>, as of April 3, 2026.