

THE TRANSFORMATION OF THE ENERGY SECTOR

CARBON CAPTURE

Study finds enough geologic storage to meet U.N. climate goals

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Published: Wednesday, December 11, 2019



NRG Energy Inc.'s Petra Nova carbon capture project in Texas. A recent study said offshore geologic storage of carbon dioxide is "an attractive and efficient long-term strategy" to meet global climate goals. Edward Klump/E&E News

There's room underground for storing enough carbon dioxide to allow the world to hit key critical climate targets, an international research team said in a study published recently in *Scientific Reports*.

The study says as many as 14,000 injection wells will be needed worldwide by 2050 to store up to 7,000 million tons of CO₂ a year — large-scale geologic disposal of industrial emissions that researchers call "essential" to significantly reducing heat-trapping gases in the atmosphere.

Co-authored by scholars at the University of Texas, Austin, and the Norwegian University of Science and Technology (NTNU), the [paper](#) uses historical well-development scenarios from "mature" hydrocarbon basins and applies pressure constraints to create a road map of offshore CO₂ storage that would help meet the U.N. Intergovernmental Panel on Climate Change's goal of limiting warming to 2 degrees Celsius.



Tip Meckel. University of Texas at Austin

Tip Meckel, a senior research scientist at the Bureau of Economic Geology at UT Austin, said that assuming the CO₂ could be delivered at the right amount, there wouldn't be a limit on the rate at which the injection wells could be deployed.

"I think what we're trying to do is provide some decisionmakers with a sense that — were they to pursue [carbon capture and storage] and carbon capture sort of broadly throughout their energy sectors — there would be a place for all of that CO₂ through time," Meckel said.

The paper said offshore continental shelves are the most significant place for the geologic storage of captured CO₂. While onshore basins are important, offshore settings provide "vast subsurface rock volumes" with suitable depth range and a relatively young age.

While a greater focus has studied where CO₂ is injected and how it stays trapped, the paper says the pressure buildup associated with injecting CO₂ is "ultimately" what limits CO₂ injection and total storage capacity.

Meckel said shallower injection wells — where there's more ability to elevate pressure — are the first candidates for storage. Deeper wells mean a greater fluid pressure, which in turn means a reduced ability to elevate pressure with injection.

"We see this as a sort of phased approach, where you're developing the shallowest resource first because it's easiest to elevate pressure and then potentially moving into these other classes," Meckel said, describing the study's tiered deployment strategy.

Published last month, the paper acknowledges the CCS sectors need to grow by "an order of magnitude" to realize goals under the 2 C scenario. This week, a status report from the Global CCS Institute — an international think tank that advocates for the technology — said there are now 51 large-scale CCS facilities worldwide, although only 19 are operational.

That number needs to increase to nearly 2,000 facilities by 2040, the report found, in order to hit climate change mitigation goals ([Energywire](#), Dec. 9).

Still, the UT Austin/NTNU paper said it reinforced "the overall viability of CCS" and pointed to historic build-out in the oil and gas sectors as a reference timetable that shows it will only take "a fraction of the historic worldwide offshore petroleum well development rate" to meet worldwide CCS requirements.

"It is clear that the required well rate for realizing global CCS in the 2020-2050 timeframe is a manageable fraction of the historical well rate deployed from historic petroleum exploitation activities," the study says, "and is most efficiently achieved with multiple simultaneous regional developments."

Philip Ringrose, an NTNU adjunct professor and a study author, said the research "inverts" the decarbonization challenge by figuring out how many wells are needed to secure the necessary emission cuts under a 2 C scenario.

"It turns out to be only a fraction of the historical petroleum industry — or around 12,000 wells globally," Ringrose said in a release. "Shared among 5-7 continental CCS hubs — that is only about 2,000 wells per region. Very doable! But we need to get cracking as soon as possible."

The Carbon Capture Coalition — whose membership spans industry, labor, environmental and nongovernmental organizations — said while it had not reviewed the UT Austin/NTNU research, it pointed to past [research](#) that shows "abundant" storage exists in the United States for CO₂ from new carbon capture projects.

The group said federal legislation and regulation is needed now to enable more deployment of these kinds of projects nationwide.

Emily Smith, a spokeswoman for the American Petroleum Institute, said the industry is committed to delivering solutions that reduce the impacts of climate change while meeting global energy needs.

"API supports bipartisan CCUS [carbon capture, utilization and storage] bills, including The USE IT Act and The LEADING Act, and will continue to champion policies that achieve the dual goals of reducing our industry's environmental footprint while providing affordable, reliable energy to all Americans," Smith said via email.

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