National lab challenges skeptics of carbon capture and storage technology

Christa Marshall, Environment & Energy Publishing, 3-24-11

Researchers at a national laboratory are challenging a study last year that suggested carbon capture and sequestration could be a costly fiasco.

In a new paper, scientists at Lawrence Berkeley National Laboratory say that a husband-and-wife team were in an error last year when they concluded that previous estimates of the necessary storage space for underground carbon dioxide were "5 to 20 times" too small.

That study, from engineering professors Michael Economides and Christine Ehlig-Economides, said that "geological sequestration is not a practical means to provide any substantive reduction in CO2 emissions". They found that carbon dioxide injections would create too much pressure in a small space underground for successful deployment of the yet-to-be-commercialized technology.

Their conclusions created a stir in the coal community, which is counting on carbon capture and sequestration, or CCS, to help ensure its survival. The technology, which envisions grabbing carbon dioxide from coal plants and industrial facilities and storing the gas in deep geological layers beneath the earth, has never been proven at scale.

Now, the Lawrence Berkeley team is saying that Economides and Ehlig-Economides were wrong to examine a geological "closed" system, where stored CO2 would be surrounded by impervious rock not just from above, but on all sides. The new work was published in the March edition of *Greenhouse Gases: Science & Technology*.

The vast majority of likely storage spots for underground injection would be "open" or "semi-closed," or without impermeable rock surrounding all sides of the storage spot, said Curt Oldenburg, head of the Geologic Carbon Sequestration Program in the Earth Sciences Division in the Berkeley lab.

That means that the gas would simply displace naturally occurring briny water and have plenty of room to disperse, he added.

"It's all a big, wet, saturated sponge down there," he said, explaining how large amounts of existing water would move into rock pore spaces in the presence of underground CO2. The areas being considered for injection are so large that there is little risk of CO2 displacing all the water, he said.

'Overwhelming majority' of scientists dispute older study results

Carbon capture developers also could reduce any risk of pressure buildup in some cases through management strategies, such as building wells to release some of the briny water to make space for stored gas, said Oldenburg.

The researchers modeled two areas being considered for carbon dioxide storage, the Illinois Basin and the southern San Joaquin Basin in California, to reach conclusions about the likely behavior of gas and briny water underground. They assumed that CO2 injections would be at levels large enough to mitigate climate change.

For the San Joaquin Basin, for example, the national lab team reported that 5 metric tons of carbon dioxide injected yearly for a half-century would be "safely contained" after a millennium of resting underground.

Yet Ehlig-Economides slammed the lab's conclusions for "misrepresenting" her and her husband's work.

She said it was not true that her research applied only to a "closed" geological system. When you inject carbon dioxide in multiple wells, they "mutually exclude each other" and create virtually enclosed boundaries underground, she said. She and her husband would consider publishing a formal rebuttal in this case, she said.

"This business of counting on pressure release through leaky seals is just wishful thinking," she said about the idea of building wells to release briny water to reduce underground pressure. Ehlig-Economides is a professor in the Department of Petroleum Engineering at Texas A&M University.

"It's a pretty outrageous idea," she said. Unlike Oldenburg, she said that any well could bring some CO2 with it, rather than just harmless water.

She also said she worried about where all the briny water would go. There are questions about salty water moving into fresh water supplies, she said.

Agree with them or not, Economides and Ehlig-Economides are facing widespread criticism from engineers, geologists, business leaders and green groups. Last year, their work got formally criticized by the Pacific Northwest National Laboratory and British geologists from Edinburgh University, among others.

"The overwhelming majority of the scientific community has found serious flaws with [their] analysis," said George Peridas, a scientist at the Natural Resources Defense Council.