

Risk of death from CO2 leakage appears to be remote -- study

Christa Marshall, *Environment & Energy Publishing*, 9-14-11

The risk of death from carbon dioxide leaking from an underground storage site is far less than the risk of getting struck by lightning or killed in a car accident, according to a new study.

The research, published this week in the Proceedings of the National Academy of Sciences, focuses on naturally occurring CO2 seeping through the ground in Italy, but the study authors say their analysis holds broad implications for industrially captured carbon dioxide that would be injected thousands of feet underneath the earth.

The technology is considered critical for the survival of coal, which spews about a third of U.S. greenhouse gas emissions. According to a "blue map" scenario from the International Energy Agency, carbon capture and storage should supply 19 percent of emissions cuts by 2050 if greenhouse gas levels are to be cut in half by that year.

The fact that leakages occur every year in Italy with little harm means that closely monitored underground plumes of the greenhouse gas from large-scale capture should not create much of a health risk, said Jennifer Roberts, a Ph.D. student in the School of GeoSciences at the University of Edinburgh. The health risk from an industrial project would actually be less, she said, because of the extensive monitoring of underground gas that would be involved.

"Essentially, we don't need to worry as much as we seem to worry about carbon capture and storage," she said. "Don't be afraid."

Some proposed CCS projects, such as one in Greenville, Ohio, ran into trouble in the past two years because of fears in the local community about underground gas.

Skeptics still see greater risks

And there are still skeptics about the technology, which has never been proven at commercial scale. In 2010, two medical doctors published a commentary in the *Journal of the American Medical Association* saying that the potential risks of CCS include "asphyxiation of humans and animals," along with compromise of safe drinking water supplies.

That commentary was slammed by multiple environmentalists, industry members and academics for not backing up arguments with solid evidence. Others have noted that preliminary tests in the United States -- including one near Natchez, Miss. -- have injected millions of tons of naturally occurring CO2 underground without incident.

Industry supporters say that carefully selected sites for storage pose virtually no risk of leakage, outside of the question of how escaping gas would affect people.

But one of the commentary writers said yesterday he still believed in risks from deep underground storage and from ferrying CO2 through a large network of pipelines.

"You can't really know whether carbon capture works until you do it," said Michael McCally, a clinical

professor in the Department of Community and Preventive Medicine at the Mount Sinai School of Medicine in New York City.

He also questioned whether the researchers have a conflict of interest, because the study was funded by the Scottish Carbon Capture and Storage consortium, which includes companies operating or proposing CCS projects. The study is a good one in terms of the situation in Italy, but should not be applied broadly to make conclusions about industrial carbon capture and storage, he said.

"I think this is sort of a stealth policy paper," he said.

But Roberts said there was no conflict of interest, especially since the study appeared in a peer-reviewed journal.

"The funders do not influence the research that we do. As researchers, we need to be neutral so that we can do the science and provide the answers, whether our funders like our findings or not," she said.

To reach their conclusions, Roberts and other researchers in the United Kingdom examined death records from the last 50 years. They found that there were 19 deaths in that time frame that were likely attributed to CO₂ leakage.

Examining deaths near CO₂ seeps in Italy

In Italy, some 8 million metric tons of natural CO₂ seeps to the surface every year because of unusual geology in the region.

In comparison, one of the largest global industrial CCS projects, run by Archer Daniels Midland in Illinois, will inject less than half of that amount underground in deep saline rock formations (*ClimateWire*, Sept. 12). The spots where CO₂ leaks in Italy -- including in densely populated areas like Rome -- typically happen without any warning from the government, she said.

"Anyone walking their dog can come across a CO₂ seep," she said. The average leaking site releases about 10 to 100 metric tons of the gas per year, she said.

Even so, the death rate from the seepage has been less than the likelihood of winning the lottery and 10,000 times less than the likelihood of getting killed in a car accident, according to the paper. The risk overall is about 1 in 36 million, said Roberts.

In one of the highest leakage spots in Italy, where 2,000 metric tons per day of CO₂ is rising to the surface, there is a farm house nearby, said Roberts.

In the case of industrial carbon capture, the risk would fall to much lower levels than in Italy, she said.

That is because sites for underground storage would be carefully selected in those cases for ability to keep gas underground permanently through protective layers of hard rock, she said. There also would be extensive monitoring with industrial sites, which is not happening with naturally leaking carbon dioxide, she said.

Regardless, the leakage rate in Italy is still within the bounds of what the Intergovernmental Panel on Climate Change said was acceptable over a 1,000-year period for stored carbon dioxide, according to the study. In other

words, even with a "high" leak rate, less than 1 percent of underground gas is rising to the surface, Roberts said.

A single study can't completely eliminate the risks of carbon capture and sequestration, said Lynn Thorpe, a senior policy specialist at Clean Water Action. She said, though, that recent new rules from U.S. EPA about a new class of injection well go a long way in eliminating any risk for drinking water. Among other things, the new rules require extensive monitoring of underground plumes, and careful selection of a storage site.

"We think there's pretty strong safeguards," she said.