

No matter where you retire, you will find a school district that needs substitute teachers for STEM classes. If you were a physicist for 40 years, you'll find that you have plenty of material to inject into almost any class. No larger organization is required!

Reference

1. S. L. Garrett, *Acoustics Today*, Fall 2023, p. 69.
2. US Census Bureau, "QuickFacts: Salinas city, California," <https://www.census.gov/quickfacts/fact/table/salinascitycalifornia>.

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CO₂ pipelines: A way forward?

David Kramer's piece "Capture alone isn't sufficient to bottle up carbon dioxide" (*PHYSICS TODAY*, July 2023, page 22) focuses on the need in the US to create a massive CO₂ sequestration capacity, which is indeed in need of attention. But the story was deficient in one respect and inaccurate in another.

In Oklahoma, induced earthquakes over the past decade have mainly been attributed to wastewater disposal—in particular, high injection rates—but some have been associated with hydraulic fracturing, or "fracking."^{1,2} Those relationships suggest that high-rate injection of supercritical CO₂ into deep saline aquifers may lead to seismicity. Indeed, the Intergovernmental Panel on Climate Change foresaw that possibility in 2005.³ Because the physical properties of supercritical CO₂ differ from those of wastewater, it's uncertain whether they will have identical seismogenic effects. But there is a need for regulations, guided by independent research, that ensure that CO₂ sequestration is performed in a manner that does not lead to earthquakes.

Carbon dioxide is heavier than air, and therefore its airborne dispersion characteristics are altogether different from those of natural gas, and CO₂ presents an increased danger to both land-based and aquatic life. Indeed, contrary to Kramer's assertion that no one was injured in the 2020 CO₂ pipeline rupture near Sartartia, Mississippi, the event

led to the hospitalization of at least 45 people in addition to the evacuation of over 200.⁴

Given that risk, the environmental hazards, and the potential for violating the rights of Indigenous communities, CO₂ pipelines have unsurprisingly been met with public opposition. The carbon capture and sequestration community should respond by building trust with the public—starting with repurposing existing natural gas pipelines to transport CO₂—and by strictly adhering to environmental protection regulations, treaties with Indigenous communities, and existing legal requirements. Rules and regulations must be changed to ensure that the characteristics of CO₂ are fully accounted for, both in its transportation and in its sequestration, and not to accelerate the laying of new pipelines.

References

1. M. Weingarten et al., *Science* **348**, 1336 (2015).
2. R. J. Skoumal et al., *J. Geophys. Res. Solid Earth* **123**, 10918 (2018).
3. Intergovernmental Panel on Climate

Change, *Carbon Dioxide Capture and Storage*, B. Mertz et al., eds., Cambridge U. Press (2005), p. 249.

4. J. Simon, "The U.S. is expanding CO₂ pipelines. One poisoned town wants you to know its story," NPR, 21 May 2023, updated 25 September 2023.

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A fulfilling career

I admired how the obituary of Benjamin Breneman Snavelly (*PHYSICS TODAY*, October 2023, page 69) shines a light not just on his research accomplishments but also on his life of service in the private and public sectors. I did not know Snavelly, but I am grateful for how my life has been touched by many scientists like him. The authors' remembrance shows how a career in physics offers us—beyond moments of breathtaking joy in a new discovery—a path toward sustained happiness while we help those around us live enriched and fulfilling lives as we engage in our

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