

Comments by Barbara W. Brandom, MD, June 11, 2024

I am a retired MD with a Masters Degree from the School of Public Health in the University of Pittsburgh.

Senate Bill 831, the Carbon Capture and Sequestration Act, moved to the Committee on Consumer Protection, Technology and Utilities in the PA House of Representatives. We do need protection from physical dangers and eminent domain, in the form of forced pooling. Politicians and businesses follow the money, it seems with no common sense. Projects planned to last for years will be subject to increasing heat, increasing flooding, more tornadoes and more landslides. The rupture of the pipeline carrying carbon dioxide near Satartia, Mississippi occurred after a heavy rain.

The process of carbon sequestration (CS), delivering huge volumes of CO₂ by pipeline and drilling of multiple wells to receive CO₂, to monitor pressures, provide emergency alternative storage, presents serious risks to public health. This not been discussion. Furthermore CS is highly likely to negatively impact water and timber resources. Every pipeline produces soil compaction above & decreases agricultural yield in that space, perhaps by as much as 30%.

Geologic carbon sequestration (CS) is a highly technical industry closely related to extraction of fossil gas. As much as 15% of the gas extracted with fossil fuel is carbon dioxide which must be removed prior to use of fossil gas. There is accumulating evidence that it is very difficult to predict the size & location of the injected mass of CO₂, the plume, (<https://jpt.spe.org/irregular-is-whats-regular-for-co2-storage-plumes>). Companies that cite decades of experience in CO₂ injection underground have been cycling just enough CO₂ through a reservoir to enhance recovery of fossil fuels. Injecting as much CO₂ as possible for permanent storage is a very different matter.

[SB 831 contains dangerous oversimplifications. It is not reasonable or beneficial to use any subsurface strata for geologic storage of carbon dioxide. Consider the 3 failures of CCS experienced by Equinor (<https://ieefa.org/resources/norways-sleipner-and-snohvit-ccs-industry-models-or-cautionary-tales>). Seismic studies must identify a large solid cap rock that could constraint sequestered CO₂ to prevent upward migration as injection pressure increases. At the site in Algeria (ibid) where Equinor injected carbon dioxide, the upward migration of CO₂ deformed the surface of the land. This could seriously damage built structures. When this

complication was recognized the CO₂ was vented to the atmosphere. At another site, under the North Sea, CO₂ migrated upward to a site between strata that had not been recognized on seismic studies. There and at a third site, injection was halted because pressures rose beyond what was expected to be retained by the cap rock. If the cap rock cracked and]

If CO₂ escaped to the atmosphere it could expand rapidly into low lying areas, diluting oxygen to asphyxiating levels. Less than 10 minutes of lack of oxygen is enough to produce permanent brain damage or death in a human being and other animals that require oxygen to live.

[Injection of large volumes of CO₂ into the common brittle rocks can trigger earth quakes. Even small earthquakes can crack the cap rock expected to contain CO₂ ([Earthquake triggering and large-scale geologic storage of carbon dioxide | PNAS](#)). CO₂ injected underground in the Illinois Basin is the likely cause of hundreds of microearthquakes that took place at the site between 2011 and 2012, (Josimar A. Silva, Mansour Khosravi, Hongkyu Yoon, Michael Fehler, Scott Frailey, Ruben Juanes. Mechanisms for Microseismicity Occurrence Due to CO₂ Injection at Decatur, Illinois: A Coupled Multiphase Flow and Geomechanics Perspective. *Bulletin of the Seismological Society of America*, 2024; DOI: [10.1785/0120230160](https://doi.org/10.1785/0120230160)).]

[Indeed the 2009 report, titled Geologic Carbon Sequestration Opportunities in Pennsylvania (<https://elibrary.dcnr.pa.gov/GetDocument?docId=1743511&DocName=Geologic-Carbon-Sequestration-Opportunities-in-PA-2009.pdf>) states, on page 17, that “The largest, single problem for sequestering CO₂ in the Oriskany Sandstone is related to cap rock seal failure. Sandstone reservoirs [Upper Devonian in SWPA] for geologic sequestration of CO₂ are also restricted by the unknown integrity of post-production [gas extraction] cap rock and the large number of oil-and-gas wells (active, abandoned, and orphaned) that could pose risk for CO₂ migration and leakage.”]

[SB 831 is compromising the independence of Pennsylvanians, relative to those in neighboring states, by requiring that only 60% of those living above the potential site of a carbon dioxide reservoir need to agree to sell their rights to the pore space, to allow a proposed project to go forward. Sequestration of carbon dioxide underground will result in a spreading plume of CO₂ the extent of which is difficult to predict. Other states developing these rules, such as West Virginia, have required 75% of the owners of surface land to agree to sell their rights to pore space before imposing eminent domain on the remaining 25%.]

The companies performing CS must retain liability until the carbon dioxide is solidly mineralized. Only then will it be unlikely to migrate in unpredictable ways.

The events in Satartia were a 'wakeup call' to pipeline regulators. The companies constructing these pipeline must be bonded to provide lifelong services to those people incapacitated by clouds of carbon dioxide, as well as replacement of injured livestock. Now is the time to demand protection of the people of Pennsylvania, because they have Constitutional rights to

“ clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.”

(May 18, 1971, P.L.769, J.R.3)

1971 Amendment. Joint Resolution No.3 added section 27.

SB 831 is selling out the safety, possibly the survival of people and farms in this state, to a new industry (CS) that is closely tied to the industries that we must outgrow as is occurring in neighboring states.

Sincerely,

B.W. Brandom, MD, speaking as an individual with grandchildren

bwb131252@gmail.com

412-512-4044