CARBON SEQUESTRATION AND CLASS VI WELLS

Frequently Asked Questions

Q: What is carbon sequestration?

A: Carbon sequestration, sometimes referred to as geologic or carbon dioxide (CO_2) sequestration, is the long-term containment of CO_2 in underground geologic formations as the final step of Carbon Capture and Storage (CCS) operations. CO_2 produced by emitters is captured, compressed for transportation and injected into deep underground rock formations for disposal to reduce the amount of CO_2 emissions that enter the atmosphere.

Q: What is carbon dioxide? What are the hazards?

A: CO_2 is a colorless, odorless gas that is naturally present in the Earth's atmosphere. CO_2 is produced by various processes, such as respiration, combustion of fossil fuels and decomposition of organic matter.

CO_2, in and of itself, is not classified as toxic or carcinogenic – its primary risks above ground are its role as a greenhouse gas in the atmosphere and as an asphyxiant when concentrated in a small area – basically, if there's enough coming up or out to displace breathable air. The asphyxiant aspect is a particular concern because CO_2 is heavier than air, so it is less likely to move up and away from people and dissipate than something like methane.

Q: How does carbon sequestration work?

A: Carbon sequestration requires extensive geologic and engineering assessments to determine if a site is appropriate to safely store CO_2. There are two main types of formations used for this kind of sequestration: 1) Deep saline aquifers where the water in the formation is too salty for human use; and 2) Depleted oil and gas fields that are no longer in production

Q: What are injection wells?

A: An injection well is used to dispose of fluids deep underground. These wells are typically drilled into porous rock formations that can safely contain the injected substances. Regulations are in place to ensure that injection wells are designed and monitored to prevent groundwater contamination and protect public health. EPA's Underground Injection Control Program consists of six classes of injection wells that vary based on function, construction and operating features.

Q: What are Class V injection wells?

A: Class V wells inject non-hazardous fluids into or above an aquifer. They are typically shallow, on-site disposal systems, such as floor and sink drains that discharge into dry wells, septic systems, leach fields and similar types of drainage wells.

Class V also includes stratigraphic test wells. These wells are not used for waste disposal but are a useful tool for site characterization. It can be utilized for logging, core collection, injectivity tests, etc. There is possible future utilization as a monitor well or Class VI injection well. However, any proposal to convert a Class V to a Class VI well is still required to go through the full Class VI permitting process. Receiving a Class V permit does not lessen regulatory requirements or guarantee that a Class VI permit will be issued.

Q: What are Class VI injection wells?

A: Class VI wells are used to inject CO_2 into deep rock formations for long-term storage to reduce atmospheric CO_2 emissions. Class VI wells have the most complex, robust permitting requirements of any class of injection well.

These requirements include detailed rules for siting, construction, operations, testing, monitoring and closure of the sequestration project. These rules account for the unique challenges of permanently storing CO_2 underground, including buoyancy of CO_2, mobility of CO_2, corrosivity of CO_2 dissolving into water and large injection volumes.

Q: How does the CO_2 stay underground?

A: Captured CO_2 is compressed to a stage known as a supercritical phase where the CO_2 no longer behaves like a gas but shares the physical properties of liquid and gas. Supercritical CO_2 can then be injected into the approved geologic formation where it becomes trapped.

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Q: How do we know where the CO_2 is once it's underground?

A: Tracking the CO_2 plume is one of the most important parts of a sequestration project. Applicants are required to use their proposed plans for injection and the geologic details from site characterization to build detailed computational models of the CO_2 plume. Creating reliable models based on accurate data is important because it helps predict how the CO_2 will behave underground and how far a CO_2 plume will extend over the life of the project. Class VI wells also have extensive requirements for regular pressure and groundwater monitoring to help regulators ensure that the CO_2 stays where it's supposed to and doesn't pose a threat to the drinking water.

Q: If CO_2 is going to be injected into aquifers, does that mean my water is going to be impacted?

A: No. Saline aquifers are deep rock formations where the pores, or small gaps between the rock grains, are filled with ultra-salty water that is too salty to be used by humans. These aquifers are usually thousands of feet deeper than the freshwater aquifers that we get our drinking water from.

The geologists and engineers at DENR who regulate Class VI wells are responsible for making sure that the CO_2 injection doesn't put Louisiana's drinking water or residents at risk.

Q: Who permits Class VI wells in Louisiana?

A: The Louisiana Department of Energy and Natural Resources (DENR) Injection and Mining Division (IMD).

Q: How can I check the status of a Class VI application?

A: A Class VI Application Tracker is available on the Permits and Applications section of DENR's Class VI Carbon Sequestration webpage. The tracker is regularly updated to reflect where each application is in the review process.

Q: Are there any Class VI wells in Louisiana?

A: Not yet. The Environmental Protection Agency (EPA) began reviewing Class VI permit applications before transferring permitting authority, known as primacy, to DENR in February 2024. Reviews are currently underway at DENR, but no permits have been issued.

Q: How long does the application process take? Will the public have the chance to have a say?

A: For a Class VI well, because of all the detailed engineering and geologic information DENR requires, the expectation is that if an operator turned in a perfect application where our staff saw no errors and had no questions that needed further information/clarification, the time from the start of a Class VI application review to opening the public comment period/holding a public hearing would be about 18 months. However, DENR expects that reviews for something as complex as Class VI application will go through several rounds of review where the applicant is required to make revisions and submit additional technical information.

Once DENR staff has gotten an application review to the point where their technical and regulatory questions have been answered, a draft version of the permit will be made public (both on our website and locally) along with the application itself, and DENR will reach out to the public for a comment period of at least 30 days. That comment period will also include a locally-held public hearing. Both the hearing and the public comment period will be advertised through local journals and outreach to parish officials to help alert their constituents.

Q: Can operators simply seize property?

A: While any CO_2 pipelines have options for expropriation of right-of-way, the same as other kinds of pipelines, the process for acquiring pore space rights for CO_2 sequestration projects is more akin to the way mineral rights are leased by oil and gas operators – through unitization. Louisiana's Legislature in 2024 set an established law so that expropriation for carbon sequestration is not allowed and a unitization framework must be used. A key difference is that while oil and gas operators generally seek to get a minimum of half the acreage they seek in a drilling unit before the rest can be force-pooled without a lease. A carbon sequestration project, by law, must get at least 75 percent of the acreage under lease before force-pooling can be done on the remainder, with the manner for determining compensation paid to unleased owners set by DENR's Commissioner of Conservation.

Q: Has permanent carbon sequestration been done before? Is there a proven science/ operational history?

A: While large-scale permanent carbon sequestration projects are new to the U.S. and Louisiana, Louisiana operators and regulators are already familiar with almost all of the components that make up the overall process. Underground injection projects have been taking place in Louisiana for generations, and the state has been enforcing modern underground injection regulations on behalf on the EPA since the 1980's.

We have specifically been dealing with managing CO_2 injection in enhanced oil recovery projects for many years – that involves injecting CO_2 into depleted oil reservoirs to increase production. In that case, the CO_2 isn't trapped in the rock permanently – much of it comes back up with the oil – but it does provide us regulatory experience in dealing with CO_2 in pipelines, wellbores and seeing how it behaves underground.