

Geologic Sequestration of Carbon Dioxide

The State of Responsible Primacy

Jake Ferrell, Carbon Removal Justice Fellow and Dr. Simone H. Stewart, Senior Industrial Policy Specialist
Climate & Energy Program, National Wildlife Federation



Kinder-Morgan operations manager for the Yates field, checks one of the CO₂ injection well heads, that uses solar and wind energy to power the well head, Thursday, June 2, 2011, in Iraan [Texas]. **Source:** Brett Coomer, Houston Chronicle, 2011 via Mella McEwen, “CO₂ Conference plans 20th annual session,” Midland Reporter Telegram, <https://www.mrt.com/business/energy/article/CO2-Conference-plans-20th-annual-session-7418744.php>. 2014.

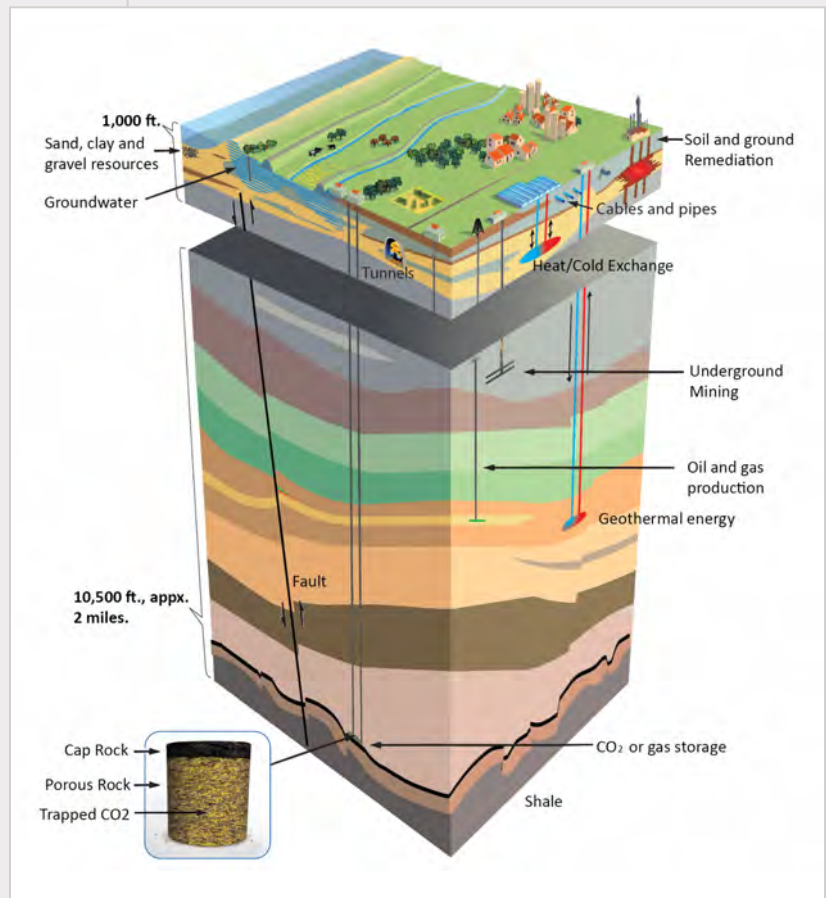
When it comes to emerging technologies and the implications of deploying climate solutions, which entity should lead the infrastructure charge: the state or the federal government? This question is one now frequently asked in the carbon management space, and has sparked debates across the country, specifically surrounding the issue of “primacy,” or state authority to regulate carbon storage wells. This issue brief from the National Wildlife Federation explains the issue of state primacy over carbon storage wells, and outlines what it would take to ensure a responsible approach.

Sequestration of CO₂ and EPA Oversight

Carbon management is a strategy whereby CO₂ is captured, either directly from industrial flue gas (carbon capture) or removed from ambient air (carbon dioxide removal), and sequestered in a form that prevents it from re-entering the atmosphere. Carbon management addresses the climate crisis by targeting excess atmospheric CO₂, a result of societal industrialization. According to the Intergovernmental Panel on Climate Change (IPCC), industrial carbon capture and carbon dioxide removal are [important strategies](#) to reach global and national net zero CO₂ emissions targets and to keep global temperatures at or below 1.5°C.¹

The most common setting for permanently sequestering CO₂ after it has been captured is underground, in very deep, impermeable rock formations. To regulate and monitor the sequestered CO₂, the US Environmental Protection Agency (EPA) is charged with administering the [Underground Injection Control \(UIC\)](#) program, whereby it sets regulatory standards and processes applications for underground wells with the goal of preventing contamination of drinking water under the Safe Drinking Water Act.² Historically, five types, or classes, of underground wells have existed, including industrial and municipal waste (class I); oil and gas (class II); solution mining (class III); shallow hazardous and radioactive waste (class IV); and non-hazardous fluids (class V). In 2010, EPA established a sixth class of wells for geological sequestration of CO₂, and continues to hold responsibility for regulating these wells across the majority of states.

Applications for class VI wells require a substantial array of information about the proposed well, [including](#): an in-depth characterization of the site geology, a corrective action preparedness plan in case there are unexpected consequences of injection, a financial responsibility statement, a pre-operational testing plan, and proposals for construction schematics, operating conditions, site monitoring, well-plugging, and site closure.³ Applicants must also detail an emergency and



*Conceptual 3D geologic diagram showing CO₂ injection and storage co-located among other uses and interests. Geologic carbon sequestration works by injecting CO₂ deep below the earth's surface into a naturally-occurring formation of porous rock. **Source:** Modified from TNO, Geological Survey of the Netherlands, and the Global CCS Institute, California Department of Conservation. <https://www.conservation.ca.gov/cgs/gcs>. 2023.*

remedial response plan for their class VI well to protect any underground sources of drinking water from any contamination. Complete applications entail at minimum 54 different sections of information across geology, engineering, and risk management.

The Role of Primacy

The federal EPA does not regulate wells across all states, however. Permitting under the UIC program is time and resource intensive, involving careful site studies and extensive modeling. The process duration from initial application to full approval takes around two years, and sometimes longer, which can be a significant hurdle to states and projects looking to quickly take advantage of federal incentives and meet the pace of scale-up.⁴ To ease the pressure

on EPA amidst a flurry of applications,⁵ EPA Administrator Michael Regan has encouraged states to apply for “primary enforcement responsibility” or “primacy” over the administration of UIC Class VI wells for CO₂ sequestration, so long as they can administer the program responsibly.^{6,7}

Applicants seeking primacy, including Tribes and territories, must meet the EPA’s minimum requirements for the specific UIC program, demonstrating “their standards are effective in preventing endangerment of underground sources of drinking water” by requiring that the applicant has: “jurisdiction over underground injection; regulations that meet the federal requirements for 1422 programs (which includes Class VI wells); and the necessary administrative, civil and criminal enforcement



A carbon dioxide (CO₂) injection well drilled by the Southeast Regional Carbon Sequestration Partnership (sponsored by the U.S. Department of Energy) at the Cranfield CO₂ test site in Mississippi. **Source:** Geology, Energy & Minerals Science Center, United States Geological Survey. <https://www.usgs.gov/media/images/co2-injection-well-mississippi>. 2010.

penalty remedies.” In potentially granting primacy, for either all or part of the well program, [EPA considers the following](#):⁸ letters from a state’s governor and attorney general, a description of what the program will look like at the state level, a memorandum of agreement between the state and EPA, copies of the state’s UIC statutes and regulations, and documents demonstrating the state’s public participation process. At the time of publication, three states – North Dakota, Wyoming, and Louisiana – have successfully applied for and been granted the power, with Louisiana becoming the most [recently awarded](#) on December 28, 2023.⁹ Three states are currently in various stages of requesting primacy: Texas, Arizona, and West Virginia. For both North Dakota and Wyoming, successfully applying for primacy was a lengthy process. North Dakota [applied](#) in 2013 and waited until 2018 for its approval, while Wyoming’s official application in 2019 was preceded by years of dialogue with EPA Region 8, which streamlined final approval in 2020.¹⁰ In October 2021, North Dakota became the first state to issue a Class VI storage permit for CO₂ captured from an ethanol industrial facility, and followed it up with a second permit for captured CO₂ from a coal-fired power plant in January 2022. The [power plant](#)’s Class VI well state application time totaled only eight months, substantially less than the federal EPA’s expected application period of two years.¹¹ Wyoming [approved](#) its first three Class VI well permits in December 2023, three years after being granted state primacy.¹²

Qualms Around Primacy

Wyoming and North Dakota are both substantial fossil fuel producing states, and their primacy bids were championed by this industry. Wyoming’s primacy bid was [celebrated](#) by the state’s Petroleum Association, and North Dakota’s bid was [recognized](#) by a coal industry group as “a path forward to ensure

the long-term viability of North Dakota’s lignite coal and energy generation industries.”¹³ Outspoken supporters of Louisiana’s bid [include](#) the American Petroleum Institute, Senator Bill Cassidy (R-LA), and a group of industry trade associations representing oil, natural gas, and chemicals.¹⁴

In the case of Louisiana, some environmental justice groups, led by the Deep South Center for Environmental Justice, [penned a letter](#) to the EPA urging them to deny the state’s bid for primacy.¹⁵ The letter argues, in some detail, that 1) Louisiana does not have sufficient expertise or staff to carry out the program on its own; 2) some proposed state environmental regulations are less stringent than federal requirements, including leaving the public open for cleanup liability; 3) the state has “a bad track record” of insufficient regulatory enforcement on previous oil and gas wells; and 4) allowing state primacy in these circumstances would undermine federal commitments to environmental justice. Indeed, Louisiana would not be unique in having [a questionable history of state regulatory enforcement](#) of penalties on industrial polluters – Eliza Griswold’s 2019 [Pulitzer Prize-winning book *Amity and Prosperity*](#), for example, showed how the Pennsylvania state body charged with environmental protection repeatedly ignored the pleas of residents living near gas fracking sites, even lining up alongside industry in the subsequent lawsuits.^{16,17}

Opposition to primacy bids in [West Virginia](#) and [Texas](#) echo similar points: they charge that state agencies lack sufficient capacity to administer the permitting program and have poor track records of upholding environmental protections in the face of industry violations.¹⁸ While a given state’s approach to regulatory enforcement is not *necessarily* determined by their past actions, it is important to recognize that a state government’s history has consequences felt at present, and that those who have been

neglected or harmed by institutions may have good reasons for withholding trust. While the EPA should continue to hold states to a high standard – meeting or exceeding all federal requirements for the UIC program – states seeking primacy might consider taking restorative action to build back foregone trust in the communities they serve.

A Pathway for Responsible Primacy

In November 2023, the Biden Administration announced a grant program aimed at facilitating more successful state primacy applications. The UIC Class VI grant program, with \$48 million in available funding, [has been allocated](#) equally across 25 interested states and Tribes to assist in building their capacity for permitting Class VI wells.¹⁹ Applicants were asked to write plans that demonstrated how “environmental justice and equity considerations” would be incorporated into their primacy programs. Concrete examples of such considerations may include “identifying communities with potential environmental justice concerns, enhancing public involvement, developing appropriately scoped environmental justice assessments, enhancing transparency throughout the permitting process, and minimizing adverse effects associated with permitting actions.” This program offers an opportunity to make environmental justice and public engagement into important pillars of state administration of Class VI wells, but as these are only plans, states still need to take proactive steps in this regard.

EPA is taking additional steps that have potential to affect responsible primacy. They have set up a publicly available [permitting tracker](#) that facilitates visibility into what applications are currently under consideration, a good precedent regarding

transparency that states with primacy ought to emulate.²⁰ The US Department of Energy’s Regional Technical Assistance Centers have some [funding set aside](#) to “provide technical, informational, and educational assistance” to stakeholders involved in CO₂ transport or storage projects, including Class VI wells.²¹ In sum, the Administration is ostensibly [committed](#) to carbon management that is “designed, built, and operated safely and responsibly, and in a way that reflects the best science and commercial practice and responds to the needs and inputs of local communities.”²² It is important that states seeking primacy are *at least as committed* to those goals, if not more so.

In the case of Louisiana’s recently approved primacy application, the EPA worked alongside the state in the creation of its final rule to adopt environmental justice-centered practices encouraged by the Administration. In the Memorandum of Agreement addendum, the state agreed to adopt all environmental justice elements described by the EPA “and in particular noted that inclusive public participation processes and incorporation of EJ and civil rights considerations in permit review will be achieved through the methods set forth in the Program Description,” including commitments to examine the potential risks to minority- and low-income populations and relying on additional evaluations conducted by third-party reviewers when potential environmental justice risks are determined.²³ While the EPA worked with the Louisiana Department of Natural Resources before approving the application to address [specific issues](#) brought up during the public comment period—spanning concerns such as pollution in overburdened communities and community liability—both the Department and the EPA will have to prove the state’s competency and reliability through direct application and enforcement of these principles.²⁴

Recent polling among registered voters conducted by Data For Progress and National Wildlife Federation asked people in Louisiana and Colorado about their views on state primacy.²⁵ In Louisiana, when asked about Class VI well primacy and given a short description of the EPA's current oversight authority,

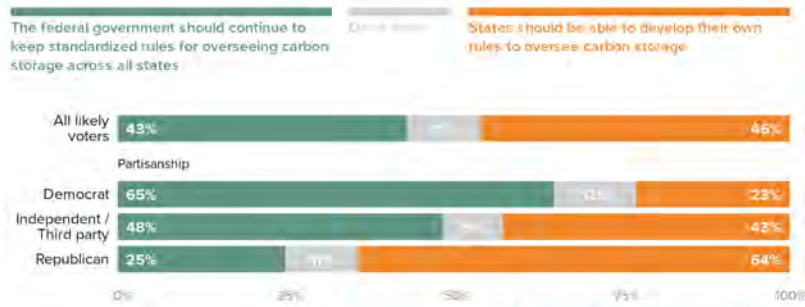
46% of voters supported state primacy while 43% supported continued federal authority. The Louisiana Department of Environmental Quality was seen as the most trusted group to oversee carbon storage in the state (35%), followed by the federal EPA (29%) and the Louisiana Department of Natural Resources (21%).

Louisiana Voters Are Divided Over Whether the Federal Government or States Should Oversee Carbon Storage

A specific kind of carbon dioxide removal technology known as direct air capture (DAC) is being considered for funding in Louisiana and several other states, like Texas.

Currently, the U.S. Environmental Protection Agency (EPA) has the authority to oversee the process of storing carbon once it has been removed from the air by DAC projects. However, Louisiana is one of several states seeking permission to move oversight authority over carbon storage to the state level.

Which of these statements best describes your view, even if neither is exactly right?



September 21-26, 2023 survey of 432 Louisiana likely voters

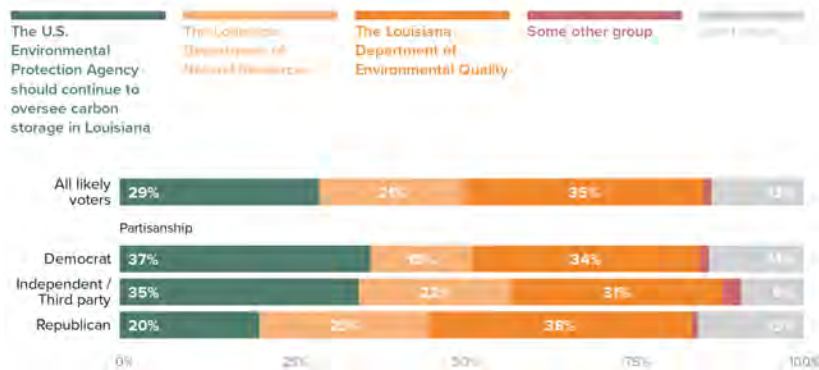


A Plurality of Voters Want the Louisiana Department of Environmental Quality to Oversee Carbon Storage

A specific kind of carbon dioxide removal technology known as direct air capture (DAC) is being considered for funding in Louisiana and several other states, like Texas.

Currently, the U.S. Environmental Protection Agency (EPA) has the authority to oversee the process of storing carbon once it has been removed from the air by DAC projects. However, Louisiana is one of several states seeking permission to move oversight authority over carbon storage to the state level.

Of the following groups, which would you trust most to oversee carbon storage for DAC projects in Louisiana?



September 21-26, 2023 survey of 492 Louisiana likely voters



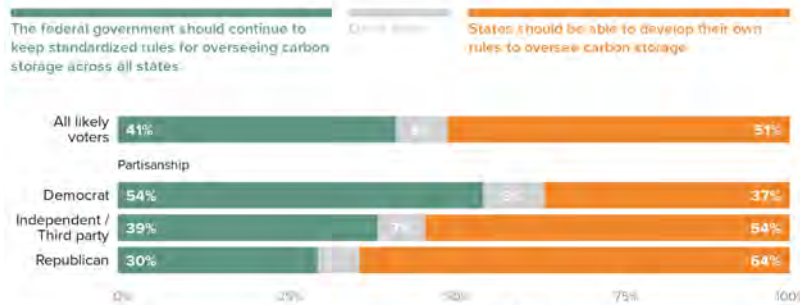
In Colorado, 51% of voters supported state primacy over carbon storage while 41% of voters supported continued federal authority. The US EPA was seen as the single most trusted group to oversee carbon storage in the state (25%); however taken together, Colorado state agencies polled

higher (51%) than the federal EPA (with the Colorado Department of Natural Resources (19%) combined with the Colorado Department of Public Health and Environment (17%) and the Colorado Air Quality Control Commission (15%).

A Majority of Colorado Voters Support States Overseeing Carbon Storage

Currently, the U.S. Environmental Protection Agency (EPA) has the authority to oversee the process of storing carbon once it has been removed from the air by carbon dioxide removal (CDR). However, Colorado is one of several states considering asking to move oversight authority over carbon storage to the state level.

Which of these statements best describes your view, even if neither is exactly right?



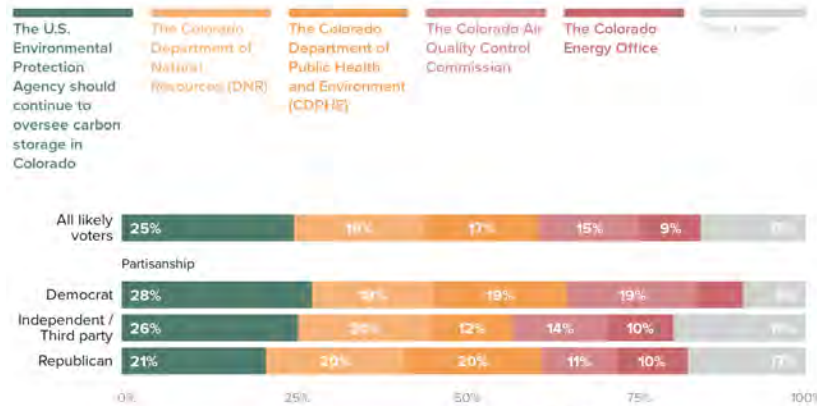
November 9–20, 2023 survey of 539 Colorado likely voters



Colorado Voters Narrowly Prefer the Environmental Protection Agency Maintain Primacy Over Carbon Storage

Currently, the U.S. Environmental Protection Agency (EPA) has the authority to oversee the process of storing carbon once it has been removed from the air by carbon dioxide removal (CDR). However, Colorado is one of several states considering asking to move oversight authority over carbon storage to the state level.

Of the following groups, which would you trust most to oversee carbon storage for CDR projects in Colorado?



November 9–20, 2023 survey of 539 Colorado likely voters



In both states, voters also expressed overwhelming desire for project developers to consult with local communities in determining site locations, engaging community members in workshops, guaranteeing local project benefits, and ensuring community participation in decision-making at key points in a project. Whether state or federal authority is in place for carbon storage, community engagement is absolutely key to responsible deployment, to holding regulators and industry accountable, and to ensuring beneficial climate and environmental outcomes.

State primacy might be considered part of responsible carbon management if the following are integrated into a larger deployment framework:

1) Capacity and Expertise. The state has sufficient staff capacity and expertise to administer the UIC Class VI well program, and the ability to properly enforce penalties to protect communities in the event of a violation. State primacy without sufficient state regulatory capacity is likely to be ineffective and potentially result in negative impacts to communities and wildlife. At minimum, the state body responsible for administering the program under primacy needs to have the tools and resources, plus the intention of enforcement with a high degree of rigor; anything less risks compromising responsible buildout.

2) Reparative and Restorative Justice. The state takes proactive steps to remediate past harms and rebuild lost trust in the communities they serve, especially communities being asked to bear further industrial development for carbon management. This should include compelling private actors to take responsibility for their own clean up. Disavowal of the legacies of environmental injustices perpetrated under state governments is a non-starter; instead, restorative justice is a necessary prerequisite for any further industrial developments to be responsible and just. Talk to communities, listen when they speak, and commit to taking actions to repair harm.

3) Enforcement and Engagement. The state has a public and transparent plan for regulatory enforcement, including clear well monitoring and reporting systems that are easily accessible and digestible, transparent accountability measures laid out ahead of time, and a process for ensuring high standards for community engagement on all projects in the state. As our polling indicated, community engagement is extremely popular in two states currently seeking primacy and is also crucial for aligning with federal initiatives like [Justice40](#) and the [Responsible Carbon Management Initiative](#).²⁶

If tenets like these hold true then some groups, like the [Louisiana Wildlife Federation](#), have found it possible to express their conditional support for state primacy.²⁷ In their absence, primacy bids from irresponsible state actors may hold back responsible carbon management, or even harm efforts toward an equitable buildout of this industry. In the absence of state primacy, the US EPA still administers the UIC Class VI well program – so it is possible to support responsible carbon management and the development of the industry while recognizing that some states may be less rigorous candidates for primacy.

Endnotes

¹ IPCC AR6 Working Group III: Mitigation of Climate Change, *Summary For Policymakers* (2022): https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf.

² United States Environmental Protection Agency (EPA), *Protecting Underground Sources of Drinking Water from Underground Injection (UIC)*. Accessed 14 December 2023: <https://www.epa.gov/uic>.

³ United States Environmental Protection Agency (EPA), *Class VI Permit Application Outline*. Accessed 14 December 2023: https://www.epa.gov/system/files/documents/2022-07/class_vi_permit_application_outline.pdf.

⁴ Carlos Anchondo, “DOE official: EPA backlog on CO₂ wells puts climate goals at risk,” *E&E News*, 20 September 2023: <https://subscriber.politicopro.com/article/eenews/2023/09/20/doe-official-permitting-backlog-for-co2-wells-risks-climate-goals-00116805>.

⁵ Jean Chemnick, “As EPA drowns in CCS applications, oil states want to take control,” *E&E News*, 8 September 2023: <https://subscriber.politicopro.com/article/eenews/2023/09/08/as-epa-drowns-in-ccs-applications-oil-states-want-to-take-control-00108147>.

⁶ Michael S. Reagan, “Underground Injection Control Class VI Wells Memorandum.” Accessed 14 December 2023: https://www.epa.gov/system/files/documents/2022-12/AD.Regan_GOV.Sig_Class%20VI.12-9-22.pdf.

⁷ United States Environmental Protection Agency (EPA), *Primary Enforcement Authority for the Underground Injection Control Program*. Accessed 14 December 2023: <https://www.epa.gov/uic/primary-enforcement-authority-underground-injection-control-program-0>.

⁸ United States Environmental Protection Agency (EPA), *Primary Enforcement Authority for the Underground Injection Control Program*. Accessed 14 December 2023: https://www.epa.gov/uic/primary-enforcement-authority-underground-injection-control-program-0#what_core.

⁹ EPA Grants Louisiana Office of Conservation State Authority Over CO₂ Injection and Sequestration,” State of Louisiana Department of Energy and Natural Resources, 28 December 2023: <https://www.dnr.louisiana.gov/index.cfm/newsroom/detail/1233>

¹⁰ Philip K. Lau, Dale D. Smith & Nadav C. Klugman, “Carbon Capture, Utilization, and Storage: Class VI Wells and US State Primacy” *Mayer Brown*, 9 June 2022: <https://www.mayerbrown.com/en/perspectives-events/publications/2022/06/carbon-capture-utilization-and-storage-class-vi-wells-and-us-state-primacy>.

¹¹ “World’s Largest Carbon Capture Facility - Project Tundra - Receives NDIC Approvals,” *North Dakota Industrial Commission*, 21 January 2022: <https://www.ndic.nd.gov/news/worlds-largest-carbon-capture-facility-project-tundra-receives-ndic-approvals>.

¹² Kimberly Mazza, “Wyoming grants its first three Class VI permits,” *Wyoming Department of Environmental Quality*, 14 December 2023: <https://deq.wyoming.gov/2023/12/wyoming-grants-its-first-three-class-vi-permits/>.

¹³ Pete Obermuller, “OPINION: Petroleum Association of Wyoming Applauds Wyoming Primacy over Class VI Injection Wells,” *Sweetwater NOW*, 4 September 2020: <https://www.sweetwaternow.com/opinion-petroleum-association-of-wyoming-applauds-wyoming-primacy-over-class-vi-injection-wells/>; “North Dakota becomes first state for Class VI Primacy,” *Lignite Energy Council*, 10 April 2018: <https://lignite.com/news/north-dakota-becomes-first-state-for-class-vi-primacy/>.

¹⁴ Jean Chemnick, “As EPA drowns in CCS applications, oil states want to take control,” *E&E News*, 8 September 2023: <https://subscriber.politicopro.com/article/eenews/2023/09/08/as-epa-drowns-in-ccs-applications-oil-states-want-to-take-control-00108147>.

¹⁵ “Comment in opposition to EPA’s proposed final rule approving Louisiana’s application to implement the UIC program for Class VI injection wells.” *Earthjustice*, 3 July 2023: https://earthjustice.org/wp-content/uploads/2023/07/comments-on-epas-proposed-approval-of-la-class-vi-primacy-application_2023jul03.pdf.

¹⁶ Lisa Song & Lylla Younes, “EPA finally calls out environmental racism in Louisiana’s Cancer Alley,” *Grist*, 19 October 2022: <https://grist.org/regulation/epa-finally-calls-out-environmental-racism-in-louisiana-cancer-alley/>.

¹⁷ Eliza Griswold, *Amity and Prosperity: One Family and the Fracturing of America* (Farrar, Straus, & Giroux, 2019): <https://www.pulitzer.org/winners/eliza-griswold>.

¹⁸ “Group asks EPA to deny West Virginia authority over carbon storage projects,” *Parkerburg News & Sentinel*, 19 August 2023: <https://www.newsandsentinel.com/news/business/2023/08/groups-ask-epa-to-deny-west-virginia-authority-over-carbon-storage-projects/>; “Castro, Doggett Urge EPA to Reject Texas Railroad Commission’s Application for Primacy of Class VI Carbon Dioxide Sequestration Wells,” 17 July 2023: <https://castro.house.gov/media-center/press-releases/castro-doggett-urge-epa-to-reject-texas-railroad-commissions-application-for-primacy-of-class-vi-carbon-dioxide-sequestration-wells#:~:text=WASHINGTON%20%E2%80%93%20Representatives%20Joaquin%20Castro%20>.

¹⁹ United States Environmental Protection Agency (EPA), *Biden-Harris Administration Announces State and Tribal Allocations for \$48 Million Grant Program to Protect Groundwater Resources and Tackle Climate Change*. 2 November 2023: <https://www.epa.gov/newsreleases/biden-harris-administration-announces-state-and-tribal-allocations-48-million-grant>.

²⁰ United States Environmental Protection Agency (EPA), *Current Class VI Projects under Review at EPA*, Accessed 14 December 2023: <https://www.epa.gov/uic/current-class-vi-projects-under-review-epa>.

²¹ United States Department of Energy (DOE), *DOE Announces \$40 Million to Provide Regional Technical Assistance Through Carbon Storage Partnerships*, 1 December 2023: <https://www.energy.gov/fecm/articles/doe-announces-40-million-provide-regional-technical-assistance-through-carbon-storage>.

²² United States Department of Energy (DOE), *DOE Announces \$40 Million to Provide Regional Technical Assistance Through Carbon Storage Partnerships*, 1 December 2023: <https://www.energy.gov/fecm/articles/doe-announces-40-million-provide-regional-technical-assistance-through-carbon-storage>.

²³ EPA, “Prepublication State of Louisiana Underground Injection Control Program; Class VI Proposed Signed Rule,” via *PoliticoPro* “EPA gives Louisiana control over carbon sequestration wells,” 29 December 2023: <https://subscriber.politicopro.com/f/?id=0000018c-b5ba-db9e-abbf-f7ba4fd90000&source=email>

²⁴ EPA, “EPA Response to Public Comments on the Louisiana Department of Natural Resources’ Class VI Primacy Application Docket ID: EPA-HQ-OW-2023-0073” via *PoliticoPro* “EPA gives Louisiana control over carbon sequestration wells,” 29 December 2023: <https://subscriber.politicopro.com/f/?id=0000018c-b5ba-db9e-abbf-f7ba4fd90000&source=email>

²⁵ National Wildlife Federation and Data for Progress, *In Progress*, February 2024.

²⁶ United States Office of Energy Justice and Equity, *DOE Justice40 Covered Programs*. Accessed 14 December 2023: <https://www.energy.gov/justice/doe-justice40-covered-programs>; United States Office of Fossil Energy and Carbon Management, *U.S. Department of Energy Announces its Intent to Launch a Responsible Carbon Management Initiative*, 11 August 2023: <https://www.energy.gov/fecm/articles/us-department-energy-announces-its-intent-launch-responsible-carbon-management>.

²⁷ Rebecca Triche, “LWF Comment on Primacy LA Class VI wells final,” *Louisiana Wildlife Federation*, 29 July 2023: <https://lawildlifefed.org/wp-content/uploads/LWF-Comment-on-Primacy-La-Class-VI-wells-FINAL.pdf>.