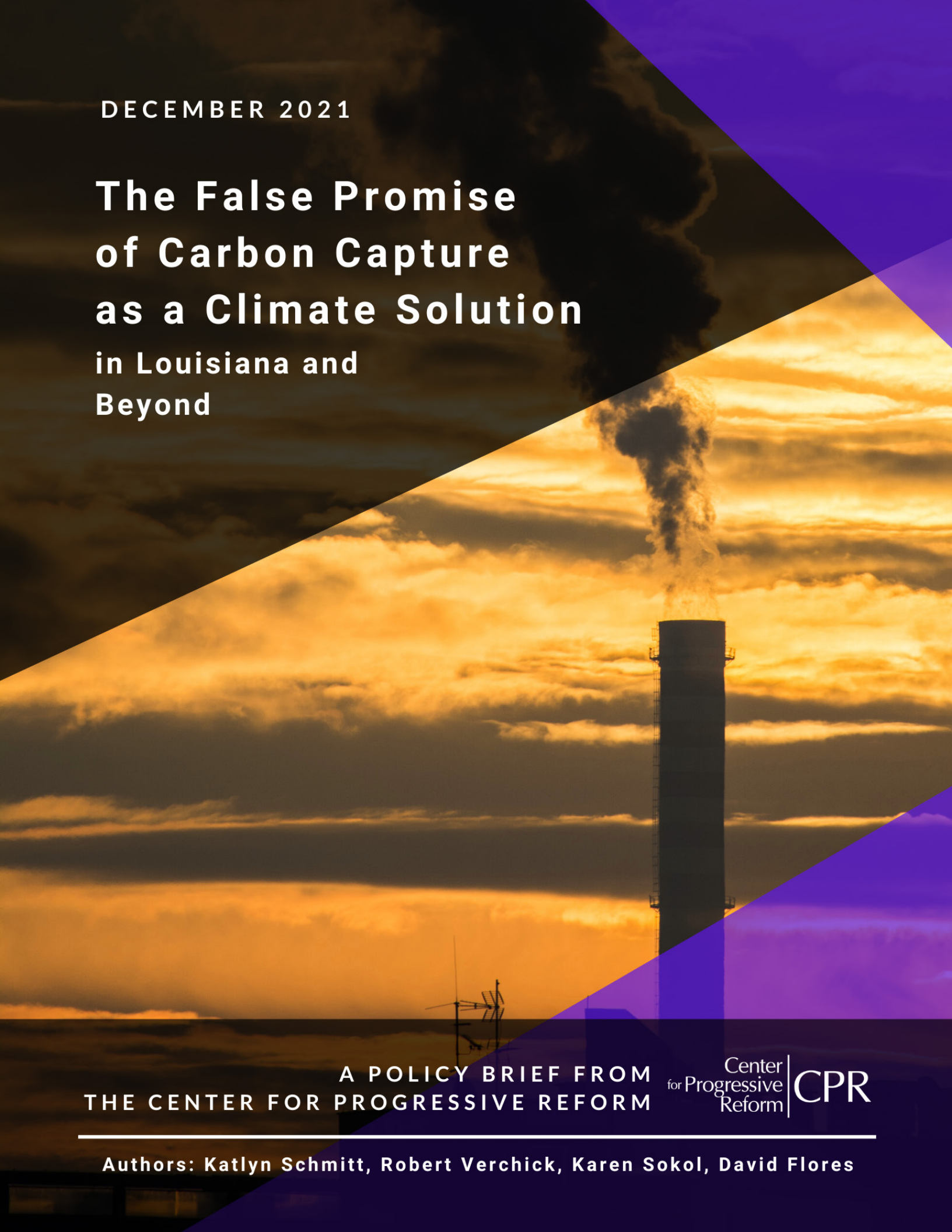

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The False Promise of Carbon Capture as a Climate Solution

in Louisiana and Beyond

A POLICY BRIEF FROM
THE CENTER FOR PROGRESSIVE REFORM

Center for Progressive Reform | CPR

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Introduction: The False Promise of Carbon Capture

Carbon capture use and storage ("carbon capture"),[1] heavily promoted by the coal, oil, and gas industries, is now at the center of the national climate policy debate.[2] Today when industries burn fossil fuels, the resulting carbon dioxide and methane soars into the atmosphere, traps heat, and contributes to climate breakdown. Using carbon capture technology, industries claim they will recover post-combustion carbon dioxide from their flues and smokestacks and either "store" the gas permanently underground in sedimentary rock or "use" the gas to recover oil or make other products. Proponents claim it's a win-win — benefiting both the planet and the fossil fuel industry.

But, on closer inspection, the large-scale roll-out of such technologies is a false promise. Neither the technology to capture most, much less all, carbon dioxide emissions from polluting facilities nor the ability to safely contain gas permanently underground has been proven, and the United States does not have the regulatory structure to monitor either. And using carbon dioxide to produce other goods will not keep the gas permanently out of circulation since all things eventually deteriorate. (Of course, using the gas to produce more combustible oil would only further fuel the climate crisis.) On top of this, wide-scale industrial expansion of carbon technology promises to harm historically marginalized communities that already bear disproportionate environmental burdens.

In the United States, the oil and gas industry has targeted Louisiana as an emerging hub for carbon capture, mainly because of the large concentration of industrial facilities that emit carbon dioxide in the stretch of land between New Orleans and Baton Rouge.[3] Louisiana Governor John Bel Edwards and state regulators openly support carbon capture as a way to meet the state's goal of reducing greenhouse gas emissions to net-zero by 2050.[4] While Louisiana must move quickly and aggressively in pursuit of climate change solutions, such expansive deployment of carbon capture would only do more harm.[5]

Deploying large-scale carbon capture at polluting facilities is not a climate solution; indeed, it would further entrench fossil fuel production and thus put the Paris Agreement's goal of limiting global temperature to 1.5 degrees Celsius above preindustrial levels out of reach.[6] In this way, such investment has the potential to expand fossil fuel industries in Louisiana under the claim that carbon dioxide emissions would be stored permanently underground. Even worse, companies would likely use much of the captured carbon dioxide to extract more oil, accelerating climate change and widening existing social inequities.[7]

Carbon capture is not the right choice for Louisiana because the technology would not slow global warming in ways needed to keep the rise in mean global temperature to 1.5 degrees Celsius — the goal of the United Nations Paris Agreement recently reaffirmed by the Glasgow Climate Pact.[8] Deploying carbon capture in Louisiana would also lead to climate injustice by foisting the risks and burdens of this technology on the state's historically marginalized

communities. Instead, the right choice for Louisiana involves a rapid shift toward energy efficiency and carbon-free energy sources in both industrial and non-industrial sectors of the economy.

Carbon capture (post-combustion) is an energy-intensive, cost-prohibitive, and risk-laden process that involves capturing carbon dioxide from a smokestack and compressing it into what's known as a supercritical fluid.[9] Supercritical carbon dioxide is held at or above its critical pressure, adopting properties in between a gaseous and liquid state to be transported.[10] From there, the carbon dioxide is sent through a pressurized pipeline to an underground injection well, where it is either deposited into dominantly sedimentary rock formations for long-term storage (carbon capture and storage, or CCS) or, more commonly, used (carbon capture and use, or CCU) in an extractive process called enhanced oil recovery.[11] Carbon dioxide acts as a solvent that can break down rock formations and extract any remaining oil in depleted fields and reservoirs.[12] There are approximately 180,000 wells, known as Class II injection wells, commercially used for enhanced oil recovery.[13] By comparison, there are only two active permits in the United States for CCS wells that inject carbon dioxide for long-term storage, known as Class VI injection wells,[14] along with a handful of government-supported research and development CCS projects.[15]

Carbon capture projects have also oversold their ability to reduce carbon dioxide emissions from smokestacks. The Petra Nova project, one of the world's largest post-combustion carbon capture projects located in southeast Texas, claimed it would have captured as much as 90 percent of the plant's overall carbon dioxide emissions; in actuality, it only captured 7 percent,[16] all of which was used for enhanced oil recovery.[17] (The Petra Nova Project was shuttered in 2020 because low oil prices "made it uneconomic to sell carbon dioxide to boost oil drilling operations.")[18]

There is also no proof to claims of "permanent" storage of injected carbon dioxide from CCU or CCS.[19] A recent report from the National Energy Technology Laboratory estimates that only between 30 and 40 percent of the carbon dioxide used for enhanced oil recovery remains underground after each injection cycle.[20] The rest of the carbon dioxide escapes back into the atmosphere. Compounding matters, Louisiana's Department of Natural Resources estimates there are more than 4,000 abandoned or orphaned oil and gas wells in the state.[21] These wells create even more pathways by which carbon dioxide can leak back into the atmosphere,[22] not to mention the other social, environmental, and climate costs associated with these wells.[23]

With CCS, stored carbon dioxide must be adequately contained and regulated for *thousands of years to come* — and too many risks and uncertainties are associated with this relatively new technology. A recent report from the Intergovernmental Panel on Climate Change (IPCC) noted eight critical knowledge gaps related to CCS, including that storage and capacity estimates are imperfect and that the mechanisms for long-term storage are not fully understood.[24] Other key uncertainties include the long-term behavior of carbon dioxide in the subsurface and the long-term evolution of leakage rates.[25] At best, moving forward with the planned industry-wide buildout means consigning future generations to deal with a colossal amount of waste — a ticking time bomb of carbon dioxide stored underground — with no guarantee it will remain secure. A recent study published in *American Geophysical Union* predicts that CCS could have a neutral or even negative impact on climate change, accounting for the energy needed to capture and store carbon dioxide and the delayed carbon dioxide emissions associated with "even low leakage rates" due to imperfect storage.[26]

The primary federal incentive for carbon capture, known as the 45Q Tax Credit — offering companies a tax credit per ton of carbon dioxide captured for use or storage through 2026 — does not ensure the permanent storage of injected carbon dioxide.[27] The International Energy Agency (IEA) estimates that, by 2026, a majority of the tax credit will go to enhanced oil recovery projects and other forms of CCU.[28] Because of this, the IEA forecasts that the 45Q Tax Credit could increase oil production by *50,000 to 100,000 barrels per day*.[29] Companies are only on the hook to repay the credit if claimed carbon dioxide leaks or escapes into the atmosphere within the first three years of use or storage, but verification is virtually nonexistent.[30] Compounding matters, Louisiana has a poor track record for oversight of the oil, gas, and coal industries,[31] and these industries have a poor track record of keeping harmful substances contained.[32]

Perhaps most problematic are the human and health threats that carbon capture projects pose to nearby Black, Indigenous, Hispanic, Asian, and low-income communities in Louisiana. The industrial corridor in Louisiana targeted for carbon capture is home to more than 200 oil and gas refineries, petrochemical plants, and other industrial chemical facilities that release significant quantities of carbon dioxide, among other harmful pollutants.[33] This area was formerly known as "Plantation Country" because it held more than 500 sugarcane plantations.[34] Today, the corridor is known as "Cancer Alley" because decades of poor air and water quality from industrial pollution have heightened cancer rates and other health ailments.[35]

The predominantly Black, Hispanic, and low-income communities in Cancer Alley suffer the brunt of these poor health outcomes; similarly, Indigenous and other marginalized groups on the coast suffer poor health effects on account of other pollution related to the petroleum industry.[36] According to one study, cancer risks from air toxics in Cancer Alley disproportionately affect historically marginalized communities, with more significant impacts skewing toward the poorest communities and those with the highest percentage of Black populations.[37] Forensic Architecture, a research agency based at Goldsmiths, University of London, aptly points out that in Cancer Alley, "environmental degradation and cancer risk manifest as the byproducts of colonialism and slavery."[38] Now, these same communities stand to face continued degradation from carbon capture and its associated infrastructure. They are being asked to do the impossible: trust a set of industries that have historically polluted their air, land, and water, so much so that it has made them sick and shortened their expected life spans.

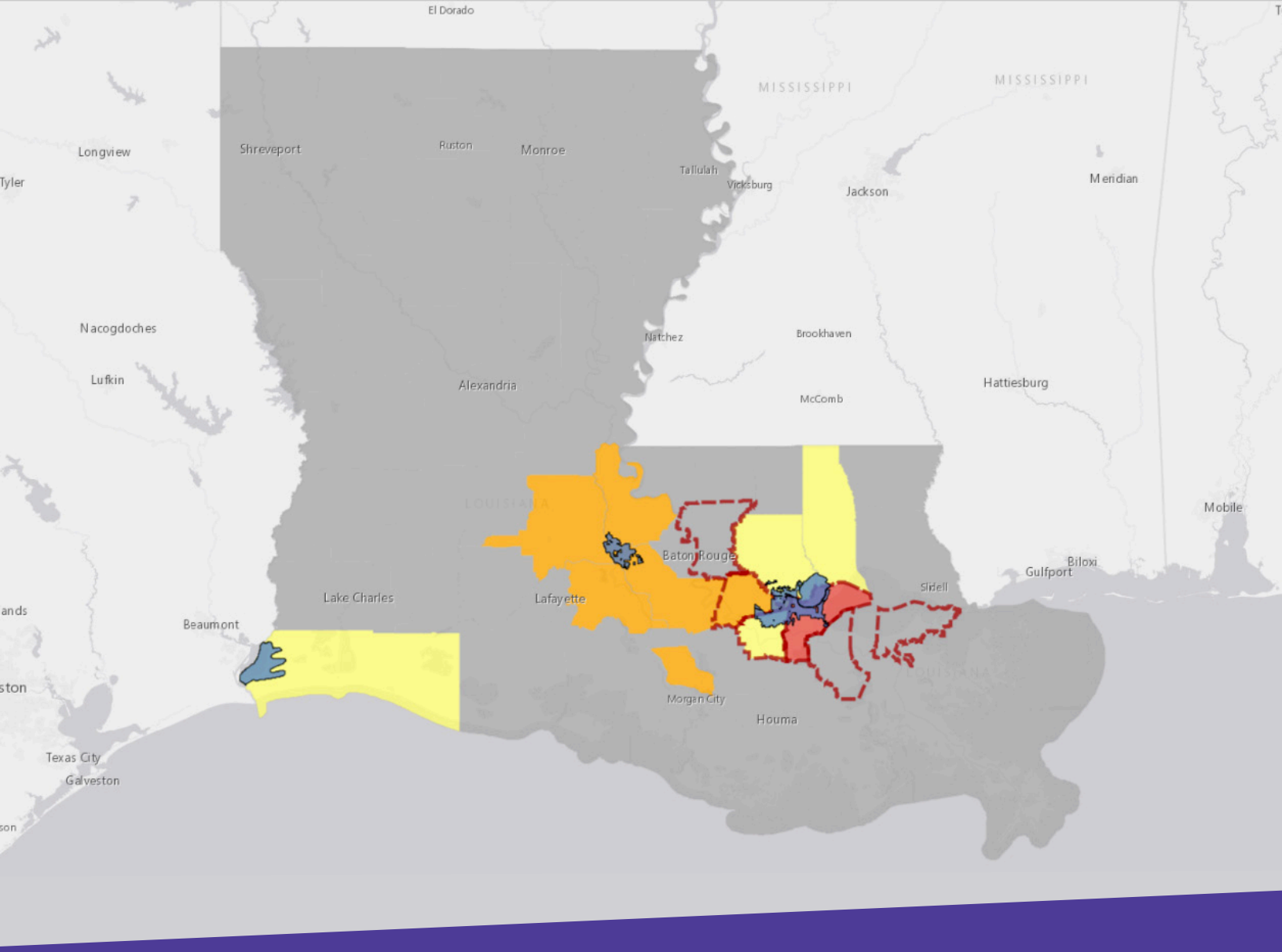
Carbon Capture Storage Proposed in Cancer Alley

In October 2021, Governor John Bel Edwards announced that Air Products Blue Energy ("Air Products") would develop the world's largest carbon capture and geologic sequestration project in Ascension Parish.[39] The $4.5 billion project would involve the construction of a manufacturing plant — where hydrogen is created by converting natural gas in a process

called steam methane reforming[40] — and at least 35 miles of pipeline to transport the captured carbon dioxide east of the manufacturing plant to underground injection wells in the state-owned Maurepas Swamp Wildlife Management Area.[41]

Air Products claims that it will capture, transport, and store roughly 5 million metric tons of carbon dioxide per year.[42] It has already obtained preliminary approval from the Louisiana State Mineral and Energy Board,[43] which has given Air Products its blessing to use more than 122,000 acres of state-owned land in Livingston, St. James, St. John the Baptist, Cameron, and Tangipahoa parishes for the project.[44] A recent study concludes that using carbon capture processes in hydrogen manufacture (described by industry marketers as "blue hydrogen"), in fact, produces much more damaging greenhouse-gas emissions than natural-gas or coal-powered heat-generating facilities.[45] The study, produced by Cornell University and the Park Foundation, finds that the greenhouse gas footprint of "blue hydrogen" is more than 20 percent greater than burning natural gas or coal for heat and approximately 60 percent greater than burning diesel for heat.[46]

The Louisiana State Mineral and Energy Board also recently struck an agreement with Capio Sequestration to drill underground injection wells in the Maurepas Swamp Wildlife Management Area. The state granted Capio Sequestration property interests in more than 44,000 acres of land in Ascension, Iberville, Pointe Coupee, St. John the Baptist, St. Martin, and St. Landry parishes for its project.[47] Capio Sequestration will inject captured carbon dioxide generated by a $9.2 billion renewable diesel refinery at the Port of Baton Rouge — roughly 50 miles away from the underground injection wells in the Maurepas Swamp Wildlife Management Area.[48] The carbon dioxide pipelines transporting the captured carbon dioxide from the biomass diesel refinery will likely span dozens of miles across Cancer Alley.



Red Outline: Cancer Alley

Yellow (Air Products CCS): Livingston, St. James, Cameron, and Tangipahoa Parishes

Orange (Capio Sequestration CCS): Ascension, Iberville, Pointe Coupee, St. Martin, and St. Landry Parishes

Red (Both Projects): St. John the Baptist Parish

Blue: Maurepas Swamp Wildlife Management Area, Sherburne Wildlife Management Area, Lake Maurepas, and Sabine Lake

The Social and Environmental Harms of Carbon Capture

Grave social and environmental harms are associated with carbon capture.[49] The White House Environmental Justice Advisory Council has voiced strong opposition to carbon capture, concluding that it is not a measure that will provide any "benefit" to communities."[50] Carbon capture requires a significant amount of energy and infrastructure to operate — resulting in increased fuel consumption and air pollution.[51] A recent study by researchers at the National Renewable Energy Laboratory and the Lawrence Livermore National Laboratory demonstrates that, from a social cost perspective, the installation and operation of carbon capture equipment powered by natural gas or other fossil fuels cause more damage than doing nothing at all.[52] The social costs include the equipment costs, the poor health outcomes associated with the installation and operation of the infrastructure, and the climate costs associated with burning more fossil fuels to capture carbon dioxide that will then be used to extract more oil.[53] In addition, the injection of carbon dioxide for long-term storage poses a threat to groundwater and drinking water resources.[54]

Carbon capture systems also increase particulate matter, which already has a catastrophic health impact on low-income communities of color near industrial facilities.[55] Particulate matter—a term that includes a range of airborne particles from soot to pollen to dust—is associated with many health risks, including premature death, upper respiratory illnesses, and heart disease.[56] Recent studies show that it is twice as deadly as previously thought.[57]

Another notable environmental and public health concern involves the construction and operation of hundreds of miles of pressurized pipelines that will transport captured carbon dioxide (along with varying amounts of industrial chemicals) across Cancer Alley to coastal areas for "permanent" underground storage.[58] While proponents of carbon capture have suggested using existing natural gas pipelines in Louisiana to transport carbon dioxide, a recent feasibility study finds that only 1 percent of the region's 5,112 pipeline segments could support conversion for carbon dioxide transportation.[59] That's because carbon dioxide must be transported in a highly pressurized state, much higher than natural gas, and corrodes steel, increasing the risk of leaks, fractures, and ruptures.[60]

Carbon dioxide is a Class 2 hazardous material regulated by the U.S. Department of Transportation and an asphyxiant that has devastating impacts on nearby humans, animals, and the environment during and after leaks.[61] Carbon dioxide can escape, leak, or rupture via many avenues during various stages in the carbon capture process.[62] Likewise, the construction of carbon dioxide pipelines and related carbon capture infrastructure will likely destroy thousands of acres of wetlands (compounding existing wetland loss),[63] forests, and coastal areas in southeast Louisiana.

Many other risks are associated with carbon capture — from aboveground leakage and rupture of captured carbon dioxide, underground leakage into drinking water, induced earthquakes, degradation of coastal ecosystems targeted for storage, and increased fossil fuel extraction and use.[64]

The Legal and Regulatory Landscape of Carbon Capture in Louisiana

In Louisiana and the rest of the United States, an uneven patchwork of laws and regulations governs carbon capture. The Louisiana Geologic Sequestration of Carbon Dioxide Act, first passed in 2009, limits business liabilities and the inevitable legal consequences for carbon capture developers.[65] Carbon capture projects are subject to only a haphazard permitting process. The law's piecemeal nature prevents Louisiana and the U.S. Environmental Protection Agency (EPA) from addressing the cumulative impacts associated with any given carbon capture project, let alone the cumulative effects associated with a regional carbon capture system or the long-term risks associated with storing millions of metric tons of carbon underground.

Federal Laws that May Apply to Carbon Capture in Louisiana

Any company wishing to operate an underground injection well for carbon storage, a class VI well, must obtain a Safe Drinking Water Act permit.[66] These wells are also subject to the Clean Air Act's Greenhouse Gas Reporting Program, which requires assorted monitoring and reporting requirements related to carbon dioxide emissions based on the well class.[67] If any part of the carbon capture and storage operation involves construction in wetlands, it will likely require a Section 404 permit under the Clean Water Act[68] and trigger other requirements under the Coastal Zone Management Act[69] and Louisiana's State and Local Coastal Resources Management Act.[70] Approximately 40 percent of the country's wetlands are located in the southern coastal region of Louisiana, the area targeted for carbon capture development.[71]

Installation of carbon capture equipment or a compressor station at an industrial facility may also trigger the Clean Air Act's New Source Review program, resulting in stricter pollution control requirements at the facility.[72] For any carbon capture developer that proposes to construct a new industrial facility, rather than utilizing the carbon dioxide emissions from an existing facility, the developer must obtain multiple permits under the Clean Air and Clean Water Acts. The development and operation of carbon capture infrastructure in Louisiana may also be subject to the Endangered Species Act[73] and other state laws, like Louisiana's Public Trust Doctrine.[74] Lastly, the National Environmental Policy Act will play a role in ensuring that an environmental impact statement is issued for various federal checkpoints in the carbon capture approval process.[75] For instance, the law may require an environmental impact statement for any part of the carbon capture infrastructure that has received federal permission to operate (such as an EPA permit for a Class VI well). The law is also triggered if any "connected" part of the infrastructure has a federal nexus (i.e., a pipeline crosses federal lands or waterways or receives a certain level of federal funding).[76]

Louisiana law delegates eminent domain authority to private companies for the purpose of acquiring private property (subsurface and surface rights) for the construction and maintenance of storage facilities and pipelines (Louisiana Revised Statute 30:1108(A)(1)). This would include projects involving CCS. The fossil fuel industry has abused such delegated authority in the past, confiscating the property of Louisiana land owners in violation of law (e.g. ***Bayou Bridge Pipeline, LLC v. 38.00 Acres***). While the process is somewhat controversial, an operator may exercise eminent domain delegated by the state only after obtaining a Certificate of Public Convenience and Necessity for a particular project (Louisiana Revised Statute 30:1102). Opponents of such actions are entitled to voice their concerns in public hearings that the Office of Conservation must hold before granting or denying any certificate (Louisiana Revised Statute 30:1107). While the state of Louisiana has preemptively declared carbon capture "in the public interest," Louisiana courts and the Office of Conservation must still determine the exact limits of the delegation of state eminent domain powers where CCS is concerned.

In April 2021, Louisiana applied for primary regulatory and oversight authority, or "primacy" under the Safe Drinking Water Act, over Class VI underground injection wells used for CCS.[77] In determining whether to grant Louisiana primacy over this particular class of wells, the EPA must consider various factors, including whether the state's Office of Conservation can effectively administer a Class VI program that is as stringent as the EPA's.[78]

If Louisiana were to gain primary authority to regulate Class VI wells, the state's Department of Natural Resources Office of Conservation (DNR-OC) would oversee the facilities. But DNR-OC lacks the necessary resources to provide proper oversight and ensure widespread compliance with its existing programs,[79] calling into question its ability to provide the requisite level of oversight for these wells.

The agency already retains primacy over Class I, II, III, IV, and V wells and has a poor track record in regulating Class II wells used by the oil and gas industry.[80] A legislative audit found that the agency failed to "sufficiently monitor wells to determine if they comply with regulations" and did "not always take enforcement action when it identifies noncompliance."[81] The audit also found that that the agency did not conduct required routine inspections for more than half (53 percent) of the active oil and gas wells by the specified timeframes."[82] Expanding the agency's programmatic authority would further stretch its limited resources, indirectly encouraging widespread noncompliance. Since the minimum regulations set by the EPA for Class VI wells are far more extensive than the rules for Class II wells and require greater oversight,[83] the EPA should not grant the Louisiana DNR-OC primacy for Class VI wells.

Climate Justice for Louisianans

Compliance with environmental laws alone will not fully address the long list of risks associated with carbon capture. Indeed, carbon capture will only delay the rapid transformation of our energy sector needed to keep global heating to 1.5 degrees Celsius or below.[84] Instead, Louisiana lawmakers and regulators should pursue actions and policies that emphasize an ambitious transition of the state's infrastructure to renewable energy sources, like solar, geothermal, tidal, and wind (both onshore and offshore).[85] Of the utmost importance, any new infrastructure built in the state of Louisiana must not further harm or endanger the historically marginalized and environmental justice communities living there.

While sources of carbon dioxide in Louisiana are plentiful, carbon-free clean energy projects are few and far between.[86] Federal and state funding should prioritize carbon-free energy projects, shifting current incentives from carbon capture (e.g., approximately $10.3 billion in federal funding for carbon capture over the next four years)[87] to expanding carbon-free, clean, and renewable energy infrastructure. Abandoned oil and gas infrastructure should be used to retrofit geothermal projects to harness pressurized heat deep underground.[88] Some areas in northern Louisiana, in particular, have ideal subsurface environments for tapping into the earth's geothermal energy sources.[89]

Equally as important, communities in Cancer Alley and other communities who have borne the brunt of the climate crisis must be at the front of the line for any climate or toxic pollution mitigation and climate adaptation efforts.[90] These community members, who have long suffered from oil and gas operations, require immediate attention. They are entitled to reap the benefits of this clean energy transition, including the decent-paying jobs it will create.[91] Thus, climate solutions should involve local communities at every stage of development. An equitable climate justice transition means leaving no one behind, with environmental justice communities being a primary beneficiary of all the positive outcomes this new era promises.[92]

Recommendations

- The Louisiana State Legislature should pass a statewide moratorium on the siting of any new carbon capture and storage projects in or near any community overburdened by polluting facilities or in or near environmentally fragile areas such as coastal wetlands.

- Industrial carbon capture projects at polluting facilities should be ineligible for any state (and federal) subsidies. Subsidies for new technologies should instead be directed toward electrifying high-heat industrial processes, expanding carbon-free chemical manufacturing processes, designing offshore wind technologies for use in the Gulf of Mexico and utilizing the abundance of solar and geothermal energy sources the state boasts.

- Philanthropic leaders and organizations should make sufficient resources available to support environmental justice communities and advocacy groups in Louisiana's Cancer Alley so they can use the array of legal tools available to oppose carbon capture and hold Louisiana, the EPA, and private developers accountable for any proposed construction of carbon capture and storage operations.

- State governors and policymakers, including in Louisiana, should allocate resources and create incentives to support the necessary transition away from fossil fuels and production to carbon-free, clean, and renewable energy sources.

- Significant investments must be made in Cancer Alley and Louisiana's coastal communities to enhance the quality of life, mitigate the decades of harm done to communities by toxic industries, and support a community-driven recovery that prioritizes the voices of those most impacted.

Appendix: Carbon Capture Projects and Socioeconomic Data in Louisiana Parishes

	Parish	*Population Size*	*Race & Ethnicity*	*Median Household Income*	*U.S. Median Household Income* ($65,712)
Air Products					
	Livingston	142,282	White (80.7%) Black (7.8%) Hispanic (6.1%)	$63,389	Below
	St. James	20,192	White (49.1%) Black (46.9%) Other (1.7%)	$51,603	Below
	St. John the Baptist	42,477	Black (56.6%) White (31.4%) Hispanic (7.7%)	$57,429	Below
	Cameron	5,617	White (92.1%) Hispanic (3.5%) Other (2.2%)	$53,423	Below
	Tangipahoa	133,157	White (59.9%) Black (29.8%) Hispanic (5.4%)	$47,832	Below
Capio Sequestration					
	Ascension	126,500	White (62.9%) Black (23.9%) Hispanic (8.2%)	$80,527	Above
	Iberville	30,241	Black (44.0%) Hispanic (4.6%) White (48.3%)	$50,161	Below
	Pointe Coupee	20,758	White (58.9%) Black (34.7%) Hispanic (3.0%)	$41,480	Below
	St. John the Baptist	42,477	Black (56.6%) White (31.4%) Hispanic (7.7%)	$57,429	Below
	St. Martin	51,767	White (63.5%) Black (29.0%) Hispanic (3.2%)	$48,656	Below
	St. Landry	82,540	White (52.3%) Black (41.4%) Hispanic (2.6%)	$36,403	Below

Endnotes

[1] The analysis in this report only extends to industrial, post-combustion activities, in which the carbon dioxide that results from industrial processes or from the burning of fossil fuels to generate electricity or heat is captured before it can be released into the atmosphere and is then stored in dominantly sedimentary rock formations or is used to recover oil or make another product.

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