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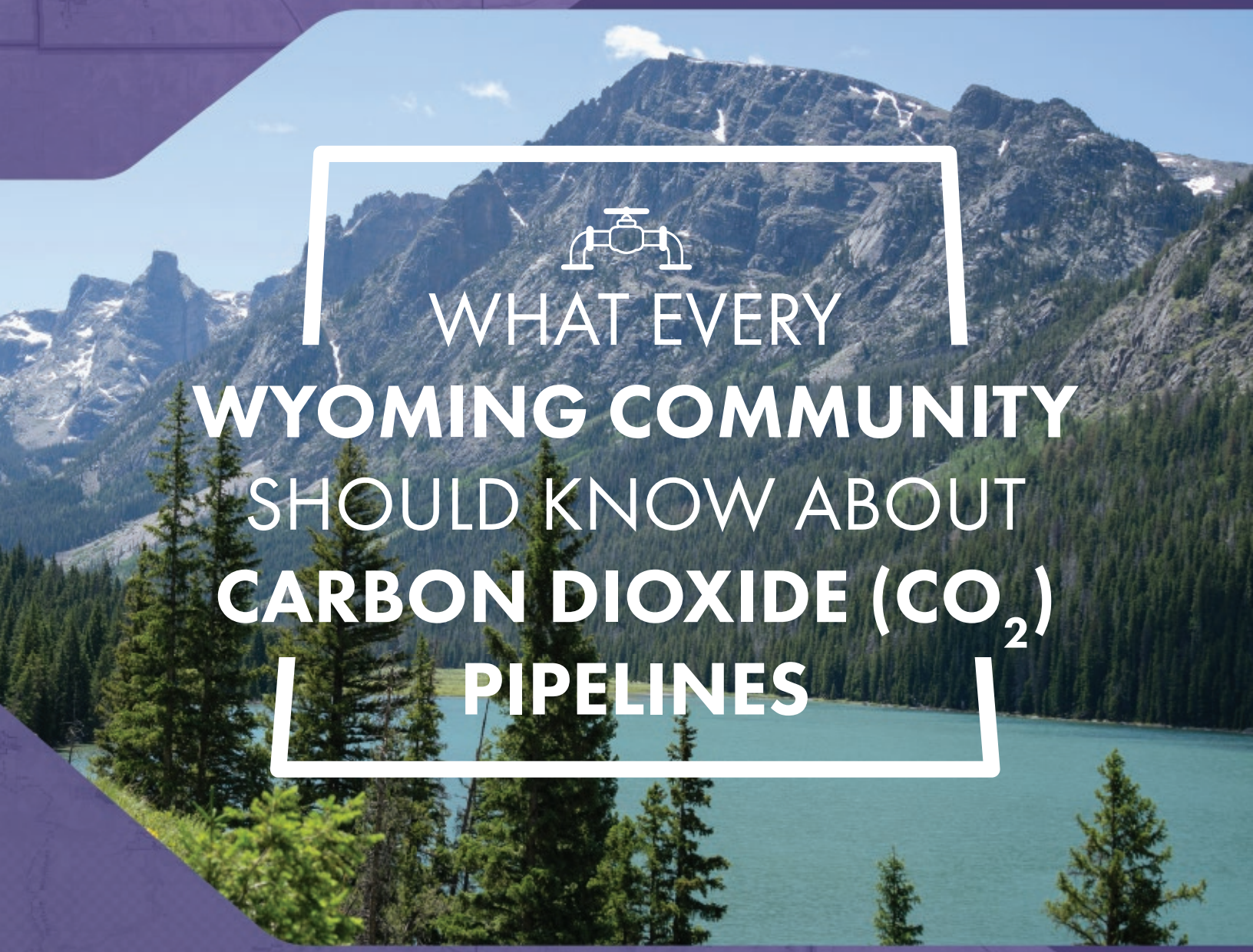

# WHAT EVERY **WYOMING COMMUNITY** SHOULD KNOW ABOUT **CARBON DIOXIDE ($CO_2$) PIPELINES**

PART OF THE
SCHOOL OF ENERGY RESOURCES (SER)
LANDOWNER GUIDE SERIES

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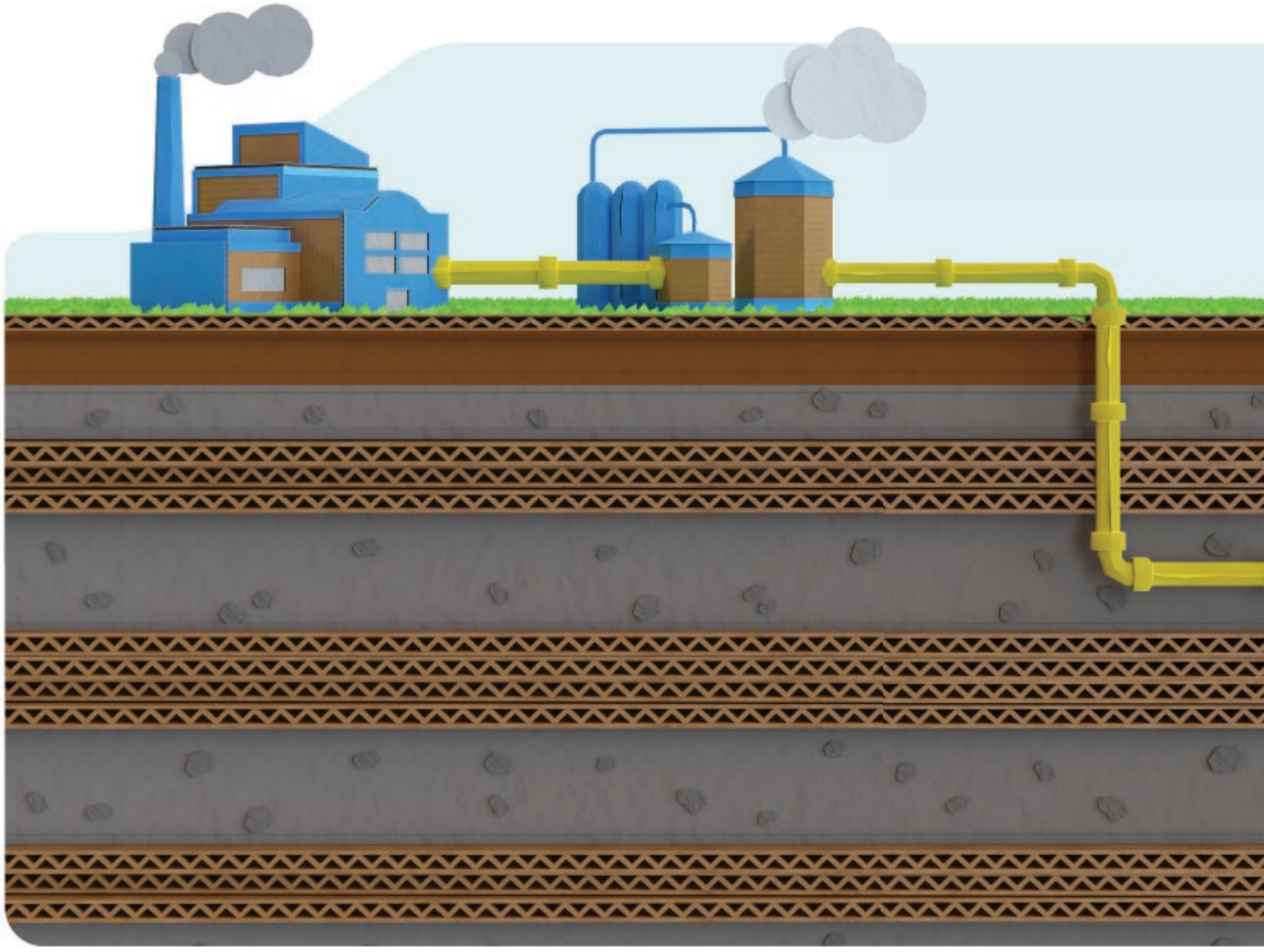

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UW | School of Energy Resources

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# ACKNOWLEDGMENTS


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# THE WHERE, WHY, AND HOW OF CO2 TRANSPORT

## WHAT IS THE HISTORY OF CO2 TRANSPORT IN WYOMING?

There is an extensive network of CO2 transportation pipelines already in operation or development across more than a dozen United States (U.S.) states—primarily in the Midwest, Southwest, and Gulf Coast regions of the country[1]—as well as Saskatchewan and Alberta, Canada.[2] In the U.S., there are over 5,000 miles of CO2 pipelines, some of which have been in use for over 50 years.[3]

There are already more than 300 miles of CO2 pipeline operating in Wyoming. Two large-scale trunk lines deliver CO2 captured from the Shute Creek natural gas processing plant to Salt Creek and other oil fields for enhanced oil recovery (EOR) operations.[4] The Shute Creek line carries approximately 1,200 million cubic feet of CO2 per day (mmcf/d) and the Greencore line, completed in 2012, carries approximately 720 mmcf/d.[5] Smaller distribution lines deliver this CO2 to EOR operations in Fremont, Sweetwater, and Natrona Counties.[6] In 2012, the state of Wyoming began the process of establishing pre-determined corridors across federal lands to facilitate future expansion of the CO2 pipeline network. That process was completed in 2021.[7]

[1] *Active Pipelines in the NPMS,* U.S. Pipeline & Hazardous Materials Safety Admin., https://www.npms.phmsa.dot.gov/Documents/NPMS_CO2_Pipelines_Map.pdf (updated Mar. 11, 2024) (showing location of "liquefied CO2" pipelines).

[2] *Market Snapshot: Canada is expanding its CO2 pipeline network,* Canada Energy Regulator (May 1, 2024), https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2024/market-snapshot-canada-is-expanding-its-co2-pipeline-network.html#:~:text=In%20Canada%2C%20new%20carbon%20dioxide,2%20capture%20and%20pipeline%20project.

[3] *Ann. Rep. Mileage for Hazardous Liquid Carbon Dioxide Sys.,* U.S. Dep't of Transp. (2024).

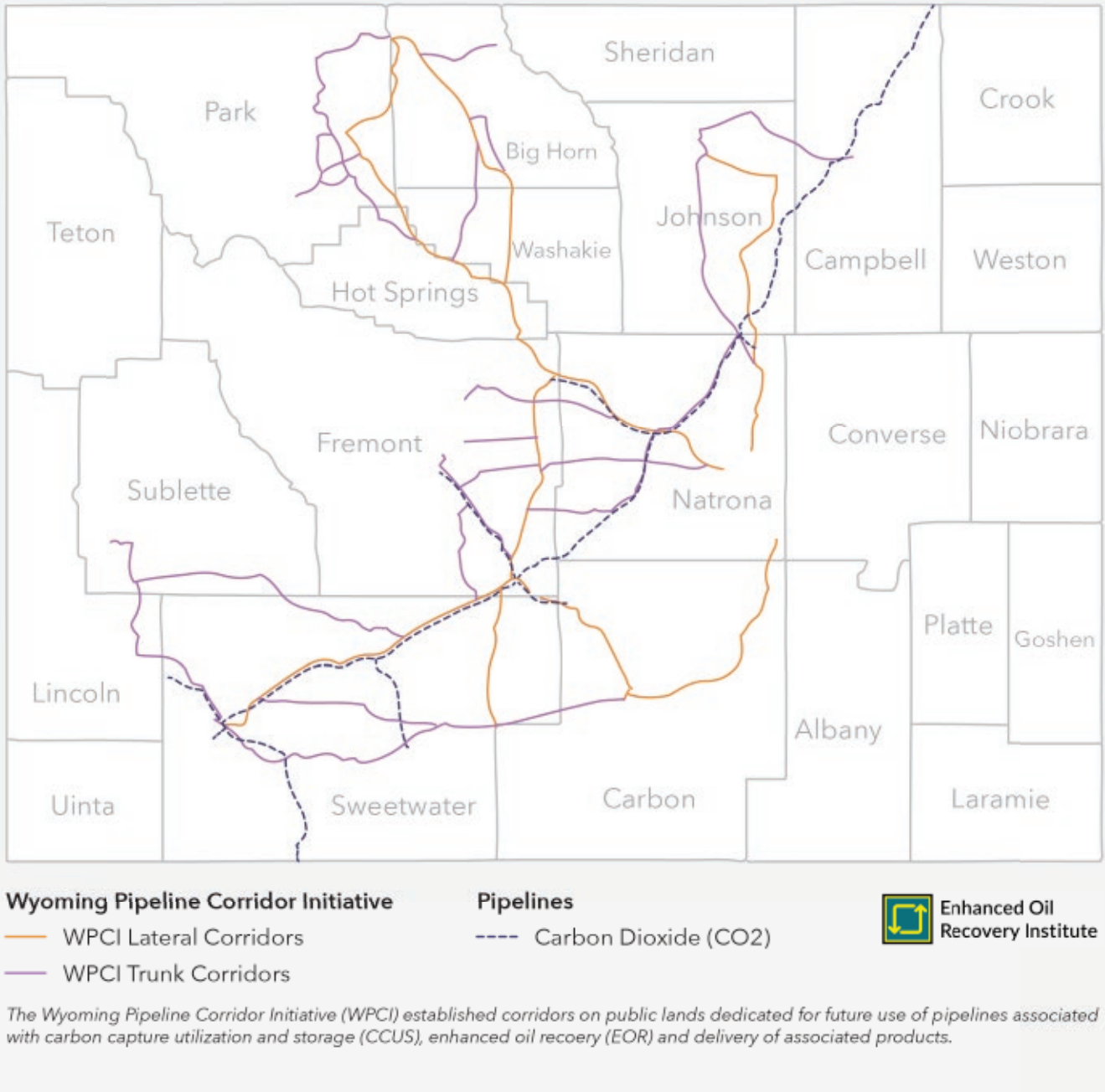
[4] Matthew Wallace, et al., *A Review of the CO2 Pipeline Infrastructure in the U.S.,* U.S. Dep't of Energy Nat'l Energy Tech. Lab. (Apr. 21, 2015), https://www.energy.gov/sites/prod/files/2015/04/f22/QER%20Analysis%20-%20A%20Review%20of%20the%20CO2%20Pipeline%20Infrastructure%20in%20the%20U.S_0.pdf.

[5] *Id.*

[6] *Id.*

[7] Brad Purdy, *BLM Wyoming releases decision on corridor initiative* (Jan. 19, 2021) https://www.blm.gov/press-release/blm-wyoming-releases-decision-corridor-initiative.

**Figure 1:** Map of Wyoming showing existing CO2 pipelines and WPCI





## WHERE DOES CO2 COME FROM AND HOW IS IT USED?

CO2 can be extracted from underground sources or can be captured from industrial facilities, such as ethanol plants, paper mills, mining processing facilities, natural gas processing plants, coal-fired generating facilities and more.[8] Point source capture, which refers to the process of capturing CO2 directly from an industrial facility before it is released into the atmosphere, is particularly important to the decarbonization of hard-to-abate sectors such as the biofuels, cement, steel, or chemical industries.[9] CO2 captured from industrial point-sources is often referred to as "anthropogenic" (human-created) CO2. Direct air capture (DAC) is another technology that also allows removal of CO2 directly from the air.[10] Once captured, most CO2 is processed, dehydrated, pressurized, and transported via pipeline to end users or for permanent storage underground.[11]

Although CO2 is frequently characterized as a waste, it is also utilized as a commodity in various settings, including in the food and beverage, industrial, and medical sectors.[12] Most CO2 is used as an injectant for enhanced oil recovery (EOR), a technique used to recover thirty to sixty percent more oil from mature fields.[13] As reported by the Enhanced Oil Recovery Institute at the University of Wyoming, CO2-based EOR accounts for 6% of total annual oil production in Wyoming, generating approximately $26,000,000 annually in state tax revenue.[14] The majority of CO2 used in EOR remains trapped underground and is stored. When anthropogenic[15] CO2 is used for EOR, this reduces the carbon intensity of oil production.[16]

[8] Ian J. Duncan, *Enhanced Oil Recovery: Legal Framework for Sustainable Management of Mature Oil Fields,* The Found. for Nat. Res. and Energy L. Ann. and Special Inst. Part 7 (2015); Ramsey Fahs et al., *Pathways to Commercial Liftoff: Carbon Management,* Dep't of Energy, Chapter 2: Current State – Carbon Management Technologies and Markets: Figure 3, page 8 (2023), https://liftoff.energy.gov/wp-content/uploads/2024/02/20230424-Liftoff-Carbon-Management-vPUB_update4.pdf.

[9] Int'l Energy Agency, Carbon Capture, Utilisation, and Storage, https://www.iea.org/energy-system/carbon-capture-utilisation-and-storage (last visited May 22, 2024).

[10] Duncan., *supra* note 8, at 12.

[11] Jennifer Pett-Ridge et al., *Roads to Removal: Options for Carbon Dioxide Removal in the U.S.,* Roads to Removal, *Chapter 5: CO2 and Biomass Transportation,* 5-1 (2023), https://roads2removal.org/#geologic-storage-and-transportation.

[12] Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation,* 30 Energy L. J. 85 (2009).

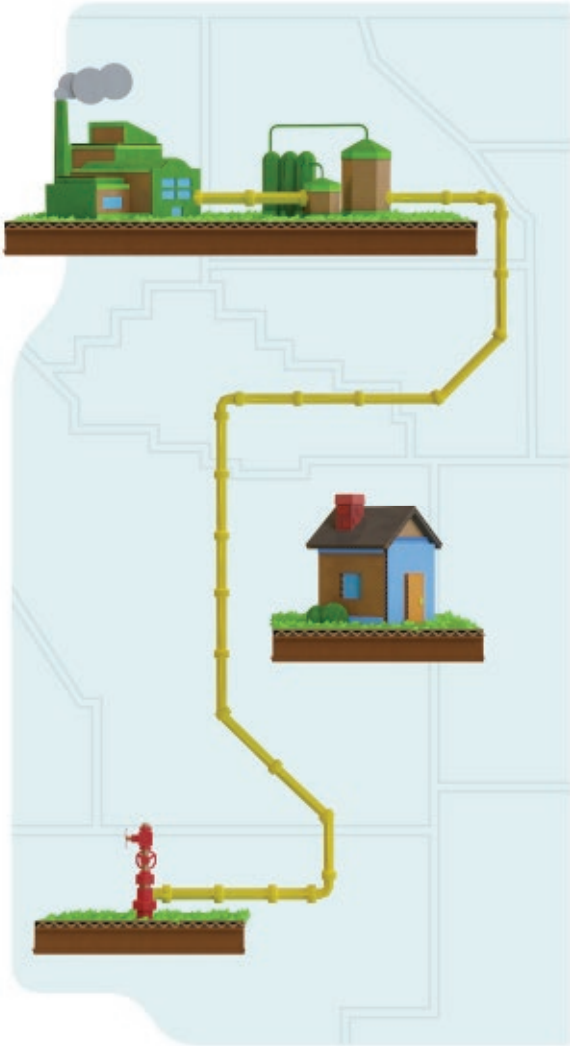
[13] *Enhanced Oil Recovery,* Dep't of Energy, https://www.energy.gov/fecm/enhanced-oil-recovery (last visited May 22, 2024).

[14] Lon Whitman, *EORI CO2 EOR Fact Sheets 2024,* Enhanced Oil Recovery Inst. (2024), https://www.eoriwyoming.org/projects-resources/publications/344-eori-co2-eor-fact-sheets-2024/download.

[15] *Anthropogenic*, Merriam-Webster Dictionary (2024): "of, relating to, or resulting from the influence of human beings on nature."

[16] Fahs, *supra* note 8, at 18; *$CO_2$ EOR Yields a 37% Reduction in $CO_2$ Emitted Per Barrel of Oil Produced,* Clean Air Task Force (2019), https://www.catf.us/wp-content/uploads/2019/06/CATF_EOR_LCA_Factsheet_2019.pdf.

Permanent geologic storage of CO2 can also be a standalone objective. Technologies such as carbon capture and storage (CCS) are becoming more widespread as a strategy for climate change mitigation.[17] CO2 is captured either directly from a point source (such as a coal-fired power plant) or directly from the atmosphere via DAC, and then subsequently transported and injected into a secure geologic formation underground, where it is sequestered in perpetuity.



## WHY ARE CO2 PIPELINES NEEDED?

Sources of CO2 supply are not always located near places with CO2 demand, such as established oil fields, or appropriate geologic formations for permanent storage. In these cases, pipelines provide a transportation mechanism.[18] As new capture capabilities are added to CO2-emitting facilities across the U.S, additional pipelines and infrastructure will be required to deliver CO2 to end users or storage locations.[19] Building this capacity can support development of new EOR projects, direct air capture and carbon storage projects, and new Wyoming industries that depend on availability of storage capacity. Such industries may include the hydrogen and ammonia industries, which produce significant amounts of CO2 that have the potential to be abated through CCS.[20]

[17] *Carbon Capture*, Utilisation and Storage, Int'l Energy Agency, https://www.iea.org/energy-system/carbon-capture-utilisation-and-storage (last visited July 12, 2024).

[18] *See* Hongfang Lu et al., *Carbon dioxide transport via pipelines: A Systematic Review*, 266 J. of Cleaner Prod. 121994 (2020); Roads to Removal, https://roads2removal.org/#geologic-storage-and-transportation (last visited May 24, 2024); *See generally* Jerry R. Fish & Eric L Martin, Technical Advisory Comm. Report: Approaches to Pore Space Rights, Cal. Carbon Capture & Storage Rev. Panel (2010), http://www.climatechnage.ca.gov/carbon_capture_review_panel/mettings/2010-08-18/white_papers/Pore_Space_Rights.pdf.

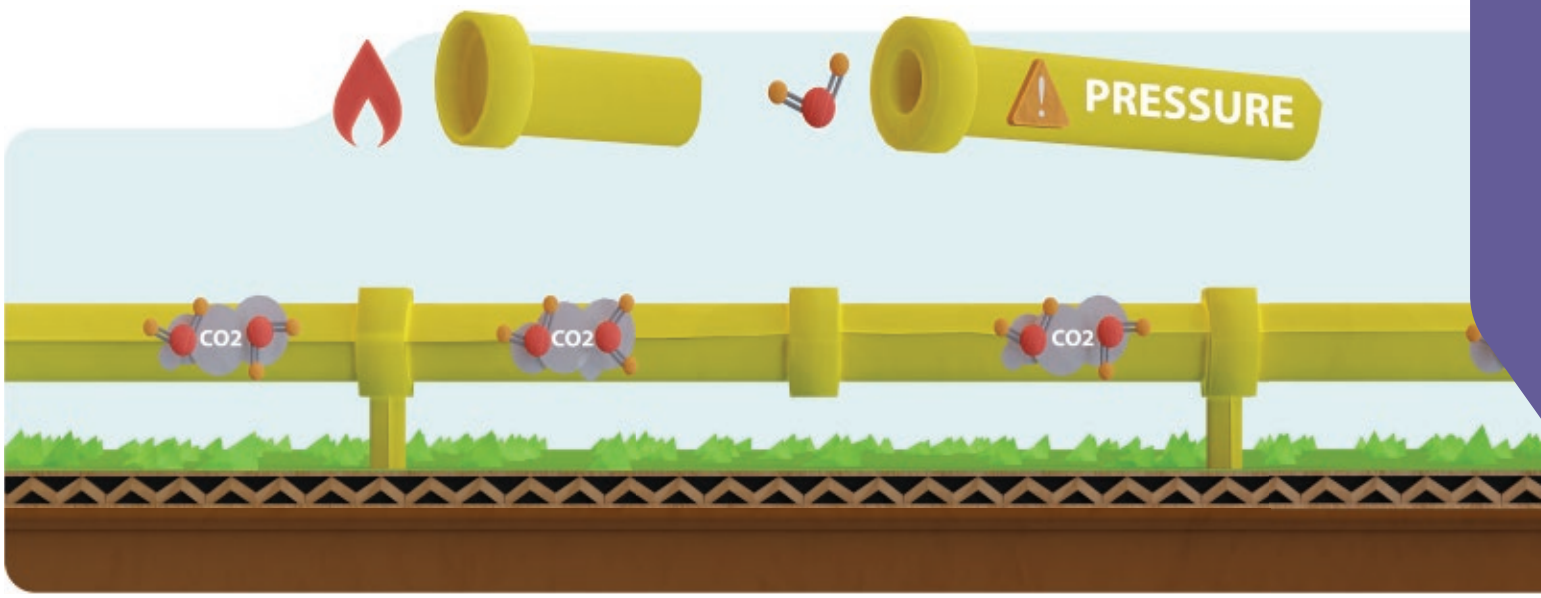
[19] *See* John Gale & John Davison, *Transmission of CO2—Safety and Economic Considerations,* 29 Energy 1319, 1319–28 (2004).

[20] *See* Madeleine Lewis, et al., *Hydrogen Development with CCS in Wyoming*, Univ. of Wyo. School of Energy Res. (2023), https://www.uwyo.edu/ser/research/centers-of-excellence/energy-regulation-policy/_files/h2-development-with-ccs-in-wyo.pdf; *Ammonia Technology Roadmap*, Int'l Energy Agency (2021), https://iea.blob.core.windows.net/assets/6ee41bb9-8e81-4b64-8701-2acc064ff6e4/AmmoniaTechnologyRoadmap.pdf.



## HOW DOES CO2 TRANSPORT WORK?

Most CO2 captured for carbon sequestration or for use in EOR will be transported by pipelines specifically designed for CO2 transport. CO2 behaves differently depending on temperature and pressure combinations allowing it to be a solid, liquid, gas, or a dense phase.[21] Most existing and proposed pipelines move CO2 in a "dense phase" or "supercritical phase" that has properties of both a liquid and a gas.[22] Transport in these phases requires higher pressures than those used for the transport of natural gas.[23] As a result, CO2 pipelines typically use thicker walled pipe,[24] and may use additional linings, claddings, and coatings to manage corrosion risk.[25] Some existing natural gas pipelines may be compatible with these specifications and could move CO2 in a gaseous phase, however, repurposing natural gas pipelines as CO2 pipelines for transport in the supercritical phase is generally difficult.[26]




[21] James B. Curry, *Developing Carbon Dioxide Infrastructure,* 98 N.D. L. Rev. 387, 389 (2023).

[22] *Id*.

[23] J. Greg Schnacke, Philip M. Marston & Patricia A. Moore, *Enhanced Oil Recovery: Legal Framework for Sustainable Management of Mature Oil Fields,* The Found. for Nat. Res. and Energy L. Ann. and Special Inst. Part 10 (2015).

[24] Philip M. Marston & Patricia A. Moore, *From EOR to CCS: The Evolving Legal and Regulatory Framework for Carbon Capture and Storage,* 29 Energy L.J. 421, 435 n.15 (2008); *Developing a Pipeline Infrastructure for CO2 Capture and Storage: Issues and Challenges,* ICF Int'l, 35 n.65 (2009), https://ingaa.org/wp-content/uploads/2009/02/8228.pdf [hereinafter "ICF Report"].

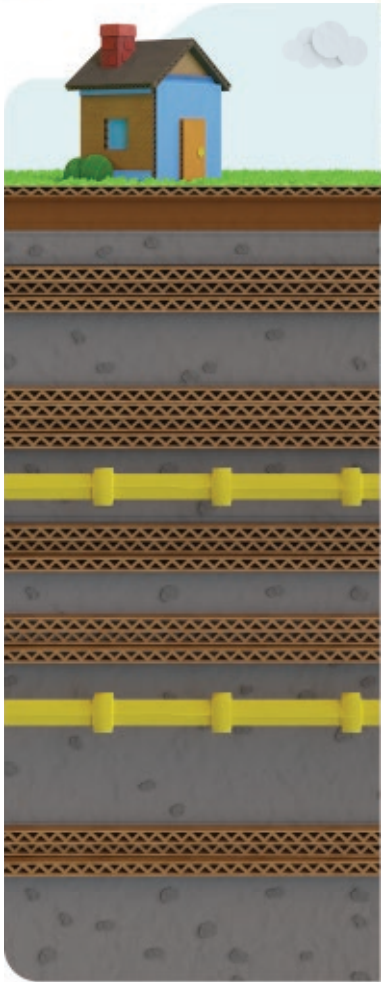
[25] Marston & Moore, *supra* note 24, at 435–36; ICF Report, *supra* note 24, at 39.

[26] *Recommended Practice: Design and Operation of CO2 Pipelines*, Det Norske Veritas, DNV-RP-J202, at 29 (Apr. 2010); Marston & Moore, *supra* note 24, at 430, 436, 450 (*citing Southern Natural Gas Co.*, 115 F.E.R.C. 62, 266 at P 1-3 (2006)).

## WHO PAYS FOR CO2 TRANSPORT?

CO2 pipeline operators charge a fee for the transport of CO2.[27] In the case of geologic storage operations, these fees are typically paid by the company that operates the capture equipment. Where the CO2 is used in EOR, transport is usually paid by the oil and gas company.[28] Charges for CO2 pipeline transport are generally not subject to economic regulation like natural gas pipelines,[29] but are established to cover capital costs of construction, land acquisition, operation, and to provide a rate of return.[30]

For some projects, CO2 transport costs may be partially funded by federal tax credits. The federal government has incentivized the storage and utilization of CO2 through the enactment of 45Q, a federal tax credit for the capture and storage of CO2. Companies that operate capture equipment earn tax credits for each ton of carbon oxide that is permanently stored underground.[31] The amount per ton varies depending on how the CO2 is captured and whether it is used for EOR, with higher credits for direct air capture and geologic storage and lower credits for EOR and other utilization technologies.[32] Depending on the project, some companies may also be able to claim additional incentives, sell carbon offset credits or realize profits from the sale of low carbon products.[33]



[27] *See Business Models for Commercial CO2 Transport and Storage*, Zero Emissions Platform, 6 (Figure 2: Timeline for income and expenditure for CO2 capture transport and storage) (2014), https://zeroemissionsplatform.eu/wp-content/uploads/ZEP-report-on-Business-Models-for-Commercial-CO2-Transport-and-Storage.pdf [hereinafter "Business Models"].

[28] Marie B. Durrant, *Enhanced Oil Recovery: Legal Framework for Sustainable Management of Mature Oil Fields,* The Found. for Nat. Res. and Energy L. Ann. and Special Inst. pt. 5 (2015).

[29] Curry, *supra* note 21. The Federal Energy Regulatory Commission (FERC) is responsible for the economic regulation of interstate natural gas pipelines, imposing cost and business practice requirements. *See* 18 C.F.R. pt. 284.

[30] Sean T. McCoy & Edward S. Rubin, *An Engineering-economic Model of Pipeline Transport of CO2 with Application to Carbon Capture and Storage,* 2 Int'l J. of Greenhouse Gas Control 223 (2023) ("The total construction cost for each project is broken down into four categories: materials, labor, right-of-way (ROW), and miscellaneous charges. The materials category includes the cost of line pipe, pipe coatings, and cathodic protection. Labor is the cost of pipeline construction labor. ROW covers the cost of obtaining right-of-way for the pipeline and allowance for damages to landowners' property during construction. Miscellaneous includes the costs of surveying, engineering, supervision, contingencies, telecommunications equipment, freight, taxes, allowances for funds used during construction (AFUDC), administration and overheads, and regulatory filing fees".).

[31] 26 U.S.C. § 45Q (2022).

[32] *Id*.

[33] *Economic Contributions of Summit Carbon Solutions,* Ernst & Young LLP, 9 (2022), https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-001/SCSIMPACTREPORT.pdf.

# SITING

## HOW ARE CO2 PIPELINES SITED?

The Federal Energy Regulatory Commission (FERC) has determined that the scope of its jurisdiction to regulate pipelines does not include those for CO2 because CO2 is not considered "natural gas" under the Natural Gas Act.[34] As a result, pipeline routing decisions, as well as authority for eminent domain, are determined according to state procedures.

Route selection is influenced by numerous factors. The primary drivers for CO2 pipelines will be the locations of sources of CO2 and the locations of "sinks" for CO2—either suitable geologic storage facilities or enhanced oil field projects. Geographic factors such as topography may also impact routing. The National Energy Technology Laboratory has created a database that evaluates slope, public and energy infrastructure, and ground cover that provides planners with information about areas that are favorable for routing.[35] When determining the optimal pipeline route, pipeline companies consider this and other information like human safety and proximity to sensitive and protected resources.

In Wyoming, there is no state routing process. However, if the pipeline company needs to exercise eminent domain to acquire necessary access, it will be required to demonstrate to the court that the route was chosen to maximize public good and minimize private injury.[36]

[34] *See Aulston v. United States,* 915 F.2d 584, 595 n.15, 596 (10th Cir. 1990) (citing *Cortez Pipeline Co.*, 7 F.E.R.C. 61,024 (1979) (holding by FERC that CO2 is not natural gas within the meaning of the Natural Gas Act)).

[35] *NETL Develops Pipeline Route Planning Database to Guide CO2 Transport Decisions,* Nat'l Energy Tech. Lab. (May 31, 2023), https://netl.doe.gov/node/12580.

[36] Wyo. Stat. Ann. §1-26-504 (2024).

## WHEN ARE STATE AND FEDERAL AGENCIES INVOLVED?

Even though CO2 pipelines are exempted from the Wyoming Industrial Siting Act,[37] CO2 pipeline operators will interact with numerous state agencies throughout the siting and construction process.[38] Land along the pipeline route is often owned or managed by state agencies requiring operators to engage with state agencies throughout the project. For example, the Wyoming Department of Transportation has rules and regulations concerning the construction of pipelines within highway rights-of-way.[39]

Where the federal government owns land, it has the authority to decide whether and where to grant rights of way for pipelines. Title V of the Federal Land Policy and Management Act (FLPMA) grants the Departments of Agriculture and Interior the authority to grant, issue, or renew rights-of-way over public lands for various purposes, including carbon pipeline systems.[40] The Bureau of Land Management (BLM) also has authority to issue rights-of-way for CO2 pipelines under the Mineral Leasing Act (MLA).[41] Pipeline rights-of-way must be consistent with agencies' applicable land use plans, and may require additional environmental analyses and mitigation of potential environmental impacts under the National Environmental Policy Act (NEPA).[42]

## WHAT AUTHORITY DO LOCAL GOVERNMENTS HAVE?

Local governments—counties or municipalities—may enact zoning ordinances that apply to CO2 pipelines,[43] provided they do not conflict with the Pipeline Hazardous Materials Safety Administration's (PHMSA's) standards for safety or with state laws.[44] The lack of a statewide siting framework in Wyoming may provide more room for local government regulation, though any rules would still need to relate to the local government entity's land use authority.

[37] Wyo. Stat. Ann. § 35-12-119(c)(iii) (2023).

[38] *Building Our Way to Net-Zero: Carbon Dioxide Pipelines in the United States*, Global CCS Inst., 15 (Table 2 (Overview of types of permits and permissions needed for CCUS projects), https://www.globalccsinstitute.com/wp-content/uploads/2024/05/Building-Our-Way-to-Net-Zero-Carbon-Dioxide-Pipelines-in-the-United-States.pdf.

[39] Wyo. Stat. Ann. § 1-26-813 (2024); Wyo. Stat. Ann. § 24-2-105 (2024).

[40] Title V of the Federal Land Policy and Management Act (FLPMA); *United States v. Jenks*, 22 F.3d 1513, 1515 (10th Cir. 1994).

[41] *See* 30 U.S.C. § 185(a) (2024); *see also Exxon Corp v. Lujan,* 970 F.2d 757 (10th Cir. 1992) (discussing the appropriateness of BLM's decision to issue a CO2 pipeline permit under the MLA and determining that the BLM can appropriately issue these permits under either FLMPA or the MLA).

[42] *Id.* at § 185(h).

[43] Center for Environmental Policy, *20-01: Planning, Zoning and Hazardous Liquid Pipelines*, Kentucky Resources Council, 1, https://www.kyrc.org/assets/files/news_images/20-01_PlanningAndZoningAndHazardousLiquidsPipelines.pdf.

[44] 49 U.S.C. § 60104(c) (2024).

# SAFETY

## ARE CO2 PIPELINES SAFE?

CO2 pipeline ruptures or leaks rarely pose a threat to humans or animals. CO2 is non-combustible, however, because CO2 displaces the oxygen in the air, it is considered an asphyxiant. Serious health impacts only occur as a result of exposure to extreme concentrations.[45] In most situations, when CO2 in a super-critical phase is released into open air (as would generally be the case with a pipeline leak or rupture) it will naturally vaporize, dissipate, and pose a minimal threat to health and safety.[46]

The Pipeline Hazardous Materials Safety Administration (PHSMA) maintains records of all reportable incidents.[47] PHMSA's criteria for reportable incidents has changed over time, but generally requires reporting incidents resulting in the loss of more than five gallons of CO2, damages exceeding $50,000, or any injury requiring hospitalization.[48] Since 2004, there have only been four CO2 pipeline incidents in Wyoming that were reportable to PHMSA, occurring in 2017, 2019, 2022, and 2023. According to PHSMA's classifications, none of these resulted in any significant incident consequences. According to a recent study by the Great Plains Institute, relying on PHMSA data, the average accident rate for CO2 pipelines between 2004 and 2022 was only 0.001 per mile in operation per year.[49]

[45] Mehari T, Tekeste et al., *Effect of subsoil tillage during pipeline construction activities on near-term soil physical properties and crop yields in the right-of-way*, 37 Soil Use & Mgmt. 545, 553 (2019).

[46] *Failure Investigation Report - Denbury Gulf Coast Pipelines, LLC – Pipeline Rupture/ Natural Force Damage,* Dep't of Transp., 3 (2022), https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2022-05/Failure%20Investigation%20Report%20-%20Denbury%20Gulf%20Coast%20Pipeline.pdf [hereinafter "Failure Investigation Report"].

[47] PHMSA Pipeline Incidents, 2024-2023, https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-20-year-trends

[48] PHMSA Incident Report Criteria Change History, last downloaded July 9, 2024, https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-facility-incident-report-criteria-history.

[49] Kelley Reierson, *Examining the Safety Record of Carbon Dioxide Pipelines* (Aug. 14, 2024), https://betterenergy.org/blog/examining-the-safety-record-of-carbon-dioxide-pipelines/.

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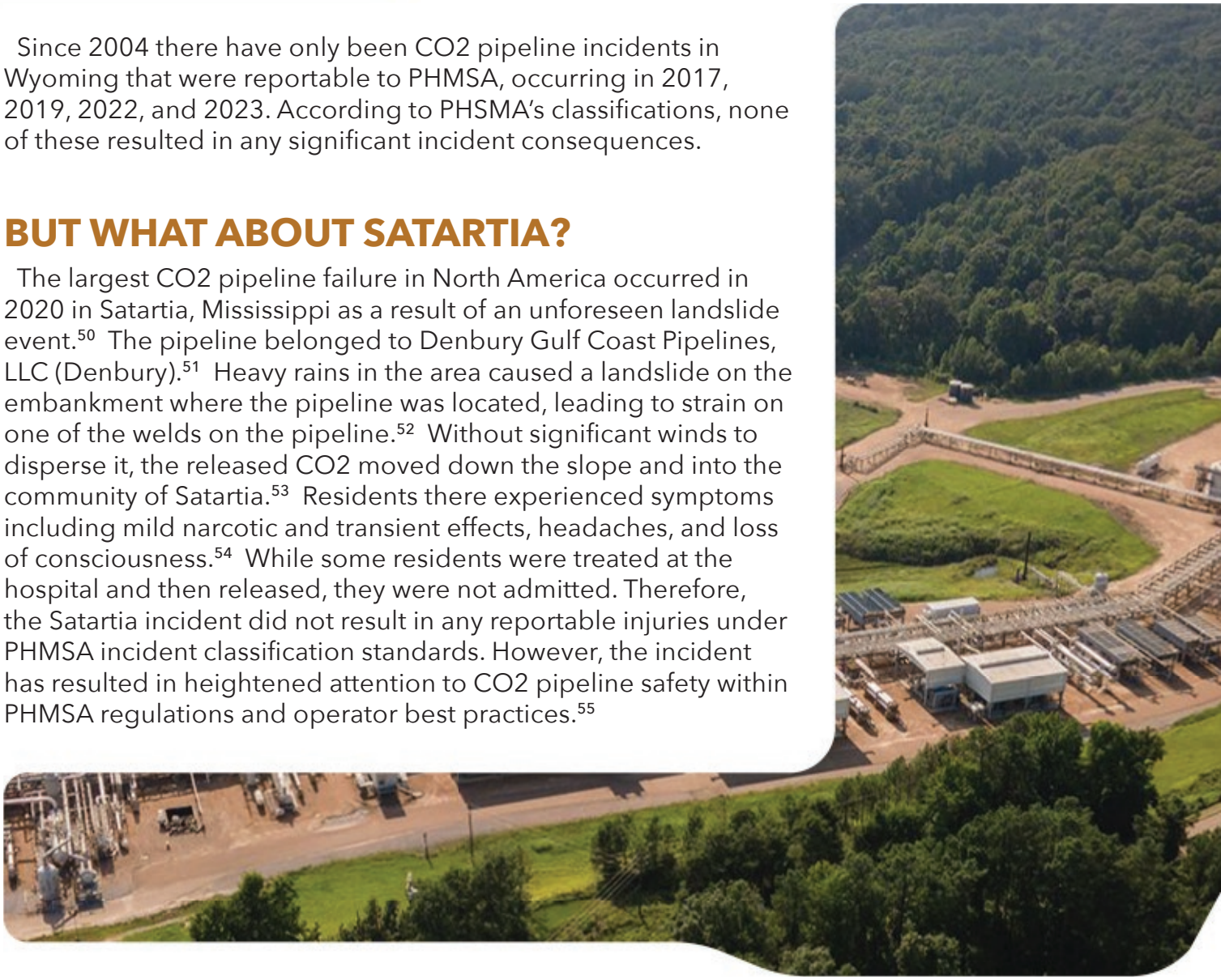
## BUT WHAT ABOUT SATARTIA?

The largest CO2 pipeline failure in North America occurred in 2020 in Satartia, Mississippi as a result of an unforeseen landslide event.[50] The pipeline belonged to Denbury Gulf Coast Pipelines, LLC (Denbury).[51] Heavy rains in the area caused a landslide on the embankment where the pipeline was located, leading to strain on one of the welds on the pipeline.[52] Without significant winds to disperse it, the released CO2 moved down the slope and into the community of Satartia.[53] Residents there experienced symptoms including mild narcotic and transient effects, headaches, and loss of consciousness.[54] While some residents were treated at the hospital and then released, they were not admitted. Therefore, the Satartia incident did not result in any reportable injuries under PHMSA incident classification standards. However, the incident has resulted in heightened attention to CO2 pipeline safety within PHMSA regulations and operator best practices.[55]



[50] *See id.*

[51] *Id.* at 1.

[52] Failure Investigation Report, *supra* note 45, at 3.

[53] *Id.*

[54] *Id.*; *Department of Transportation's PHMSA Releases Investigation Into Disastrous 2020 CO2 Pipeline Leak in Satartia, Mississippi,* Pipeline Safety Trust 2 (2022), https://www.pstrust.org/wp-content/uploads/2022/05/PR-5.26.22-Denbury-Failure-Report-FINAL.pdf. According to some accounts, a "rotten egg smell" accompanied the CO2 release, potentially indicating the presence of hydrogen sulfide (H2S) in the line, which could have exacerbated health effects. Failure Investigation Report, *supra* note 45, at 8. However, PHMSA conducted monitoring and could not corroborate the presence of H2S. *Id.*

[55] Pipeline Safety: Potential for Damage to Pipeline Facilities Caused by Earth Movement and Other Geological Hazards, 87 Fed. Reg. 33576 (June 2, 2022).

## HOW ARE CO2 PIPELINES REGULATED FOR SAFETY?

PHMSA, which resides within the U.S. Department of Transportation (DOT), has statutory authority over CO2 pipeline safety.[56] PHMSA has authority to set and enforce regulations for the construction, operation and maintenance, and spill response planning for CO2 pipelines.[57]

CO2 pipelines are subject to comprehensive federal safety regulations. Currently, PHMSA regulates the majority of CO2 pipelines[58] under the same safety requirements that apply to pipelines carrying hazardous liquids which are flammable, toxic, or would be harmful to the environment if released in significant quantities.[59] Accordingly, CO2 pipelines are subject to the same safety regulations as crude oil pipelines, rather than those applied to natural gas pipelines.[60] These regulations require strict safety protocols including testing for strength and defects and requirements for training pipeline employees.[61] During the Biden Administration, PHMSA commenced rulemaking that, among other things, would impose new requirements for CO2 pipelines and emergency preparedness and establish new standards for transporting CO2 in a gaseous state.[62] As of the February 2025, the proposed rule had not been published in the federal register.

Following the Satartia incident, PHMSA took action to improve its regulations and enforcement capacity. It initiated a rulemaking to update standards for CO2 pipelines, including pipelines carrying CO2 in a gaseous phase.[63] It also added new requirements related to emergency preparedness and response, issued a

[56] CO2 pipelines are defined as pipelines carrying at least 90% CO2 molecules compressed to a supercritical state. *See*, 49 C.F.R. § 195.2.

[57] *See generally* 49 C.F.R. §§190, 195–99 (2024); Dep't of Transp., https://www.phmsa.dot.gov/regulations (last visited May 26, 2024).

[58] The majority of existing and proposed CO2 pipelines transport CO2 in a supercritical state. *See supra* note 21 and accompanying text. Gaseous CO2 pipelines are expected to be regulated under new rules that PHMSA expects to promulgate in 2024 or 2025. *See infra* note 85.

[59] *Id*.; 40 C.F.R. § 195.2 (2024).

[60] 40 C.F.R. § 195.2 (2024).

[61] Curry, *supra* note 21, at 391.

[62] *See* PIPELINE & HAZARDOUS MATERIALS SAFETY ADMIN., *Notice of Proposed Rulemaking, Pipeline Safety: Safety of Carbon Dioxide and Hazardous Liquid Pipelines* (proposed Jan. 10, 2025) (to be codified at 49 C.F.R. pts. 190, 195, 196, 198), https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2025-01/PHMSA%20Notice%20of%20Proposed%20Rulemaking%20for%20CO2%20Pipelines%20-%202137-AF60.pdf.

[63] National Public Radio, https://www.npr.org/2023/05/21/1172679786/carbon-capture-carbon-dioxide-pipeline (quoting Tristan Brown, the Deputy Administrator of PHMSA) (last visited May 26, 2024); Curry, *supra* note 21, at 391.

nationwide advisory bulletin to pipeline operators related to geohazards, issued new research solicitations to improve safety, and increased the number of pipeline inspectors and engineers by 20%.[64]

Notably, the PHMSA rules were already comprehensive prior to these amendments, and it does not appear the Satartia incident resulted from under-regulation of safety. In its investigation of the Satartia incident, PHMSA found several probable violations of its rules related to Denbury's internal incident response planning, maintenance of the pipeline, inspections, and a failure to timely notify first responders and others following the incident.[65] Denbury also failed to conduct meetings with first responders or to implement public education programs that could have improved response times or informed residences of how to respond in the event of a possible failure.[66] While it is unclear the extent to which taking these actions could have prevented or mitigated the incident, PHMSA's new regulations and expanded enforcement authority are intended to further lower these risks.

## WHAT HAPPENS AFTER A CO2 PIPELINE INCIDENT?

Although CO2 pipeline ruptures or other failures are rare and unlikely to occur, PHMSA has set forth requirements for operator response and penalties in the event of any incidents. CO2 pipeline operators must report all incidents within one hour of discovery to help facilitate a rapid response.[67] PHMSA will investigate the incident and may assess penalties for any violations of its rules or require the operator to update equipment or implement new procedures.[68] The amount of the penalty will vary depending on the frequency, duration, and/or severity of the violation.[69] For example, PHMSA and Denbury ultimately reached a settlement for $2.9 million in penalties for the Satartia pipeline incident.[70]

[64] Dep't of Transp., PHMSA Announces New Safety Measures to Protect Americans From Carbon Dioxide Pipeline Failures After Satartia, MS Leak, https://www.phmsa.dot.gov/news/phmsa-announces-new-safety-measures-protect-americans-carbon-dioxide-pipeline-failures (last visited May 22, 2024).

[65] *See generally Notice of Probable Violation, Proposed Civil Penalty and Proposed Compliance Order,* Dep't of Transp., (2022), https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2022-05/42022017NOPV_PCO%20PCP_0526022_%2820-176125%29%20-%20Denbury%20Pipeline.pdf [hereinafter "Notice of Probable Violation"].

[66] *Id*. at 8–9; 49 C.F.R. § 195.440 (2024).

[67] Notice of Probable Violation, *supra* note 63; 49 CFR. § 195.52 (2024).

[68] 49 U.S.C. §§ 60102; 60118 (2024).

[69] 49 U.S.C. § 60122 (2024) and 49 C.F.R. § 190.225 (2024) (for any violation that warrants a civil penalty, data from the completed Violation Report is used to calculate risk-based civil penalties considering the statutory assessment considerations); *See generally Civil Penalty Summary,* Dep't of Transp.,(2024), https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2024-01/Civil-Penalty-Summary-01-19-2024.pdf.

[70] *Consent Order*, CPF No. 4-2022-017-NOPV (Mar. 24, 2023), https://downloads.regulations.gov › attachment_21.

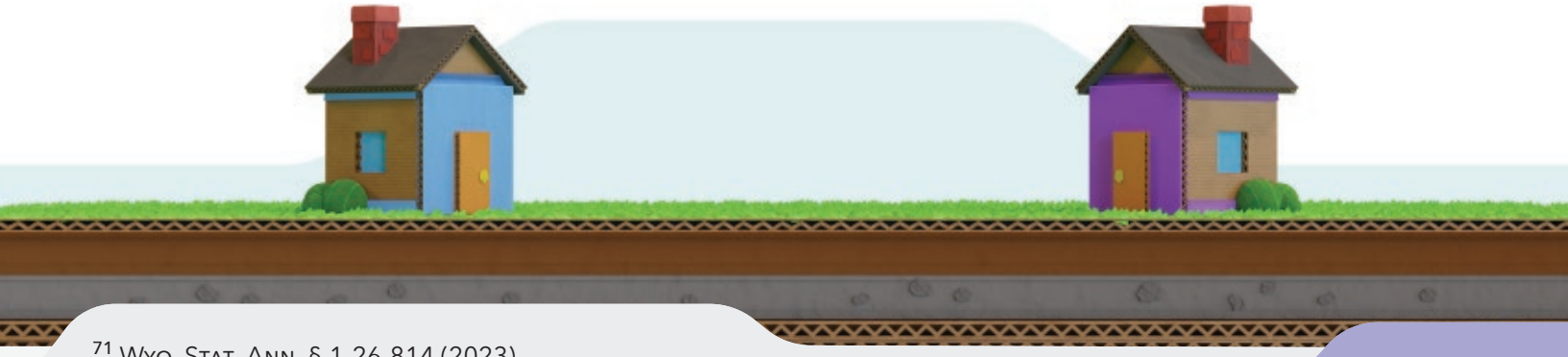
# CO2 PIPELINES & LANDOWNERS

## HOW WILL I KNOW IF A PIPELINE IS BEING PLANNED ACROSS MY LAND?

A representative from the pipeline company will contact the owners of land along the anticipated pipeline route to acquire an easement or right of way. In most situations, a landowner will negotiate a voluntary agreement with the pipeline company at this point, though it has no obligation to do so. Leaseholders and other users of land may not receive direct notice of a proposed project. However, most pipeline companies will also host community meetings and engage in other outreach before beginning a project.

## IS MY PROPERTY SUBJECT TO CONDEMNATION FOR CO2 PIPELINES?

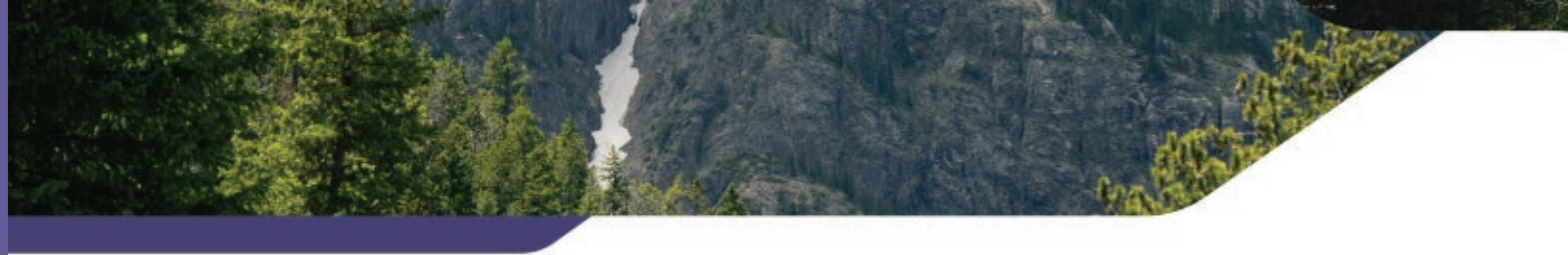
In Wyoming, pipeline companies may condemn easements through eminent domain.[71] The Wyoming Constitution grants the power of eminent domain to private companies in limited purposes for "ways of necessity" "for agricultural, mining, milling, domestic or sanitary purposes."[72] Wyoming courts have interpreted this as including pipelines and have permitted condemnation for a CO2 pipeline constructed for EOR purposes.[73]



[71] Wyo. Stat. Ann. § 1-26-814 (2023).

[72] Wyo. Const. art. 1, § 32; See Wyo. Stat. Ann. § 1-26-504(a) (2023); EOG Res., Inc. v. Floyd C. Reno & Sons, Inc., 468 P.3d 667, 673 (Wyo. 2020).

[73] *Barlow Ranch, L.P. v. Greencore Pipeline Co. LLC*, 301 P. 3d 75, 99–101 (Wyo. 2013).



Prior to seeking condemnation, a pipeline company must make reasonable and diligent efforts to acquire property by good faith negotiations.[74] This duty of good faith includes making a fair-market offer and providing an opportunity for a landowner to reply with a counteroffer.[75] If the parties do not reach an agreement, the condemnation may be resolved through judicial proceedings in the state district court where the property is located.[76] The matter of compensation may be determined through a judicially supervised appraisal, or tried before a jury.[77] The district court decision can be appealed to the Wyoming Supreme Court.[78]

## WHAT IS THE VALUE OF AN EASEMENT OR RIGHT OF WAY?

Landowners may negotiate for the value of the easements, as well as for other protections and conditions, in voluntary processes. However, where condemnation is used, payments are statutorily limited to fair market value.[79] In Wyoming, fair market value is a price agreed upon by an informed seller (i.e., a seller who is willing but not obligated to sell) and an informed buyer (i.e., a buyer who is willing but not obligated to buy).[80] Generally, the property's fair market value is based on accepted appraisal techniques, which may include evaluation of comparable sales.[81] In Barlow Ranch, L.P. v. Greencore Pipeline Co. LLC, the Wyoming Supreme Court held that considering comparable easements in an appraisal is appropriate when determining the value of just compensation.[82] Total compensation value may include annual payments and inflation adjustments.[83] Other generally accepted appraisal techniques in determining fair market value allows consideration of various factors, including the price paid for other comparable easements of comparable type, size and location on the same or similar property.[84] When evaluating the fairness of consideration, courts in Wyoming have previously considered safety risks and their effect on the value of the property.[85]

[74] Wyo. Stat. Ann. § 1-26-509(a) (2023); Wyo. Stat. Ann. § 1-26-510(b) (2023) (stating "[n]egotiations conducted in substantial compliance with Wyo. Stat. § 1-26-509(b) through (e) are prima facie evidence of 'good faith' by the condemnor"); *Barlow Ranch*, 301 P. 3d at 90.

[75] *See* Wyo. Stat. Ann. § 1-26-509 (2023). "Fair market value" is defined in Wyo. Stat. Ann. § 1-26-704 (2024).

[76] Wyo. R. Civ. P. 71.1(e)(2)(A); *Bridle Bit Ranch Co. v. Basin Elec. Power Coop.,* 118 P.3d 996, 1013 (Wyo. 2005).

[77] Wyo. R. Civ. P. 71.1 (h), (j); *Bridle Bit Ranch Co.*, 118 P.3d at 1013.

[78] Wyo. Stat. Ann. § 1-26-504 (2023); Wyo. Stat. Ann. §§ 1-26-509(2023) *et seq*.

[79] Wyo. Stat. Ann. §§ 1-26-701 (2023) *et seq*.

[80] Wyo. Stat. Ann. § 1-26-704 (2023); *Barlow Ranch, L.P. v. Greencore Pipeline Co. LLC*, 301 P. 3d 75, 83 (Wyo. 2013).

[81] Wyo. Stat. Ann. § 1-26-704(a)(iii) (2023); *Barlow Ranch*, 301 P. 3d at 84.

[82] Wyo. Stat. Ann. §§ 1-26-702, 704 (2023); *Barlow Ranch*, 301 P. 3d at 87.

[83] Wyo. Stat. Ann. § 1-26-703 (2023); *Barlow Ranch*, 301 P. 3d at 105–06.

[84] Wyo. Stat. Ann. §§ 1-26-702, 704 (2023); *Barlow Ranch*, 301 P. 3d at 87.

[85] *Barlow Ranch*, 301 P. 3d at 100.



## WHAT ARE THE POTENTIAL IMPACTS OF CO2 PIPELINE CONSTRUCTION ON MY LAND?

Like any industrial activity, the construction and operation of pipelines create the possibility of certain impacts to humans and the environment. During the construction of an underground pipeline, soil disturbance or compaction may have adverse effects on soil physical properties.[86] In studies of natural gas pipelines, crop production over the easement of the pipeline has been shown to decrease as compared with surrounding areas if restoration is not completed correctly.[87] Pipeline construction can also contribute to habitat fragmentation and loss in forested environments.[88] Landowners are typically compensated for these types of damages as part of the right-of-way acquisition process.

## WHAT IF MY PROPERTY IS DAMAGED BY A CO2 PIPELINE INCIDENT?

In addition to penalties imposed by PHMSA, a landowner that is damaged by a pipeline rupture, leak, or other pipeline incident may be able to recover damages from the pipeline operator by bringing a civil case under various theories of tort law. Landowners have brought nuisance actions against pipeline companies for damages resulting from pipeline leaks. For example, in a case based on a leak in Oklahoma, the jury found that the landowner could recover damages for pollution resulting from the leak as well as loss of market value to the property.[89]

Landowners may also have contract claims arising from breaches of the terms of the easement agreement, such as provisions requiring the pipeline company to restore the premises or to reasonably operate, maintain, or repair the pipeline.[90] Where a contract is breached, the landowner may be able to seek damages, specific performance, or injunctive relief. Landowners should consider working with their counsel to proactively address potential harms during easement negotiation, with particular attention to insurance, indemnity, and damages provisions, as well as the liability of any successors in interest to the operator (if any).

[86] Tekeste et al., *supra* note 44, at 553.

[87] *Id*. at 545.

[88] *See generally* Lillie A. Langlois, *Linear Infrastructure Drives Habitat Conversion and Forest Fragmentation Associated with Marcellus Shale Gas Development in a Forested Landscape,* 197 J. OF EVNTL. MGMT. 167–76 (2017) (showing that pipelines in the Marcellus shale gas development were the largest contributor to forest fragmentation).

[89] *Valley View Angus Ranch, Inc. v. Duke Energy Field Servs.*, LP, 410 F. App'x 89 (10th Cir. 2010).

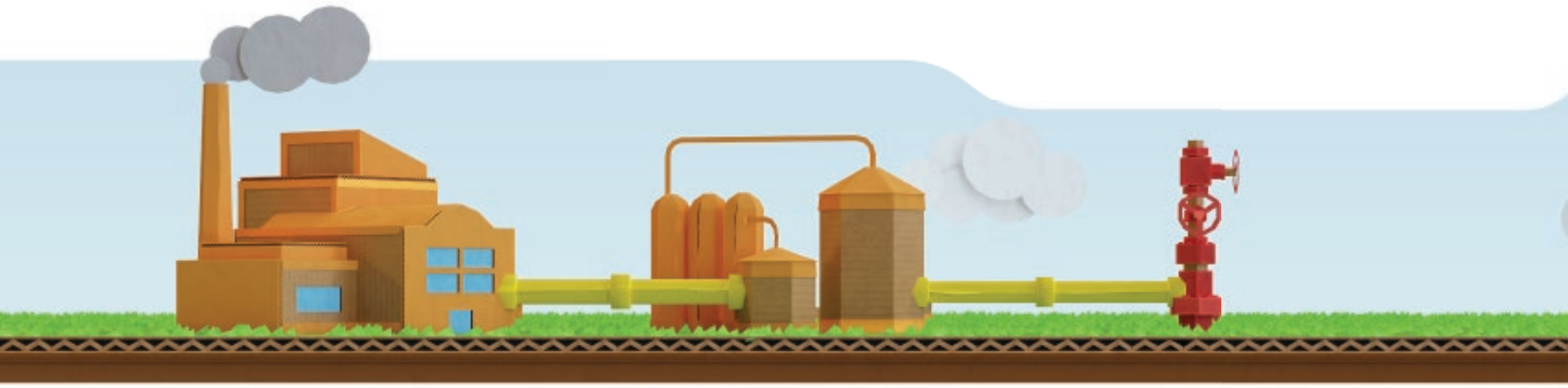
[90] *See, e.g., Webb v. Exxon Mobil Corp.*, 856 F.3d 1150 (8th Cir. 2017).

## HOW CAN COMMUNITY MEMBERS BECOME ACTIVE PARTICIPANTS IN THE DECISION-MAKING PROCESS?

Most negotiations regarding pipeline siting and routing occur between the pipeline company and the landowner. By virtue of their ownership, property owners have well-recognized rights. These rights provide procedural protections that are not available to the general public or other interested stakeholders.

In some states, stakeholder and community interests are considered during the state's evaluation of whether to grant a certificate of public convenience and necessity, which generally provides the pipeline with the right to condemn property along a specified route. Since Wyoming has no such process for CO2 pipelines, community interests are more likely to be considered at the local government level or as part of public-land acquisition processes. For example, the grant of a right-of-way across public land or under a federal waterway would require NEPA review.[91] Community members could participate in the agency's decision by submitting comments during the public comment process.[92]

Community opposition to all types of pipelines has grown over the past decade, including high-profile disputes like those involved with the Dakota Access Pipeline or the Constitution Pipeline. At times, these disputes have resulted in extensive litigation against federal agencies related to the adequacy of environmental reviews.[93]



[91] 42 U.S.C. § 4332(2)(C) (2024). "Major federal action" is defined at 40 C.F.R. § 1508.18 (2024). "Significantly" is defined at 40 C.F.R. § 1508.27 (2024).

[92] *A Citizen's Guide to NEPA: Having Your Voice Heard,* Council on Envtl. Quality, 8 (Figure 1) (2021) https://ceq.doe.gov/docs/get-involved/citizens-guide-to-nepa-2021.pdf.

[93] *Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs*, 280 F. Supp. 3d 187 (D.D.C. 2017) (holding the U.S. Army Corps of Engineers erred in its analysis of the environmental impact of the pipeline crossing Lake Oahe by the Dakota Access Pipeline. Early relief was granted to the Tribe where the easement for the pipeline was vacated and ordered that the pipeline be emptied of oil during the remand process).

The recent negotiation of a voluntary community benefits agreement (CBA) between a CO2 pipeline operator and several community organizations who opposed the pipeline, however, indicates the possibility of favorable, out-of-court solutions.[94] In 2024, the Bold Alliance (which generally opposes CO2 pipeline development) entered into a groundbreaking agreement with Tallgrass Energy to negotiate terms for developing Tallgrass's Trailblazer Pipeline. Under the terms of the agreement, Tallgrass promised to provide heightened landowner protections as compared to those otherwise required by law, pledged funding for first responder training and equipment, and agreed to invest a significant sum in a community foundation.[95] While not required by law, during the Biden administration, the U.S. Department of Energy (DOE) indicated its preference for this type of mutual resolution, which can ensure communities receive benefits around a myriad of issues, including local hiring and job training, the creation of jobs with competitive wages and benefits, the provision of funding for local infrastructure, and agreements to support local businesses. According to a 2021 document published by the White House Council on Environmental Quality, "[s]trong CBAs center on promoting inclusiveness, enforceability, transparency, coalition building, and efficiency."[96]

[94] Katheryn Scott et al., *Pathways to Commercial Liftoff: Industrial Decarbonization*, Dep't of Energy, 69 (2023), https://liftoff.energy.gov/wp-content/uploads/2023/10/LIFTOFF_DOE_Industrial-Decarbonization_v8.pdf.

[95] Jane Kleeb, *Tallgrass, Bold Alliance, and Key Agricultural and First Responder Organizations Announce a Community Benefits Agreement*, Bold Nebraska (Apr. 9, 2024) https://boldnebraska.org/tallgrass-bold-alliance-and-key-agricultural-and-first-responder-organizations-announce-a-community-benefits-agreement/.

[96] Scott, et al., *supra* note 92, at 70.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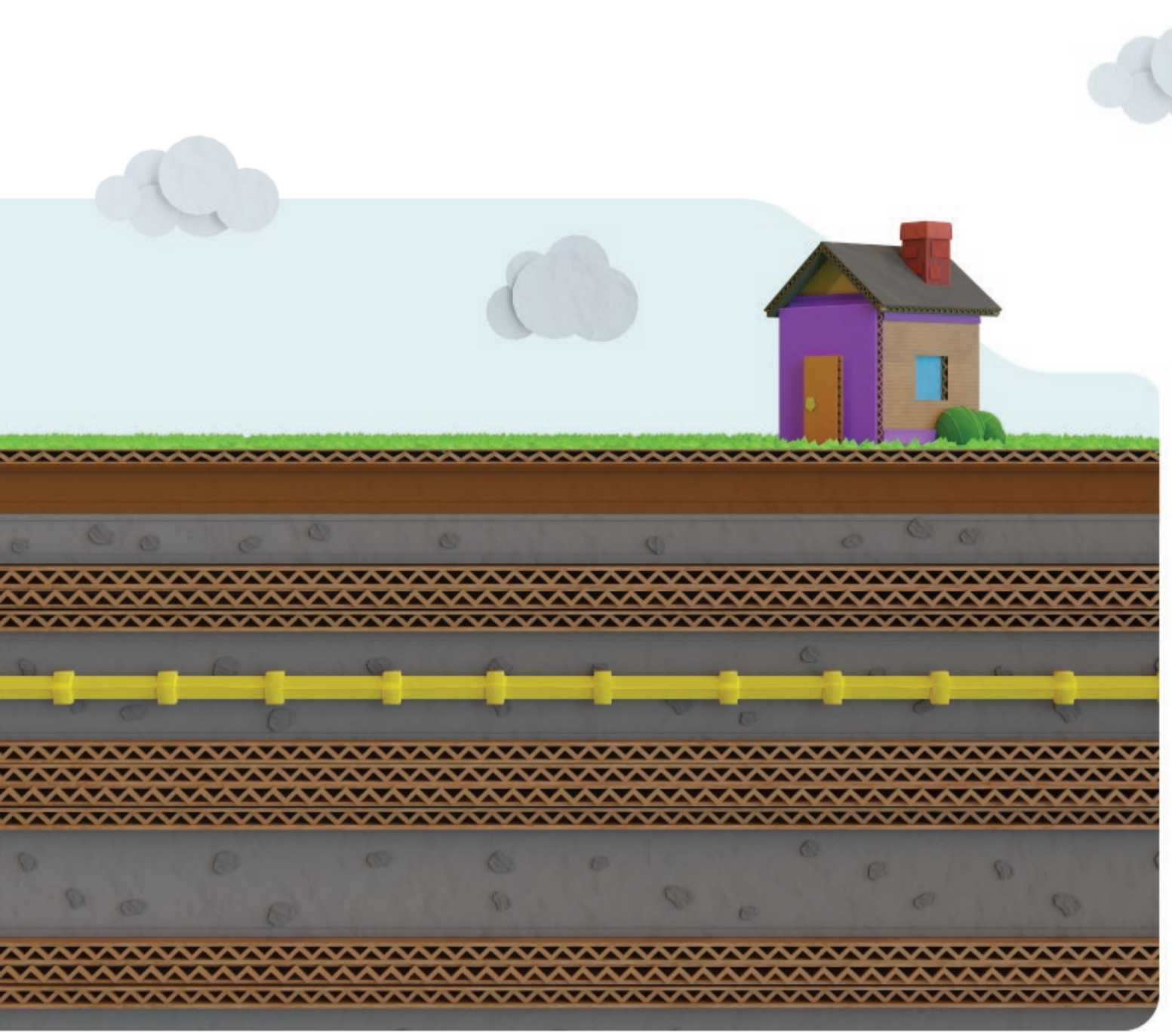

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