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Introduction

Last fall, the subject of oil pipeline siting was thrust into the spotlight. Protesters and police and private security employed by the Dakota Access Pipeline clashed in full media view.[1] Social media accounts buzzed as constituents as diverse as activists, lawyers, nurses, and homemakers nationwide "checked in" at Standing Rock.[2] "Water Protectors" were profiled in *National Geographic* and *Vogue*.[3] Suddenly, it seemed,

1. Joshua Barajas, *Police Deploy Water Hoses, Tear Gas Against Standing Rock Protesters*, PBS NEWSHOUR (Nov. 21, 2016, 10:08 AM), https://www.pbs.org/newshour/nation/ police-deploy-water-hoses-tear-gas-against-standing-rock-protesters; Derek Hawkins, *Police Defend Use of Water cannons on Dakota Access Protestors in Freezing Weather*, WASH. POST (Nov. 21, 2016), https://www.washingtonpost.com/news /morning-mix/wp/2016/11/21/police-citing-ongoing-riot-use-water-cannons-on-dakota-access-protesters-in-freezing-weather/?utm_term=.d2a7f49bd01d.

2. Robinson Meyer & Kaveh Waddell, *Facebook is Overwhelmed with Check-Ins to Standing Rock*, THE ATLANTIC (Oct. 31, 2016), https://www.theatlantic.com/technology/archive/2016/10/facebook-is-overtaken-with-check-ins-to-standing-rock/505988/.

3. Rebecca Bengal, *The Water Protectors at Standing Rock Who Stood Against DAPL*, VOGUE (Mar. 8, 2017), https://www.vogue.com/projects/13528338/american-women-water-protectors-standing-rock-dakota-access-pipeline-protesters/; Saul Elbein, *These Are the Defiant "Water Protectors" of Standing Rock*, NAT'L GEOGRAPHIC (Jan. 26, 2017),

everyone had an opinion on oil pipeline siting, including the adequacy of state approvals and federal oversight. There was widespread outrage that private oil pipelines could be developed over the objections of the local landowners and stakeholders most impacted by disruptions to land use and potential spills.[4] Meanwhile, approximately 450 miles away and removed from the media frenzy, an application quietly proceeded for a federal right-of-way on a 16-inch carbon dioxide ("CO_2") pipeline.[5] This pipeline would tie into a larger network intended to transport anthropogenic CO_2 from a privately owned treatment plant to a larger trunk line where it would be transported to aging oil fields for injection as part of tertiary recovery operations.[6] In addition to the federal right-of-way, the pipeline company would require permission to cross private lands—permission it could likely obtain, if needed, through the exercise of eminent domain.

More than 5,000 miles of high-pressure pipelines carrying CO_2 traverse the western and southern United States primarily connecting natural and anthropogenic sources of CO_2 sources to mature oilfields for CO_2 enhanced oil recovery (CO_2-EOR).[7] The majority of CO_2 pipelines are point-to-point—connecting one privately held asset to another. CO_2 is not transported or delivered for general use by the public—it is neither a heating nor transportation fuel. Accordingly, the pipeline network has developed in a highly localized and organic manner connecting reliable sources of CO_2 to oilfields for CO_2-EOR.

However, there is a foreseeable need for a more flexible, integrated CO_2 pipeline network. It is anticipated that there will be significant growth in CO_2 transportation infrastructure in the coming decades. Demand for CO_2 for CO_2-EOR purposes is only anticipated to grow.[8] Additionally, should

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https://news.nationalgeographic.com/2017/01/tribes-standing-rock-dakota-access-pipeline-advancement/.

4. Paul Parfomak, *Dakota Access Pipeline: Siting Controversy*, CRS INSIGHT (June 15, 2017), https://fas.org/sgp/crs/misc/IN10567.pdf.

5. Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Riley Ridge to Natrona Project, Wyoming, 79 FR 32975 (Bureau of Land Management June 9, 2014).

6. *Id*.

7. *Annual Report Mileage for Hazardous Liquid or Carbon Dioxide Systems*, U.S. DEP'T OF TRANSP., PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMIN. (Nov. 1, 2017), https://www.phmsa.dot.gov/pipeline/library/data-stats/annual-report-mileage-for-hazardous-liquid-or-carbon-dioxide-systems [hereinafter DOT Mileage Report].

8. *See* Vello Kuuskraa & Matt Wallace, *CO_2-EOR Set For Growth as New CO_2 Supplies Emerge*, OIL & GAS J. (Apr. 7, 2014), http://www.ogj.com/articles/print/volume-

carbon capture, utilization, and storage (CCUS) be implemented more broadly as a climate-mitigation technology, transportation of additional volumes of CO_2 from anthropogenic sources to storage reservoirs will be necessary. Together, it is estimated that these technologies will necessitate between a three-fold and five-fold expansion of existing CO_2 transportation infrastructure within the United States in the next 30 years.[9]

The precise route of the pipelines may be impacted by a variety of factors under both state and federal law. Like oil pipelines and electric transmission lines, developers of CO_2 pipelines site infrastructure according to state law. Accordingly, state law determines whether, and under which circumstances, CO_2 pipeline companies may utilize eminent domain authority to acquire property along the pipeline route. States principally provide pipelines with this authority under two public interest justifications: 1) the development of natural resources; or 2) constructing and making available public access infrastructure through the imposition of common carrier requirements.

This paper analyzes the adequacy of the current regulatory framework for siting CO_2 pipelines with a goal towards building a CO_2 pipeline network that is flexible enough to serve both CO_2-EOR and CCUS purposes. Part I discusses carbon dioxide itself: its production and capture, its transport, and its current uses in CO_2-EOR and CCUS. Part II discusses state and federal regulations controlling the siting of CO_2 pipelines. Part III examines the process for permitting and acquiring right of way for CO_2 pipelines with a focus on state approaches to grants of condemnation authority to private developers of CO_2 pipelines. Specifically, the discussion compares the two principal methods states utilize to establish public interest for eminent domain for CO_2 pipelines. This exploration analyzes approaches adopted by states that utilize a public purpose justification based on natural resource development as contrasted with those requiring public use via common carriage mandates. Part III also considers the benefits and limitations of requiring common carriage, noting the unique technical and legal requirements of CO_2 transport for both CO_2-EOR

112/issue-4/special-report-eor-heavy-oil-survey/co-sub-2-sub-eor-set-for-growth-as-new-co-sub-2-sub-supplies-emerge.html.

9. *See* J.J. Dooley et al., *Comparing Existing Pipeline Networks with the Potential Scale of Future U.S. CO_2 Pipeline Networks*, 1 ENERGY PROCEDIA 1595 (2009), *available at* http://ac.els-cdn.com/S1876610209002100/1-s2.0-S1876610209002100-main.pdf?_tid=cc780e34-caec-11e7-ab6e-00000aacb361&acdnat=1510850585_ae8a579226bf4eab66cd391db3ffe9b7 ("Between 11,000 and 23,000 additional miles of dedicated CO_2 pipeline might be needed in the United States before 2050.").

and CCUS. Part IV examines state siting in a broader context. It considers whether the patchwork of state siting requirements is an insurmountable hurdle to a growing and adaptable CO_2 transportation network and discusses proposals for federal siting regulation. The paper concludes that, at least for the time being, state siting is appropriate given the localized nature of CO_2 pipeline development and its impacts on landowners and the environment. However, the paper suggests that a public goods approach to siting and justifying eminent domain is preferable. A public use approach resolves ambiguity regarding condemnation authority of CO_2 pipeline developers under current statutes and constitutional provisions drafted principally with oil or natural gas in mind. Further, through common carrier requirements it may be possible to assure that CO_2 pipeline infrastructure developed utilizing eminent domain for CO_2-EOR can later be integrated into a broader, national pipeline network to accommodate CCUS.

I. CO_2 – Capture, Transport, and Use

CO_2 is concurrently and variably considered a by-product,[10] a pollutant greenhouse gas (GHG) capable of threatening public health and subject to regulation under the Clean Air Act,[11] and a valuable commodity essential to improving oil production.[12] This would seemingly generate an obvious

10. *See* Maryam Takht Ravanchi & Saeed Sahebdelfar, *Carbon Dioxide Capture and Utilization in Petrochemical Industry: Potentials and Challenges*, 4 APPLIED PETROCHEMICAL RES. 63, 63-77 (May 2014). *See generally* Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co., 308 F.3d 1167 (Fed. Cir. 2002) (describing carbon dioxide as an "undesirable byproduct" of ethylene oxide production); Nat'l Union Fire Ins. Co. of Pittsburgh v. Terra Indus., Inc., 346 F.3d 1160, 1162 (8th Cir. 2003) ("Carbon Dioxide is a byproduct of fertilizer production.").

11. *See* Massachusetts v. EPA, 549 U.S. 497, 529 (2007) ("Carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons are without a doubt 'physical [and] chemical . . . substances[s] which [are] emitted into . . . the ambient air.'"); *Overview of EPA's Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under the Clean Air Act*, U.S. ENVTL. PROT. AGENCY, (Apr. 17, 2009), http://epa.gov/climatechange/endangerment/downloads/determination.pdf. State statutes may also classify CO_2 as a pollutant. *See, e.g.*, N.H. REV. STAT. ANN. § 125-O:1 (West 2002); N.J. STAT. ANN. § 48:3-87(a)(2) (West 2008).

12. *See* MONT. CODE ANN. §§ 82-11-111(9), 82-10-301 through -302; (West, Westlaw through 2017 Sess.); OKLA. STAT. tit. 27A, § 3-5-101(1) (West 2010) ("Carbon dioxide is a valuable commodity to the citizens of the state, particularly for its value in enhancing the recovery of oil and gas and for its use in other industrial and commercial processes and applications."); Paul Parfomak & Peter Folger, *Carbon Dioxide (CO_2) Pipelines for Carbon Sequestration: Emerging Policy Issues*, CONG. RES. SERV. (2007), http://research.policy archive.org/18606.pdf; *Best Practices for: Geologic Storage Formation Classification,*

synergy—GHG produced from the burning of fossil fuels could be captured, rather than emitted, and then stored underground as part of commercial CO_2-EOR operations.[13] Yet, despite shortages in CO_2 for CO_2-EOR operations,[14] this has rarely been the case historically.[15] Almost all of the CO_2 used in enhanced oil recovery is produced from natural sources underground,[16] and almost all the CO_2 generated by industrial processes and power generation is emitted into the atmosphere.[17] This paradox results from several reasons, including the fact that most anthropogenic CO_2

Understanding Its Importance and Impacts on CCS Opportunities in the United States, U.S. DEP'T OF ENERGY, NAT'L ENERGY TECH. LAB. (2010), https://www.netl.doe.gov/File%20Library /Research/Carbon%20Seq/Reference%20Shelf/BPM_GeologicStorageClassification.pdf.

13. Storage of CO_2 related to enhanced oil recovery operations is variously called associated storage and incidental storage. *See* MONT. CODE ANN. § 82-11-188; WYO. STAT. ANN. § 30-5-502; L. Steven Melzer, *Carbon Dioxide Enhanced Oil Recovery (CO_2 EOR): Factors Involved in Adding Carbon Capture, Utilization and Storage (CCUS) to Enhanced Oil Recovery,* NAT'L ENHANCED OIL RECOVERY INITIATIVE (Feb. 2012), http://neori.org/Melzer_CO2EOR_CCUS _Feb2012.pdf (report prepared for the National Enhanced Oil Recovery Initiative, Center for Climate and Energy Solutions); J. Greg Schnacke et al., *Carbon Dioxide Infrastructure: Pipeline Transport Issues and Regulatory Concerns – Past, Present, and Future, Enhanced Oil Recovery: Legal Framework for Sustainable Management of Mature Oil Fields*, ROCKY MTN. MIN. L. FOUND. 10 (2015).

14. *See* Melzer, *supra* note 13, at 6 ("Depletion of the source fields and/or size limitations of the pipelines are now constricting EOR growth.").

15. *See* Bob Berwyn, *Wait, They're Drilling For CO_2 in Colorado?*, COLO. INDEP. (Mar. 15, 2010), http://www.coloradoindependent.com/151977/wait-theyre-drilling-for-co2-in-colorado; 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 (2008).

16. As of 2016, only eight EOR projects used anthropogenic CO_2, injecting an estimated total of 21 metric tons annually. *Compare* Carbon Capture & Sequestration Techs., *Commercial EOR Projects Using Anthropogenic Carbon Dioxide*, MASS. INST. OF TECH., http://sequestration.mit.edu/tools/projects/index_eor. html [hereinafter MIT Report] (last visited Nov. 16, 2017), *with* Guntis Moritis, *Special Report: EOR/Heavy Oil Survey: Point of View: SPE IOR Conference Chair Laments Lack of R&D Funds*, OIL & GAS J. (Apr. 19, 2010), http://www.ogj.com/articles/print/volume-108/issue-14/General-Interest/special-report-eor.html; *see also Enhanced Oil Recovery*, OFFICE OF FOSSIL ENERGY, http://energy.gov/fe/science-innovation/oil-gas-research/enhanced-oil-recovery (last visited Nov. 28, 2017) (noting that there were "about 114 active commercial CO_2 injection projects that together inject over [75 metric tons] of CO_2" in the U.S. alone in 2010); Marston & Moore, *supra* note 15, at 424.

17. Compare the 21 metric tons captured in 2016 for reinjection, to the more than 2800 metric tons emitted by the Coal and Natural Gas sources in 2016. *See* MONTHLY ENERGY REV., U.S. ENERGY ADMIN 178-85 (2017), https://www.eia.gov/totalenergy/ data/monthly/archive/00351706.pdf.

capture technologies have not innovated to efficiently and economically address supply needs.[18] Natural CO_2 is often purer and is less expensive to produce in sufficient volumes than the capture and processing of anthropogenic CO_2.[19] It may also be subject to less regulation.[20] However, this paradigm is unlikely to last. As natural reservoirs are depleted and tertiary recovery of oil becomes more prevalent, and as CO_2 capture technologies advance, an increase in the use of anthropogenic CO_2 will be necessary to meet CO_2 demand for EOR.[21] These technologies may become more commercially driven due to tax or other incentives.[22] Concurrently, the geologic injection and storage of anthropogenic CO_2 may be required in some instances due to, for example, regulation,[23] carbon pricing,[24] or

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18. *See* Melzer, *supra* note 13, at 6. An exception is natural gas separation associated with natural gas production operations, which is economic in many situations where CO_2-EOR is also available.

19. *See* A. S. Bhown & B. C. Freeman, *Analysis and Status of Post-Combustion Carbon Dioxide Capture Technologies*, 45 ENVTL. SCI. TECH. 8624, 8624-32 (2011); Anand B. Rao & Edward S. Rubin, *A Technical, Economic, and Environmental Assessment of Amine-Based CO_2 Capture Technology for Power Plant Greenhouse Gas Control*, 36 ENVTL. SCI. TECH. 4467, 4467-75 (2002); Melzer, *supra* note 13, at 6 ("The new age of anthropogenic supplies of CO_2 has just not advanced to meet the supply shortages. The CO_2 cost gap between industrial CO_2 and the pure, natural CO_2 remains a barrier.").

20. *See* Arnold W. Reitze, Jr., *Federal Control of Carbon Capture and Storage*, 41 ENVTL. L. REP. NEWS & ANALYSIS 10796, 10808 (2011).

21. *See* Ian J. Duncan, *CO_2-EOR 101: An Overview of CO_2 Enhanced Oil Recovery*, ENHANCED OIL RECOVERY: LEGAL FRAMEWORK FOR SUSTAINABLE MANAGEMENT OF MATURE OIL FIELDS, ROCKY MT. MIN. L. FOUND. 7-3 (2015).

22. The currently existing 45Q tax credit (I.R.C. § 45Q) is insufficient to address current cost gaps. *See Siting and Regulating Carbon Capture, Utilization, and Storage Infrastructure, Workshop Report*, U.S. DEP'T OF ENERGY (2017), *available at* http://energy.gov/sites/prod/files/2017/01/f34/Workshop%20Report--Siting%20and%20Regulating%20Carbon%20Capture%2C%20Utilization%20and%20Storage%20Infrastructure.pdf. Amendments to 45Q have been proposed. *See* H.R. 3761, 115th Cong. (2017).

23. CCUS has been included in Step 1 of a top-down BACT analysis for GHGs. *See* Utility Air Reg. Grp. v. EPA, 134 S. Ct. 2427, 2448 (2014). However, EPA guidance specifies that its inclusion "does not necessarily mean CCS should be selected as BACT for such sources." *See* John-Mark Stensvaag, *Preventing Significant Deterioration Under the Clean Air Act: The BACT Determination – Part 1*, 41 ENVTL. L. REP. NEWS & ANALYSIS 11101, 11104 n.25 (2011) (citing U.S. EPA Office of Air and Radiation, PSD and Title V Permitting Guidance for Greenhouse Gases). EPA's Proposed New Source Rule Proposal for New, Modified, and Reconstructed Plants under CAA 111(b) also relied on the use of CCUS in establishing emissions limitations. *See* Michael. J. Nasi & Jacob Arechiga, *Greenhouse Gas Reduction Technologies for Power Generation*, RMMLF SPECIAL INST., CLIMATE

governmental imperatives[25] for geoengineering solutions to climate change.[26] As a result, it is likely that the capture of CO_2 from anthropogenic sources and its transport for both CO_2-EOR and CCUS will be of increasing importance in coming years.

The transport of CO_2 across long distances is critical to both improved oil recovery and climate mitigation through CCUS.[27] Sources of CO_2, whether natural or anthropogenic, are rarely co-located with established oil fields or appropriate subsurface storage complexes for geologic storage.[28] In order to deliver CO_2 to these end users, a pipeline network is required,

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CHANGE LAW AND REGULATIONS: PLANNING FOR A CARBON-CONSTRAINED REGULATORY ENVIRONMENT, Appendix B (2015).

24. *See* Henriette Naims, *Economics of Carbon Dioxide Capture and Utilization—A Supply and Demand Perspective*, 23 ENVTL. SCI. & POLLUTION RES. INT'L 22226, 22231 (2016) ("If these [capture] costs can be reimbursed, e.g., through CO_2 utilization options or political incentives such as a carbon tax, then carbon capture could make economic sense.").

25. *See* J. Thomas Lane et al., *Carbon Sequestration: Critical Property Rights and Legal Liabilities – Real Impediments or Red Herrings?*; 32 E. MIN. L. FOUND. § 23.02 (2011), *available at* http://www.adv res.com/pdf/32nd%20Annual%20Institute %20of%20 EMLF %20Vol%202%20-%20FINAL%20Chapter%2023.pdf; Melzer, *supra* note 13, at 2.

26. CCUS continues to be promoted as one of the chief technologies available to combat climate change. *See Carbon Capture Utilization and Storage: Climate Change, Economic Competitiveness, and Energy Security*, U.S. DEP'T OF ENERGY (2016), http://energy.gov/sites/prod/files/2016/09/f33/DOE%20-%20Carbon %20Capture%20 Utilization%20and%20Storage_2016-09-07.pdf. ("There is international consensus that CCUS will play a critical role as part of an economically sustainable route to the emissions cuts needed to limit global warming to 2°C. In 2014, the Intergovernmental Panel on Climate Change (IPCC) concluded that without CCUS, the costs of climate change mitigation could increase by 138%, and further, that realizing a 2°C scenario may not even be possible without CCUS technologies."); *see also* R.K. Pachauri & L.A. Meyer, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: SYNTHESIS REPORT (2014), *available at* http://www.ipcc.ch/pdf/assessment-report /ar5/syr/SYR _AR5_FINAL_full_wcover.pdf; Stephen Pacala & Robert Socolow, *Stabilization Wedges: Solving the Climate Program for the Next 50 Years With Current Technologies*, 305 SCIENCE 968 (2004).

27. *See* Rickard Svensson et al., *Transportation Systems for CO_2 – Application to Carbon Capture and Storage*, 45 ENERGY CONVERSION & MGMT 2343, 2353 (2004); Dooley, *supra* note 9, at 1596; Paul Parfomak & Peter Folger, CONG. RES. SERV., RL34316, Pipelines for Carbon Dioxide (CO_2) Control: Network Needs and Cost Uncertainties (2008).

28. *See generally* Jerry R. Fish & Eric L Martin, TECHNICAL ADVISORY COMMITTEE REPORT: APPROACHES TO PORE SPACE RIGHTS, CAL. CARBON CAPTURE & STORAGE REV. PANEL (2010), http://www.climatechange.ca.gov/carbon_capture_review_panel/ meetings/ 2010-08-18/white_papers/Pore_Space_Rights.pdf.

often crossing several states and federal land.[29] An integrated and nationwide network may address concerns about CO_2 availability and reliability for CO_2-EOR and favorably impact economics for CCUS and captured anthropogenic CO_2.[30] However, unlike the massive growth of natural gas pipelines in the 20th century, CO_2 pipelines are unlikely to grow explosively or pervasively. Demand for CO_2 is highly localized and development is likely to progress through point-to-point, single use pipelines. An integrated backbone CO_2 pipeline infrastructure that is flexible enough to accommodate CO_2-EOR and CCUS uses is unlikely to develop organically. Accordingly, facilitating the expansion of CO_2 transportation networks in a manner that addresses economic needs, while promoting CCUS, presents unique legal challenges.

Exploration, Production, and Capture of CO_2

CO_2 can be produced from naturally occurring underground sources[31] or can be captured from industrial facilities, such as mining processing facilities or coal fired generation.[32] Natural CO_2 is produced from underground reservoirs that are typically called domes.[33] Known reservoirs of natural CO_2 exist in Colorado, Utah, New Mexico, and Mississippi.[34] These reservoirs contain high purity CO_2 that is suitable for use in CO_2-EOR with minimal processing.[35] Natural CO_2 reserves in the United States are substantial: as of 2012, known reservoirs of natural CO_2 were estimated to contain approximately 41 trillion cubic feet of CO_2.[36]

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29. *See* John Gale & John Davison, *Transmission of CO_2—Safety and Economic Considerations*, 29 ENERGY 1319, 1319-28 (2004).

30. *See* Ioannis Chrysostomidis, et al., *Assessing Issues of Financing a CO_2 Transportation Pipeline Infrastructure*, 1 ENERGY PROCEDIA 1625, 1632 (2009).

31. *See* Duncan, *supra* note 21, at 3 (stating that "[n]aturally occurring CO_2 reservoirs exist in Colorado, New Mexico, and Mississippi").

32. *Id*. A third alternative, scrubbing CO_2 from the atmosphere, may eventually become available. *See* Robert Kunzig & Wallace Broecker, *Carbon Scrubbers: Taking CO_2 Out of the Air*, NEW SCIENTIST 34-37 (2009); Richard Schiffman, *Why CO_2 'Air Capture' Could Be Key to Slowing Global Warming*, YALE ENV'T 360 (May 23, 2016), http://e360.yale.edu/features/pulling_co2_from_atmosphere_climate_ change_lackner.

33. *See generally* Phil DiPietro et al., *A Note on Sources of CO_2 Supply for Enhanced-Oil-Recovery Operations*, SOC'Y OF PETROL. ENG'RS ECON. & MGMT. 69, 69-74 (2012).

34. *Id*.

35. *Id*.

36. *Id*. at 69-70.

Ownership and Leasing of CO_2

Natural CO_2 is found on both private and federal lands, including both private and federal split estate configurations. A split estate exists where different parties own the surface and mineral interests. "Split Estate Federal Minerals"[37] arose principally from reservations in patents issued under the land disposition acts of the early 20th century, including the Coal Land Acts,[38] Agricultural Entry Act,[39] and the Stock Raising Homestead Act.[40] By retaining the minerals Congress sought to preserve valuable public resources while simultaneously promoting efficient extraction of mineral resources and development of the arid west for both natural resource and agricultural purposes.[41] In the past one hundred years, whether these reservations include specific substances, such as gravel[42] or coal bed methane,[43] has been hotly contested, leaving ambiguity as to what precisely has been conveyed or retained.[44] Consistent with these cases, in the late 1970s and early 1980s, when production of natural CO_2 for CO_2-EOR purposes was gaining momentum, there was confusion as to whether CO_2

37. *See* 43 U.S.C. §§ 299, 301 (2012); DEP'T OF INTERIOR, BUREAU OF LAND MGMT., PUBLIC LAND STATISTICS, at 8 (2014), http://www.blm.gov/public_land_statistics/pls14/pls2014.pdf ("The term Split-Estate Federal Minerals refers to Federal mineral rights under private surface lands. These are patented lands with minerals reserved to the United States.").

38. 30 U.S.C. §§ 81, 83-85 (2012).

39. 38 Stat. 509, ch. 142, *as amended*, 30 U.S.C. § 121 et seq.

40. Stock-Raising Homestead Act, Pub. L. No. 64-290, 39 Stat. 862 (1916).

41. *See* Watt v. W. Nuclear, 462 U.S. 36, 47 (1983) ("While Congress expected that homesteaders would use the surface of SRHA lands for stock-raising and raising crops, it sought to ensure that valuable subsurface resources would remain subject to disposition by the United States, under the general mining laws or otherwise, to persons interested in exploiting them."); United States v. Union Oil Co. of Cal., 549 F.2d 1271, 1276 (9th Cir. 1977) ("When Congress imposed a mineral reservation upon the Act's land grants, it meant to . . . retain governmental control of subsurface fuel sources, appropriate for purposes other than stock raising or forage farming.").

42. *Id*. (holding that the gravel found on lands patented under the SRHA is a mineral reserved to the United States despite the fact that it would not have been considered a mineral at the time of the SRHA).

43. *See* Amoco Prod. Co. v. S. Ute Indian Tribe, 526 U.S. 865, 865 (1999) (holding that "[t]he term 'coal' as used in the 1909 and 1910 [Coal Land Acts] does not encompass CBM gas.").

44. *See Watt*, 462 U.S. at 62 (Powell, J., dissenting) (noting that by including gravel as a "mineral" within the reservation of the Stock Raising Homestead Act "only the dirt itself could not be claimed by the Government"); *Union Oil*, 549 F.2d at 1278 (noting that the patent under the SRHA "give[s] the owner much more than the surface, [it] give[s] him all except the body of the reserved mineral") (citation omitted).

was a "gas" as defined within these mineral reservations of "oil and gas."[45] The Department of Interior, citing the broad definition of gas in BLM regulations[46] and the general intent of the Congress to retain valuable mineral resources,[47] determined that the oil and gas reservations in land patents issued by the United States include CO_2.[48] This position was later confirmed in *Aulston v. United States*.[49] Thus, in addition to federal fee lands, CO_2 is federally owned on land with private surface and federal minerals retained pursuant to these reservations.

Federally owned CO_2 is considered a leasable mineral under the Mineral Leasing Act (MLA).[50] Like combustible and hydrocarbon gas, CO_2 on federal lands is produced by drilling and completing wells pursuant to oil and gas leases.[51] "Gas," as used in the MLA, is not restricted to hydrocarbons.[52] In fact, Bureau of Land Management definitions define "gas" as "any fluid, either combustible or noncombustible, which is produced in a natural state from the earth and which maintains a gaseous or rarefied state at ordinary temperatures and pressure conditions."[53] Noting specifically that helium, a non-hydrocarbon gas, was within the meaning of "gas" in the statute, the Tenth Circuit in *Aulston* held that CO_2 was a "gas" within the meaning of the MLA and thus could be extracted under the terms of an oil and gas lease.[54]

Where both surface and minerals are privately owned, a property-specific analysis is required to determine ownership of CO_2. If CO_2 is expressly granted or reserved, the language of the grant or reservation will control. However, where the conveyancing language is ambiguous, state

45. *See* Aulston v. United States, 915 F.2d 584 (10th Cir. 1990).

46. 30 C.F.R. § 206.151 (2017).

47. *Aulston*, 915 F.2d at 598 (citing *Union Oil*, 549 F.2d. at 1274-76).

48. *See* Robert D. Lanier, 93 Interior Dec. 66 (IBLA 1986); Rocky Mt. Min. L. Found., Law of Federal Oil and Gas Leases, § 9.03(3) (2017) (citing Memorandum from Reg'l Solicitor, Den. on Reservation of Carbon Dioxide Gas in Land Patent to the Colo. State Dir., Bureau of Land Mgmt. (July 2, 1979)).

49. 915 F.2d 584 (10th Cir. 1990).

50. *See generally* Aulston v. United States, 915 F.2d 584 (10th Cir. 1990).

51. *See generally* Atl. Richfield Co. v. Farm Credit Bank of Wichita, 226 F.3d 1138 (10th Cir. 2000); Comm'r of Gen. Land Office v. SandRidge Energy, Inc., 454 S.W.3d 603 (Tex. App.—El Paso 2014, pet. denied).

52. Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits, 88 Interior Dec. 538 (1981) (subsequently withdrawn).

53. 43 C.F.R. § 3000.0-5(a) (2017).

54. *See Aulston*, 915 F.2d 584, 591-99 (10th Cir. 1990) (citing Northern Nat. Gas Co. v. Grounds, 441 F.2d 704 (10th Cir. 1971)).

case law or statutory enactments may be determinative.[55] These approaches may variously look to the value of the substance,[56] its location and the degree of surface damage caused by the manner by which it can be reasonably extracted,[57] the substance's similarity to named minerals,[58] and the commonly understood meaning of the term at the time of the grant.[59] Some states like North Dakota have statutorily defined "minerals," although doing so has not necessarily resolved uncertainty for interpretation.[60] Despite abundant case law on the question, ambiguous mineral reservations or conveyances may still be unclear as applied to various substances—including CO_2.

Exploration and Production

State regulation of exploration activities and potential surface and environmental impacts of exploration are very similar to those for oil and gas. CO_2 is produced using methods similar to those used for hydrocarbon gas production. In fact, CO_2 domes may be discovered in the course of oil and gas exploration. Accordingly, state oil and gas conservation agencies may be authorized to create drill spacing units, permit new drilling, and unitize leases for purposes of CO_2 production.[61] Drilling for CO_2 results in

55. See Patrick H. Martin & Bruce M. Kramer, WILLIAMS & MEYERS OIL & GAS LAW, § 219 (2015); E. Wayne Thode, *Mines and Minerals – Meaning of the Word "Minerals" in a Grant or Reservation*, 27 TEX. L. REV. 726 (1949).

56. *See* Spurlock v. Santa Fe Pac. R.R., 694 P.2d 299, 304, 308 (Ariz. Ct. App. Div. 1 1984) (holding a "a reservation of 'all oil, gas, coal, and minerals whatsoever'" included "all commercially valuable substances separate from the soil"). This is substantially similar to the "manner of enjoyment" approach suggested by Professor Kuntz. *See* Eugene O. Kuntz, *The Law Relating to Oil and Gas in Wyoming*, 3 WYO. L.J. 107, 112-13 (1947); *see also* John S. Lowe, *What Substances are Minerals?,* 30 ROCKY MT. MIN L. INST. 2-1 (1984).

57. *See generally* Moser v. U.S. Steel Corp., 676 S.W.2d 99 (Tex. 1984); David A. Scott, *Determining Mineral Ownership in Texas After Moser v. United States Steel Corp. – The Surface Destruction Nightmare Continues*, 17 ST. MARY'S L.J. 185 (1985).

58. *See generally* State ex rel. Comm'rs Land Office v. Butler, 753 P.2d 1334 (Okla. 1987).

59. *See generally* Keith v. Kinney, 140 P.3d 141 (Colo. App. 2005); *Salzseider v. Brunsdale,* 94 N.W.2d 502 (N.D. 1959); *Atwood v. Rodman,* 355 S.W.2d 206 (Tex. Civ. App.—El Paso 1962); Mullinnix LLC v. HKB Royalty Trust, 126 P.3d 909 (Wyo. 2006).

60. N.D. CENT. CODE ANN. § 47-10-24 (West 1983); George E. Reeves, *The Meaning of the Word "Minerals"*, 54 N.D. L. REV. 419 (1978); Robert E. Beck, *"And Other Minerals" As Interpreted By the North Dakota Supreme Court*, 52 N.D. L. REV. 633 (1976).

61. *See* Bailey v. Shell W. E&P, Inc., 609 F.3d 710 (5th Cir. 2010); *see, e.g.*, MISS. CODE. ANN. § 53-1-3(d) (West 1995) (defining "gas" to include Carbon Dioxide and therefore putting CO_2 within the permitting authority of the state Oil and Gas Board); N.M. STAT. ANN. § 70-2-34(A) (West 2003) ("The oil conservation division shall adopt and

surface disturbances and can generate impacts to species, noise and light pollution, and other environmental externalities associated with the exploration and production of other gaseous underground resources. Appropriately, surface requirements for bonding, setbacks, and reclamation may also be similar to those mandated for oil and gas exploration.

Producing CO_2 as a byproduct from industrial processes and natural gas separation plants is an alternative to natural CO_2. Early CO_2-EOR projects, prior to the discovery of natural sources, used CO_2 from industrial facilities and natural gas separation plants. Although the processes are distinct, and the CO_2 itself is indistinguishable from that produced by natural sources, for purposes of this paper CO_2 sourced from these types of facilities are collectively referred to as "anthropogenic CO_2."[62] Anthropogenic CO_2 can be captured from the flue gas stream from existing sources such as natural gas, coal, and combined cycle power plants, and from energy intensive industrial processing facilities such as gas processing, coal gasification, combined cycle generation, and fertilizer production facilities.[63] Most currently available technologies capture from a flue through retrofits onto existing plants.[64] The cost of capture and the purity of CO_2 captured depend on the quantity of CO_2 in the flue and the method of generation, and estimates vary greatly.[65] While the potential volume of CO_2 that can be captured from these sources may exceed that available from underground reservoirs,[66] methods of capture can be expensive and the CO_2 captured may require additional processing to reach pipeline quality specifications. These specifications require removal of water and other impurities that

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administer rules on the conservation, the production and the prevention of waste of carbon dioxide, helium and other non-hydrocarbon gases in the same manner as it regulates, conserves and prevents waste of natural or hydrocarbon gas.").

62. *See* Marston & Moore, *supra* note 15, at 428.

63. Duncan, *supra* note 21, at 3; Schnacke, *supra* note 13, at 287; Dipietro, *supra* note 33, at 1, tbl. 2-3.

64. Duncan, *supra* note 21, at 3; Rao & Rubin, *supra* note 19, at 4467.

65. Patrick Falwell & Brad Crabtree, *Understanding the National Enhanced Oil Recovery Initiative*, CORNERSTONE (2014), http://cornerstonemag.net/understanding-the-national-enhanced-oil-recovery-initiative/; *Developing a Pipeline Infrastructure for CO_2 Capture and Storage: Issues and Challenges*, ICF INTERNATIONAL, at 23 (2009), http://www.globalccsinstitute.com/publications/developing-pipeline-infrastructure-co2-capture-and-storage-issues-and-challenges [hereinafter ICF Report]; Kelly Thambimuthu et al., *Capture of CO_2*, IPCC SPECIAL REPORT ON CARBON DIOXIDE CAPTURE AND STORAGE (Bert Metz 2005); *CO_2 Pipeline Infrastructure*, INT'L ENERGY AGENCY, GLOBAL CCS INST., at 12, 14, 104 (2014), http://hub.globalccsinstitute.com/sites/default/ files/publications/ 120301/co2-pipeline-infrastructure.pdf.; Marston & Moore, *supra* note 15, at 433.

66. DiPietro, *supra* note 33.

contribute to corrosion during transportation or make the CO_2 unsuitable for EOR.[67] Perhaps due to these constraints, the majority of CO_2-EOR projects use natural CO_2. Only eight oil and gas fields presently utilize anthropogenic CO_2 for enhanced recovery operations.[68]

CO_2 Transportation

Once captured, CO2 is processed, dehydrated, pressurized, and transported via pipeline to end-users for CO_2-EOR.[69] According to data compiled by the Pipeline Hazardous Materials Safety Administration (PHMSA), as of 2016, there were over 5,100 miles of CO_2 pipelines in the U.S.[70] The majority of CO_2 pipelines were built to deliver CO_2 from reservoirs in New Mexico and Colorado for EOR operations in the Permian oil field in West Texas.[71] In addition to these states, demand for EOR has driven construction of significant CO_2 pipeline infrastructure in Wyoming, Mississippi, Louisiana, and Texas.[72] These pipelines are highly localized and field specific, and carry "both naturally-occurring CO_2 and anthropogenic CO_2 extracted or captured from industrial sources."[73] CO_2-EOR accounts for approximately 90 percent of total CO_2 transported, although additional end uses include manufacturing, such as soda bottling.[74]

Transportation of CO_2 by pipeline requires unique design and construction to address the pressure and temperature requirements for transport in a supercritical phase. CO_2 is transported in a supercritical dense-phase state at pressures ranging "from 1,200 to 2,700 psi"—pressures significantly higher than those used for the transport of natural gas.[75] Dense-phase gas has attributes that are both like a gas and a liquid.[76]

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67. B. Wettenhall, et al., *The Effect of CO_2 Purity on the Development of Pipeline Networks for Carbon Capture and Storage Schemes*, 30 INT'L J. OF GREENHOUSE GAS CONTROL 197-211 (2014); Marston & Moore, *supra* note 15, at 434.

68. MIT Report, *supra* note 16.

69. Schnacke, *supra* note 13, at 10-6.

70. DOT Mileage Report, *supra* note 7.

71. Dooley, *supra* note 9, at 1596 (citing *Natural Gas Transmission Pipeline Annual Mileage Database*, U.S. DEP'T OF TRANSP., PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMIN., OFFICE OF PIPELINE SAFETY (2007), https://www.phmsa.dot.gov/ data-and-statistics/pipeline/annual-report-mileage-natural-gas-transmission-gathering-systems)).

72. *Id*.; Dooley, *supra* note 9, at 1596.

73. Schnacke, *supra* note 13, at 275.

74. *Id*. at 289 (citing Presentation, Lisa Bacanskas, *CO_2-EOR and EPA's Greenhouse Gas Reporting Program*, EPA Workshop: Introduction to Carbon Dioxide Enhanced Oil Recovery (CO_2-EOR) (June 11, 2013)).

75. *Id.* at 278.

76. *Id*.; Marston & Moore, *supra* note 15, at 426.

Because dense-phase CO_2 moves like a liquid, pumps, rather than compressors, are required to move it through the pipeline.[77] Compression to these pressures is itself energy intensive.[78] Since CO_2 cannot be burned to generate the energy necessary for compression, compression stations must be located near sources of electric power or natural gas.[79] Due to high pressures, CO_2 pipelines typically use thicker walled pipe than is used for natural gas pipelines.[80] Additional linings, claddings, and coatings may be necessary to manage corrosion risk.[81] Although possible, these unique construction specifications make requalification of existing natural gas pipelines for CO_2 unusual.[82]

End Uses of CO_2

CO_2 is considered a commodity for use in manufacturing, the food and beverage industry, and energy production.[83] The majority of CO_2 drilled, produced, and transported today is for use in oil fields for CO_2-EOR.[84] Conventional oil production may only produce as much as 80% or as little as 10% of the initial oil in place.[85] As pressure within the reservoir diminishes, oil remains trapped within the pore space.[86] Some of this stranded oil can be produced by the injection of CO_2 to mobilize flow of oil within the pore spaces towards a production well.[87]

EOR operations also result in underground storage of CO_2. As long as tertiary recovery operations continue, CO_2 is recycled and reinjected with only minimal losses throughout the process.[88] Approximately 90% of the total CO_2 injected will remain within the hydrocarbon reservoir, a process

77. Schnacke, *supra* note 13, at 278.

78. Marston & Moore, *supra* note 15, at 435.

79. *Id.* at 435-36; ICF Report, *supra* note 65, at 39.

80. *Id*.

81. *Id.*

82. *Recommended Practice: Design and Operation of CO_2 Pipelines*, DET NORSKE VERITAS, DNV-RP-J202, at 29 (Apr. 2010); Marston & Moore, *supra* note 15, at 430, 436, 450 (citing *Southern Natural Gas Co.*, 115 F.E.R.C. ¶ 62, 266 at P 1-3 (2006)).

83. Emitted CO_2 has also been classified as a "pollutant" under the Clean Air Act, whereas injected CO_2 for storage has been classified as a solid waste and may be considered a hazardous waste, if not injected under Class VI and within the scope of EPA's conditional exclusion. *See supra* note 11 and *infra* note 402.

84. Duncan, *supra* note 21, at 1.

85. *Id*.

86. *Id*. at 2.

87. *Id.*

88. Robert C. Ferguson, et al., *Storing CO_2 with Enhanced Oil Recovery*, ENERGY PROCEDIA 1, 1989-96 (2009); Schnacke, *supra* note 13, at 283.

that is referred to as "associated storage."[89] This storage accounts for the majority of anthropogenic CO_2 that has been sequestered to date.[90]

CO_2 can also be sequestered underground for CCUS to decarbonize fossil-fuel generation and mitigate climate change.[91] In this process, CO_2 is viewed as a waste rather than a commodity. CO_2 is captured from anthropogenic sources, such as coal and natural gas fired power plants or natural gas separation facilities, and injected underground for long term or permanent storage.[92] Sequestration requires rock formations with impervious layers and that are free of faulting to prevent the injected CO_2 from migrating or escaping into other formations, such as fresh water aquifers, or to the surface.[93] The underground reservoirs where CO_2 can be sequestered may be depleted oil or gas fields—hydrocarbon reservoirs that have already demonstrated secure containment of substances under pressure over a geologic time scale—or newly discovered non-hydrocarbon storage sites such as deep saline aquifers or coal seams.[94]

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89. *Id.* (quoting *The Global Status of CCS: 2012*, GLOBAL CCS INST., at 147 (2012), http://hub.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf).

90. Marston & Moore, *supra* note 15, at 425 ("The amount of CO_2 that has been incidentally stored [as residual unrecoverable CO_2 injected for EOR] over the last several decades dwarfs the volumes injected by CCS pilot projects around the world.").

91. An exploration of the comparative merits and drawbacks of CCUS as a climate mitigation technology is beyond the scope of this article. *See* David Biello, *Can Carbon Capture Technology Be Part of the Climate Solution*, YALE ENV'T 360 (Sept. 8, 2014), http://e360.yale.edu/features/can_carbon_capture_ technology_be_ part_of_the_climate_solution; *Carbon Capture and Storage: The Solution of Deep Emissions Reductions*, INT'L ENERGY AGENCY (2015), https://www.iea.org/publications/freepublications/publication/ CarbonCaptureandStorageThesolutionfordeepemissionsreductions.pdf; Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change Carbon Sequestration and Property Rights,* 2010 ILL. L. REV. 363, 371-72 (2010) [hereinafter Climate]; Jeff Tollefson, *Is The 2 Degree C World a Fantasy?*, NATURE (Nov. 24, 2015), http://www.nature.com/news/is-the-2-c-world-a-fantasy-1.18868; *Technology Roadmap: Carbon Capture and Storage*, INT'L ENERGY AGENCY, at 7 (2013), http://www.iea.org/publications/freepublications/publication/Technology RoadmapCarbonCaptureandStorage.pdf.

92. Academic literature refers to both CCUS and CCS, often using the terms interchangeably. However, there are differences between projects where CO_2 is exclusively stored and projects where CO_2 is utilized for EOR, or the production of chemicals or other industrial products. *See* Rosa M. Cuellar-Franca & Adisa Azapagic, *Carbon Capture, Storage, and Utilization Technologies: A Critical Analysis and Comparison of Their Life Cycle Environmental Impacts*, 9 J. OF CO_2 UTILIZATION 82-102 (Mar. 2015).

93. Nasi, *supra* note 23, at 9B-9.

94. Stefan Bachu, *Identification of Oil Reservoirs Suitable for CO_2-EOR and CO_2 Storage (CCUS) Using Reserves Databases, with Application to Alberta, Canada*, 44 INT'L

The U.S. Department of Energy (DOE) estimates that in the U.S. alone there is adequate sequestration capacity for geologic storage to contain more than 3,300 billion metric tons of CO_2.[95] Implementation of CCUS at the nationwide, commercial scale necessary to materially impact climate change will require CO_2 pipeline infrastructure to expand dramatically.[96] Development of even a small portion of these storage resources will require a significant expansion of CO_2 transportation infrastructure.[97] An explosion of construction, however, is unlikely. Thus far, implementation of CCUS technology has been exclusively through pilot projects with extensive government funding.[98] The DOE has provided billions of dollars for CCUS research, technology development, and pilot projects.[99] It is unknown whether, and to what extent, these technologies will be commercially adopted.

Pipelines developed for EOR will likely form the basis for a larger system to accommodate CCUS deployment. In fact, many depleted EOR assets may have additional carbon storage potential. Transitioning end-of-life EOR assets to permanent storage facilities requires navigation of complex and inconsistent regulatory permitting requirements and

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J. OF GREENHOUSE GAS CONTROL 152-65 (Jan. 2016); Stephanie M. Haggerty, Note, *Legal Requirements for Widespread Implementation of CO_2 Sequestration in Depleted Oil Reserves*, 21 PACE ENVTL. L. REV. 197, 200-01 (2003).

95. U.S. DEP'T OF ENERGY, CARBON SEQUESTRATION ATLAS OF THE UNITED STATES AND CANADA 15 (2007).

96. Dooley, *supra* note 9, at 4; Paul Parfomak & Peter Folger, *Pipelines for Carbon Dioxide (CO_2) Control: Network Needs and Cost Uncertainties*, CONG. RES. SERV., RL34316 (Jan. 10, 2008).

97. Kevin Bliss, et al., *A Policy, Legal, and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide, Topical Report*, INTERSTATE OIL & GAS COMPACT COMM'N, at 32 (Sept. 10, 2010); Dooley, *supra* note 9, at 1957.

98. Peter Folger, *Carbon Capture and Sequestration: Research, Development, and Demonstration at DOE*, U.S. CONGRESSIONAL RES. SERV., RL42496 (Feb. 10, 2014); Climate, *supra* note 91, at 374; Marston & Moore, *supra* note 15, at 425, Nasi, *supra* note 23, at 9B-12.

99. Climate, *supra* note 91, at 307 (citing Steven D. Cook, *Carbon Capture, Storage to Get 2.4 Billion in Recovery Funds, Secretary Chu Announces*, 40 ENV'T REPT. 1164 (BNA) (May 22, 2009); U.S. DEP'T OF ENERGY, OFFICE OF FOSSIL ENERGY, FE IMPLEMENTATION OF THE RECOVERY ACT, *available at* http://energy.gov/fe/fe-implementation-recovery-act (last visited Aug. 1, 2017); *Carbon Capture Utilization and Storage: Climate Change, Economic Competitiveness, and Energy Security*, U.S. DEP'T OF ENERGY (Aug. 2016), https://energy.gov/sites/prod/files/2016/09/f33/DOE%20-%20Carbon%20Capture%20Utilization%20and%20Storage_2016-09-07.pdf.

adjustments to real property entitlements.[100] While these assets may permit utilization of existing pipeline infrastructure for at least some storage, in order to make maximum utility of available methods of capture and the reservoirs at each terminus, the unique needs and objectives of those technologies will need to be evaluated.[101]

The exact "size and configuration of the pipeline system" that will be required for CCUS will depend on a number of factors, including the demand and economics of EOR, fuel switching, and the timing, rate, and stringency of commercial adoption of CCUS technologies.[102] By all accounts, however, there will be significant expansion of CO_2 pipeline infrastructure between now and 2050.[103] Much of this infrastructure may be pieced together from pipelines developed for CO_2-EOR. Integration of these pipelines into a flexible, hybrid infrastructure that can accommodate CCUS requires consideration of the ways in which CO_2 pipelines are sited, constructed, and regulated today.

II. The Federal Regulatory Framework for CO_2 Transport

Unlike pipelines for natural gas, there is no federal regulatory framework for siting CO_2 pipelines or providing pipeline developers with eminent domain authority. Only safety is subject to comprehensive federal regulation. Rather, the design, routing, construction, and operation of CO_2 pipelines are regulated at the state level. Nonetheless, numerous federal laws and regulations influence CO_2 pipeline siting, design, or operation, particularly where pipelines cross state lands. These regulations introduce

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100. A full exploration of these issues is beyond the scope of this article. *See* Patrick Falwell, *State Policy Actions to Overcome Barriers to Carbon Capture and Sequestration and Enhanced Oil Recovery*, CTR. FOR CLIMATE AND ENERGY SOLS., (Sept. 2013) (for the Industry Working Group of North America 2050); Elizabeth J. Wilson & David Gerard, CARBON CAPTURE AND SEQUESTRATION: INTEGRATING TECHNOLOGY, MONITORING AND REGULATION (Blackwell Publishing 2007); Marston & Moore, *supra* note 15.

101. *Id.* at 464 ("A CCS Pipeline for removing captured CO_2 from one or more power plants for permanent geologic storage is, in certain respects, the polar opposite of the EOR pipeline.").

102. Richard S. Middleton & Jeffrey M. Bielicki, *A Comprehensive Carbon Capture and Storage Infrastructure Model*, 1 ENERGY PROCEDIA, at 1611-16 (Feb. 2009); Dooley, *supra* note 9; *Id.* at 436.

103. Howard J. Herzog, *Scaling Up Carbon Dioxide Capture and Storage: From Megatons to Gigatons*, 33 ENERGY ECONOMICS 4, 597-604, 600 (2011); M.D. Jensen, et al., *A Phased Approach to Building a Hypothetical Pipeline Network for CO_2 Transport During CCUS*, ENERGY PROCEDIA 37, 3097-3104 (2013).

mechanisms for federal agencies to influence the siting of CO_2 pipelines in coordination with state regulatory agencies.

Safety

Safety is the only aspect of CO_2 pipeline development that is subject to comprehensive federal regulation. PHMSA—part of the U.S. Department of Transportation—regulates the safety of interstate CO_2 pipelines[104] pursuant to the Hazardous Liquid Pipeline Safety Act of 1979 (HLPSA).[105] Through the Office of Pipeline Safety (OPS), PHMSA regulates the design, construction, pressure testing, operation, maintenance, corrosion control, and reporting requirements for hazardous liquid pipelines.[106] Department of Transportation regulations categorize CO_2 as a non-flammable gas hazardous material and not as a hazardous liquid. However, in 1988 Congress amended the HLPSA to require regulation of CO_2 pipeline facilities.[107] Accordingly, CO_2 pipelines are subject to the same safety regulations as hazardous liquid pipelines, rather than those applied to natural and other gas pipelines.[108]

States are largely preempted from adopting and imposing additional safety standards for interstate pipelines.[109] States can, however, accept responsibility for the safety regulation of intrastate CO_2 pipelines and can "participate in oversight of interstate pipelines" as "agents of the OPS" pursuant to delegation of HLPSA authority.[110] HLPSA permits state regulatory authority and responsibility for enforcement of HLPSA requirements either through certification pursuant to Section 60105(a) or by

104. CO_2 pipelines are defined as pipelines carrying at least 90% CO_2 molecules compressed to a supercritical state. 49 C.F.R. § 195.2 (2008).

105. 49 U.S.C. § 60101 (2006).

106. 49 C.F.R. §§ 190, 195-199 (2008).

107. An Act of October 31, 1988, Pub. L. No. 100-561, 102 Stat. 2805; Paul Biancardi & Lisa Bogardus, *An Introduction to Federal Pipeline Safety Regulations*, 38A ROCKY MTN. MIN. L. INST. 5 (1995).

108. Transportation of Carbon Dioxide by Pipeline, 54 Fed. Reg. 41912 (proposed Oct. 12, 1989) (to be codified at 40 C.F.R. pt. 195).

109. 49 U.S.C. § 60104(c) (2006); Olympic Pipe Line Co. v. City of Seattle, 437 F.3d 872 (9th Cir. 2006).

110. Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L.J. 1, 96 (2009) (citing 49 U.S.C. § 60105 (2006)). Intrastate pipelines are defined as those that both "start and stop" within a state boundary. *See* Pipeline Safety Reauthorization Act of 1988, Pub. L. No. 100-561, 102 Stat. 2805.

entering into agreements with the OPS.[111] A state must adopt the minimum federal regulations and must provide for injunctive and monetary sanctions similar to those authorized by federal pipeline safety laws to obtain certification.[112] All of the states with significant CO_2 pipeline infrastructure have obtained OPS certification to regulate some safety aspects of intrastate CO_2 pipelines.[113] Accordingly, state agencies may be responsible for functions such as inspection, accident investigation, and regulatory enforcement of intrastate hazardous liquid pipelines.[114]

In addition to administration of federal requirements, HLPSA permits states to impose additional requirements on intrastate hazardous liquid and CO_2 pipelines, provided that the additional or more stringent regulations are not inconsistent with federal regulations.[115] Pursuant to this authorization, several states have imposed specific requirements for CO_2 pipelines or for hazardous liquid pipelines in general. For example, Texas requires CO_2 operators to engage in additional public education and reporting, restricts siting near schools, and imposes additional corrosion control requirements.[116] Wyoming mandates specific casing and siting requirements for hazardous liquid pipelines facilities within the state highway system right-of-way,[117] and Oklahoma imposes additional notice

111. *Natural Gas Pipeline Safety*, COLO. DEP'T OF REGULATORY AGENCIES https://www.colorado.gov/pacific/dora/aboutgaspipelines (last visited Sept. 19, 2017); *Office of Conservation*, LA. DEP'T OF NAT. RES., http://www.dnr.louisiana.gov/ index.cfm/page/46 (last visited Sept. 19, 2017); *Pipeline Safety*, MISS. PUB. SAFETY COMM'N, http://www.psc.state.ms.us/pipeline /pipeline.html (last visited Sept. 19, 2017); *Pipeline Safety*, OKLA. CORP. COMM'N, TRANSP. DIV., http://www.occeweb.com /tr/PLSHome.htm (last visited Sept. 19, 2017); *Pipeline Safety,* R.R. COMM'N OF TEX., http://www.rrc.state.tx.us/ pipeline-safety/ (last visited Sept. 19, 2017); *Pipeline and Water*, WYO. PUB. SERV. COMM'N, http://psc.state.wy.us/ pscdocs/pipeline.html (last visited Sept. 19, 2017).

112. 49 U.S.C. § 60105 (2006).

113. *States Participating In the Federal/State Cooperative Gas and Hazardous Liquid Pipeline Safety Programs*, PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMIN. (Nov. 25, 2014), https://www.phmsa.dot.gov/portal/site/PHMSA/menu item.6f23687cf7 b00b0f22e4 c6962d9c8789/?vgnextoid=60dc8f4826eb9110VgnVCM1000009ed07898RCRD&vgnextch annel=a576ef80708c8110VgnVCM1000009ed07898RCRD&vgnextfmt=print.

114. Nordhaus & Pitlick, *supra* note 110, at 96.

115. *Id*.

116. TEX. ADMIN. CODE tit. 16, §§ 8.301-8.315 (2017).

117. *WYDOT Rules and Regulations, Utility Accommodations Section*, WYO. DEP'T OF TRANSP., http://www.dot.state.wy.us/files/live/sites/wydot/files/shared /Management_ Services/utility%20accommodations%20section %20rules/utl10.pdf (last visited Sept. 19, 2017).

requirements for hazardous liquid pipeline developers.[118] Recommended practices suggest siting pipelines based on the likelihood and consequence of failure considering pipeline contents and human activity along the pipeline route.[119] Through these requirements states can semi-customize safety requirements to address local land use, political, geographic, and environmental considerations.

An Absence of Federal Siting Authority

There is no federal siting authority for CO_2 pipelines. CO_2 concurrently falls outside the scope of "natural gas" within the Natural Gas Act (NGA) and within the "gas" exclusion in the Interstate Commerce Act (ICA).[120] Accordingly, there is no authority for federal siting of CO_2 pipelines, other than issuance of rights-of-way for those on federal land.

Natural gas pipelines are sited according to the NGA. In 1938, Congress granted the Federal Power Commission (FPC), now the Federal Energy Regulatory Commission (FERC), authority for regulating transportation of natural gas in interstate commerce.[121] The NGA requires a certificate of public convenience and necessity from FERC for every new pipeline or pipeline extension for "the transportation in interstate commerce of natural gas"[122] and for the acquisition and operation of interests in natural gas pipelines.[123] Each step of the FERC process for obtaining a certificate of public convenience and necessity is designed to provide transparency, opportunities for public comment, and coordination between stakeholders, thus streamlining the siting process through consolidated information gathering and approvals.[124] This process facilitates consideration of local and national needs and impacts to either customers or the environment.[125] If granted, the pipeline company receives the right to use eminent domain for the pipeline's entire length.[126] Accordingly, although other state

118. OKLA. ADMIN. CODE tit. 32, § 165:20-7-2 (2015).

119. Design and Operation of CO_2 Pipelines, *supra* note 82, at 17.

120. Natural Gas Act of 1938 § 1, Pub. L. No. 75-688, 52 Stat. 821 (codified as amended at 15 U.S.C. § 717 (2012); Interstate Commerce Act, 49 U.S.C. §§ 1(4), 2, 3(1) (1887).

121. Natural Gas Act, 15 U.S.C. §§ 717c, 717h (1938); Alex B. Klass & Danielle Meinhardt, *Transporting Oil and Gas: U.S. Infrastructure Challenges*, 100 IOWA L. REV. 947 (2015).

122. Natural Gas Act, 15 U.S.C. § 717f(c) (1988).

123. *Id.* § 717f(c)(1)(a).

124. Klass & Meinhardt, *supra* note 121, at 1007.

125. *Id*.

126. 15 U.S.C. § 717f(c)(1)(a).

requirements may apply, natural gas pipelines are not required to navigate state siting and eminent domain requirements to obtain right-of-way.

The NGA does not define the term "natural gas."[127] CO_2 is gaseous at atmospheric pressures. However, it is transported via pipeline at high pressures that result in a phase change from gas to an "indeterminate" state that is neither solid, liquid, or gaseous—variously called "dense phase gas," "supercritical fluid," or a "dense vapor."[128] As a result, it was initially unclear whether the NGA applied to CO_2 pipelines. Accordingly, in anticipation of the development of several interstate CO_2 pipelines, Cortez Pipeline Company petitioned FERC for a jurisdictional determination of whether CO_2 was a natural gas under the statute.[129] FERC declined to make a determination based on the chemical composition of the gas[130] and determined that gas that was 98% CO_2 was not a "natural gas" as intended by Congress in the NGA.[131] Instead, FERC based its determination on the fact that the NGA was enacted by Congress to regulate a "burgeoning" and "defined industry" in order to "protect the consumers of a salable commodity from exploitation at the hands of the natural gas companies."[132] Concluding that the CO_2 transported was solely for the purpose of increasing the production of oil and would not be sold as fuel to the public, the Commission found that the proposed pipeline was "not within the NGA jurisdiction provided by the Commission."[133] In 2006, in *Southern Natural Gas Co.*, FERC reaffirmed its lack of jurisdiction, stating that CO_2 facilities were "exempt from jurisdiction under [ ] the NGA."[134]

Oil pipelines are also subject to federal regulation, although not federal siting, pursuant to the Interstate Commerce Act (ICA).[135] The ICA was passed in 1887 to address the growing problem of natural monopolies in railroads.[136] It required that railroads charge "just and reasonable rates"

127. *Cortez Pipeline Co.*, 7 FERC 61024 (Apr. 6, 1979) (stating that "[t]here appears to have been no attempt during the legislative debate over the NGA to address the problem of the ambiguity in the term natural gas") (internal citations and quotations omitted).

128. Schnacke, *supra* note 13, at 3.

129. *Cortez Pipeline Co.*, 7 FERC 61024 (Apr. 6, 1979).

130. *Id*.

131. *Id*.

132. *Id*. (citing FPC v. La. Power & Light Co., 406 U.S. 621, 631 (1972); Sunray Mid-Continent Oil Co. v. FPC, 364 U.S. 137, 147 (1960); Phillips Petroleum Co. v. Wisconsin, 347 U.S. 672 (1954); FPC v. Hope Nat. Gas Co., 320 U.S. 591, 610 (1944)).

133. *Id*.

134. *Maritimes & Ne. Pipeline, L.L.C.*, 115 FERC 61176 (2006).

135. ExxonMobil Oil Corp. v. FERC, 487 F.3d 945, 956 (D.C. Cir. 2007).

136. Am. Trucking Ass'ns v. Atchison, T. & S.F. Ry., 387 U.S. 397 (1967).

without regard to locality or distance and without preference to any individual product or shipper—thus establishing the baseline requirements for what is now referred to as "common carriage."[137] Oil pipelines were similarly "bedeviled" by monopolistic practices.[138] By 1904 Standard Oil transported more than 90% of the total oil transported in the United States.[139] In response to complaints of Standard Oil's monopolistic behavior and the resulting lack of access to interstate markets and price disparities, Congress passed the Hepburn Act of 1906 and expanded the regulatory responsibilities of the Interstate Commerce Commission (ICC) under the ICA to include oil pipelines.[140] Oil pipelines were thus subjected to common carrier requirements, including non-discriminatory access, regulation of rates and terms of service, and ICC approval of tariffs.[141]

Oil pipeline regulation was transferred to FERC with the passage of the Department of Energy Organization Act in 1977.[142] FERC authority over oil pipelines is notably different from its authority over natural gas pipelines. The authority it derives from the ICA is exclusively focused on assuring reasonable and nondiscriminatory access to oil pipelines; FERC does not regulate the siting, construction, expansion, or operation of oil pipelines and does not provide developers with nationwide powers of eminent domain along proposed pipeline routes. Accordingly, state law determines siting, permitting or certification, and a developer's rights to acquire land by eminent domain.

CO_2 is also excluded from FERC regulation under the ICA. The ICA initially applied to all persons engaged in "the transportation of oil or other commodity, except water and gas, by means of pipelines."[143] Similar to the NGA, the ICA leaves the term "gas" undefined. In 1981, in response to a request from Cortez Pipeline Co. and after public comment, the ICC, the predecessor regulatory agency to FERC, issued a final declaratory order.[144]

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137. Interstate Commerce Act, 49 U.S.C. §§ 1(4), 2, 3(1) (1887).

138. Farmers Union Cent. Exch., Inc. v. FERC, 734 F.2d 1486, 1494 (D.C. Cir. 1984).

139. Klass & Meinhardt, *supra* note 121, at 959-60.

140. Valvoline Oil Co. v. United States, 25 F. Supp. 460 (W.D. Pa. 1938); Elizabeth Granitz & Benjamin Klein, *Monopolization by "Raising Rivals' Costs": The Standard Oil Case*, 39 J.L. & ECON 1 (1966); Jeff D. Makholm, et al., *The Politics of U.S. Oil Pipelines: The First Born Struggles to Learn from the Clever Younger Sibling*, 37 ENERGY L.J. 409, 410 (2016) (citing Pub. L. No. 59-337, 34 Stat. 584 (1906)).

141. Klass & Meinhardt, *supra* note 121, at 961.

142. *Id*. at 980 (citing JAMES H. MCGREW, FERC: FEDERAL ENERGY REGULATORY COMMISSION 227 (2d ed. 2009); 42 U.S.C. § 7172(b)).

143. *Valvoline Oil Co.*, 25 F. Supp. at 462.

144. *Cortez Pipeline Co.*, 45 Fed. Reg. 85,177 (1980).

The ICC also elected not to base its decision on the physical properties of CO_2. Instead, the ICC based its analysis on the original language in the Hepburn Act and legislative history regarding the exclusion of "natural or artificial" gas.[145] In a decision that it later affirmed, the ICC concluded the "all gas types classified by origin or source were excluded from [its] jurisdiction."[146]

Where a proposed CO_2 pipeline will cross federal land, the Bureau of Land Management (BLM) has authority to grant rights-of-way for CO_2 pipelines as a "natural gas" pursuant to the MLA.[147] In *Exxon Corp. v. Lujan*, Exxon challenged the grant of a right-of-way for a CO_2 pipeline under the MLA, asserting instead that the proper authority for issuing the right-of-way was the Federal Land Policy and Management Act (FLPMA).[148] BLM has authority under the MLA to grant right-of-way for "pipeline purposes for the transportation of oil, natural gas, synthetic liquid or gaseous fuels, or any refined product produced therefrom,"[149] whereas pipeline rights-of-way for water and any substance other than those covered by the MLA are issued pursuant to FLPMA.[150] The BLM determined that the term "natural gas" as used in the MLA was not limited to hydrocarbons and accordingly issued the right-of-way pursuant to the MLA.[151] Exxon argued that because carbon dioxide was not a hydrocarbon[152] and FERC had each previously determined that CO_2 was not a "natural gas" in *Cortez Pipeline*, the appropriate authority for issuing right-of-way was FLPMA.[153] The court affirmed BLM's decision, finding that FERC's determination was under a different statute and accordingly had "no bearing" on BLM's

145. Nordhaus & Pitlick, *supra* note 110, at 90.

146. Harry L. Reed, *The New Carbon Dioxide Pipelines: Revival of the Common Carrier at Common Law*, 12 OKLA. CITY U. L. REV. 103, 108 (1987) (citing ICC, Cortez Pipeline Company—Petition for Declaratory Order—Commission Jurisdiction Over Transportation of Carbon Dioxide by Pipeline, 45 Fed. Reg. 85,177 (1980); ICC, Cortez Pipeline Co.—Petition for Declaratory Order—Commission Jurisdiction Over Transportation of Carbon Dioxide, 46 Fed. Reg. 18,805 (1981)). Adam Vann & Paul W. Parfomak, *Regulation of Carbon Dioxide Sequestration Pipelines: Jurisdictional Issues*, U.S. CONGRESSIONAL RES. SERV., RL343070, at 2 (Apr. 15, 2008); Schnacke, *supra* note 13, at 10-18.

147. Exxon Corp. v. Lujan, 970 F.2d 757, 761 (10th Cir. 1992).

148. *Id*. (The crux of this dispute concerned whether or not Exxon would be required to operate its pipeline as a common carrier.)

149. 30 U.S.C. § 28(a)185.

150. 43 U.S.C. § 1761(a)(2).

151. *Lujan*, 970 F.2d at 761.

152. *Id*. at 760. Hydrocarbon refers to a chemical composition including both hydrogen and carbon, whereas CO_2 is a combination of carbon and oxygen.

153. *Cortez Pipeline Co.*, 7 FERC 61024 (Apr. 6, 1979).

interpretation. Given the many definitions of "natural gas" within the federal regulations, including some within the Department of Interior, the court found that BLM's interpretation that CO_2 was a "natural gas" was not unreasonable.[154] Accordingly, CO_2 pipelines crossing federal land are sited by BLM pursuant to the MLA.

Opportunities for Federal Input in State Siting Processes

Despite the lack of federal siting and eminent domain authority, the National Environmental Policy Act (NEPA), the Clean Water Act (CWA), the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA), among others, may provide opportunities for federal agencies to influence on CO_2 pipeline siting. These opportunities are most abundant where the pipeline crosses federal lands or waterways—as is often true in the western United States. For example, Denbury's proposed Riley Ridge to Natrona project in Wyoming required the grant of a 212-mile right-of-way, 76% of which crossed federal lands administered by five BLM field offices.[155] Although not requiring a full assessment of the entire pipeline project, thus far the project has required section 106 review, ESA consultation, and preparation of an EIS. These processes may increase public awareness about CO_2 pipeline projects, enhance consideration of potential impacts, and influence siting decisions made pursuant to state law.

NEPA

NEPA may provide an opportunity for federal agencies to conduct additional environmental analyses, facilitate public participation, and contribute oversight to state siting processes. NEPA requires the preparation of an environmental assessment (EA) or an Environmental Impact Statement (EIS) for any major federal action that will significantly affect the quality of the human environment prior to the irreversible or irretrievable commitment of resources.[156] Construction of a CO_2 pipeline, particularly one of adequate size for CCUS, across federal lands could have

154. *Lujan*, 970 F.2d at 757.

155. *Riley Ridge to Natrona Project, Project Description*, BUREAU OF LAND MGMT., https:// eplanning.blm.gov/epl-front-office/projects/nepa /64342/77065/85578/ RRNP_ Project_Description.pd (last visited Sept. 19. 2017).

156. 42 U.S.C. § 4332(2)(C). "Major federal action" is defined at 40 C.F.R. § 1508.18 (1977). "Significantly" is defined at 40 C.F.R. § 1508.27. *See also* Metcalf v. Daley, 214 F.3d 1135, 1141 (9th Cir. 2000).

significant environmental impacts.[157] Unless the pipeline could be built within a pipeline corridor or otherwise qualify for a categorical exclusion,[158] BLM would be required to conduct an EA or EIS prior to issuing a right-of-way.[159] The analysis would prompt consideration of multiple alternatives—including a no action alternative—and could prompt the integration of mitigation measures.[160] While not mandating a specific outcome,[161] the NEPA process provides opportunity for stakeholder and agency input on proposed projects that require right-of-way or other major federal action.

NEPA's application to pipelines crossing only private land is more limited. In order to trigger NEPA, there must be a "major federal action."[162] Private actions may become subject to NEPA where the project is subject to federal control or requires a federal authorization, funding, or permit.[163] These analyses are limited to the proposed action, and would be unlikely to trigger a NEPA review of the entire pipeline project and route.[164] Although it is possible for an otherwise private project to become "federalized" if the federal government has "actual power to control the project," the cumulative effect of decisions, such as PHMSA approval of a safety plan or

157. Arnold W. Reitze Jr., *Carbon Capture and Storage Program's NEPA Compliance*, 42 ENVTL. L. REP. NEWS & ANALYSIS 10853, 10856 (2012); *See DOI-BLM-WY-D010-2017-0087-EA Riley Ridge Development Project*, BUREAU OF LAND MGMT., https://eplanning.blm.gov/epl-frontoffice/eplanning/planAndProjectSite.do?methodName=dispatch ToPatternPage&currentPageId=115957 (last visited Sept. 19, 2017).

158. 40 C.F.R. §§ 1501.4(a)(2), 1508.4 (1977); 42 U.S.C. § 15942 (2005).

159. *Fuel Safe Wash. v. FERC,* 389 F.3d 1313, 1317 (10th Cir. 2004); Mont. Wilderness Ass'n v. Fry, 310 F. Supp. 2d 1127, 1146-47 (D. Mont. 2004); Arnold W. Reitze, Jr., *The Role of NEPA in Fossil Fuel Resource Development and Use in the Western United States*, 39 B.C. ENVTL. AFF. L. REV. 283 (2012); Zeke J. Williams & Steven K. Imig, *EOR on Federal Lands, Enhanced Oil Recovery; Legal Framework for Sustainable Management of Mature Oil Fields*, ROCKY MTN. MIN. L. INST. 6-20 (May 6-7, 2015).

160. Nat'l Envtl. Policy Act Handbook H-1790-1, 6.6, 6.8.4, BUREAU OF LAND MGMT. (Jan. 2008).

161. Vt. Yankee Nuclear Power Corp. v. NRDC*,* 435 U.S. 519, 558 (1978); Hammond v. Norton, 370 F. Supp. 2d 226 (D.C. Cir. 2005).

162. 40 C.F.R. § 1508.18.

163. Ka Makani 'O Kohala Ohana Inc. v. Water Supply, 295 F.3d 955, 960 (9th Cir. 2002).

164. Sierra Club v. Bostick, 787 F.3d 1043 (10th Cir. 2015).

Fish and Wildlife Service issuance of a biological opinion, are unlikely to reach that threshold.[165]

Section 404 Permits

Federal permits are frequently required for water and wetland crossings on otherwise private projects.[166] The Army Corps of Engineers issues permits for discharge of dredge or fill materials under Section 404 of the Clean Water Act.[167] Section 404 requires a permit for any "utility line"—defined as including "any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance for any purpose"—crossing requiring discharge of dredge or fill material into waters of the United States.[168] Due to the expansive geographic scope of the program, almost any pipeline project will require a 404 permit.[169] The level of environmental analysis includes a range of possibilities based on the type of permit required.[170] Permits issued under Section 404 are categorized as either general (nationwide) or individual.[171] General permits evaluate a category of activities having minimal cumulative impacts.[172] Although general permits "undergo a stringent pre-approval evaluation process that involves a comprehensive environmental assessment under NEPA and also public notice and comment," the process does not involve substantive findings related to each discrete project.[173] Individual water or wetland crossings with potentially significant impacts trigger a more extensive 404 permitting process.[174] These projects are evaluated under public interest review based

165. Sierra Club v. U.S. Army Corps of Eng'rs, 64 F. Supp. 3d 128, 149 (D.C. Cir. 2014) (citing Citizens Alert v. EPA, 259 F. Supp. 2d 9, 20 (D.D.C. 2003), *aff'd* 102 Fed. App'x 167 (D.C. Cir. 2004)).

166. Solid Waste Agency v. U.S. Army Corps of Eng'rs, 531 U.S. 159 (2001).

167. Greater Yellowstone Coal. v. Flowers, 359 F.3d 1257, 1266 (10th Cir. 2004).

168. 33 U.S.C. § 1344; (1987); 77 Fed. Reg. 10,271-72 (Feb. 21, 2012).

169. Eric Biber & J.B. Ruhl, *The Permit Power Revisited: The Theory and Practice of Regulatory Permits in the Administrative State*, 64 DUKE L. J. 133, 162 (2014).

170. *Id*. at 171.

171. Sierra Club v. U.S. Army Corps of Eng'rs, 990 F. Supp. 2d 9, 19 (D.D.C. 2013) (citing 33 U.S.C. §§ 1344(a), (e) (for general permits) and 33 C.F.R. §§ 323 and 325 (2013) (for the application and review requirements of specific permits)).

172. Nat. Res. Def. Council v. Costle, 568 F.2d 1369, 1380-82 (D.C. Cir. 1977); 33 C.F.R. § 330.1; 40 C.F.R. § 230.7 (2015).

173. *Sierra Club*, 990 F. Supp. 2d. at 19 (citing 33. U.S.C. § 1344(e)); Biber & Ruhl, *supra* note 169, at 167. For linear projects like utility lines, each crossing of a waterway is considered to be a "single and complete project" as long as these crossings are "separate and distant." *See* Sierra Club v. Bostick, 787 F.3d 1043 (10th Cir. 2015).

174. 40 C.F.R. § 230.

on environmental criteria and require the consideration of alternatives and incorporation of compensatory mitigation.[175] Neither of the 404 processes requires a consolidated environmental review of the entire project.[176] The 404 permitting process may provide a vehicle for public and federal input on siting relative to specific projects and the attachment of specific conditions and mitigation requirements within state law siting.[177] However, the efficacy of the permitting program to address cumulative consideration of environmental impacts from private land projects has been criticized.[178]

NHPA Consultation

National Historic Preservation Act (NHPA) procedures may also provide avenues for federal input on pipeline siting. The NHPA's consultation and review process is designed to avoid or minimize, to the extent possible, harm to historic properties where "the area of potential effects" from a proposed project "may result in changes in the [property's] character or use."[179] The NHPA requires federal agencies to consult with the Advisory Council on Historic Preservation and other consulting parties prior to taking an action[180] that may affect a site "included in or eligible for inclusion" in the National Register.[181] Sites may include "traditional cultural properties" that, due to their association with the cultural history, practice, or traditions of Native American groups, rural communities, or particular cultural groups within urban neighborhoods, "are important in maintaining the continuing cultural identity of the community."[182] Were a proposed pipeline project to

175. *Individual Permits*, U.S. ARMY CORPS OF ENG'RS, FT. WORTH DIST., http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/IndividualPermits.aspx (last visited Sept. 19, 2017).

176. *Sierra Club*, 990 F. Supp. 2d. at 34.

177. Dave Owen, *Little Streams and Legal Transformations*, 2017 UTAH L. REV. 1, 24 (2017).

178. Lucy Allen, *Making Molehills out of Mountaintop Removal: Mitigated "Minimal" Adverse Impacts in Nationwide Permitting*, 41 ECOLOGY L.Q. 181 (2014).

179. 36 C.F.R. § 800.2 (2000). Changes in character can result from direct, indirect, short-term, long-term, or cumulative effects.

180. Lee v. Thornburgh, 877 F.2d 1053, 1056 (D.C. Cir. 1989) (stating that "[t]he NHPA is aimed solely at discouraging federal agencies from ignoring preservation values in projects they initiate, approve funds for, or otherwise control").

181. Historic places can be nominated by agencies, individuals, preservation groups and historic societies, and, if they are deemed to meet the eligibility criteria, may be listed in the National Register. 54 U.S.C.A. § 302104.

182. Patricia L. Parker & Thomas F. King, *Guidelines for the Evaluation and Documentation of Traditional Cultural Properties*, NAT'L REG. BULL. 38 (1990), http://www.nps.gov/nr/publications/bulletins/nrb38/. Native American religious concerns

impact historic or cultural properties,[183] an agency would have to engage in the NHPA consultation process. Like NEPA, an agency's obligations under the NHPA are procedural and not outcome driven.[184] The process does not guarantee the preservation of historically or culturally significant properties, provided that the consultation process is adequate.[185] Accordingly, the utility of the NHPA to influence CO_2 pipeline siting will vary based on the location and scope of the project and level of public engagement.

FWS Consultation

Finally, pipeline siting may be influenced by species and habitat preservation concerns for threatened or listed species, including federal and state habitat protection and mitigation requirements. Federal laws such as the Endangered Species Act,[186] the Migratory Bird Treaty Act,[187] and the Bald and Golden Eagle Protection Act,[188] among others, prohibit developers from activities that are likely to result in a "take" or disturbance of a protected species and impose both civil and criminal penalties for violations.[189] Before undertaking activities likely to result in take, pipeline developers must consult with the Fish and Wildlife Service as part of NEPA or to obtain a Section 10 Incidental Take Permit and develop a habitat

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would be evaluated pursuant to the American Indian Religious Freedom Act of 1978, 42 U.S.C. § 1996 (1978).

183. NHPA compliance may be part of a NEPA record, but can apply to projects qualifying for a categorical exclusion. Nat'l Envtl. Policy Act Handbook H-1790-1, *supra* note 160, at 4.1.

184. Monumental Task Comm., Inc. v. Foxx, 157 F. Supp. 3d 573, 590 (E.D. La. 2016) (citing Coliseum Square Ass'n, Inc. v. Jackson, 465 F.3d 215, 224 (5th Cir. 2006) (quoting Bus. & Residents All. of E. Harlem v. Jackson, 430 F.3d 584, 591 (2d Cir. 2005) ("The NHPA is procedural in nature. . . . It does not itself require a particular outcome, but rather ensures that the relevant federal agency will, before approving funds or granting a license to the undertaking at issue, consider the potential impact of that undertaking on surrounding historic places.") (internal citations and quotations omitted))).

185. Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs, 205 F. Supp. 3d 4, 8 (D.D.C. 2016).

186. 16 U.S.C. §§ 1531, 1537(a), 1538-1544 (2014).

187. *Id.* §§ 703-711 (1998).

188. *Id.* § 668 (1972).

189. Roberto Iraola, *The Bald and Golden Eagle Protection Act*, 68 ALB. L. REV. 973, 992 (2005). For a list of other procedural requirements pertaining to the environmental impacts of agency actions, see Nat'l Envtl. Policy Act Handbook H-1790-1, *supra* note 160, at App. 1.

conservation plan.[190] Based on Fish and Wildlife Service conclusions, pipelines may be required to reroute or implement other "reasonable and prudent alternatives" to avoid effects to protected species or as conditions attached to an incidental take statement.[191] Pipeline developers, in coordination with agencies, may also agree to voluntary conservation measures through public-private conservation agreements or letters of commitment.[192] State conservation measures and species management plans, such as those put in place for protection of the greater sage-grouse in Wyoming and Nevada, may impose other siting limitations or habitat mitigation requirements.[193] For example, Wyoming's Greater Sage-Grouse Core Area Strategy limits surface disturbances in core habitat area through a disturbance cap of 5%, a density limit of not more than one per square mile, and a prohibition of surface disturbances within 0.6 miles of any active sage-grouse lek.[194] These habitat and conservation requirements can significantly impact pipeline siting. For example, Denbury's Greencore Pipeline route was modified in order to conform to a number of species protection mandates including those for the greater sage-grouse, raptors, and the mountain plover.[195]

Procedural requirements contained in numerous environmental laws provide opportunities for federal influence in pipeline siting. In some cases, the reviews required may be significant. These mechanisms invite participation from a diverse group of stakeholders and prompt consideration of federal interests and environmental impacts. Environmental laws thus provide a framework within which pipeline developers and agencies can

190. 16 U.S.C. § 1536(b)(a)(2)(A).

191. Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv., 807 F.3d 1031, 1037 (9th Cir. 2015) (citing 16 U.S.C. § 1536(b)(1)(B)(3)(A) (1988)).

192. *Id*. Although these voluntary public-private conservation plans may be necessary to obtain agency permission for construction, an agency may not rely on voluntary measures to approve a pipeline. Benjamin Hanna, *The Ninth Circuit Constrains Non-Enforceable Public-Private Endangered Species Conservation Agreements*, 41 B.C. ENVTL. AFF. L. REV. E. SUPP. 42 (2014).

193. For an example of some of the restrictions, see *Wyoming Pipeline Corridor Initiative Plan of Development*, WYO. PIPELINE AUTH., App. B (May 2014), https://www.wyopipeline.com/wp-content/uploads/2014/06/WPCI_POD_may_2014.pdf (last visited Sept. 20, 2017).

194. Kristina Fugate, *One Bird Causing a Big Conflict: Can Conservation Agreements Keep Sage Grouse Off the Endangered Species List?*, 49 IDAHO L. REV. 621 (2013); *Wyoming Governor's Executive Order 2011-5, Greater Sage-Grouse Core Area Protection*, WYO. EXEC. DEP'T, https://www.nrc.gov/docs/ML1301/ML13015A702.pdf.

195. *Greencore Pipeline Project*, DENBURY, http://www.denbury.com/operations/ rocky-mountain-region/COsub2-sub-Pipelines/default.aspx (last visited Sept. 20, 2017).

work together to address national and environmental concerns in a manner that complements state siting processes.

III. Siting Under State Law: The Condemnation of Pipeline Easements

The majority of CO_2 pipeline routing is dependent on state law.[196] State laws may authorize siting authorities,[197] establish set back,[198] permitting, or industrial siting requirements,[199] and create mechanisms for local government participation.[200] Most significantly, state law establishes whether and for what purposes CO_2 pipeline developers may utilize eminent domain authority to acquire property along the pipeline route.

Eminent domain, the power to take private property for public use, is essential to the ability of a sovereign, including the federal and state governments, to fulfill government functions and promote the public welfare.[201] The Fifth Amendment of the United States Constitution[202] recognizes the right of a sovereign to take private property subject to two conditions: it must be for a "public use" and "just compensation" must be paid in return.[203] States are similarly constrained in their ability to take property by the Fourteenth Amendment and by public use provisions within state constitutions.[204]

The public use requirement arose from concerns that an unrestricted right in the government to take property would be subject to private influence resulting in a threat to private rights.[205] Coerced transfers to private parties

196. Fish & Martin, *supra* note 28 at 4; Nordhaus & Pitlick, *supra* note 110, at 100.

197. WYO. STAT. ANN. § 37-5-101 (2011).

198. TEX. ADMIN. CODE tit. 16, §§ 8.301-8.315 (2017).

199. KY. REV. STAT. § 278.714 (2014); OR. REV. STAT. § 469 (2010).

200. COLO. REV. STAT. §§ 24.65.1-101 through 108 (2017).

201. DONALD WORSTER, UNDER WESTERN SKIES: NATURE AND HISTORY IN THE AMERICAN WEST 130 (1992).

202. U.S. CONST. amend. V.

203. *Id*. A discussion of the various manners of calculating just compensation for pipeline rights-of-way is beyond the scope of this article.

204. Chicago Burlington & Quincy R.R. v. City of Chicago, 166 U.S. 266, 241 (1897).

205. JACK N. RAKOVE, ORIGINAL MEANINGS: POLITICS AND IDEAS IN THE MAKING OF THE CONSTITUTION 314-15 (1996); Daniel B. Kelly, *The Public Use Requirement in Eminent Domain Law: A Rationale Based on Secret Purchases and Private Influence*, 92 CORNELL L. REV. 1, 10 (2006) (citing Clark v. Nash, 198 U.S. 361, 369 (1905); Errol Meidinger, *The Public Uses of Eminent Domain: History and Policy*, 11 ENVTL. L. 1, 17-18 (1980-1981)).

for private use were viewed as inconsistent with due process of law.[206] Accordingly, the public use limitation was drafted to restrict coerced property transfers "for the private use of another" to those that would be available for "use by the general public."[207] Consistent with this interpretation, early American applications of eminent domain were predominantly to general government functions—such as the construction of town halls, court houses, and other public buildings or buildings for the public welfare—and to "build roads and provide hydropower to grist mills widely used by local populations."[208] These takings were seen as consistent with the public use requirement because the resultant project would either be publicly owned or, if privately owned, would be available for use by the public.[209] This view pervaded up until the end of the 19th century.[210] However, as technological innovations and modes of production innovated, courts increasingly permitted the extension of eminent domain authority to private corporations for private purposes.[211] New towns and homesteads were springing up in the American West, fueled by booms and busts in coal, oil, timber, and uranium.[212] Cities were rapidly developing too; and, with development came new public health hazards associated with overcrowding and dilapidated tenement housing.[213] Soon, it seemed, land was needed not only for roads to landlocked parcels or mills, but for mines

206. Missouri Pac. Ry. Co. v. Nebraska, 164 U.S. 403, 417 (1896); Matthew P. Harrington, *"Public Use" and the Original Understanding of the So-Called "Takings Clause*," 53 HASTINGS L.J. 1245 (2002).

207. Kelly, *supra* note 205, at 10 (citing Mt. Vernon-Woodberry Cotton Duck Co. v. Ala. Interstate Power Co., 240 U.S. 30, 32 (1916) (Holmes, J.)).

208. Meidinger, *supra* note 205, at 2.

209. Wendell E. Prichett, *The "Public Menace" of Blight: Urban Renewal and the Private Uses of Eminent Domain*, 21 YALE L. & POL'Y REV. 1, 9 (2003).

210. Kelly, *supra* note 205, at 10 (citing RICHARD A. EPSTEIN, TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN 178 (1985) (stating that "[t]he nineteenth century view, abstractly considered, was that it was a perversion of the public use doctrine to acquire land by condemnation for these purposes")).

211. Prichett, *supra* note 209, at 9.

212. PATRICIA NELSON LIMERICK, SOMETHING IN THE SOIL: LEGACIES AND RECKONINGS IN THE NEW WEST 19 (2000); Gary Liebcap, *The Assignment of Property Rights on the Western Frontier: Lessons for Contemporary Environmental and Resource Policy*, 67 J. OF ECON. HIST. 2 (2007).

213. Norwood v. Horney, 853 N.E.2d 1115 (Ohio 2006); Hudson Hayes Luce, *The Meaning of Blight: A Survey of Statutory and Case Law*, 35 REAL PROP. PROB. & TR. J. 389 (2000); Prichett, *supra* note 209.

and more urban needs such as the elimination of blight.[214] Initial constructions that interpreted the public use limitation as requiring actual use by the public proved inadequate to advance legislative goals as applied to these new purposes. Thus, judicial interpretations of the public use limitation evolved in response.[215] Takings where the use advanced "public values" or was for the "comfort, convenience, and prosperity of the people" soon withstood judicial review.[216]

The division between these interpretations exists today. There are two judicial tests principally used to define "public use."[217] The first is a narrow interpretation—requiring that the end use of the property taken must be open to actual use by the public or some subset thereof.[218] The construction of roads, the creation of parks and public spaces, and other public infrastructure projects such as pipelines and railroads have all been found to satisfy this narrow requirement of "use by the public."[219] The second approach encompasses a broad scope of uses and property interests where the taking yields some general public benefit—be it revenue generation, jobs, tax base, or development of industry.[220] Projects benefiting from this approach include economic redevelopment,[221] mineral or agricultural

214. *Id.* at 25 (citing N.Y. City Housing Auth. v. Muller, 1 N.E.2d 153, 154 (N.Y. 1936)); Strickley v. Highland Boy Gold Mining Co., 200 U.S. 527, 531 (1906).

215. Only South Carolina adheres strictly to the requirement that property must be available for occupation or use by the public. *See* Karesh v. City Council, 247 S.E.2d 342, 345 (S.C. 1978); Lynda J. Oswald, *The Role of Deference in Judicial Review of Public Use Determinations*, 39 B.C. ENVTL. AFF. L. REV. 243, n.163 (2012).

216. Thomas W. Merrill, *The Economics of Public Use*, 72 CORNELL L. REV. 61, 72 (1986) (citing Cass R. Sunstein, *Naked Preferences and the Constitution,* 84 COLUM. L. REV. 1689 (1984)); Prichett, *supra* note 209, at 9 (citing HARRY SCHEIBER, THE ROAD TO MUNN: EMINENT DOMAIN AND THE CONCEPT OF PUBLIC PURPOSE IN THE STATE COURTS, IN LAW IN AMERICAN HISTORY 329, 370, 386 (Donald Fleming & Bernard Bailyn 1971)); Meidinger, *supra* note 205, at 24.

217. Alexandra B. Klass, *The Frontier of Eminent Domain*, 79 COLO. L. REV. 651, 663-64 (2008); Kelly, *supra* note 205, at 2-3, 11; Merrill, *supra* note 216, at 67.

218. Dayton Gold & Silver Mining Co. v. Seawell, 11 Nev. 394 (1876); Rindge Co. v. Los Angeles Cty., 262 U.S. 700, 707 (1923); Merrill, *supra* note 216, at 67-68.

219. Klass, *supra* note 217, at 656 (citing Philadelphia Clay Co. v. York Clay Co., 88 A. 487 (Pa. 1913)).

220. Merrill, *supra* note 216, at 64.

221. Kelo v. City of New London, 545 U.S. 469 (2005); Elizabeth F. Gallagher, Note, *Breaking New Ground*: *Using Eminent Domain For Economic Development*, 73 FORDHAM L. REV. 1837 (2005).

development projects,[222] and other purposes that promote "economic expansion."[223] Most courts, including the U.S. Supreme Court, have adopted the more expansive interpretation, thus deferring to legislative determinations of public use. [224] While not establishing an "authoritative delimitation," courts look instead to the various factors influencing historical development of the public use.[225]

The majority of states have no legislation specifically addressing the siting of CO_2 pipelines. This owes to the private nature of CO_2 transportation. Unlike oil, electricity, or natural gas, there are not broad public markets for CO_2—it is neither a generation nor transportation resource.[226] Thus, development has progressed along narrow corridors in a handful of states with either CO_2 sources or EOR. Were development to expand beyond these areas for CCUS or other purposes, states siting new infrastructure would assess public use for CO_2 pipelines under existing state frameworks for eminent domain.

The few state statutes that grant eminent domain authority for CO_2 pipelines may provide insight to how public purpose questions will be resolved. These statutes typically require that public purpose is established in one of two ways: either the pipeline will produce a public benefit by advancing the development of natural resources within the state,[227] or the pipeline will be available for "use by the public" through operation as a common carrier.[228] An analysis of the two predominant approaches provides an opportunity for deeper exploration of the public purpose requirement as applied to CO_2 transportation.

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222. Mont. Talc Co. v. Cyprus Mines Corp., 748 P.2d 444 (Mont. 1987); Tanner v. Treasury Tunnel, Mining & Reduction Co., 35 Colo. 593 (1906).

223. Corey J. Wilk, *The Struggle Over the Public Use Clause: Survey of Holdings and Trends, 1986-2003*, 39 REAL PROP. PROB. & TR. J. 251 (2004); Merrill, *supra* note 216 (noting even acquisition of a football team's intangible contract rights could be a public use).

224. Norwood v. Horney, 853 N.E.2d 115, 132-33 (Ohio 2006); Merrill, *supra* note 216, at 68 (citing United States *ex rel.* TVA v. Welch, 327 U.S. 546, 551-52 (1946)).

225. Cty. of Essex v. Hindenlang, 114 A.2d 461, 467 (N.J. App. Div. 1955), *appeal dismissed*, 132 A.2d 807 (N.J. 1957); Oswald, *supra* note 215.

226. *Cortez Pipeline Co.*, FERC 61024 (Apr. 6, 1979).

227. *See infra* notes 246-63 and accompanying text.

228. N.D. CENT. CODE § 49-19-01(1) (2007); TEX. NAT. RES. CODE §§ 111.002(6) (2007), 111.019(a) (1993).

CO_2 for a Public Purpose: Natural Resource Development Takings

The concept of "natural resource development takings"[229] refers to private oil, gas, and mining companies' "power of eminent domain under state constitutions or state statutes to take private property to develop coal, oil, or other natural resources."[230] These public purpose justifications exist almost exclusively in the American West and are deeply rooted in the history of frontier expansion.[231] Development of the west was fueled by private exploitation of natural resources: timber, water, mineral, wildlife, grass, and hydrocarbon.[232] Eager to grow their populations and economies, western states' territorial legislatures sought to advance these purposes by embedding authority to take private property as necessary for natural resource development purposes within state constitutions. Accordingly, many western state constitutions authorize eminent domain for "private takings" to promote the extractive industries through the development of roads, flues, ditches, canals, tramways, and other necessary infrastructure.[233]

States sought to serve a public purpose through the creation and growth of a resource based state economy. Through the encouragement of industry states endeavored to assure their future prosperity—jobs and wealth—and encourage the expansion and development of communities that were attendant with those industries.[234] It was commonly believed that natural resources would be the sole source of development. Considering the possibility of a coal severance tax in the Wyoming Constitution, one legislator expressed that once the coal was exhausted Wyoming would "have nothing left but a howling wilderness."[235] With these principles memorialized in states' constitutions and statutes,[236] western landowners, mineral developers, and courts' concepts of property and public use

229. Klass, *supra* note 217, at 652.
230. *Id.* at 651.
231. *Id.*
232. PATRICIA NELSON LIMERICK, THE LEGACY OF CONQUEST (1987).
233. Klass, *supra* note 217, at 667-68.
234. *Id*. at 660-61; Patricia Limerick, *The Complicated History of Extraction in Colorado*, DENVER POST (Jan. 15, 2015, 10:37 AM), http://www.denverpost.com /2015/01/15/limerick-the-complicated-history-of-extraction-in-colorado.
235. T.A. LARSON, HISTORY OF WYOMING 252 (2d ed. 1978).
236. Klass, *supra* note 217, at 657-61, n.25.

developed in a way that was more permissive of the acquisitiveness inherent to private "natural resource takings" than in eastern states.[237]

Traditionally, states have benefited from the "extreme judicial deference" afforded to the public use limitation.[238] The result, as Professor Klass has noted, is an "absence of meaningful judicial review of natural resource development companies' contentions that the taking of private property to support development of natural resources is for a public use."[239] Due to strong grants of constitutional and statutory authority, and the deference to state legislatures in establishing these purposes, the public purpose of almost any taking of private property to serve expansion and development of the extractive industries is presumed.[240] The wide latitude given to state legislatures has led many scholars, at least prior to *Kelo*, to declare the public use clause "moribund."[241]

A number of states grant developers of CO_2 pipelines eminent domain authority based on statutes grounded in the concept of natural resource development. These grants may be general, giving CO_2 pipelines condemnation authority without regard to the end use.[242] Others address CO_2 as necessary to enhanced oil recovery[243] or underground carbon storage,[244] or include CO_2 within general statutory or constitutional grants for pipelines or mineral development.[245] Consistent with historic values, these grants advance the "great public interest in an imminent need for

237. *Id.* at 657-59 (citing GORDON M BAKKEN, ROCKY MOUNTAIN CONSTITUTION MAKING 1850-1912, at 30-32 (1987) (noting that not all westerners ascribed to this philosophy)).

238. *Id.* at 661 (stating that "[c]ourts in the Interior West responded to public use challenges with strong language upholding the right of private industry to exercise the power of eminent domain as a 'public use' without the need for any oversight by local, county, or state political bodies"); Merrill, *supra* note 216, at 65; Oswald, *supra* note 215, at 251-58.

239. Klass, *supra* note 217, at 661.

240. *Id.* at 661-69, (citing Mont. Talc Co. v. Cyprus Mines Corp., 748 P.2d 444, 447-48 (Mont. 1987) ("In present day Montana, as in Wyoming, once a private taking is found to be within a broadly-defined statutory or constitutional public use, there is little further role for a court in reviewing whether the exercise of the taking power is in fact in the interests of the public.").

241. Prichett, *supra* note 209, at 2.

242. KY. REV. STAT. ANN. §154.27-100 (2014); N.M. STAT. ANN. § 70-3-5 (1993).

243. 220 ILL. COMP. STAT. ANN. 75/5 (2013); MISS. CODE ANN. § 11-27-47 (1984).

244. 220 ILL. COMP. STAT. ANN. 75/5 (2013); LA. STAT. ANN. § 30:23 (2008); LA. STAT. ANN. § 19:2(10) (2012).

245. As discussed in notes 238-247, condemnation effectuated based on statutes authorizing mineral development may preclude utilization of those CO_2 pipelines for CCUS.

energy"[246] and promote economic growth through the extraction of mineral or other natural resources, including CO_2.

Natural Resource Development as Public Purpose

Idaho, Wyoming, and Colorado advance natural resource takings through constitutional provisions granting condemnation authority to private developers for mining purposes.[247] The Idaho Constitution declares mining to be a public use in a particularly expansive provision that includes "the drainage of mines, or the working thereof, by means of roads, railroads, tramways, cuts, tunnels, shafts, hoisting works, dumps, or other necessary means to complete development, or any other use necessary to the complete development of the materials resources of the state."[248] The Colorado and Wyoming constitutions each provide that "[p]rivate property shall not be taken for private use . . . except for . . . reservoirs, drains, flumes, or ditches on or across the lands of others for agricultural, mining, milling, domestic or sanitary purposes."[249] Historically, these provisions have been used by mining companies for access and transportation facilities, as well as for land, lumber, and construction materials,[250] and upheld based on the public interest in exploiting resources and making new markets.[251]

Constitutional natural resource takings provisions have been interpreted to encompass a range of uses beyond those specifically enumerated within the provision. Instead courts have focused on states' broader intent to promote natural resource development. For example, the Wyoming Supreme Court has included oil and gas exploration and production activities within the term "mining" as used in Article I, section 32 of the Wyoming Constitution and the Wyoming Eminent Domain Act.[252] Rejecting a strict interpretation, the court found that oil and gas development was encompassed in the term "mining" based on its historical categorization as a mineral, early exploration techniques referring to oil and

246. Coronado Oil Co. v. Grieves, 603 P.2d 406 (Wyo. 1979).

247. COLO. CONST. art II, § 14; WYO. CONST. art. 1, § 32; WYO. STAT. ANN. § 1-26-815 (2007).

248. IDAHO CONST. art. I, § 14.

249. WYO. CONST. art. I, § 32. Despite nearly identical constitutional provisions, Colorado courts have taken a much more restrictive approach, limiting the application of its private necessity provision solely to landlocked parcels. *See* Larson v. Sinclair Transp. Co., 284 P.3d 42 (Colo. 2012).

250. Meidinger, *supra* note 205, at 30 (citing Dayton Gold & Silver Mining Co. v. Seawell, 11 Nev. 294, 411 (1876)).

251. Klass, *supra* note 217, at 661.

252. Coronado Oil Co. v. Grieves, 603 P.2d 406, 441 (Wyo. 1979).

gas wells as mines, and consistency with the purpose of the provision to "facilitate the development of [the] state's resources."[253] The result was a significant extension of authority to private oil and gas companies. Uses that fall within those enumerated in section 32 are presumed "by constitutional edict" to have "the force and effect of a public use," thus satisfying the public purpose requirement of the Wyoming Eminent Domain Act.[254]

Based on this expansive reading of the term "mining," CO_2 production and its associated transportation may also fall within the broad scope of Wyoming's natural resource taking authority. Categorization of one substance, for example natural gas, is not dispositive as to the categorization of another.[255] Whether a specific project falls within the legislative declarations of public use requires an analysis of the project and material within its geographic and historical context. There are no precise analogs for CO_2 pipelines or production. CO_2, like natural gas, is gaseous at atmospheric pressures and can be extracted via wells under the terms of oil and gas leases. However, technical definitions may be less persuasive than considerations of history and purpose.[256] While CO_2 is like other extractive activities that benefit from Wyoming's natural resource takings provision in that it brings economic benefits to the state through encouragement of energy and generation of revenue, it is unique in that its production is a fairly recent development and is not limited to drilling or other techniques

253. *Id.*

254. *Id.* (citing Grover Irrigation & Land Co. v. Lovella Ditch, Reservoir & Irrigation Co., 131 P. 43 (Wyo. 1913)). A CO_2 pipeline would still need to satisfy other provisions of the act, including demonstrating that it is a "petroleum or other pipeline compan[y]" and that the project was located so as to balance the greatest public good and private injury and that the intended property was necessary for the project. *See* WYO. STAT. ANN § 1-26-504(a) (2013); WYO. STAT. ANN § 1-26-814 (1981); WYO. STAT. ANN § 1-26-815 (2013). Eminent domain has been used at least once in Wyoming for purposes of obtaining right of way for a CO_2 pipeline. However, the issue in that case was calculation of compensation under the Wyoming Eminent Domain Act and not a determination of public purpose. *See* Barlow Ranch Ltd. P'ship v. Greencore Pipeline Co., 301 P.3d 75 (Wyo. 2013).

255. Merrill, *supra* note 216, at 94 (citing Kaiser Steel Corp. v. W. S. Ranch Co., 467 P.2d 986, 988 (N.M. 1970)) (noting that coal mining may be governed by one rule, metal mining by another).

256. *Cortez Pipeline Co.*, 7 FERC 61024 (Apr. 6, 1979); Exxon Corp. v. Lujan, 970 F.2d 757 (10th Cir. 1992).

like mining. Thus, CO_2 pipelines may not benefit from the rich history that served the condemnor in *Coronado*.[257]

State statutes detail the legal processes to condemn property and which entities have authority to condemn.[258] These statutes may limit the scope of condemnation authority for natural resource development. Accordingly, determination of whether and, if so, how CO_2 pipeline developers are authorized to use eminent domain requires a state specific analysis. A survey of state statutes, regulations, and procedures goes beyond the scope of this Article. However, a look at Colorado's grant of condemnation authority to pipelines provides insight to the types of interpretation issues that are likely to arise. Colorado's eminent domain laws grants condemnation authority to "telegraph, telephone, electric light power, gas, or pipeline compan[ies]"[259] and to "pipeline[s] for the transmission of power, water, air, or gas for hire to any mining or mining claim or for any manufacturing, milling, mining, or public purpose."[260] Despite Colorado's broad constitutional natural resource takings provision, Colorado courts have precluded oil pipelines from using eminent domain on the basis that they are neither "pipeline companies" within the meaning 38-5-105, nor do they transport "water, air, or gas" as required by 38-4-102.[261] CO_2 pipelines may fall within the scope of these statutory authorizations based on the classification of CO_2 as "gas." However, as noted elsewhere, CO_2 is transported in a pseudo-liquid state, thus complicating that determination.[262] A pipeline company could also demonstrate that the CO_2 was transported to a "mining claim" or for "mining" or another public purpose.[263] Unlike Wyoming, Colorado courts have not considered whether the term "mining" includes operations for oil and would thus encompass EOR operations. A developer could also advance arguments that CO_2 transportation by pipeline is for a public purpose—be it climate mitigation or natural resource

257. Failing to establish CO_2 production itself as mining, a potential condemnors could also argue that CO_2 transportation as part and parcel of enhanced oil recovery would fall within the courts prior expansive reading of the term "mining."

258. A sampling of these statutes is listed in Klass, *supra* note 217, at n.25.

259. COLO. REV. STAT. § 38-5-105 (2017).

260. *Id.* § 38-4-102.

261. Larson v. Sinclair Transp. Co., 284 P.3d 42 (Colo. 2012)

262. *See supra* note 127 and accompanying text.

263. Colorado courts have not considered whether the term "mining" includes oil production.

production. Whether those uses constitute a sufficient public use would ultimately be determined by the judiciary.[264]

While advancing many of the same public benefits, CO_2 fits imperfectly within the historical context of constitutional natural resource development takings provisions. Statutory provisions regarding the authority and procedures granted to natural resource companies for eminent domain are likewise ambiguous when applied to CO_2 pipelines. Accordingly, while natural resource development takings provisions have been interpreted broadly and given extensive judicial deference, the extent to which CO_2 pipeline developers can avail themselves of these provisions is unclear.

To the Last Drop: EOR as a Public Purpose

A number of states grant eminent domain authority specifically to CO_2 pipeline developers for the purpose of encouraging enhanced oil recovery.[265] This approach is a refinement of the general natural resource development approach to establishing public purpose. In these states, CO_2 is not viewed as the primary resource itself but is rather an ancillary product necessary for production of another natural resource: oil.

State legislatures adopting this approach establish public purpose through increased petroleum production.[266] For example, Louisiana's

264. COLO. CONST. art. II, § 15 ("[W]henever an attempt is made to take private property for a use alleged to be public, the question whether the contemplated use be really public shall be a judicial question, and determined as such without regard to any legislative assertion that the use is public.").

265. LA. STAT. ANN. § 19:2(10); MISS. CODE ANN. § 11-27-47. Kentucky provides eminent domain to carbon dioxide transmission pipelines for "sale, storage, or carbon management." *See* KY REV. STAT. § 154.27-100. North Dakota and Texas provide broader grants of condemnation authority without regard to the end use but, as discussed *infra* at notes 295-309, tie condemnation authority to common carrier status.

266. This article does not address the merits of putting in place policies that facilitate increasing oil recovery rather than transitioning to renewable energy. However, social cost associated with climate change may be a limiting factor in public use determination. In at least one case, *Merrill v. City of Manchester*, the court stated that "if social costs exceed probable benefits, the project cannot be said to be built for a public purpose." 499 A.2d 216, 237 (N.H. 1985). For analysis of the evolving metrics for calculating the social cost of carbon in regulatory and NEPA analyses, see Daniel A. Farber, *Coping with Uncertainty: Cost-Benefit Analysis, the Precautionary Principle, and Climate Change*, 90 WASH. L. REV. 1659 (2015); Michael Greenstone, et al., *Developing a Social Cost of Carbon for US Regulatory Analysis: A Methodology and Interpretation*, 7 REV. ENVTL. ECO & POL'Y 23 (2013); Ted Hamilton, *The Virtues of Uncertainty: Lessons From the Legal Battles Over the Keystone XL Pipeline*, 18 VT. J. ENVTL. L. 222, 249-53 (2016); Mark Squillace & Alexander Hood, *NEPA, Climate Change, and Public Lands Decision Making*, 42 ENVTL. L. 469 (2012).

statute provides that the state, corporations, or limited liability companies may expropriate private property for "the piping or marketing of carbon dioxide for use in connection with a secondary or tertiary recovery project for the enhanced recovery of liquid or gaseous hydrocarbons."[267] Similarly, Mississippi's statute advances enhanced oil recovery within the state as the public purpose for the exercise of eminent domain by CO_2 pipeline developers.[268] New Mexico, while not specifying that CO_2 within pipelines must be used for enhanced oil recovery, grants eminent domain authority to pipeline developers pursuant to its oil and gas chapter, indicating a relationship to those purposes.[269]

CO_2-for-EOR provisions blur the already fuzzy distinctions between natural resource development takings and economic development takings.[270] Economic development takings originated in the 1920s as part of the urban renewal movement's efforts to eliminate the public health and safety hazards associated with slums and blight.[271] Over time, the scope of economic development expanded to include the creation of jobs, increases in tax base or revenues, and community revitalization—all of which were found to constitute permissible public purposes.[272] Recently, however, the

267. LA. REV. STAT. ANN. § 19:2(10) (2012). Incidentally, Louisiana's statute also provides expropriation rights for operations related to storage of carbon dioxide underground. *Id.* § 30:1108 (2009).

268. MISS. CODE ANN. § 11-27-47 (1984). Use of eminent domain is limited to pipelines for carbon dioxide for "use in connection with secondary or tertiary recovery projects located within the state of Mississippi for the enhanced recovery of liquid or gaseous hydrocarbons." A proposed bill, HB 907 (2016), would have required CO_2 pipelines to operate as common carriers, but did not pass. *See* H.B. No. 907, MISS. LEGIS., *available at* http://billstatus.ls.state.ms.us/documents/2016/pdf/HB/0900-0999/HB0907IN.pdf (last visited Sept. 21, 2017). In 2017, a similar effort failed. H.B. 1449, MISS. LEGIS., *available at* https://legiscan.com/MS/bill/ HB1449/2017.

269. N.M. STAT. ANN. § 70-3-5 (1993). Nordhaus & Pitlick, *supra* note 110, at 98 (citing 1983-1986 Op. Att'y Gen. N.M. 146 (1984)).

270. Klass, *supra* note 217, at 652.

271. George Lefcoe, *After Kelo, Curbing Opportunistic Tif-Driven Eonomic Development*, 83 TUL. L. REV. 45, 50-51 (2008); Hudson Hayes Luce, *The Meaning of Blight: A Survey of Statutory and Case Law*, 35 REAL. PROP. PROB. & TR. J. 389 (2000), Ilya Somin, *The Grasping Hand: "Kelo v. City of New London" and the Limits of Eminent Domain*, 29 FLA. B.J. 66, 80-86 (2016).

272. Berman v. Parker, 348 U.S. 26 (1954); City of Shreveport v. Chanse Gas Corp., 794 So. 2d 962, 973-74 (La. Ct. App. 2001); Poletown Neighborhood Council v. City of Detroit, 304 N.W.2d 455, 459-60 (Mich. 1981); City of Duluth v. State, 390 N.W.2d 757 (Minn. 1986); D. Benjamin Barros, *Nothing "Errant" About It: The* Berman *and* Midkiff *Conference Notes and How the Supreme Court got to* Kelo *With Its Eyes Wide Open*, PRIVATE PROPERTY, COMMUNITY DEVELOPMENT, & EMINENT DOMAIN (2008); Patricia E.

Supreme Court revived the question of whether private takings to further economic development activities constitute public use.[273] In *Kelo v. City of New London*, the Court found that economic development was a "traditional and long accepted function of government,"[274] and, deferring to legislative determinations that general increases in tax base and economic revitalization were public purposes, upheld a taking for those purposes.[275] The public was less convinced, resulting in a tide of legislative action to limit the use of eminent domain for private economic development purposes.[276]

CO_2-EOR undeniably generates economic benefits to the state through the maximization of recoverable reserves. Nationwide, DOE estimates that CO_2-EOR could increase domestic oil reserves by 87.1 billion barrels.[277] This additional recovery has significant economic benefits. For example, EOR has the potential to revitalize state economies by generating significant state revenues from severance and income taxes and royalty and provide high-compensation employment opportunities.[278] Although general economic benefits may inure to the state or its citizens, except where development occurs on state or federal land, the profits these operations yield are private.

EOR is similar in many ways to economic redevelopment. In response to the *Kelo* decision, many states have enacted anti-*Kelo* or post-*Kelo* laws through statutes or constitutional amendments, disclaiming economic redevelopment as a public purpose.[279] Public purpose arguments based

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Salkin & Lora A. Lucero, *Community Redevelopment, Public Use, and Eminent Domain*, 37 URB. LAW. 201 (2005).

273. Kelo v. City of New London, 545 U.S. 469 (2005).

274. *Id.* at 484.

275. *Id*.

276. Michael J. Coughlin, *Absolute Deference Leads to Unconstitutional Governance: The New For a New Public Use Rule*, 54 CATH. U. L. REV. 1001 (2005); Steven J. Eagle & Lauren A. Perotti, *Coping with Kelo: A Potpourri of Legislation And Judicial Responses*, 42 REAL PROP. PROB. & TR. J. 799 (2008); Anastasia C. Sheffler-Wood, *Where Do We Go From Here? States Revise Eminent Domain Legislation in Response to Kelo*, 79 TEMP. L. REV. 617 (2006).

277. Klaas T. van 't Veld & Owen R. Philips, *The Economics of Enhanced Oil Recovery: Estimating Incremental Oil Supply and CO_2 Demand in the Powder River Basin*, 3 ENERGY J. 31, 32 (2011) (citing Kuuskraa & Ferguson, *Storing CO_2 with Enhanced Oil Recovery*, DEP'T OF ENERGY, NAT'L ENERGY TECH. LAB. (2008)).

278. Melzer, *supra* note 13, at 6.

279. County of Wayne v. Hathcock, 684 N.W.2d 765 (Mich. 2004); Eagle & Perotti, *supra* note 276.

exclusively on EOR may be vulnerable to these same criticisms.[280] EOR is more similar to the "upgrading" of property of which Justice O'Connor was so skeptical in her *Kelo* dissent.[281] In the context of the tertiary recovery operations for which the majority of CO_2 is needed, the economic resource has already been at least partially developed. The developer will not be "shut in and deprived of the opportunity to exploit" his valuable resources.[282] Rather, condemnation of private property is desired in order to increase the profitability and yield of existing resources.

Despite these similarities, natural resources takings have been more-or-less insulated from the wave of post-*Kelo* reforms aimed at limiting the ability of political subdivisions or private parties to take private property for economic redevelopment.[283] That owes in part to the differing historical contexts behind these public purpose justifications. Economic redevelopment takings originated in the 1920s with the movement to eliminate the public health hazards associated with blight,[284] and accordingly the extension of that authority to take property for the purpose of increasing tax revenue was perceived by the public as an overreach. On the contrary, the history of natural resource takings indicates that the high grading of property in order to encourage industrial and agricultural development was precisely the purpose of these constitutional provisions. Natural resource takings were intended to establish new industries, promote exploitation of land and natural resources, and encourage the growth of emerging economies.[285] Though perhaps less existential to western states'

280. Klass, *supra* note 217, at 676-77, 681-700.

281. *Id.* at 672 (citing *Kelo*, 545 U.S. at 503 (O'Connor, J., dissenting) ("Nothing is to prevent the state from replacing any Motel 6 with a Ritz Carlton, any home with a shopping mall, or any farm with a factory.")).

282. Coronado Oil Co. v. Grieves, 603 P.2d 406, 411 (Wyo. 1979).

283. Colorado, Wyoming, and Louisiana have all imposed harsh limitations on the ability of the state to take property for economic development purposes; however, these limitations may not extend to natural resource takings. *See* LA. CONST. ART. VI § 21 (creating the industrial use exception, "Assistance to Local Industry"); LA. STAT. ANN. § 19:2 (permitting expropriation by certain corporations and limited liability companies); UTAH CODE ANN. § 78-34-1 (West 2002 & Supp. 2007), as amended by S.B. 117, 2006 Leg., Gen. Sess. (2006)) (noting exceptions specifically for natural resource development purposes; Eagle and Perotti, *supra* note 276 (citing ALASKA STAT. § 09.55.240(a) (2006), as amended by H.B. 318, 24th Leg., Reg. Sess. (2006)); Klass, *supra* note 217, at 675-76. North Dakota's constitutional amendment, which limits all takings except for those by common carriers or public utilities, is a notable exception. *See* N.D. CONST. art. I, § 16 (as amended by Measure 2) (2006).

284. Lefcoe, *supra* note 271; Luce, *supra* note 213; Somin, *supra* note 271.

285. Norwood v. Horney, 853 N.E. 2d 1115, 1132-33 (Ohio 2006) (citing *The Public Use Limitation on Eminent Domain: An Advance Requiem*, 58 YALE L.J. 599, 600 (1949); Philip

economies today, the continued expropriation of property for those purposes still falls within the scope of the original constitutional and statutory provisions.

Public Use: CO_2 Pipelines as Common Carriers

A second category of statutes adheres to a more traditional "public use" justification for eminent domain. Some states that have enacted these statutes, such as North Dakota, Montana, and Colorado, may also have natural resource takings provisions within their state constitutions but have limited the scope of that authority through the imposition of common carrier requirements. These requirements authorize private companies to take private property for utilitarian use, provided that they consent to "provide necessary services without discrimination and at reasonable rates."[286]

Courts have confirmed that the "public use" requirement is satisfied where privately owned pipelines are required to operate as common carriers. In *Vardeman v. Mustang Pipeline Company*, a landowner challenged that the purpose of the pipeline was not a public use.[287] The court found that the public use requirement was satisfied both because the pipeline would be used "in a manner determined by the legislature to be a public use"—the movement of "a petroleum product . . . from the producing areas to areas where it can be used"—and because the designation as a common carrier also established use for a public purpose.[288]

Several states and the federal government adopt the common carrier approach with respect to CO_2 pipelines.[289] These statutes authorize condemnation for CO_2 pipelines provided that the pipelines are operated as common carriers. Common carriers provide non-discriminatory access to

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Nichols Jr., *The Meaning of Public Use in the Law of Eminent Domain*, 20 B.U. L. REV. 615, 617 (1940)) ("In America's nascent period, there was an abundance of unclaimed land, limited government activity, and little controversy over the use of eminent domain to develop land and natural resources.").

286. Meidinger, *supra* note 205, at 22.

287. Megan James, *Checking the Box is Not Enough: The Impact of Texas Rice Land Partners v. Denbury Green Pipeline-Texas, LLC and Texas's Eminent Domain Reforms on the Common Carrier Application Process*, 45 TEX. TECH L. REV. 959, 987 n.283-84 (citing Vardeman v. Mustang Pipeline Co., 51 S.W.3d 308, 310 (Tex. App.—Tyler 2001, pet. denied)).

288. *Id.*

289. Pipelines receiving right of way pursuant to the MLA are required to act as common carriers. 30 U.S.C. § 185(r) (2006).

pipelines at established tariffs, thereby opening their pipelines to public use.[290] While these carriers can establish specifications that require all CO_2 transported through them to be of pipeline quality,[291] they must willing to carry product for anyone meeting those specifications. As such, by conferring eminent domain authority under this condition, states assure that the infrastructure itself is available for use by the public thus encouraging the growth of industry. Common carrier requirements may also foster efficiencies. As infrastructure expands, these nondiscriminatory access and regulated rate pipelines may help avoid duplicative routes or facilities by promoting development of a core backbone infrastructure by providing access to existing point-to-point pipelines. Further, by lowering barriers to entry, common carrier requirements may facilitate more widespread implementation of CCUS or transitions from CO_2-EOR to incremental storage operations.

Common Carriers and Pipelines

Common carrier requirements evolved from the assumption that in order to counteract adverse behavior, companies enjoying a natural monopoly should be required to "serve all comers at fair rates."[292] The hallmark requirements of common carriage are that the carrier must offer nondiscriminatory access to unrelated parties at fair and reasonable rates.[293] Common carrier requirements are found across a broad spectrum of industries providing "public goods," including public utilities, telecommunications companies, airlines, taxicabs, cruise ships, canal operating companies, and oil pipelines.

The Hepburn Act, passed in 1906, requires oil pipelines to operate as common carriers, regardless of whether eminent domain was utilized in obtaining right of way.[294] Prior to its passage, monopolistic behavior by the Standard Oil Trust, which controlled nearly all the oil pipelines in the country, limited the ability of Kansas refineries to ship crude out of state.[295]

290. Reed, *supra* note 146, at 104.

291. Bliss, *supra* note 97; Marston & Moore, *supra* note 15, at 442, 448.

292. Richard Posner, *Natural Monopoly and Its Regulation*, 21 STAN. L. REV. 548, 607 (1968) (citing Am. Trucking Ass'ns v. Atchison, 387 U.S. 397, 406-07 (1967)); Reed, *supra* note 146.

293. Belle Fourche Pipeline Co., 28 FERC 61,150, 61,281 (1984); Posner, *supra* note 292; Klass & Meinhardt, *supra* note 121, at 960.

294. 34 Stat. 584 (1906); 49 U.S.C. § 1 et seq.; Leonard L. Coburn, *The Case for Petroleum Pipeline Deregulation*, 3 ENERGY L.J. 225, 229 (1982); Klass & Meinhardt, *supra* note 121, at 960.

295. *Id.*

In order to obtain access to its pipelines, Standard Oil required that producers first sell oil to it at its set price.[296] The Hepburn Act assured equitable treatment of producers and shippers by amending the ICA and extending ICC authority to oil pipelines.[297] Regulatory provisions of the ICA required nearly all pipelines to "charge just and reasonable rates for their service; provide and furnish transportation upon reasonable request; establish reasonable through routes with other carriers; and establish just and reasonable rates for through transportation."[298] The only exception was for "a pipeline engaged solely in transporting oil from its wells across a state line to its own refinery for its own use."[299]

With the exception of pipelines receiving a right of way across federal lands pursuant to the MLA, CO_2 pipelines are not subject to federal common carrier requirements.[300] However, a number of states statutorily require CO_2 pipelines, or pipelines generally, to operate as common carriers.[301] These statutes establish processes and requirements for developments that are intended for use by the public. For example, North Dakota imposes universal common carrier requirements.[302] Were Colorado's constitutional or statutory provisions for condemnation found to extend to CO_2 pipelines,[303] those pipelines would be required to act as common carriers by carrying CO_2 "for hire."[304] Similarly, Montana and Texas impose common carrier requirements only on those CO_2 pipeline companies utilizing the power of eminent domain. The following three

296. United States v. Ohio Oil Co., 234 U.S. 548 (1914).

297. Coburn, *supra* note 294, at 229 (citing Staff of Subcomm. on Antitrust and Monopoly of the Senate Comm. on the Judiciary, *Oil Company Ownership of Pipelines*, 95th Cong., 2d Sess., 99 (Comm. Print 1978)).

298. *Id.* at 230 (citing 49 U.S.C. §§ 1(5), 1(4)) ("The Interstate Commerce Act was recodified without substantive change by Pub. L. 95-473 (Oct. 17, 1978), 92 Stat. 1337, 49 U.S.C. § 10101 et seq.").

299. *Id*. at 562 (citing Pipe Line Cases, 234 U.S. 548 (1914)).

300. Natural gas pipelines crossing federal land were originally obligated to act as common carriers but were exempted in 1953. *See* William A. Mogel & John P. Gregg, *Appropriateness of Imposing Common Carrier Status on Interstate Natural Gas Pipelines*, 25 ENERGY L.J. 21, 42 (2004).

301. COLO. REV. STAT. ANN. §§ 38-4-102, 38-4-105 (2017); KY. REV. STAT. ANN. § 278.470 (2014); MONT. CODE. ANN. §§ 30-70-102(20), 69-13-101 (West 2007); N.D. CENT. CODE ANN. §§ 49-19-01(1), 49-19-08 (West 2007); OKLA. STAT. ANN. tit. 52 §§ 23, 24, 56; TEX. NAT. RES. CODE. ANN. § 111.019 (West 2015).

302. N.D. STAT. ANN. § 49-19-01(1) (West 2007).

303. *See supra* notes 259-264 and accompanying text.

304. COLO. REV. STAT. ANN §§ 38-4-102, 38-4-105 (West 2017).

examples demonstrate differing approaches to common carrier requirements as applied to CO_2 pipelines.

North Dakota imposes strict common carrier requirements on CO_2 pipelines via both constitutional and statutory provisions. A citizen-initiated constitutional amendment passed in response to the *Kelo* decision provides that "[p]rivate property shall not be taken for the use of, or ownership by, any private individual or entity, unless that property is necessary for conducting a common carrier or utility business."[305] North Dakota also statutorily defines any party transporting natural gas via pipeline "for hire or for sale" within the state, "the right of way for which is granted or secured . . . through the exercise of the right of eminent domain" as a common carrier.[306] North Dakota goes further by defining any entity "engaged in the business of transporting crude petroleum, gas, coal, or carbon dioxide by pipelines" as a pipeline common carrier.[307] As such, pipeline operators must submit to the jurisdiction of the North Dakota Public Service Commission, which, among other things, establishes and enforces rates and regulates tariffs.[308] Accordingly, all CO_2 pipelines in North Dakota must operate as common carriers, whether or not eminent domain is used to acquire right of way.

Montana grants eminent domain authority only to common carrier pipelines but does not require all pipelines to operate as common carriers.[309] Montana law defines a common carrier pipeline as one that transports by pipeline "carbon dioxide from a plant or facility that produces or captures carbon dioxide" but excludes "pipelines that are limited in their use to the wells, stations, plants, and refineries of the owner."[310] This provision would require some CO_2 pipelines transporting anthropogenic CO_2 to operate as a common carrier but would exclude pipelines transporting only natural CO_2.[311] In a provision that mimics the Hepburn Act "Uncle Sam"

305. N.D. CONST. art. I, § 16.
306. N.D. CENT. CODE § 49-19-01(3).
307. *Id.* § 49-19-01(1).
308. *Id.* § 49-19-17.
309. MONT. CODE §§ 30-70-102(20), 69-13-101.
310. *Id.* § 69-13-101(3)(a).
311. Plant or facility is defined as "a facility that produces a flow of carbon dioxide that can be sequestered or used in a closed-loop enhanced oil recovery operation. This does not include wells from which the primary product is carbon dioxide." *Id.* § 15-6-158(2)(g).

exception,[312] Montana also excepts point-to-point pipelines where both the CO_2 source and the end use are owned by the same party.[313]

Texas takes a similar approach but does not distinguish based on either the source or end use of the pipeline. Private pipelines are permitted for any source or use of CO_2, however, the use of eminent domain obligates a CO_2 pipeline to operate as a common carrier.[314] Although no permit is required prior to construction, the Texas Railroad Commission must designate the pipeline as a common carrier.[315] To do so, the pipeline must notify the Commission of its proposed route and establish whether or not the pipeline will be available for use by the public through the filing of a T-4 permit application and a P-5 Organization Report.[316] The developer must declare itself to be a common carrier, provide the Texas Railroad Commission with a letter agreeing to be subjected to Chapter 111 of the Natural Resource Code, and publish a tariff prior to exercising eminent domain.[317] However, mere willingness to serve other customers is not enough to exercise eminent domain; the court in *Denbury Green Pipeline-Texas, LLC v. Texas Rice Land Partners, Ltd.* clarified that there must also be a reasonable probability that the pipeline will actually be used by the public.[318] Consistent with the proposition that landowners should not be deprived of their property for purely private use, the developer must demonstrate that

312. Coburn, *supra* note 294, at 231.

313. MONT. CODE ANN. § 69-13-101e(3) (West 2013).

314. TEX. NAT. RES. CODE ANN. § 111.019(b) (West 2011); Amanda Buffington Niles, Comment, *Eminent Domain and Pipelines in Texas: It's as Easy as 1, 2, 3 – Common Carriers, Gas Utilities, and Gas Corporations*, 16 TEX. WESLEYAN L. REV. 271 (2010).

315. TEX. NAT. RES. CODE ANN. §§ 111.002(6), 111.020(d) (West 2011).

316. *Form T-4, Application for Permit to Operate a Pipeline in Texas*, R.R. COMM'N OF TEX. (Dec. 15, 2011), *available at* http://www.rrc.state.tx.us/forms/forms/gs/T-4Permit.pdf; *Pipeline Eminent Domain and Condemnation Frequently Asked Questions*, R.R. COMM'N OF TEX., http://www.rrc.state.tx.us/about/faqs/eminentdomain.php (last visited Apr. 23, 2012).

317. TEX. NAT. RES. CODE ANN. §§ 111.002(6), 111.014 (West 2011); Cavarrio Carter, *System Check: Balancing Texas's Need for Natural Resources Exploration with Texas Landowner Rights in Light of Texas Rice Land Partners v. Denbury Green Pipeline Texas*, 2 LSU J. ENERGY L. & RES. 309, 318 (2014); James, *supra* note 287, at 971.

318. Denbury Green Pipeline-Texas, LLC v. Tex. Rice Land Partners, Ltd, 510 S.W.3d 909 (Tex. 2017) (stating that there must also be a reasonable probability "that the pipeline will at some point after construction serve the public by transporting gas for one or more customers who will either retain ownership of their gas or sell it to parties other than the carrier").

the pipeline will not be "limited in [its] use to the wells, stations, plants, and refineries of the owner."[319]

Texas' approach equates common carriage with public use.[320] Once a pipeline has demonstrated that it will serve as a common carrier, it does not have to make any additional showing regarding the public purpose of the pipeline.[321] Accordingly, whether the pipeline will mitigate climate change, provide CO_2 for the beverage industry, or be used for EOR is irrelevant. The operation of the pipeline as a public good is itself indicative of public purpose. In a subsequent decision, the Texas Supreme Court clarified that the state's requirement does not mandate that a pipeline serve a substantial public purpose but rather that it establishes a reasonable probability of public use.[322]

Pipelines for CCUS: Public Purpose v. Use by the Public

The growing demand for EOR and investment and research towards CCUS indicate that there will be increased development of CO_2 pipelines in coming decades.[323] As new CO_2 pipelines expand across the country, private landowners nationwide will be expected to yield their property towards those ends. CO_2 pipelines intended for CCUS may not be able to rely on traditional natural resource development justifications of public purpose to obtain condemnation authority. This challenge illustrates the limitations of public purpose arguments based solely on extraction and contributes to the dialogue on whether property taken by private companies should be made available to some "possession, occupation, and direct enjoyment by the public."[324] Resolution of these issues will influence where pipelines are located, how they are operated, and the extent to which they can be integrated into a broader network to serve both EOR and climate-change mitigation uses.

Many of the traditional public purpose justifications for natural resource development are ill fitting as applied to CO_2 pipelines for CCUS, absent

319. *Id.*; Richard F. Brown, *Oil, Gas, and Mineral Law*, 66 SMU L. REV. 1003, 1027-28 (2013).

320. Dave Player, *Eminent Domain, Denbury, and the Keystone XL Pipeline*, 8 TEX. J. OIL GAS & ENERGY L. 177, 179-183 (2013); Montana J. Ware, Note, *Private Takings in Texas: Defining Public Use after Kelo*, 12 TEX. J. OIL GAS & ENERGY L. 259, 270 (2017).

321. Vardeman v. Mustang Pipeline Co., 51 S.W.3d 308 (Tex. App.—Tyler 2001, pet. denied).

322. *Denbury*, 510 S.W.3d at 917.

323. Dooley, *supra* note 9.

324. Klass, *supra* note 217, at 662.

associated EOR operations. Although non-EOR-CCUS may offset the environmental externalities of natural resource development, it does not, in itself, result in either the expansion of tax revenue or the development or production of natural resources. Accordingly, many of the statutes and constitutional provisions that have enabled use of condemnation for CO_2 pipelines related to the production of CO_2 or for EOR would be insufficient with respect to pipelines for carbon storage alone.

If natural resource takings provisions are narrowly interpreted as serving a public purpose solely by advancing resource extraction through the elimination of holdouts,[325] CO_2 pipelines for CCUS hardly fit within those confines. However, these constitutional provisions can also be interpreted as an intentional effort to broaden the eminent domain authority granted to private industry as a means for facilitating natural resource development towards the general end of economic prosperity.[326] Viewed in this light, it is feasible to argue that CCUS serves these same public purposes by decarbonizing fossil energy generation, thus resulting in an avoided cost from climate-related harms and potentially costly new emissions regulations.

The challenge of applying natural resource development takings provisions to CO_2 pipelines for CCUS illustrates the limitations inherent in public purpose justifications based entirely on the end use of the substance produced or transported. Whereas condemnation for CO_2 transportation as a resource or as necessary to "mining" would be nearly presumed to serve a public purpose, condemnation for CO_2 pipelines intended for CCUS may be constrained by the public purpose limitation. While little would prevent a pipeline developer from making a pipeline available for transport for purposes of CCUS *after* construction,[327] the law is opaque as to whether pipelines could be constructed with CCUS as the principal end. Due to the fact that the permanent storage reservoir might not be co-located with the

325. Coronado Oil Co. v. Grieves, 603 P.2d 406 (Wyo. 1979); Dayton Gold & Silver Mining v. Seawell, 11 Nev. 394 (1876) ("[T]he entire people of the state are directly interested in having the future developments unobstructed by the obstinate action of any individual or individuals.").

326. *See* Potlatch Lumber Co. v. Peterson, 88 P. 426, 431 (Idaho 1906) (holding that "a complete development of the material resources of our young state could not be made unless the power of eminent domain was made broader than it was in many of the Constitutions of the several states of the Union" because to hold otherwise would be "to defeat the development of the great natural advantages, resources and industrial opportunities.").

327. Kevin L. Cooney, *A Profit for the Taking: Sale of Condemned Property After Abandonment of the Proposed Public Use*, 74 WASH. U. L. Q. 751 (1996) (citing Mainer v. Canal Auth., 467 So. 2d 989, 993 (Fla.1985)).

EOR use, these limitations could be problematic, particularly for development of spur lines for the last mile. Accordingly, natural-resource development justifications of public purpose unnecessarily constrain development of an integrated CO_2 transportation network precisely at a time where maximum flexibility and expansion are needed.

As others have suggested, the natural resource development justification for public purpose is ripe for reconsideration in light of changing public needs.[328] A historical narrative characterizes the relationship of American attitudes and the physical environment as moving through three distinct phases: 1) fear; 2) conquest and mastery through maximum economic utilization; and, 3) appreciation and preservation.[329] Although reality was more nuanced than this linear model suggests,[330] historical approaches to interpreting public use clauses throughout the 19th and early 20th centuries largely align with this model, with courts considering public purpose in light of changing norms and historical use.[331] Yet, modern analyses of public purpose as it relates to natural resource purposes are firmly rooted in the rhetoric of conquest and utilization,[332] even whereas public attitudes towards nature have reoriented towards conservation, integration, and restraint.[333] Accordingly, as Professor Klass has suggested, the forced reallocation of property rights to promote natural resource development seems increasingly inconsistent with the evolving economies of western states towards emphasis on conservation and tourism, the protection of surface rights, and concerns about climate change and the social costs of carbon.[334]

Climate-Change Mitigation as Public Purpose

Climate-change mitigation may soon qualify as a public purpose independent of natural resource development.[335] There is a "general consensus that climate change poses a threat to human health and the

328. Klass & Meinhardt, *supra* note 121, at 689.
329. Limerick, *supra* note 212, at 172-73.
330. *Id*.
331. *Norwood*, 853 N.E.2d at 1129-30.
332. *Coronado*, 603 P.2d at 411.
333. Klass, *supra* note 217, at 679.
334. *Id*. at 679, 680, 689.
335. Samantha J. Hepburn, *Ownership Models for Geological Sequestration: A Comparison of the Emergent Regulatory Models in Australia and the United States*, 44 ENVTL. L. REP. NEWS & ANALYSIS 4, 10310, 10313 (2014) (citing Climate, *supra* note 91, at 417).

environment," as well as significant threats to private property.[336] Addressing these threats is one of the country's critical needs, and despite public perceptions to the contrary, likely provides specific benefits within the individual states.[337] As states and the federal government move to address the impacts of climate change or to reduce emissions, whether climate-change mitigation constitutes a public purpose is likely to be of critical importance.

This question is already being considered in the context of CCUS. CCUS will require not only land for pipelines but significant subsurface property rights necessary for sequestration.[338] It is generally acknowledged that existing statutes permitting eminent domain for gas storage are likely insufficient to acquire subsurface rights necessary for CCUS.[339] Accordingly, regulatory initiatives for CCUS and legislative declarations of pore space ownership have been shaped by the background landscape of eminent domain. In fact, the Interstate Oil and Gas Compact Commission (IOGCC) model statute proposes eminent domain as a tool to acquire subsurface property for CCUS.[340] In addition to other natural-resource based approaches to establishing public purpose, both Louisiana and Kentucky have passed legislation designating carbon storage as a public

336. Climate, *supra* note 91, at 424-25; Holly Doremus, *Climate Change and the Evolution of Property Rights*, 1 UC IRVINE L. REV. 1091 (2011).

337. Nadja Popovich, et al., *How Americans Think About Climate Change, in Six Maps*, N.Y. TIMES (Mar. 21, 2017), https://www.nytimes.com/interactive/2017/03/21/ climate/how-americans-think-about-climate-change-in-six-maps.html; Square Butte Electric Co-op v. Hilken, 244 N.W.2d 519, 524 (N.D. 1976).

338. Delissa Hayano, *Guarding the Viability of Coal and Coal-fired Power Plants: A Road Map for Wyoming's Cradle to Grave Regulation of CO_2 Sequestration*, 9 WYO. L. REV. 139, 141 (2009) (citing Steven L. Bryant, *Geologic CO_2 Storage – Can the Oil and Gas Industry Help Save the Planet?*, 54 ROCKY MTN. MIN. L. INST. 2-1, 2-8 (2008)); Tara Righetti, *Correlative Rights and Limited Common Property in the Pore Space: A Response to the Challenge of Subsurface Trespass in Carbon Capture and Sequestration*, 47 ENVTL. L. REP. NEWS & ANALYSIS 10420 (May 2017).

339. Mark A. de Figueiredo, *Property Interests and Liability of Geologic Carbon Dioxide Storage, A Special Report to the MIT Carbon Sequestration Initiative*, LAB. FOR ENERGY AND ENVT. 12-14 (Sept. 2005).

340. *Storage of Carbon Dioxide in Geologic Structures: A Legal and Regulatory Guide for States and Provinces*, INTERSTATE OIL AND GAS COMPACT COMM'N, TASK FORCE ON CARBON CAPTURE AND GEOLOGICAL STORAGE (2007); Tracy J. Logan, *Carbon Down Under – Lessons from Australia: Two Recommendations for Clarifying Subsurface Property Rights to Facilitate Onshore Geologic Carbon Sequestration in the United States,* 11 SAN DIEGO INT'L L.J. 561, 596-598 (2010); Larry Nettles & Mary Conner, *Carbon Dioxide Sequestration – Transportation, Storage, and Other Infrastructure Issues*, 4 TEX. J. OIL GAS & ENERGY L. 27, 36-37 (2009).

purpose.[341] Although courts have traditionally afforded extensive deference to legislative declarations of public purpose, these designations may not be dispositive as to judicial interpretations of states' constitutional provisions.

In some states, however, there may be insufficient political initiative to declare CCUS or climate mitigation as a public purpose. In fact, at least two states, Wyoming and Oklahoma, have expressly provided that nothing within their carbon capture and sequestration statutes creates a right to use eminent domain for CCUS.[342] These provisions do not necessarily preclude developers of CO_2 pipelines from obtaining condemnation authority under other provisions of law.[343] However, an express statement of the legislature against utilization of eminent domain for CCUS—at least in the context of unitization of subsurface rights—may challenge arguments that pipelines for CCUS is within broader declarations of public purpose.

At least one case has analyzed issues that tangentially relate to use of eminent domain for climate change. In *Borough of Harvey Cedars v. Karan*, a New Jersey borough successfully condemned a landowner's beachfront strip for the construction of protective sand dunes.[344] Sand dune protection is pertinent to coastal climate adaptation projects.[345] In fact, the National Oceanic and Atmospheric Administration's U.S. Climate Resilience Toolkit describes sand dunes as "natural infrastructure" that towns can protect or enhance to reduce damage from "rising sea levels."[346]

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341. KY. REV. STAT. ANN. § 154.27-100 (2014); LA. STAT. ANN. § 30:1108 (2009).

342. OKLA. STAT. tit. 3 § 5-106(d); WYO. STAT. ANN. § 35-11-316 (West 2009).

343. Oklahoma grants eminent domain authority to oil pipelines for transport of "petroleum, liquid or liquefiable hydrocarbons and chemicals" and to natural gas pipelines. OKLA. STAT. ANN. tit. 52 §§ 51-67, 21-35. It is unknown whether CO_2 pipelines would fall within either of these provisions. Oklahoma requires both oil and natural gas pipelines to be common carriers.

344. Borough of Harvey Cedars v. Karan, 70 A.3d 524 (N.J. 2013); Robert R.M. Verchick, *Culture, Cognition, and Climate*, 2016 ILL. L. REV. 969, 1018 (citing 70 A.3d at 1017-18).

345. *Id.*; Andrew Romano, *The Day Climate Change Ruined Our Lives*, NEWSWEEK (Mar. 25, 2013, 4:45 AM), http://www.newsweek.com/day-climate-change-ruined-our-lives-62931. On the issue of compensation, see Joshua Ulan Galperin, *Raisins and Resilience: Elaborating Horne's Compensation Analysis with an Eye to Coastal Climate Change Adaptation*, 35 STAN. ENVTL. L.J. 3, 4-6 (2016).

346. Caitlyn Kennedy, *Beachfront Q&A: Talking About Dunes, Development, Storms, and Sea Level Rise*, CLIMATE.GOV (Oct. 28, 2013), https://www.climate.gov/news-features/features/beachfront-qa-talking-about-dunes-development-storms-and-sea-level-rise; *Restoring Natural Dunes to Enhance Coastal Protection*, U.S. CLIMATE RESILIENCE TOOLKIT, NAT'L OCEANIC AND ATMOSPHERIC ADMIN. (Jan. 17, 2017), https://toolkit.climate.gov/case-studies/restoring-natural-dunes-enhance-coastal-protection.

The dispute in *Borough of Harvey Cedars* concerned the determination of just compensation for an easement necessary to construction of protective sand dunes.[347] The municipality's right to acquire easements through its statutory powers of eminent domain for the construction of the sand dunes does not appear to have been questioned. In fact, the public benefits of the storm-protection project are discussed only as to whether it conferred a special benefit upon the property owners.[348] The benefits of protective sand dunes are much more localized and causally related to the property taken, and accordingly fall more closely within traditional public purposes than atmospheric GHG reduction strategies. Accordingly, although *Borough of Harvey Cedars* does not establish acceptance of climate change as a public purpose, it indicates that condemnation is already being used to acquire property necessary for climate-change mitigation projects. Further, the partial takings issues addressed in *Borough of Harvey Cedars* are likely to be a critical issue should eminent domain be used for condemnation of subsurface pore space.[349]

The transportation of CO_2 is a critical component of the vast infrastructure necessary to CCUS, and thus CO_2 pipelines have the potential to serve an important public purpose. Even were CCUS or climate-change mitigation accepted as a public purpose in its own right, success of CCUS on a national scale will require access to a greater interstate pipeline network. The incremental construction of trunk and spur lines for EOR pipelines could develop into the foundation for an national CO_2 pipeline network, but only if others can make use of that infrastructure. Absent common carrier requirements, infrastructure constructed using eminent domain to serve EOR purposes will not be available to "use by the public" through access by other producers or shippers in the same area. Thus, CCUS project proponents wishing to connect existing networks with new sources of captured CO_2 may suffer the same limits on access to market as early oil producers, hindering development of an integrated national pipeline network available for public use. Where used as an alternative to natural resource development justifications of public purpose, public use requirements thus serve a dual purpose in assuring future access to infrastructure built using eminent domain and eliminating limitations based on the natural resource end uses of CO_2 transported. Presently, those

347. *Borough of Harvey Cedars*, 70 A.3d 524; Bianca Iozzia, *Putting a Price Tag on an Ocean View: The Impact of Borough of Harvey Cedars v. Karan on Partial Taking Valuations*, 25 VILL. ENVTL. L.J. 501 (2014).

348. *Borough of Harvey Cedars*, 70 A.3d 524.

349. Climate, *supra* note 91, at 420.

limitations may preclude development of pipelines intended for CCUS, whereas stand-alone public use requirements would permit their development provided that they too operated as common carriers. Accordingly, where states elect to grant condemnation authority to CO_2 pipeline developers, approaches that require availability for use by the public may be preferable to those that focus solely on the end use of the product transported.

IV. Adequacy of the Current Regulatory Framework

The cost of pipeline construction[350] and unavailability of an integrated, open-access CO_2 pipeline network have been identified as among the major obstacles to widespread implementation of CCUS or greater deployment of EOR technologies. Concerns about inconsistent regulation between states and monopolization are cited as major impediments to its development. In response, many have suggested that a federal siting process is needed. This part evaluates the adequacy of the current regulatory framework to facilitate development of a nationwide integrated CO_2 pipeline network and suggests that many of the monopolization concerns identified could be overcome through state integration of common carrier requirements.

Proposals for a Federal Siting Framework

CO_2 pipelines are planned, constructed, and financed based on the specific characteristics of both the source and the end use—in almost all cases for EOR.[351] Accordingly, construction of CO_2 pipelines is likely to unfold in a slow and geographically limited manner as new industrial facilities, EOR operations, and CCS-enabled power plants are brought online. Early development of natural gas and oil pipelines, and of electric transmission lines, progressed in much the same way. In each case, an initial, localized build-out of infrastructure was accomplished through state

350. Cost estimates for CO_2 pipeline construction range from $70,000 to $126,000 per inch-diameter/mile. Joseph Essandoh-Yeddu & Gürcan Gülen, *Economic Modeling of Carbon Dioxide Integrated Pipeline Network for Enhanced Oil Recovery and Geologic Sequestration in the Texas Gulf Coast Region*, 1 ENERGY PROCEDIA 1, 1602-10 (2009); Tim Grant, et al., *Carbon Dioxide Transportation and Storage Costs in NETL Studies*, U.S. DEP'T OF ENERGY, NAT'L ENERGY TECH. LAB. (May 2014); Sean T. McCoy & Edward S. Rubin, *An Engineering-Economic Model of Pipeline Transport of CO_2 with Application to Carbon Capture and Storage*, GREENHOUSE GAS CONTROL, 219-29 (2008). An inch-diameter/mile is a cost estimate tool based on the cost per inch of diameter of pipe over a mile.

351. Schnacke, *supra* note 13, at 286.

regulation and private enterprise.[352] As the industry grew and expanded, federal regulation or backstop authority eventually became necessary to overcome geographic barriers or market failures.[353]

CO_2 pipelines may follow this well-worn path. Concerns about monopolization, among other problems, have led a number of scholars to conclude that federal regulation of CO_2 pipeline siting is needed.[354] Suggested frameworks include a model based upon the Natural Gas Act, federal common carrier requirements similar to those imposed on oil pipelines, FERC backstop authority, or the creation of an opt-in option for federal siting.[355] Each of these proposals seeks to address the inefficiencies of inconsistent state regulations and the risk of monopoly control.

Although federal regulation may eventually be required, it may not be needed yet. In the natural gas context, federal siting contributed to faster permitting, ease in obtaining right of way, and price stability.[356] However, these efficiencies came with new costs, such as "high rates, barriers to entry, stymied productivity, technological change, and management quality."[357] Thus, where state approaches appear to be sufficient, premature imposition of federal siting authority may impose unnecessary costs.[358]

States are better equipped to establish public participation and consider significant local concerns about safety, land use, and impacts to property and environment.[359] Further, under state siting rules, pipeline infrastructure has grown steadily, including a number of interstate pipelines and market participants. Those very pipelines are likely to form the backbone of the CO_2 transportation infrastructure that will ultimately be required. A

352. Alexandra B. Klass & Jim Rossi, *Reconstituting the Federalism Battle in Energy Transportation*, 41 HARV. ENVTL. L. REV. 423, 436 (2017).

353. Climate, *supra* note 91.

354. Policy Brief: Regulating Carbon Dioxide Pipelines for the Purpose of Transporting Carbon Dioxide to Geologic Sequestration Sites, CCS REG. PROJECT 3, 5 (2009).

355. Joel Mack & Buck Endemann, *Making Carbon Dioxide Sequestration Feasible: Toward Federal Regulation of CO_2 Sequestration Pipelines*, 38 ENERGY POL'Y 735, 739-42 (2010); Cyrus Zarraby, *Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Networ*k, 80 GEO. WASH. L. REV. 950 (2012); Nordhaus & Pitlick, *supra* note 110, at 98-100.

356. Bliss, *supra* note 97.

357. *Id*.

358. Nordhaus & Pitlick, *supra* note 110, at 100-01 (citing Hearing on S. 2323 and S. 2144 Before the S. Comm., 110th Cong. (2008) (testimony of Hon. Joseph T. Kelliher, Chairman, FERC) [hereinafter "Kelliher Testimony"]).

359. Klass & Rossi, *supra* note 352, at n.148.

preemptive disruption in siting processes could drive away the only capital currently being invested in CO_2 transportation.

Proposals for federal siting have arisen in response to concerns that the incremental piecing together of CO_2 pipelines for EOR may later preclude or deter use and access to infrastructure for CCUS. Common carrier requirements in state eminent domain and siting processes may address many of these concerns. Common carrier requirements are consistent with historical understandings of public use, and will assure that the EOR-driven development of CO_2 pipelines today will later be available to serve CCUS or other carbon-mitigation industries. By doing so, states can concurrently promote development of an accessible and integrated pipeline infrastructure and avoid upsetting what has thus far seemed to be a workable paradigm.

The Monopoly Concern

All pipelines are considered natural monopolies.[360] The investment and time required to permit and build long distance pipelines, particularly interstate pipelines, is significant. Once built, pipelines present an opportunity to exert market power and extract secondary rents.[361] While nothing de facto prevents others from entering the market, "the costs of entering the market are so high [due to the fixed cost of building a pipeline] that it is most efficient for only one firm to serve a given geographical region."[362]

Prior to the Hepburn Act and NGA, both the oil and natural gas industries were characterized by control and consolidation of infrastructure in the hands of a few companies. Consumers and producers alike complained of monopolization.[363] In response, Congress enacted federal regulation. In the case of the NGA, the purpose was to protect consumers from market dominance, prevent discrimination against unaffiliated entities, and provide rate stability.[364] While not imposing common carrier requirements, the NGA granted FERC's predecessor, the Federal Power Commission, jurisdiction to assure that rates were "just and reasonable" and

360. Nat'l Fuel Gas Supply Corp. v. FERC, 468 F.3d 831, 834 (D.C. Cir. 2006); *see also* ALFRED E. KAHN, ECONOMICS OF REGULATION: INSTITUTIONAL ISSUES: PRINCIPLES AND INSTITUTIONS 199-23 (1971).

361. Merrill, *supra* note 216, at 85.

362. *Nat'l Fuel Gas Supply*, 468 F.3d at 834.

363. Klass & Meinhard, *supra* note 121, at 994.

364. Mack & Endemann, *supra* note 355, at 738; *see also* Assoc. Gas Distribs. v. FERC, 824 F.2d 981 (D.C. Cir. 1987).

that pipelines did not discriminate through "undue preferences."[365] The Hepburn Act addressed similar concerns through the imposition of federal common carrier requirements and rate regulation by the ICC.[366]

CO_2 pipelines are vulnerable to the same market manipulations. In fact, almost all of the large scale CO_2 trunk lines in the United States today are controlled by subsidiaries of three companies: Denbury Resources, Kinder Morgan, and Occidental Petroleum.[367] Further, unlike oil, CO_2 is not transportable by other means. Although conditions that might tend to create a natural monopoly are present, it is unclear to what extent closely held control of the transportation infrastructure impacts shipper access to pipelines or pricing of CO_2 to downstream EOR consumers. Affordable access to CO_2 has been identified as the "single largest challenge to the development of a thriving CO_2-based EOR industry in Wyoming."[368] However, it is unclear whether, or to what extent, high CO_2 prices result from lack of supply, insufficient capacity, or rent seeking by pipeline companies.

Similarly, it is unknown if pipeline control by a small number of market participants results in discriminatory access. At least one producer in Mississippi has asserted that access to CO_2 pipelines in the state is restricted through submarket pricing, limiting production and trapping reserves.[369] In Louisiana and Mississippi,[370] neither of which imposes common carrier requirements on CO_2 pipelines, one company controls all of the CO_2

365. 15 U.S.C. §§ 717(b), 717d(a), 717c, 717d, 717f(c)(1)(a); *see also* Natural Gas Act Amendment of 1947, Pub. L. No. 80-245, 61 Stat. 459.

366. Granitz & Klein, *supra* note 140; Klass & Meinhardt, *supra* note 121, at 961.

367. Matthew Wallace, et al., *A Review of the CO_2 Pipeline Infrastructure in the U.S.*, U.S. DEP'T OF ENERGY (Apr. 21, 2015).

368. Dag Nummedal, et al., *Enhanced Oil Recovery in Wyoming: Prospects and Challenges*, UNIV. OF WYO. 1 (June 15, 2003), https://www.uwyo.edu/acadaffairs/_files/docs/eorfinal.pdf

369. Clay Chandler, *Investor: Legislation Would Free Up Millions of Barrels of Miss. Oil*, CLARION LEDGER (Feb. 18, 2015, 9:43 AM), http://www.clarionledger.com/story/money/ business/2015/02/18/investor-legislation-free-millions-barrels-miss-oil/23610935/; Mark A. Worthey, *Worthey: Company Has Grip on Mississippi's CO_2*, CLARION LEDGER (Apr. 2, 2015, 12:30 PM) http://www.clarionledger.com/story/opinion/ 2015/04/02/worthey-company-grip-mississippis-co/70833934/.

370. LA. STAT. ANN § 30:1107 (2009) (providing that issuance of a certificate of public convenience and necessity shall not "[c]ause any . . . transporter of carbon dioxide for storage to become, or be classified as, a common carrier or . . . [subject] such carbon dioxide to storage transporter to any duties, obligations, or liabilities as a common carrier").

transportation infrastructure.[371] In contrast, in Texas, where common carriage is required to exercise eminent domain, at least two companies operate major trunk lines, and an even greater number of companies operate smaller scale distribution systems.[372] On its face this would indicate the existence of a natural monopoly in states without common carrier requirements. The experience in the Rocky Mountain Region, however, tells a different story; in Wyoming, where common carriage is not required, a number of companies operate both trunk and spur lines.[373] Accordingly, the efficacy of common carrier requirements in assuring more market participation or access is likewise unclear.

A Return to Public Use

States can facilitate development of infrastructure that may later prove compatible with CCUS through the imposition of common carrier requirements on pipeline developers utilizing eminent domain. This approach, similar to what has been adopted in Texas, establishes public use through the creation of infrastructure available for use by the public. As the litigants in *Texas Rice Partners* asserted, there is something about CO_2 transportation that *feels* private—particularly where, as many CO_2 pipelines are, such pipelines are constructed and operated principally, if not exclusively, for the transportation of CO_2 owned and used by the same party. A public use approach establishes a public benefit through the availability of the infrastructure to the public—thus encouraging new development, exploration, and uses of CO_2 where such infrastructure is located. Public use, as distinguished from public purpose, limits opportunities for monopoly and "secondary rent seeking" through the creation of public goods.[374] By reducing barriers to entry, common carrier requirements may reduce concerns about unfair pricing to both unaffiliated CO_2 producers and consumers for EOR.

The use of eminent domain for projects that are available to public use may be more defensible under both state and federal constitutional protections of private property. As discussed in Part III, the public purpose justifications for siting CO_2 pipelines—for natural resource development or

371. DiPietro, *supra* note 33.

372. *Id*.

373. Matthew Wallace, et al., *A Review of the CO_2 Pipeline Infrastructure in the U.S.*, U.S. DEP'T OF ENERGY (Apr. 21, 2015).

374. Merrill, *supra* note 216, at 73 (citing R. EPSTEIN, PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN (1985)) ("Public goods are those that possess both jointness in supply and impossibility of exclusion.").

EOR—are based exclusively on the end use of the product transferred. Many of these statues are ambiguous as applied to CO_2, which may or may not constitute a "gas" or "natural resource" within the terms of those statutes. Further, changing views on climate, growing interests in recreation and tourism, and increasing land values leave natural resource extraction justification of public use vulnerable to criticism. Even were states to adopt legislation declaring transportation for CCUS a public purpose, those pipelines would similarly be limited—granting access to a closed set of market participants to transport a product for a defined purpose. Transitions to renewable energy and other market shifts may make CCUS uncompetitive as a decarbonization strategy for the power sector, thus rendering the public purposes advanced by laws authorizing condemnation for CO_2 pipelines on that basis obsolete.[375] The result is a rigid infrastructure that promotes monopolization and discourages innovation, rather than one that promotes creation of public goods in the form of pipelines to offer nondiscriminatory access to all potential future users.

A public access approach to siting addresses these limitations, although an imposition of common carrier requirements on pipelines developed without the use of eminent domain does not seem necessary. Like North Dakota, the Hepburn Act imposed federal common carrier requirements on all pipelines—regardless of how right of way was obtained.[376] Doing so was necessary to upend an entrenched monopoly characterized by uncompetitive practices resulting in stranded assets and limited access to market.[377] This sort of retroactive reallocation of property does not seem necessary. In at least two of the three geographic areas where CO_2 pipeline infrastructure exists, there are already a number of competitive market participants owning and operating CO_2 pipelines.[378] If common carrier requirements were linked only to the use of eminent domain—as they are in Montana and Texas—pipelines developed entirely on private land with private capital through voluntary agreement with landowners could be privately operated for the exclusive use of the owner(s).

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375. *Expect the Unexpected: The Disruptive Power of Low-carbon Technology*, CARBON TRACKER INITIATIVE (Feb. 2017), http://www.carbontracker.org/wp-content/uploads/2017/02/Expect-the-Unexpected_CTI_Imperial.pdf.

376. Klass & Meinhardt, *supra* note 121, at 961; *see supra* notes 305-308 and accompanying text.

377. United States v. Ohio Oil Co., 234 U.S. 548 (1914); Klass & Meinhardt, *supra* note 121, at 961.

378. *See supra* notes 372-373 and accompanying text.

Challenges of CO_2 Common Carriage

Common carrier requirements are criticized as resulting in a paucity of public goods. Precisely because they are open to public use and do not convey a monopoly or unique advantage on the holder, common carrier requirements may deter investments resulting in scarcity.[379] Historically, both oil and natural gas companies opposed common carrier requirements.[380] These companies argued that common carrier requirements impermissibly subject private investment to public use, or would deter investments in infrastructure.[381] Yet, neither state nor federal regulatory siting or rate regulation requirements have resulted in an underdevelopment of pipeline infrastructure for oil or natural gas.[382] Similarly, although implementation challenges certainly exist,[383] development of CO_2 pipelines has not been forestalled by common carrier requirements in Texas, Colorado, Montana, and on federal lands.[384]

Curtailment and Single-Customer Pipelines

In order for common carrier requirements to work within the current industrial organizational structure, they must be consistent with the made-to-measure manner of pipeline development for EOR.[385] This raises two primary issues: curtailment and single-customer pipelines. CO_2 pipelines are designed with both a specific quantity of supply and a specific quantity of need/capacity at each terminus. Accordingly, common carrier requirements that result in curtailment—in order to make available capacity downstream—may create uncertainty as to whether there will be sufficient capacity to justify either capture costs or to adequately support the downstream EOR purposes.[386] For example, disparate common carrier requirements could result in bottlenecks driven by downstream oversubscriptions, thus making the pipeline unsuitable to an upstream

379. Miceli, Thomas J., *Free Riders, Holdouts, and Public Use: A Tale of Two Externalities*, 148 PUBLIC CHOICE 105-117 (2011); Klass & Meinhardt, *supra* note 121, at 992; Merrill, *supra* note 216, at 73.

380. Klass & Meinhardt, *supra* note 121, at 992.

381. *Id.*

382. *Id.* at 1016.

383. Schnacke, *supra* note 13, at 307-13.

384. It is unclear how BLM has implemented its MLA common carrier obligations in existing pipelines. *See* Sam Kalen, *Thirst for Oil and the Keystone XL Pipeline*, 46 CREIGHTON L. REV. 1, 21 (2012).

385. Schnacke, *supra* note 13, at 313.

386. Zarraby, *supra* note 355, at 969.

facility's capture needs.[387] Further, if a private developer of a CO_2 pipeline cannot be assured that it will have sufficient CO_2 for its EOR operations[388] or offloading capacity for captured CO_2, the pipeline may be difficult to finance.[389] In response to these issues, both a 2010 interagency task force established by President Obama and the IOGCC/SSEG CO_2 Pipeline Transport Task Force concluded that the apportionment practices under the oil pipeline framework were unworkable with the dedicated business models for CO_2 transport.[390] Accordingly, an effective CO_2 pipeline network—and any common carrier requirements attached thereto—will likely need to provide a mechanism for sources to reserve capacity.[391]

The made-to-measure nature of most CO_2 pipelines also creates the likelihood that many pipelines may be single-customer in the early stages of development.[392] As Mack and Endemann note, this may make common carrier requirements more difficult to satisfy. However, although criticized by landowners, the reasonable likelihood of a future public use standard articulated by the court in *Texas Rice Partners* may be sufficient. Pipeline companies would not necessarily need contracts from multiple generators or storage/EOR companies, provided that such use could be reasonably contemplated at some point in the future. While this may be sufficient, the standards for establishing common carriage may differ from state to state, creating uncertainty as to whether pipelines can rely on access to eminent domain. A requirement that a pipeline affirmatively establish the existence of multiple suppliers prior to construction could create an insurmountable obstacle to early-stage infrastructure development.

Pipeline Gas Specifications

Pipeline gas specifications may limit existing pipelines' utility to other shippers. Pipeline specifications for gas composition are critical to the safety and operation of the pipeline—the presence of other chemical

387. *Id*. at 968.

388. Exxon Corp. v. Lujan, 730 F. Supp. 1535, 1537 (D. Wyo. 1990) ("In order for tertiary recovery operations to be successful, a steady, constant, and uninterrupted supply of carbon dioxide is needed.").

389. Mack & Endemann, *supra* note 355, at 739. Challenges of common carrier requirements as applied to oil pipelines may provide insight to these issues. *See* Jeff. D. Makholm, et. al., *The Politics of U.S. Oil Pipelines: The First Born Struggles to Learn from the Clever Younger Sibling*, 37 ENERGY L.J. 409, 422 (2016).

390. Schnacke, *supra* note 13, at 311 (citing *Report of the Interagency Task Force on Carbon Capture and Storage*, OFFICE OF FOSSIL ENERGY (Aug. 2010)).

391. *Id.* at 311-12 (citing Bliss, *supra* note 97, at 15).

392. Mack & Endemann, *supra* note 355, at 741.

components within the CO_2 stream can lead to corrosion or impact miscibility pressures.[393] For example, material concentrations of either nitrogen or methane can preclude dense phase operations and oxygen can lead to corrosion.[394] Accordingly, pipeline specifications recommend dewatering and removing impurities at the inlet to the pipeline.[395]

Not only is dehydration and removal of certain impurities important for preventing corrosion, different downstream uses also require different qualities of gas. For example, the food and beverage industry has higher requirements than EOR.[396] Components like nitrogen in CO_2 may adversely impact suitability of CO_2 streams for EOR, whereas other chemicals within CO_2 may result in damage to industrial equipment.[397] Storage operators and EOR operators alike would need to consider the specific chemical and geologic characteristics of the target formation to avoid undesired interactions.[398] Due to these diverse considerations, gas specifications are tailored to fit the commercial requirements of the downstream project for which it is built.[399] CO_2 sources entering the pipeline would need to meet those specifications.[400] These specifications could result in limited utility of certain pipelines to other shippers or downstream users. Accordingly, uniform specifications, while promoting an integrated network, may be prohibitively costly and inefficient relative to certain sources or uses.[401]

The source and chemical components of CO_2 entering the pipeline may also subject pipeline and downstream users to additional regulatory requirements. For example, storage and injection pipeline operators would also be careful to avoid including any CO_2 stream containing components that might fall outside EPA's Conditional Exclusion from the Resource

393. TOWLER ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE: SPECIAL REPORT ON CARBON CAPTURE AND SEQUESTRATION (2008); Z.X. Zhang, et al., *Optimization of Pipeline Transport for CO_2 Sequestration*, 47 ENERGY CONVERSION AND MANAGEMENT 6, 702-15 (2006); Bliss, *supra* note 97; ICF Report, *supra* note 65, at 42.

394. *Id.*

395. *Recommended Practice: Design and Operation of CO_2 Pipelines*, DET NORSKE VERITAS 20 (Apr. 2010); Yoon-Seok Choi, et al., *Effect of Impurities on the Corrosion Behavior of CO_2 Transmission Pipeline Steel in Supercritical CO_2 – Water Environments*, 44 ENVIRON. SCI. TECH. 9233-9238 (2010).

396. Henriette Naims, *Economics of Carbon Dioxide Capture and Utilization – A Supply and Demand Perspective*, 23 ENVTL. SCI. POLLUTION RES. 22,226, 22,232-35 (2016).

397. Marston & Moore, *supra* note 15, at 449; Recommended Practice, *supra* note 395.

398. Marston & Moore, *supra* note 15, at 435.

399. *Id*. at 448.

400. *Id*. at 448-49.

401. Bliss, *supra* note 97, at 18-21.

Conservation and Recovery Act (RCRA).[402] Similarly, pipelines may also prohibit introduction of CO_2 into the pipeline in order to avoid perceived project delays resulting from greenhouse gas reporting requirements under the EPA's Subpart RR rules.[403] Occidental has successfully complied with Subpart RR in order to obtain the 45Q tax credit in two CO_2-EOR projects—suggesting that such requirements are not an insurmountable obstacle. However, critics have suggested that downstream users may be concerned that comingled CO_2 would become subject to additional plan approval and reporting requirements, thus requiring assurance from pipeline companies.[404] Accordingly, CO_2 pipeline specifications may exclude certain upstream sources to avoid the potential of subjecting the entire stream to GHG Reporting Requirements or RCRA.

Inconsistent Rates

A final concern regarding state imposition of common carrier requirements on interstate CO_2 pipelines is the likelihood of inconsistent rates along various pipeline segments. The establishment and publication of non-discriminatory rates is a hallmark of common carriage and is subject to state economic regulation.[405] In a state directed common carrier model, each state would establish its procedures and requirements for rate regulation.[406] For example, Texas authorizes the Railroad Commission to establish rules for CO_2 tariffs, whereas in Montana the Public Service Commission regulates rates.[407] Due to varying procedures and policies, there is a strong possibility for differential rates along segments of an interstate pipeline.[408] Resulting implementation challenges may limit the efficacy of requirements in providing actual pipeline access and result in uncertainties for pipeline

402. Hazardous Waste Management System: Conditional Exclusion for Carbon Dioxide (CO_2) Streams in Geologic Sequestration Activities, 40 C.F.R. §§ 9, 20, 261 (Jan. 3, 2014).

403. Jonas J. Monast, et al., *A Cooperative Federalism Framework for CCS Regulation*, 7 ENVTL. ENERGY L & POL'Y J. 2, 15 (2012); Mandatory Reporting of Greenhouse Gases: Injection and Geologic Sequestration of Carbon Dioxide, 75 FR 75,060-01 (Dec. 1, 2010) (codified at 40 C.F.R. §§ 72, 78, 98 (2013)); WENDY B. JACOBS, GLOBAL CLIMATE CHANGE AND U.S. LAW, chs. 17, 19-20 (2014); Marston & Moore, *supra* note 15, at 470.

404. *Siting and Regulating Carbon Capture, Utilization, and Storage Infrastructure, Workshop Report*, U.S. DEP'T OF ENERGY (Jan. 2017); Marston & Moore, *supra* note 15, at 455; Schnacke, *supra* note 13, at 307-09.

405. Nordhaus & Pitlick, *supra* note 110, at 99.

406. Mack & Endemann, *supra* note 355, at 739.

407. MONT. CODE ANN. § 69-13-102 (West 2013); Nordhaus & Pitlick, *supra* note 110, at 96 (citing TEX. NAT. RES. CODE ANN. § 111.014 (West 1977)).

408. Mack & Endemann, *supra* note 355, at 739.

developers and customers.[409] This concern may be mitigated to a limited extent by rate dispute resolution by the Surface Transportation Board, an agency within Department of Transportation.[410] The STB has jurisdiction over interstate common carrier transportation, including some pipelines for commodities "other than water, gas, or oil."[411] Although its authority has not been tested with respect to CO_2 pipelines and STB could disclaim jurisdiction, a government accounting office report found that the STB had jurisdiction to resolve rate discrimination disputes.[412] This authority would note assure uniform rates across state lines, but rather that rates were reasonable and non-discriminatory.[413] Accordingly, if a shipper brought a case to the board and the STB agreed to take up the issue, it is unclear how disputes would be resolved.

Implementation

The integration of reserve capacity and specific made-to-measure pipeline gas specifications into tariff agreements and terms of service could undermine the actual utility of CO_2 pipelines as common carriers, adding costs to both upstream shippers and downstream users.[414] Determinations of pipeline quality gas, rate consistency, and reserve capacity present challenges that will need to be considered in tariff agreements and assessed to assure that the result is not so specific as to preclude actual access by other shippers. Accordingly, common carrier requirements should be developed in consultation with industry to assure compatibility with existing pipeline business models and to avoid disruption to CO_2-EOR operations.[415]

State agencies play an important role in balancing these considerations. State regulatory agencies, such as infrastructure authorities or oil and gas conservation or public service commissions, have experience siting oil pipelines and would have regulatory authority over the permitting and

409. *Id*.

410. Nordhaus & Pitlick, *supra* note 110, at 90-91, 99.

411. *Id*. at 90 (citing 49 U.S.C. §15301(a) (2006)).

412. Monast, *supra* note 403, at 24; Nordhaus & Pitlick, *supra* note 110, at 90-93 (citing Phyllis F. Scheinberg, Assoc. Dir., Transp. Issues, Issues Associated with Pipeline Regulation by the Surface Transp. Bd., Testimony Before the Subcomm. on Surface Transp. and Merchant Marine Infrastructure Safety and Security, U.S. Senate, Gov't Accountability Office (Mar. 31, 1998)).

413. Nordhaus & Pitlick, *supra* note 110, at 99.

414. Marston & Moore, *supra* note 15, at 455.

415. Workshop Report, *Siting and Regulating Carbon Capture, Utilization, and Storage Infrastructure*, U.S. DEP'T OF ENERGY, at 43 (Jan. 2017).

unitization of CCUS facilities and EOR operations. These agencies may be better equipped than federal regulators to balance the additional cost of uniform standards or curtailment with the state interest in making infrastructure truly accessible for use by the public.

The majority of states do not have laws specifically addressing siting or eminent domain for CO_2 pipelines. In the absence of EOR activities within the state, there has been no urgency to adopt specific legislation. Accordingly, whether a CO_2 pipeline can obtain eminent domain authority and under which conditions requires an analysis of whether such pipelines fall within existing authority for intrastate natural gas and oil pipelines or natural resource development.[416] However, as EOR operations extend into new areas—for example, Ohio and Pennsylvania—and as CCUS plays an increasingly larger role in the national climate change dialogue, state legislatures will have to consider statutes for siting CO_2 pipelines.[417] Eminent domain is likely essential to development of both intrastate and interstate pipelines and will thus be a core component of any such siting legislation.[418] Accordingly, legislatures will have a new opportunity to make a determination between public purpose and public use. By imposing common carrier requirements on CO_2 pipelines utilizing eminent domain, states can play an important role in assuring that the CO_2 pipelines built today can later be integrated into a CO_2 pipeline network that will serve both EOR and CCUS needs.

Common carrier requirements could also be integrated into the eminent domain laws for states with existing siting rules and operating CO_2 pipelines. For example, New Mexico, Wyoming, Mississippi, and Louisiana all permit use of eminent domain for CO_2 pipelines but do not require common carriage. These statues could be modified going forward. However, doing so may prove difficult. Failed efforts to enact common carrier legislation in Mississippi in 2014 and 2016 indicate that there may be a lack of political will for those changes or that efforts may face opposition from entrenched interests.[419] Additionally, retroactive imposition of common carrier requirements on pipelines not currently carrying product

416. Klass & Meinhardt, *supra* note 121, at 1027.

417. MORGAN, ET AL., CARBON CAPTURE AND SEQUESTRATION: REMOVING THE LEGAL AND REGULATORY BARRIERS (2012).

418. *Id.*

419. Miss. H.B. No. 907 (2016); Clay Chandler, *Pipeline Carrier Bill Dies Quietly*, CLARION LEDGER (Feb. 15, 2014). http://www.clarionledger.com/story/news/ politics/2014/ 02/16/-pipeline-carrier-bill-dies-quietly/5522159/.

for other shippers—nor indicating a willingness to do so—could raise constitutional concerns.[420]

Limitations of the State Siting Approach

The current state siting approach is subject to a number of limitations that may need to be resolved as the industrial organization and pipeline configuration grows to accommodate CCUS.[421] A long distance CO_2 pipeline would require a multiplicity of state and local approvals, each with potentially different requirements for eminent domain, common carriage, rate regulation, and stipulations.[422] The resulting patchwork may introduce uncertainty and inefficiency, thus diminishing economies of scale and limiting access to capital.[423] Further, as pipelines expand into new regions, states may block pipelines that would go through their sovereign territory but are unpopular either because they serve politically unsupported purposes or would not materially serve customers or industries within the state.[424] A majority of states have neither CCUS nor EOR operations and thus would have little incentive to subject private landowners in the state to eminent domain for an activity perceived as having little local relevance.[425] While the existence of several interstate CO_2 pipelines indicates that these challenges have not precluded development thus far,[426] the lessons of the Keystone XL pipeline, the Constitution natural gas pipeline, and the Plains & Eastern Clean Line caution not to discount that possibility.[427] Although CO_2 pipelines are unlikely to be characterized by rapid expansion relating from new sources of supply or exponentially increasing demand, additional regulation at the state and federal level may be necessary to address these obstacles as the need for interstate pipelines grows. Even then,

420. United States v. Ohio Oil Co., 234 U.S. 548, 561 (1914).

421. Industrial organizational structures for CCUS are unlikely to mimic those for EOR, thus, as those new configurations come on line, the administrative regulation of access to pipelines may again require consideration. *See* M. A. de Figueiredo, et al., *Regulating Carbon Dioxide Capture and Storage*, MIT CTR. FOR ENERGY & ENVTL. POL'Y RES. (2007).

422. Mack & Endemann, supra note 355, at 739.

423. *Id.* at 739; Nordhaus & Pitlick, *supra* note 110, at 98; Zarraby, *supra* note 355, at 968.

424. *Id.*; Klass & Rossi, *supra* note 352.

425. For examples of these challenges in the transmission context, see Alexandra B. Klass & Elizabeth J. Wilson, *Interstate Transmission Challenges for Renewable Energy: A Federalism Mismatch*, 65 VAND. L. REV. 1801, 1084, 1858-75 (2012).

426. For example, the northern Rockies CO_2 pipeline network crosses Colorado, Utah, Wyoming, and Montana, see Nemmedal, *supra* note 368; Wallace, *supra* note 367, at 15.

427. Klass & Rossi, *supra* note 352; Player, *supra* note 320.

comprehensive federal siting may not be the optimal approach. For example, as scholars have suggested in the transmission and oil pipeline contexts, these challenges may open pathways for non-binary state and federal cooperation or for limited federal intervention in state pipeline siting: for example, through interstate compacts,[428] backstop siting authority,[429] or the establishment of interstate pipeline corridors.[430]

Despite these limitations, for the time being the current state siting approach is preferable to a federal siting framework. While there is a strong and growing national interest in CCUS as a component of broader federal climate policy, presently, almost all CO_2 pipeline construction is occurring in the context of CO_2-EOR. These oil and gas production activities have traditionally been regulated by state conservation agencies, which permit operations and create unities for EOR and which are well equipped to make the types of balancing determinations related to tariffs and common carrier requirements that will be required. Further, CO_2 pipelines' design, construction, and operation, and impacts to the environment and to landowners are predominately local. Thus, it is appropriate for state legislature to make these important determinations regarding land use, private property, and public purpose.

V. Conclusion

There is no federal siting framework for CO_2 pipelines. Accordingly, state law determines whether and under which conditions private entities developing CO_2 pipelines may utilize eminent domain. States thus far have provided this authority under two public purpose justifications: natural

428. Klass & Rossi, *supra* note 352, at 486; Alexandra B. Klass & Jim Rossi, *Revitalizing Dormant Commerce Clause Review for Interstate Coordination*, 100 MINN. L. REV. 129, 145 (2015); Bliss, *supra* note 97, at 50.

429. Nordhaus & Pitlick, *supra* note 110, at 101 (citing 16 U.S.C. § 824p (2005)); Klass & Rossi, *supra* note 352, at 455-56. Congress provided federal backstop authority for transmission lines based on concerns related to grid reliability and energy security, concerns not present for CO_2 pipelines.

430. State CO_2-EOR Deployment Work Group, *21st Century Energy Infrastructure: Policy Recommendations for Development of American CO_2 Pipeline Networks*, GREAT PLAINS INST. (Feb. 2017); *Siting and Regulating Carbon Capture, Utilization and Storage Infrastructure*, U.S. DEP'T OF ENERGY 26 (Jan. 2017) (describing Wyoming's Pipeline Corridor Initiative); Matt Fry, Testimony Before the Subcomm. on Env't and Public Works (Sept. 13, 2017), *available at* https://www.epw.senate.gov/public/_cache /files /6/5/652f109b-c33c-4054-bcb6-d92d5a825666/BB8B2C37209CB099AE276F7 46FDE9458.fry-testimony-09.13.2017.pdf.

resource development and the creation of physical infrastructure available for use by the public.

The anticipated expansion of CO_2 pipelines provides a fresh opportunity for consideration of the public purpose requirement in light of changing social norms, public needs, and new technologies. The historically adequate public purposes of natural resource and economic development may hinder development of an integrated and accessible CO_2 pipeline network that can accommodate growing demand for both EOR and CCUS. Given anticipated needs for CO_2 pipelines for CCUS, a public use approach is preferable. This approach may assure that new pipelines developed for CO_2-EOR will be available for use by other shippers. Further, a public use approach clarifies condemnation authority of CCUS pipeline developers by resolving interpretation problems related to provisions that link eminent domain to extractive natural resource development.

The imposition of common carrier requirements within a state siting framework provides opportunities to promote growth and flexibility within the commercially driven CO_2 pipeline industry. This approach, however, leaves important structural and implementation issues to be resolved regarding the application of common carrier requirements to existing infrastructure, coordination between agencies across many levels of government, and disparate pipeline gas specifications and state regulations. These challenges provide a valuable opportunity for industry and state legislatures to collaboratively and proactively advance solutions that appropriately balance commercial concerns, the property rights of landowners, and the public interest.