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Carbon Dioxide Pipelines: Regulatory and Commercial Issues in Carbon Capture, Utilization, and Sequestration

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Synopsis

Amidst increased focus on measures to capture, utilize, and sequester carbon dioxide in addressing climate change, the important role of carbon dioxide pipelines in CCUS efforts is coming to the forefront, and highlighting long-standing legal issues and uncertainties that could impact such measures. This paper reviews the development of the existing U.S. carbon dioxide pipeline system (largely to support enhanced oil recovery), the CCUS efforts that are prompting interest in further pipeline development, the jurisdictional issues that may impact such expansion, and, however such issues are resolved, the long-standing common carriage legal standards that will likely govern the development of such projects.

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Introduction

The United States has over fifty years of experience with commercial carbon dioxide pipelines developed largely to support enhanced oil recovery (EOR). With the increasingly urgent focus on reducing carbon dioxide and other greenhouse gas (GHG) emissions in the United States and globally[1] in addressing climate change,[2] a key component in international and national strategies to mitigate the effects of carbon dioxide emissions is the deployment of carbon capture, utilization, and storage (CCUS) technologies. This focus has necessarily led to an increased attention to carbon dioxide pipelines,[3] which were historically designed and primarily used for EOR, but now are recognized for their utility both in supporting efficient and high-capacity, long-term carbon dioxide storage as a byproduct of EOR activities and in transporting carbon dioxide to other storage reservoirs.

Although the carbon dioxide pipeline system in the United States dates to the 1970s,[4] the potential for a large-scale expansion of that system has gained robust momentum most recently as a primary means of implementing CCUS.[5] Such development of carbon dioxide pipelines in the United States has been touted as "essential to achieving the major reductions in atmospheric carbon dioxide concentrations necessary

[1] *Global Greenhouse Gas Emissions Data*, U.S. ENVTL. PROT. AGENCY (last updated Mar. 25, 2021), https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data. Carbon dioxide is estimated to make up over 80% of greenhouse gas emissions in the United States and over 75% globally.

[2] *See generally Overview of Greenhouse Gases*, U.S. ENVTL. PROT. AGENCY (last updated Apr. 14, 2021), https://www.epa.gov/ghgemissions/overview-greenhouse-gases#CO2-references.

[3] *See generally* James Osborne, *On Gulf Coast, is carbon storage the next big thing?*, HOUSTON CHRON. (Oct. 29, 2020), https://www.houstonchronicle.com/business/article/On-Gulf-Coast-carbon-storage-ideas-abound-15683044. php; James Osborne, *Oxy to shift into 'carbon management company'*, HOUSTON CHRON. (Dec. 2, 2020), https://www.houstonchronicle.com/business/energy/article/Oxy-lays-out-net-zero-plan-focused-on-carbon-15769763.php; *US government approves routes for Wyoming CO2 pipelines*, THE ASSOCIATED PRESS (Jan. 21, 2021), https://abcnews.go.com/Technology/wireStory/us-government-approves-routes-wyoming-co2-pipelines-75408458.

[4] Matthew Wallace et al., *A Review of the CO2 Pipeline Infrastructure in the U.S.*, U.S. DEPT. OF ENERGY 2 (Apr. 21, 2015), https://www.energy.gov/sites/prod/files/2015/04/f22/QER%20Analysis%20%20A%20Review%20of%20the%20CO2%20Pipeline%20Infrastructure%20in%20the%20U.S_0.pdf.

[5] *See New CCUS Study Highlights Pipeline Network Needed*, ENERGY EQUIP. & INFRASTRUCTUREALL., https://www.eeia.org/aboutus/about-one.cfm?Getone=yes&category=Current&ID=559.

for climate change mitigation."[6] The U.S Department of Energy (DOE) forecasts that, in order to support increasing CCUS projects, the carbon dioxide pipeline infrastructure within the United States would need to triple in size by 2030.[7] Although there are other potential uses of and mitigation measures for carbon dioxide, at this point it appears that EOR is the most viable option that can be readily implemented. As discussed below, new incentives and the commercial development of CCUS technologies opens the door for significant opportunities for carbon dioxide pipelines and carbon dioxide storage hubs.

This increased attention, however, brings to the fore long-simmering questions over where carbon dioxide pipelines fit in the national pipeline regulatory scheme. The posture of key federal agencies is uncertain, leaving open a range of possible regulatory outcomes. As set forth below, the answer to these questions may have profound implications for the contemplated expansion. These issues also implicate the handling of legal risks in structuring the commercial/contractual terms of CCUS projects.

In this rapidly evolving context, it is timely to review the legal and regulatory framework in which carbon dioxide pipelines were originally built and operate.

Enhanced Oil Recovery

Enhanced oil recovery is the third phase of oil production and hence is often referred to as tertiary recovery.[8] This phase can lead to the highest production out of the three production phases.[9] The first phase or primary recovery relies on natural pressure often combined with pumps, but this produces only limited amounts of oil, about 10 percent of the reservoir's oil.[10] Secondary recovery focuses on water and gas injections leading to production ranging from 20-40 percent.[11] Finally, EOR can take several forms, but the most common and effective technique involves injecting gases (such as carbon dioxide with water) into the reservoir, which can produce anywhere from 30-60 percent of the reservoir's oil.[12] This carbon dioxide "flooding" involves injecting a 95 percent or higher content of carbon dioxide, which changes the composition of the oil allowing it to "detach [] from the rock surfaces, and causing the oil to flow more freely within the reservoir so that it can be 'swept up' in the flow from injector to producer well."[13] EOR has become crucial over the years as reservoirs mature and oil recovery through primary and secondary methods has been completed, yet significant volumes of oil remain.[14]

High risks and costs of implementing carbon dioxide EOR has hindered an even larger expansion of the carbon dioxide pipeline system in the United States. Carbon dioxide must be purchased well before EOR production begins and can be costly.[15] Carbon dioxide can range from 25 to 50 percent of the cost per barrel produced making the large up-front capital and slow return on the investment unappealing.[16] Additionally, carbon dioxide pipelines require a distinctive design from current oil and gas pipelines adding further expense to development due simply to the building of these pipelines.[17] This is due to the much higher pressure range necessary to transport carbon dioxide generally requiring that the wall of the pipeline be thicker than those used to transport natural gas.[18]

Development of Carbon Dioxide Pipeline Systems in the United States

The vast majority of carbon dioxide pipelines in the United States were built in the 1980s and 1990s and

[6] *Id.*
[7] *Id.*
[8] *Enhanced Oil Recovery*, Energy.gov, https://www.energy.gov/fe/science-innovation/oil-gas-research/enhanced-oil-recovery.
[9] *Id.*
[10] *Id.*
[11] *Id.*
[12] *Id.*
[13] L. Stephen Melzer, *Carbon Dioxide Enhanced Oil Recovery (CO2 EOR): Factors Involved in Adding Carbon Capture Utilization and Storage (CCUS) to Enhanced Oil Recovery* 4 (Feb. 2012), https://carboncapturecoalition.org/ wp-content/uploads/2018/01/Melzer_CO2EOR_CCUS_Feb2012.pdf.
[14] *Carbon Dioxide Enhanced Oil Recovery*, U.S. Dept. of Energy 15 (Mar. 2010), https://www.netl.doe.gov/sites/default/files/netl-file/co2_eor_primer.pdf.
[15] *Id.* at 13.
[16] *Id.*
[17] Vincent Gonzales et al., *Carbon Capture and Storage 101*, Res. for the Future (May 6, 2020), https://www.rff.org/publications/explainers/carbon-capture-and-storage-101/.
[18] Keith 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* 15 (Sept. 10, 2010), https://www.sseb.org/ downloads/pipeline.pdf.

utilize carbon dioxide from natural sources.[19] For the most part these pipelines are used for EOR with only very limited use for other industrial purposes.[20] The first large carbon dioxide pipeline in the United States, the Canyon Reef Carriers, was built in Scurry County, Texas in 1970.[21] Presently, Texas produces the most oil in the United States using carbon dioxide EOR, totaling more than 80 percent of the oil produced through this method.[22] Of the over 4,500 miles of carbon dioxide pipelines in the United States, over 2,600 miles are within the Permian Basin of west Texas and southeastern New Mexico.[23] The United States leads the world in active carbon dioxide floods with more than 90 percent within the Permian Basin alone.[24]

Three major pipelines—Cortez, Bravo Dome, and Sheep Mountain—deliver naturally sourced carbon dioxide to the Permian Basin.[25] The Cortez pipeline, operated by Kinder Morgan, is about 500 miles in length and begins at the McElmo Dome and Doe Canyon in southwestern Colorado with a capacity of approximately 20 million metric tons (Mt) of carbon dioxide per year.[26] Bravo Dome and Sheep Mountain pipelines are both operated by Oxy Permian.[27] The Bravo Dome pipeline is about 218 miles in length and originates at the Bravo Dome in northeast New Mexico.[28] The Sheep Mountain pipeline is approximately 400 miles in length, originating in central Colorado.[29] These three pipelines ultimately connect to the Denver City carbon dioxide hub, located in western Texas. From there smaller pipelines transport the carbon dioxide to connected oil fields for carbon dioxide flooding.[30] Among these are the Centerline and Central Basin pipelines, both operated by Kinder Morgan, which deliver naturally sourced carbon dioxide from the Denver City carbon dioxide hub to oil fields throughout Texas and New Mexico.[31] Unlike the pipelines just discussed, the Canyon Reef Carriers pipeline transports carbon dioxide produced by gas processing plants in the Val Verde Basin.[32]

Another area containing significant carbon dioxide pipeline systems is the Gulf Coast region. Denbury Inc. owns over 750 miles of carbon dioxide pipelines in the region.[33] The most notable of the pipelines include the North East Jackson Dome Pipeline, the Free State Pipeline, the Delta Pipeline, and the Green Pipeline.[34] These four pipelines mainly carry naturally occurring carbon dioxide primarily sourced from the Jackson Dome located near Jackson, Mississippi.[35] Additionally, Denbury has acquired carbon dioxide from two industrial plants, one in Port Arthur, Texas since 2012 and the other in Geismar, Louisiana since 2013.[36] The longest of these pipelines, the Green Pipeline, is 320 miles in length extending from Donaldsonville, Louisiana to an area south of Houston, Texas.[37] The North East Jackson Dome Pipeline runs directly from the Jackson carbon dioxide source and connects to the Green Pipeline in Donaldsonville, Louisiana.[38] Overall these pipelines transport carbon dioxide to various fields in Mississippi, Louisiana, and Texas for use in carbon dioxide EOR.[39]

The carbon dioxide pipelines in the Rocky Mountain region transport carbon dioxide from two main natural gas processing plants.[40] Two major pipelines carry this carbon dioxide to numerous smaller pipelines which deliver the carbon dioxide to areas in central Wyoming and northwest Colorado to implement carbon dioxide EOR.[41] Other states that have carbon dioxide pipelines include Kansas, Oklahoma, North Dakota, and Michigan.[42] These are much smaller in regard to both capacity and length than the carbon dioxide pipelines

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[19] Wallace et al., *supra* note 4, at 3.
[20] *Id.* at 2.
[21] David Coleman et al., *Chapter 4: Transport of CO2*, IPCC Special Report on Carbon dioxide Capture and Storage 182 (2005), https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_chapter4-1.pdf.
[22] U.S. Dept. of Energy, *supra* note 14, at 17.
[23] Wallace et al., *supra* note 4, at 4.
[24] Coleman et al., *supra* note 21, at 182 (citing The Oil & Gas Journal 2012 Worldwide EOR Survey).
[25] Wallace et al., *supra* note 4, at 4.
[26] *Id.*; Coleman et al., *supra* note 21, at 182-83.
[27] Wallace et al., *supra* note 4, at 6.
[28] *Id.*
[29] *Id.* at 4.
[30] *Id.*; Coleman et al., *supra* note 21, at 182-83.
[31] Wallace et al., *supra* note 4, at 5.
[32] *Id.*
[33] *Gulf Coast CO2 Pipelines*, Denbury Inc., https://www.denbury.com/operations/gulf-coast-region/Pipelines/ default.aspx.
[34] *Id.*
[35] *Id.*
[36] *Naturally Occurring CO_2 Sources*, Denbury Inc., https://www.denbury.com/operations/gulf-coast-region/co2-sources-and-pipelines/default.aspx.
[37] *Id.*
[38] *Id.*
[39] *Current Tertiary Operations*, Denbury Inc. https://www.denbury.com/operations/gulf-coast-region/tertiary-operations/default.aspx.
[40] Wallace et al., *supra* note 4, at 8.
[41] *Id.*
[42] *Id.* at 10-12.

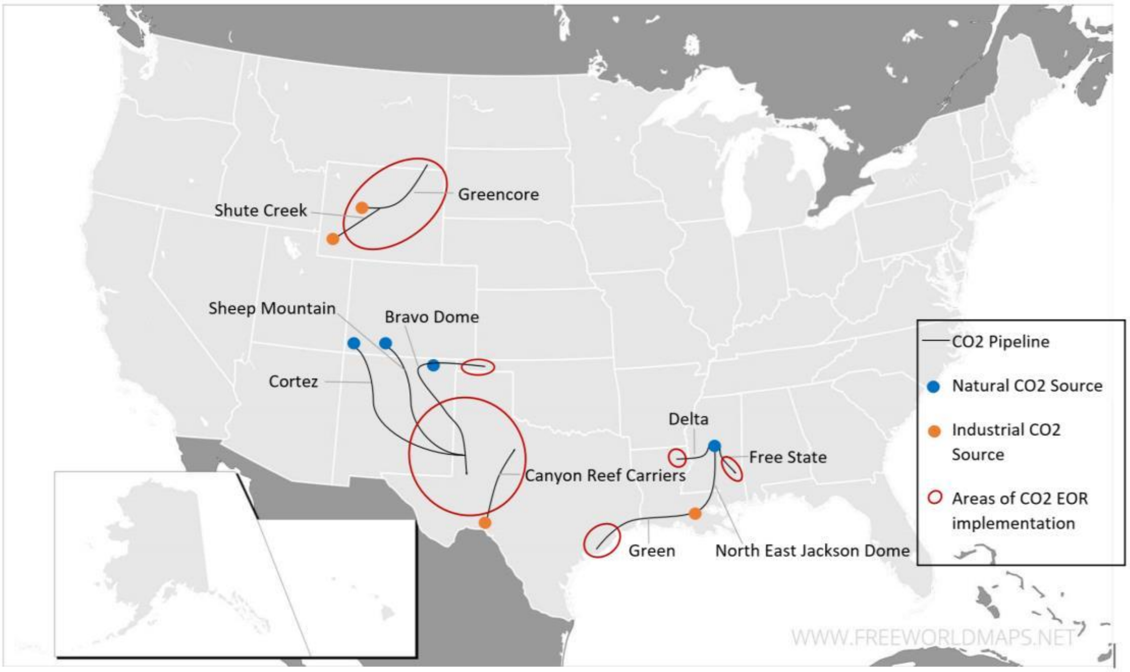

Figure 1. General Location of the Major Carbon Dioxide Pipelines in the United States.[43]

previously discussed. Rather than delivering to other small pipelines, these pipelines carry the carbon dioxide directly captured from anthropogenic sources to the EOR projects.[44] The Dakota Gasification Pipeline originating in North Dakota transports carbon dioxide produced at the Great Plains Synfuels Plant to Saskatchewan, Canada for an EOR project.[45] The White Frost pipeline in Michigan carries carbon dioxide sourced from a gas processing plant to a number of minor EOR projects.[46]

Development of CCUS Technology

Carbon capture and storage is the use of various technologies by which carbon is captured from industrial sources and power generation and stored before that carbon is emitted into the atmosphere.[47] Once captured from the source, the carbon dioxide is compressed to a fluid and then transported via pipeline.[48] Carbon capture utilization and storage is the term linked to carbon dioxide EOR because this process utilizes the carbon instead of just storing the carbon, thereby providing financial support for the massive investment required for installation and operation of carbon capture and storage facilities as well as carbon dioxide pipelines for transportation.[49] This utilization does not, however, mean that the carbon is emitted into the atmosphere. Much of the carbon dioxide, 90-95 percent, is sequestered in the reservoir once injected because, in simplistic terms, it sticks to surfaces of the rocks.[50] The remaining carbon dioxide that is not sequestered is recycled from the produced oil, recompressed, and mixed with incoming carbon dioxide to continue the EOR process.[51] This “closed loop” model is employed in all large carbon dioxide EOR projects.[52]

Nearly all of the large-scale carbon dioxide pipeline systems in the United States utilize naturally occurring carbon dioxide, which is gradually being depleted. The

[43] Daniel Feher, FREEWORLDMAPS.NET (2021), https://www.freeworldmaps.net/download/maps/united-states/us-blacknwhite-map.jpg (source for outline of the United States map).
[44] *Id.*
[45] *Id.* at 12.
[46] *Id.*
[47] Gonzales et al., *supra* note 17.
[48] *Carbon Sequestration Legislation in the 116th Congress*, CONG. RES. SERV. (Feb. 21, 2020), https://crsreports.congress.gov/product/pdf/IF/IF11345.

[49] *See generally* Alex Dewar & Bas Sudmeijer, *The Business Case for Carbon Capture*, BOSTON CONSULTING GRP. (Sept. 24, 2019), https://www.bcg.com/en-us/publications/2019/business-case-carbon-capture; Gonzales et al., *supra* note 17. This article will use the term CCUS, which is intended to capture both the concept of utilization through EOR as well as stand-alone storage hubs.
[50] Melzer, *supra* note 13, at 11.
[51] *Id.*
[52] *Id.*

development and expansion of carbon dioxide pipeline systems and storage hubs paired with CCUS technologies to gather anthropogenic sources of carbon dioxide (*i.e.*, generated by human activity) is largely untapped and holds open the prospect of dependable, long-term supplies of carbon dioxide.[53] Although only about 4 percent of oil in the United States is currently produced using carbon dioxide EOR,[54] a growing focus on threats of climate change and implementation of policies on that front by the Biden administration highlight the need for carbon dioxide EOR utilizing anthropogenic carbon dioxide. This area has greater benefit than projects that use naturally sourced carbon dioxide due to reduced GHG emissions and importantly, the 45Q tax credit, which allows these projects to be economically viable, from the standpoint of developing the CCUS technologies. These carbon dioxide EOR projects come with their own benefits with respect to oil production but should gain additional momentum from the promise of reducing carbon dioxide emissions.[55]

A substantial and accelerated worldwide reduction in GHG emissions is unachievable without aggressive adoption and commercial development of CCUS technology. Even if alternative power sources are widely implemented, the options for industrial processes remain limited aside from fossil feedstocks. Some industrial processes themselves emit carbon dioxide while processing raw materials, which demonstrates the need for CCUS technology.[56] Although technological headway has been made globally,[57] only ten large-scale CCUS facilities currently exist in the United States, with approximately twenty worldwide.[58] The development of CCUS technology beyond the pre-commercial phase has faced various hurdles due to project complexity and the large capital expense.[59] There are various components of a CCUS project, including the capture followed by storage and utilization.[60] Complexity is enhanced by the numerous entities and stakeholders. The projects require coordination among the organizations involved in order to develop a financially viable result. These factors have resulted in some CCUS projects being competitive cost wise and others not.[61] As more projects develop, however, data regarding the best practices continues to emerge for projects of varying sizes, which will assist in developing more reliable data.[62]

These challenges have recently been mitigated in the United States with the adoption of the revised Section 45Q tax credit which has provided incentives for CCUS and has signaled the commercial development of CCUS technology.[63] This tax credit has made the development of carbon dioxide pipelines to transport carbon dioxide to storage hubs economically appealing even without further utilization of all the carbon dioxide. This is a substantial milestone because there is now a benefit to storing carbon dioxide that exceeds the amount needed for an EOR project. Additionally, the Utilizing Significant Emissions with Innovative Technology (USE IT) Act, which was recently signed into law, requires the Council on Environmental Quality to develop guidelines to speed up the expansion of CCUS facilities and carbon dioxide pipelines[64] and affords CCUS and carbon dioxide pipelines an expedited permitting review process as established by the FAST Act.[65] The FAST Act establishes the Federal Permitting Improvement Steering Council for the purpose of streamlining the federal permitting process by developing an organized and transparent plan focusing on areas such as setting deadlines, coordinating with state agencies, and reducing burdens on the applicant where possible. It is estimated that the United States will be responsible for about half of the total investment worldwide in CCUS technology over the course of the next decade due to the ideal circumstances

[53] *See generally id.* at 6.
[54] Wallace et al., *supra* note 4, at 1.
[55] *See generally* Melzer, *supra* note 13.
[56] *Report of the Mission Innovation Carbon Capture, Utilization, and Storage Experts' Workshop*, U.S. Dept. of Energy 2-1 (Sept. 2017), https://www.energy.gov/sites/prod/files/2018/05/f51/Accelerating%20Breakthrough%20Innovation%20in%20Carbon%20Capture%2C%20Utilization%2C%20and%20Storage%20_0.pdf.
[57] *See generally* Natalia Romasheva & Alina Ilinova, *CCS Projects: How Regulatory Framework Influences Their Development*, Res. (Dec. 9, 2019).
[58] Dewar & Sudmeijer, *supra* note 49; Adi Akheramka & Nekkhil Mishra, *Setting Up CCUS Projects for Success: Overcoming Front-End Development Barriers* (Aug. 12, 2020), https://www.ipaglobal.com/news/article/setting-up-ccus-projects-for-success-overcoming-front-end-development-barriers/.
[59] Akheramka & Mishra, *supra* note 58.
[60] *Id.*
[61] *Id.*
[62] *Id.*
[63] Dewar & Sudmeijer, *supra* note 49; Akheramka & Mishra, *supra* note 58.
[64] Chris Galford, *USE IT carbon capture bill becomes law, incentivizing development and deployment*, Daily Energy Insider (Dec. 31, 2020), https://dailyenergyinsider.com/news/28522-use-it-carbon-capture-bill-becomes- law-incentivizing-development-and-deployment/.
[65] 42 U.S.C. § 4370(m)(6) (2021) (defining the term "covered project").

of the large-scale existing pipeline systems and the effectiveness of carbon dioxide for EOR paired with large industrial emissions.[66] About thirty CCUS projects are currently underway in the United States in a number of states including Texas and Mississippi.[67]

CCUS technology is expected to develop in phases due to various challenges presented in different regions with respect to both expense and the availability of utilization techniques.[68] The technology needed to capture carbon dioxide at the facility emitting the carbon dioxide can be particularly costly due to increased water usage needed in order to process, separate, and capture the carbon dioxide.[69] Cost is less of an issue for industrial processes that emit nearly pure carbon dioxide, such as natural gas processing, in comparison to industries with less concentrated carbon dioxide emissions, because capturing highly concentrated carbon dioxide does not require high energy or extensive equipment to separate the carbon dioxide.[70] To put this in perspective, to capture nearly pure carbon dioxide can cost under $30 per metric ton of carbon dioxide with CCUS technology whereas other decarbonization techniques in the same instance can cost over $50 per metric ton.[71]

For industries such as petroleum refining and the manufacturing of cement, lime, aluminum, iron, and steel, the process is not so simple which means greater expense. The price fluctuation is significant for capturing the carbon dioxide in these industries ranging from less than $50 to over $200 per metric ton of carbon dioxide.[72] Still, CCUS technology is no more expensive than other decarbonization methods employed in these industries.

CCUS technology may be slower to develop for power plants due to economic obstacles.[73] Even with those obstacles, however, several power plant retrofit projects are under development in the United States, and promising advancements in technology have cut the capture costs in half compared to older projects.[74] With technology innovations and more in depth understanding as more projects develop, the price of coal-fired power plant retrofits are projected by the DOE to diminish to $30 per metric ton by 2030.[75]

The commercial development of CCUS technology decreases the risk for pipelines by providing steady, high volumes of carbon dioxide. This, however, considerably increases the necessity not just for additional carbon dioxide pipelines, but also additional storage hubs to receive the carbon dioxide via pipeline. Past CCUS projects demonstrate that such projects necessitate the use of carbon dioxide pipelines to be economically viable. For instance, in 2010, $285 million in funding from the DOE's Industrial Carbon Capture and Sequestration Program was granted to Air Products for implementation of a CCUS project for its "steam methane reformers located within the Valero Refinery in Port Arthur, Texas."[76] The Green Pipeline, discussed above, made the project economically possible; without the carbon dioxide pipeline for transportation the CCUS project would not have been undertaken.[77]

Tax Credits: IRC Sections 45Q and 43

Section 45Q of the U.S. tax code "provides a performance-based tax credit to power plants and industrial facilities that capture and store carbon dioxide that would otherwise be emitted into the atmosphere."[78] In 2018, the 45Q tax credit was revised to increase the incentive for carbon dioxide put to use through EOR to $35 per metric ton of carbon dioxide used with no limit on total quantity.[79] This credit was an

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[66] Dewar & Sudmeijer, *supra* note 49.
[67] Peter Connors et al., *Review of Federal, State, and Regional Tax Strategies and Opportunities for CO2-EOR-Storage and the CCUS Value Chain* 1 (Sept. 21, 2020), https://usea.org/sites/default/files/Review%20of%20Federal%2C%20State%2C%20and%20Regional%20Tax%20Strategies%20and%20Opportunities%20for%20CO2-EOR-Storage%20and%20the%20CCUS%20Value%20Chain.pdf.
[68] Dewar & Sudmeijer, *supra* note 49.
[69] Gonzales et al., *supra* note 17.
[70] Dewar & Sudmeijer, *supra* note 49.
[71] *Id.*
[72] *Id.*
[73] *Id.*
[74] Connors et al., *supra* note 67, at 2.
[75] *Id.*
[76] *Denbury Green Pipeline-Texas, LLC v. Tex. Rice Land Partners, Ltd.*, 510 S.W.3d 909, 912-13 (Tex. 2017) ("*Denbury*").
[77] *Denbury*, 510 S.W.3d at 916.
[78] *The Role of 45Q Carbon Capture Incentives in Reducing Carbon Dioxide Emissions*, Clean Air Task Force, https://www.catf.us/wp-content/ uploads/2017/12/CATF_FactSheet_45QCarbonCaptureIncentives.pdf.
[79] Melody M. Bomgardner, *45Q, the tax credit that's luring US companies to capture CO_2*, Chem. and Eng'g News (Feb. 23, 2020), https://cen.acs.org/environment/greenhouse-gases/45Q-tax-credit-s-luring/98/i8. A project

increase from a previous tax credit of $25 per metric ton accompanied by a limit on total quantity.[80] Facilities are required to meet a certain threshold of carbon dioxide emitted and captured in order to benefit from the credit.[81] Additionally, in order to be eligible, the CCUS facilities must be under construction by December 31, 2023,[82] and thereafter the credit will be available for a twelve year timeframe from the date service begins.[83] This date was recently extended to December 31, 2025 in the COVID-19 stimulus bill.[84] The credit is given to the owner of the carbon capture equipment, but the 2018 amendment now allows that credit to be transferred to the entity that utilizes or stores the carbon dioxide.[85] On June 2, 2020, the Internal Revenue Service (IRS) issued a notice of proposed rulemaking regarding various portions of the 45Q tax credit that impact "persons who physically or contractually ensure the capture and disposal of qualified carbon oxide, use of qualified carbon oxide as a tertiary injectant in a qualified enhanced oil or natural gas recovery project, or utilization of qualified carbon oxide in a manner that qualifies for the credit."[86] This progression of the 45Q tax credit is vital to creating "regulatory certainty from the IRS [which] will be a key component in fostering stakeholder confidence and creating a vibrant investment market for CCUS projects."[87]

While the 45Q tax credit goes to the owner of the carbon capture equipment unless otherwise transferred, Section 43 directly benefits the entity executing the EOR by providing a 15% tax credit for costs sustained to implement EOR.[88] In order to qualify under this section the carbon dioxide EOR project must "involve[] the application of 1 or more tertiary recovery methods which can reasonably be expected to result in more than an insignificant increase in the amount of crude oil which will ultimately be recovered."[89] The EOR project must have started after December 31, 1990 and be located within the United States to be eligible for the credit.[90] When the price per barrel of oil is above $28, as adjusted for inflation, the credit percentage is reduced.[91]

Overall, the amended 45Q tax credit "reduces the cost and risk to private capital of investing in the deployment of carbon capture technology across a range of industries."[92] The DOE has estimated that the amended 45Q tax credit will cause a substantial growth in the U.S. carbon dioxide EOR industry resulting in an increase "by more than 400,000 barrels per day per year by 2035."[93] Despite the fact that most current carbon dioxide pipelines rely on naturally sourced carbon dioxide, the commercial development of CCUS facilities is expected to cause a considerable shift with about 85 percent of the carbon dioxide used for EOR to come from anthropogenic sources instead.[94] The pairing of these two tax credits, 45Q and 43, provides economic incentives that direct a collaboration between the CCUS and EOR industries.[95]

A director of the Carbon Capture Coalition recognized that the $50 credit for carbon capture storage "could be enough to justify the entire enterprise" and specifically focused on Louisiana and Texas as a prime location for carbon dioxide storage hubs because "[t]hey're in very close proximity, so you can have multiple facilities taking advantage of the same pipeline system. You get an economy of scale."[96] The state of Texas accounts for the

must be a "qualified enhanced oil recovery project" as defined under Section 43 and described further below. 26 U.S.C. § 43(c)(2).

[80] *Id.*; Connors et al., *supra* note 67, at 8.

[81] Connors et al., *supra* note 67, at 9.

[82] The construction of the CCUS facility can begin after January 1, 2024, if the qualified facility is under construction prior to that date and the original planning and design of the qualified facility included the installation of CCUS technology. *Id.* at 10.

[83] Bomgardner, *supra* note 79; Connors et al., *supra* note 67, at 10.

[84] Elizabeth C. Crouse et al., *The Sun Also Rises: Congress Votes to Stimulate the Renewable Energy, Efficiency, Carbon Capture and Storage Industries*, The Nat'l L. Rev. (Dec. 28, 2020), https://www.natlawreview.com/article/ sun-also-rises-congress-votes-to-stimulate-renewable-energy-efficiency-carbon.

[85] Connors et al., *supra* note 67, at 3.

[86] *See* Proposed Rule, *Credit for Carbon Oxide Sequestration*, 85 Fed. Reg. 34,050 (June 2, 2020).

[87] Connors et al., *supra* note 67, at 37.

[88] *Id.* at 10.

[89] 26 U.S.C. § 43(2)(A)(i) (2021).

[90] 26 U.S.C. § 43(2)(A)(ii)-(iii).

[91] Connors et al., *supra* note 67, at 10.

[92] Jennifer Christensen, *Primer: Section 45Q Tax Credit for Carbon Capture Projects*, Great Plains Inst. (June 17, 2019), https://www.betterenergy.org/blog/primer-section-45q-tax-credit-for-carbon-capture-projects/#more-3873.

[93] Clean Air Task Force, *supra* note 78.

[94] Wallace et al., *supra* note 4, at 1.

[95] *See generally* Connors et al., *supra* note 67, at 10.

[96] *On Gulf Coast, is carbon storage the next big thing*, *supra* note 3. These statements were made by Brad Crabtree. The Carbon Capture Coalition is "a nonpartisan collaboration of more than 80 businesses and organizations building federal policy support for economy-wide deployment of carbon capture, transport, use, removal, and storage." *About the Carbon Capture Coalition*, Carbon Capture Coal., https://carboncapturecoalition.org/about-us/#:~:text=The%20Carbon%20Capture%20Coalition%20is,%2C%20use%2C

highest carbon dioxide emissions within the United States, and the geology along the Texas-Louisiana Gulf Coast makes the area ideal for carbon dioxide storage hubs.[97] A couple of carbon storage projects along the gulf coast are currently in preliminary planning stages including one extending along the southwest coast of Louisiana and another proposed in Louisiana by Occidental Petroleum that would have the capacity to store 10 million tons of carbon dioxide per year.[98] In Texas, there is a recent investigation into the potential of an offshore carbon dioxide storage facility off Port Arthur.[99]

New Legislation

The aftermath of the 2020 elections has seen increased legislative activity aimed at addressing climate change. This is reflected in a growing impetus in Congress to support development of CCUS projects along with the overall strong shift in focus on the threats of climate change evidenced by the Biden administration's efforts to pursue a climate-oriented infrastructure bill.[100] Indicative is the Storing CO2 and Lowering Emissions (SCALE) Act, which would provide further economic incentive for the development of carbon dioxide pipeline and storage infrastructure and was recently introduced by a bipartisan group of lawmakers.[101] The SCALE Act would seek to accelerate CCUS by providing additional funding for the development of the necessary transportation and storage infrastructure. For instance, the legislation would furnish low-interest loans and grants to assist in the development of common carrier carbon dioxide pipelines, with the aim of lowering investment risk for such projects.[102] The SCALE Act would also establish a cost-sharing program for geologic storage hubs "with particular emphasis on larger-scale commercial projects that would serve as regional storage hubs for multiple capture facilities serving different industries."[103] If enacted, initiatives such as this could serve, along with the 45Q and 43 tax credits, to provide further support for the infrastructure development necessary to implement the storage and/or utilization component of CCUS.

State Incentive Programs in the Texas-Louisiana Gulf Coast Region

A number of states have their own incentive programs for the use of CCUS, which vary from providing "credits, exemption or reduction of property tax, severance tax, gross receipt tax, and sales tax, etc."[104] Texas has many incentives for carbon that is sequestered, making the use of carbon dioxide from anthropogenic sources for EOR more enticing including "sales tax exemptions, franchise tax credits, and severance tax reductions."[105] For instance, a 50 percent reduction in severance tax is given for oil produced through the use of EOR, but an additional 50 percent reduction is provided when the EOR utilizes anthropogenically sourced carbon dioxide from within Texas and the carbon dioxide is "sequestered in one or more geological formations in the state following the [EOR] process."[106] Texas also provides financial incentives for the CCUS projects themselves including sales and use tax exemptions for tangible personal property used in connection with CCUS projects so long as the project qualifies for the 50 percent severance reduction for EOR or the carbon dioxide is otherwise sequestered within the state.[107] A further benefit for carbon dioxide pipelines in Texas is the ability under certain conditions to be considered a common carrier which comes with the right of eminent domain.[108] In Louisiana, when industrially sourced carbon dioxide is used in tertiary recovery such as EOR,

%20removal%20and%20storage. Royal Dutch Shell and the St. Louis coal miner Peabody Energy are among the members.

[97] *See On Gulf Coast, is carbon storage the next big thing*, *supra* note 3.

[98] *Id.*

[99] *Id.*

[100] *See generally President Biden introduces ambitious clean energy and climate-change focused infrastructure bill*, JDSUPRA (Apr. 5, 2021), https://www.jdsupra.com/legalnews/president-biden-introduces-ambitious-3231748/.

[101] *Carbon Capture Coalition Endorses the SCALE Act: House Bill Represents a Step-Change in Federal Policy Needed to Further Commercialize Carbon Capture*, CARBON CAPTURE COAL. (Dec. 16, 2020), https://carboncapturecoalition.org/carbon-capture-coalition-endorses-the-scale-act-house-bill-represents-a-step-change-in-federal-policy-needed-to-further-commercialize-carbon-capture/; Nader Sobhani, *Bipartisan SCALE Act Puts U.S. on the Path to Becoming a Global Leader in Carbon Capture*, NISKANEN CTR. (Mar. 22, 2021), https://www.niskanencenter.org/bipartisan-scale-act-puts-u-s-on-the-path-to-becoming-a-global-leader-in-carbon-capture/.

[102] CARBON CAPTURE COAL., *supra* note 101.

[103] *Id.*

[104] Connors et al., *supra* note 67, at 3.

[105] *Id.*

[106] *Id.* at 28-29.

[107] *Id.* at 29.

[108] *Id.* at 30. The requirements for obtaining common carrier status are discussed further below.

it is exempt from sales and use tax and also a 50 percent reduction is given on the severance tax for crude oil produced in such instances.[109]

Regulatory Status of Carbon Dioxide Pipelines

The regulatory status and treatment of carbon dioxide pipelines over the past fifty years has been driven by certain fundamental realities. First, as reviewed above, existing carbon dioxide pipelines were largely developed to meet energy production and industrial needs—primarily as a key input in the enhanced production of crude oil. Second, flowing from the first, there was, and remains, no meaningful "consumer" demand for or interest in access to supplies of carbon dioxide. This contrasts with natural gas, for which there is both industrial demand for power production and manufacturing and consumer/commercial demand for heating and air conditioning. As a result, the existing pipelines arose from and were underpinned by commercial arrangements among sophisticated business entities arranging inputs into industrial and production processes. As a result of these two realities, there was little or no need for comprehensive economic or "conduct" regulation of such pipelines beyond compliance with general pipeline right of way, environmental, and safety requirements, and enforcement of these requirements.

In that long-prevailing context, an uncertain regulatory status of carbon dioxide pipelines at the federal level, reviewed fully below, could be tolerated because the lack of certainty was without serious consequence. The existing pipelines were installed under state and local siting laws and regulations and operated in conformance with applicable standards, including federal pipeline safety regulation. However, the factors that fostered a continuing salutary neglect of the status of these pipelines are changing.

As detailed above, the developing national CCUS mandate makes the widespread, large scale, and rapid development of such pipelines likely. Moreover, depending on the scope of and impetus behind federal and state CCUS programs, this development could occur across the country, rather than being concentrated in hydrocarbon-producing regions. While this shift from the past is unlikely to generate a "consumer" interest in carbon dioxide pipelines, it will raise the visibility of such pipelines. Additionally, the level of scrutiny of and, indeed, resistance to green-field pipeline installation has dramatically increased over time, both in frequency and effect.[110] As a result, it has become progressively harder to build any pipelines in the face of aggressive resistance both from local landowners and national interest groups. It is possible that the carbon mitigation purpose of these pipeline projects could abate to a degree the resistance of national interest groups; however, local resistance would seem less likely to be minimized by such considerations. All of these factors could weigh on investment decisions around pursuing carbon dioxide pipeline projects, which are inherently long-lived assets and, therefore, must factor into investment decisions the need for a stable legal-regulatory regime and contractual arrangements supporting the typically long period over which such investments are recovered.

In the face of these shifting circumstances and risks, the likelihood of success in the increased national development of carbon dioxide pipeline capability may depend to a significant degree on regulatory certainty. Nevertheless, the regulatory picture at the federal level is not certain. Two federal agencies possess statutory authority over the rates and terms of service—the "economics"—of various classes of pipelines: the Federal Energy Regulatory Commission (FERC) and the Surface Transportation Board (STB). Both would be at

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[109] *Id.* at 21.

[110] *See generally* Laila Kearney & Devika Krishna Kumar, *North Dakota oil prices surge and output stalls as pipeline's fate awaited*, Reuters (Feb. 10, 2021), https://www.reuters.com/article/us-usa-oil-dakota-idUSKBN2AA1FR; George Cahlink & Emma Dumain, *How Keystone XL politics have changed*, E&E News (Feb. 12, 2021), https://www.eenews.net/stories/1063725017; Bob Gillies, *Keystone XL pipeline halted as Biden revokes permit*, Associated Press (Jan. 20, 2021), https://apnews.com/article/joe-biden-alberta-2fbcce48372f5c29c3ae6f6f93907a6d; Kristoffer Tigue, *Urging Biden to Stop Line 3, Indigenous-Led Resistance Camps Ramp Up Efforts to Slow Construction*, Inside Climate News (Feb. 16, 2021), https://insideclimatenews.org/news/16022021/biden-line-3-minnesota-enbridge-pipeline-indigenous-resistance/; Brooks Johnson, *Enbridge pipeline work site near Cloquet evacuated after 'suspcious device' found*, StarTribune (Feb. 19, 2021), https://www.startribune.com/enbridge-pipeline-work-site-near-cloquet-evacuated-after-suspicious-device-found/600025127/.

least plausible candidates for exercising regulatory authority over carbon dioxide pipelines, and for affording such regulatory certainty to their expanded development. However, both the FERC and the STB's predecessor, the Interstate Commerce Commission (ICC), have declined to assert jurisdiction over carbon dioxide pipelines,[111] introducing some basis for doubt over where regulatory jurisdiction lies.[112] Consequently, outside of the safety standards established by the U.S. Department of Transportation,[113] there is uncertainty. The implications of that uncertainty for carbon dioxide pipelines are reviewed below, along with what it portends for commercial/contractual approaches to CCUS pipeline projects.

Federal Energy Regulatory Commission

In *Cortez Pipeline Company*, FERC determined that it did not have jurisdiction over carbon dioxide pipelines pursuant to the Natural Gas Act (NGA).[114] As discussed above, the Cortez Pipeline begins in southwestern Colorado and extends to the Denver City carbon dioxide hub in west Texas to be utilized in the Wasson Oil Field for EOR. In 1978, prior to construction of the pipeline, gathering system, and dehydration and compression facilities, Cortez filed a petition for a declaratory order with the Commission requesting a determination that construction and operation of the Cortez Pipeline were not subject to the Commission's jurisdiction.[115] The proposed pipeline would transport 98 percent carbon dioxide.[116] The residual 2 percent would be methane, which would never be separated or sold.[117]

Pursuant to the NGA, FERC regulates the transportation and sale of natural gas in interstate commerce.[118] The primary focus of the discussion in *Cortez* involved the ambiguity of the term "natural gas."[119] In order to fully analyze the issue, the Commission determined that it needed to "look beyond a scientific or engineering test to the purpose of the enactment of the NGA itself. . . ."[120] Based on previous cases that examined the meaning of natural gas, the Commission determined that it did not need to define the term to such specificity as a particular composition, caloric content, or vapor tension.[121] The critical concern was rather a determination of the meaning in the context of the "goals and purposes of the NGA."[122] The Commission noted that the main goal of the NGA is to "afford consumers a bond of protection from excessive rates and charges."[123] Overall, the Commission determined that this goal would not be furthered by asserting jurisdiction over the Cortez Pipeline, and hence carbon dioxide would not be defined as natural gas pursuant to the NGA.[124]

Interstate Commerce Commission

In 1980, Cortez again filed a petition for declaratory order, this time with the ICC.[125] At the time of filing, the ICC's jurisdiction extended to interstate transportation by pipeline of a commodity other than gas, oil, or water. The ICC would have referenced the FERC decision in Cortez but was unable to do so since FERC relied on the goals and purpose of the NGA in its reasoning rather than the meaning of the term "natural gas."[126] The ICC focused on the intent of Congress and whether it "intended to exclude from [the ICC's] jurisdiction all gas types regardless of origin or source."[127] The original language in the Hepburn Act of 1906 excluded "natural or artificial gas" from the ICC's jurisdiction, but, when later recodified, the "natural and artificial" terms were deemed unnecessary and removed.[128] The ICC determined based on legislative history that Congress intended to exclude "the universe of gas types classified by origin or source."[129] Accordingly, the ICC made a preliminary finding that it lacked jurisdiction over the transportation of carbon dioxide via pipeline and set the

[111] Wallace et al., *supra* note 4, at 31.
[112] *Id.*
[113] *Id.*
[114] *Cortez Pipeline Co.*, 7 FERC ¶ 61,024 (1979) ("*Cortez*").
[115] *Id.* at 61,040.
[116] *Id.*
[117] *Id.*
[118] 15 U.S.C. § 717(b) (2021).
[119] *Cortez*, 7 FERC ¶ 61,024, at 61,041.
[120] *Id.*
[121] *Id.*
[122] *Id.*
[123] *Id.* at 61,042.
[124] *Id.*
[125] *Cortez Pipeline Co.*, 45 Fed. Reg. 85,177 (1980).
[126] *Id.*
[127] *Id.*
[128] *Id.*
[129] *Id.*

petition for a proceeding to receive comments.[130] Only one of the petitioners filed comments and the ICC subsequently affirmed its preliminary conclusion that it lacked jurisdiction.[131]

Surface Transportation Board

In 1996, the STB succeeded the ICC with respect to "jurisdiction over the [interstate] transportation by pipeline, or by pipeline and railroad or water, when transporting a commodity other than water, gas, or oil."[132] The "water, gas, or oil" language construed by the ICC in 1980 is the same language presented in the current statute.[133] Though the STB is the successor of the ICC, it is not bound by ICC decisions and could choose to interpret the language differently. The question is how the STB reads the statute, and, again, there is a greater or lesser degree of uncertainty depending on where one looks.

In 1998, the U.S. General Accounting Office (GAO) issued a report addressing pipeline regulatory issues in connection with the STB,[134] observing that the "STB does not attempt to identify all products or pipelines under its jurisdiction. We identified five products—anhydrous ammonia, *carbon dioxide*, coal slurry, hydrogen, and phosphate slurry—carried by 21 pipelines subject to STB's jurisdiction."[135] The GAO's report thus suggests that the STB has applied its jurisdiction to the transportation of carbon dioxide via pipeline. Arguably consistent with that indication is the STB's description on its website of the scope of its jurisdiction as including "non-energy pipelines."[136] In 2008, in testimony before the Senate Energy and Natural Resources Committee, then-FERC Chairman Joseph Kelliher took as a given that the STB possessed such jurisdiction.[137] Still, there have been equivocations. A 2008 report on carbon dioxide pipeline jurisdiction by the Congressional Research Service recited a communication with STB personnel indicating the agency's awareness of the uncertainty generated by the conflict between the GAO report and the ICC's *Cortez* decision and STB's expectation that it "would likely not act to resolve this conflict unless a carbon dioxide pipeline dispute comes before it."[138] A 2015 review published by the DOE noted that the STB had not to date heard a case concerning carbon dioxide transportation.[139]

State Regulation of Carbon Dioxide Pipelines

While it is beyond the scope of this article to attempt to address the state of the law across the various states with regard to carbon dioxide pipelines, a Texas case serves to highlight complexities that can arise when the siting of interstate carbon dioxide pipelines is left to state law.

In *Denbury Green Pipeline-Texas* (*Denbury*), the Texas Supreme Court looked at whether the Green Pipeline was a common carrier and therefore had the right of eminent domain.[140] Denbury Green was formed to build the Green Pipeline and filed a T-4 permit with the Texas Railroad Commission to acquire common carrier status after being denied access to two tracts of Texas Rice's land located in Jefferson County.[141] The permit was granted, and Denbury utilized its eminent domain authority pursuant to the Texas Natural Resources Code to construct the Green Pipeline.[142] The Texas Supreme Court initially remanded the case noting that Denbury Green had the burden of proof to establish common carrier status and needed to produce evidence to demonstrate such status.[143] In *Texas Rice I*, the court held that pursuant to the Texas Constitution in order "[t]o qualify as a common carrier with the power of eminent domain, the pipeline must serve the public; it cannot be built only for the builder's exclusive use."[144] The test established in that case was that "a reasonable

[130] *Id.*
[131] Cortex Pipeline Co., 46 Fed. Reg. 18,805 (1981).
[132] 49 U.S.C. § 15301(a) (2021).
[133] 49 U.S.C. § 15301(a) (2021).
[134] U.S. Gov't Accountability Off., GAO/T-RCED-98-127, Issues Associated With Pipeline Regulation by the Surface Transportation Board (1998) (hereinafter "GAO Report").
[135] GAO Report at 7 (emphasis added).
[136] *See About STB*, Surface Transp. Bd., https://prod.stb.gov/about-stb/.
[137] *Regulatory Aspects of Carbon Capture, Transportation, and Sequestration: Hearing on S. 2323 and S. 2144 Before the Comm. on Energy and Natural Res.*, 110th Cong. 12-13 (2008) (statement of Joseph T. Kelliher, Chairman, Federal Energy Regulatory Commission).
[138] Adam Vann & Paul W. Parfomak, *Regulation of Carbon Dioxide (CO2) Sequestration Pipelines: Jurisdictional Issues*, Cong. Research Serv., RL34307 at CRS-6 n.29 (April 15, 2008).
[139] Wallace et al., *supra* note 4, at 32.
[140] *See Denbury*, 510 S.W.3d 909.
[141] *Id.* at 911.
[142] *Id.*
[143] *See Texas Rice I*, 363 S.W.3d 192 (Tex. 2012) ("*Texas Rice I*").
[144] *Id.* at 200.

probability must exist 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."[145]

In *Denbury*, the Texas Supreme Court held that Denbury produced sufficient evidence to demonstrate that it was a common carrier as a matter of law.[146] The court considered transportation agreements between Denbury and third parties along with proximity to potential customers. Denbury had begun negotiating an agreement with Air Products prior to the construction of the Green Pipeline.[147] Although this evidence was inconclusive because ownership of the carbon dioxide ultimately transferred to Denbury, the court highlighted that the agreement supported the fact that the Green Pipeline was designed at least in part to transfer carbon dioxide owned by third parties as it was the only pipeline close enough to accomplish the task for Air Products.[148] The court also looked at the transportation agreement entered after construction of the Green Pipeline between Denbury and Airgas Carbonic.[149] Pursuant to this agreement, Airgas Carbonic maintained ownership of the carbon dioxide.[150] Based on this evidence, the court determined that "the Green Line would, *at some point after construction* do what it now most certainly does: transport [carbon dioxide] owned by a customer who retains ownership of the gas."[151] Denbury, therefore, had established its burden of proof that it was a common carrier with eminent domain authority.[152]

Though the *Denbury* outcome permitted the pipeline to rest secure in its right of way condemnations, one hears echoes of the circumstances that led to the 1947 amendment to the NGA. The amendment permitted interstate natural gas pipelines holding certificates of public convenience and necessity from the Federal Power Commission, FERC's predecessor, to exercise a national power of condemnation to secure their rights of way. The amendment became necessary when various states effectively hampered the development of such pipelines by excluding a pipeline merely transiting a state from meeting the "public use" qualification under state condemnation laws.

Future of Carbon Dioxide Pipeline Regulation

The predicted significant expansion of the carbon dioxide pipeline system in the United States in support of CCUS projects brings to the fore the question of regulatory jurisdiction. Our extensive national experience with pipeline regulation offers a range of potential approaches. However, in considering those frameworks, one promptly confronts the reality that neither FERC nor the STB—the principal federal pipeline agencies—has definitively asserted jurisdiction over interstate carbon dioxide pipelines.[153] As discussed, FERC has specifically disclaimed jurisdiction over carbon dioxide pipelines with respect to the NGA. The STB may have jurisdiction, but it has yet to act upon such jurisdiction or explicitly address itself to carbon dioxide pipelines. It has been noted that a cohesive federal regime may be necessary in this area and could develop along the lines of regulation of other network industries in the United States.[154] Some have proposed that new carbon dioxide pipelines developed for CCUS projects be regulated in a manner similar to natural gas, including permits for construction and operation.[155] These suggestions occurred prior to the increased tax credit which has placed a spotlight on the financial viability of the combination of CCUS and carbon dioxide pipelines.

STB regulation of interstate carbon dioxide pipelines may be less controversial given the GAO Report that reflected the STB already has jurisdiction. The STB deals primarily with the economic regulation of freight rail including "railroad rate, practice, and service issues and rail restructuring transactions, including mergers, line sales, line construction, and line abandonments."[156] If

[145] *Id.*
[146] *Denbury*, 510 S.W.3d at 914.
[147] *Id.* at 916.
[148] *Id.*
[149] *Id.*
[150] *Id.* at 917.
[151] *Id.* at 916.
[152] *Id.* at 917-18.
[153] *See supra* Section Regulatory Status of Carbon Dioxide Pipelines.
[154] *See* Vann & Parfomak, *supra* note 138, at CRS-7 & n.32.
[155] *See* Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 Energy L.J. 85 (2009).
[156] Surface Transp. Bd., *supra* note 136.

the STB were to assert jurisdiction over carbon dioxide pipelines, the regulation would likely be minimal and thus more similar to FERC's regulation of oil pipelines in comparison to natural gas.

FERC, on the other hand, has broad experience in regulating both natural gas and oil pipelines. Even though FERC has previously expressly denied having NGA jurisdiction over carbon dioxide pipelines, this is not determinative. It is also possible, as has been urged elsewhere, that Congress could establish a separate regulatory regime for carbon dioxide pipelines.[157]

Resolution of such questions is beyond the scope of this article, and, indeed, is over the horizon. Subject to the potential for legislative action, what is clear is that, whether jurisdiction lies with the STB or FERC, existing standards for the provision of interstate pipeline transportation would apply. If jurisdiction rests with the STB, such transportation would be subject to well-understood common carrier standards. The same would be true if FERC were to assert jurisdiction and apply its experience in regulating common carrier oil pipelines. Either way, one finds a well-developed body of agency rulings and federal court precedent construing the meaning of these standards, and to that area, we turn next.

Common Carrier Transportation Standards

The rules and standards applicable to common carriers are set forth in two versions of the Interstate Commerce Act that would be applied by FERC or the STB—the "original" Interstate Commerce Act of 1887 applied by FERC to oil pipelines and the "new" Interstate Commerce Act applicable to the STB's jurisdiction over non-energy pipelines.[158] These principles are well known and have been routinely applied by carriers and parsed by the federal agencies and courts going back to the ICC. It is to that long history that any oversight of transportation terms, services, and conduct would undoubtedly revert. Thus, a brief review of those standards is pertinent in contemplating the development, commercial terms, and operation of carbon dioxide pipelines.

Common carriage. The essence of common carriage is the obligation of the carrier to provide service to any customer willing to enter into its contract terms.[159] The Interstate Commerce Act (ICA) defines "common carrier" broadly, with a narrow exception, in the case of oil pipelines, for a pipeline "simply drawing oil from its own wells across a state line to its own refinery for its own use."[160] Most of the key legal and regulatory concepts of common carriage services flow from this starting principle.

Holding out – the boundaries of service. The scope of a common carrier's obligation to contract with a potential customer is established by the carrier and its proffered terms, with a central term being the specification of the service the carrier holds itself out to perform. A common carrier has no duty to provide particular services and can narrowly tailor the types of services it holds out to the public without violating the ICA.[161] Concretely, a common-carrier carbon dioxide pipeline could define precisely what it would carry—relevant to the extent there were variations in the purity of the carbon dioxide stream—and which points of origin and of delivery it would serve. Such terms could encourage or foreclose connections with other carriers or with new points of origin or delivery, with potential positive and negative implications for CCUS pipeline project developers and, more widely, for the anticipated development of a more expansive national carbon

[157] Vann & Parfomak, *supra* note 138, at CRS-7.
[158] 49 U.S.C. app § 1 (1988) *et seq.*; 49 U.S.C. §§ 15101-16106 (2021).
[159] 49 U.S.C. app § 1(3)(a); 49 U.S.C. § 15102(2).
[160] *Compare Pipe Line Cases*, 234 U.S. 548, 562 (1914) *with Valvoline Oil Co. v. United States*, 308 U.S. 141, 145 (1939) (rejecting the argument that the pipeline was not a common carrier even though it owned all of the throughput it transported on its line because it did not draw the oil from its own wells); *Champlin Refining Co. v. United States*, 329 U.S. 29, 33-34 (1946) (holding that the pipeline was a common carrier despite owning all of the oil transported through the pipeline because it was not moving the oil for its own use, but rather to move the product to market).
[161] *United States v. Caroline Freight Carriers Corp.*, 315 U.S. 475 (1942) (noting that "a carrier's holding out and actual performance may be limited to a few articles only"); *B.J. Alan Co. v. ICC*, 897 F.2d 561, 563 (D.C. Cir. 1990) (highlighting that a common carrier is not restricted in "'carv[ing] out as large or small a [niche] as it feels appropriate.'" quoting *Steere Tank Lines, Inc. v. ICC*, 675 F.2d 103, 105 (5th Cir. 1982))); *CHS Inc. v. Enter. TE Prods. Pipeline Co.*, 155 FERC ¶ 61,178, at P 22 (2016) (holding that a common carrier need not hold itself out as providing all services in order to be in compliance with the ICA).

dioxide pipeline network.

Service upon reasonable request. A common carrier must provide service to a customer making a reasonable request.[162] This duty, however, is not without limit, and whether a request is reasonable is a question of fact. This concept is related to holding out in that a potential customer's request that aligns with the terms proffered by a carrier is more likely to be upheld as "reasonable," but vulnerable to being denied if not. For example, a carrier could deny service if the potential customer sought service at a point where the pipeline did not offer connection or of a product that did not meet the pipeline's specifications in terms of composition, pressure, etc.[163] This is in contrast to contract carriers (*e.g.*, natural gas pipelines), which do not commit to accommodating upon reasonable request and instead contract with each customer for transportation services.[164]

Published terms. It is fundamental that a common carrier must post its terms of service, including its rates, and apply them uniformly.[165] This requirement of the ICA is embodied in and reinforced by the "filed rate doctrine."[166] There are, however, well-established bases for a carrier to vary its terms and rates based on differences in the circumstances of the service or of the customer.

Undue discrimination or preference. It is likewise fundamental that a common carrier provide uniform service to its customers.[167] As noted, a carrier can provide variations in its service terms, provided there is a rational basis for such variation. For example, it is reasonable to afford discount rates where a customer contracts to have larger volumes of a commodity transported and/or makes a longer term commitment.[168] The bedrock principle is that a common carrier must provide similar service to customers that are similarly situated.[169]

Nominations and prorationing. Common carrier service is secured through nominations by customers seeking service, typically over an upcoming month, at the published terms. When nominations exceed capacity, the carrier allocates available space among the nominating customers.[170] Various systems have developed for such prorationing of scarce capacity.[171] Particularly relevant for efforts to build new or expanded pipelines has been the development of forms of "contract" common carriage, premised on the offering, through well-publicized "open seasons," of committed or "firm" capacity on the new or expanded capacity to potential customers willing to meet the offered commercial terms in exchange for the assurance of capacity immune to prorationing.[172]

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[162] 49 U.S.C. app § 1(4); 49 U.S.C. § 15701(a).

[163] *See e.g.*, *High Prairie Pipeline, LLC v. Enbridge Energy, LP*, 149 FERC ¶ 61,004, at PP 14, 36 (noting that the mere physical presence of an interconnection is not determinative of the pipeline offering interconnection service and that the pipeline is not violating the "service upon reasonable request" provision of the ICA by not offering such service); *B.J. Alan Co. v. ICC*, 897 F.2d 561, 564 (D.C. Cir. 1990) (affirming the ICC decision that even when a particular service is authorized by a certificate, it can be discontinued if "economically or operationally impracticable.").

[164] *See* Harvey L. Reiter, *Competition and Access to the Bottleneck: The Scope of Contract Carrier Regulation under the Federal Power and Natural Gas Acts*, 18 Land & Water L. Rev. 1, 38-39 (1983) (noting that the service upon reasonable request "can accurately be described as uniquely characteristic of statutory common carriers.").

[165] 49 U.S.C. app § 6(1)-(2); 49 U.S.C. § 15701(b)-(d).

[166] *See Louisville & N.R. Co. v. Maxwell*, 237 U.S. 94, 97 (1915) (noting that "the rate of the carrier duly filed is the only lawful charge. Deviation from it is not permitted upon any pretext. Shippers and travelers are charged with notice of it, and they as well as the carrier must abide by it, unless it is found by the Commission to be unreasonable.").

[167] 49 U.S.C. app §§ 2, 3(1); 49 U.S.C. §§ 15501(b), 15505. *See Armour Packing Co. v. United States*, 209 U.S. 56, (1908) (affirming violations of the Elkins Act where a rate other than the published tariff rate was paid to the carrier).

[168] *See e.g.*, *Enbridge Pipelines (Southern Lights) LLC*, 121 FERC ¶ 61,310 (2007) (holding that the pipeline did not engage in undue discrimination or preference when it offered discounted rates for a certain volume commitment level because the opportunity to make the specified volume commitment was made available to all shippers through an open season process); *Express Pipeline P'ship*, 76 FERC ¶ 61,245, 62,254 (1996) (approving discounted rates for shippers making term commitments because this is reasonable in light of the assurances provided by longer term commitments).

[169] *See Express Pipeline P'ship*, 76 FERC ¶ 61,245, 62,254 (noting that "contract rates are not inherently discriminatory provided that the carrier offering them makes them available to all similarly situated shippers of like commodities.").

[170] *See Suncor Energy Marketing Inc.*, 132 FERC ¶ 61,242, at P 24 (2010) (acknowledging that the "purpose of a prorationing procedure is to allocate constrained pipeline capacity among shippers in an equitable manner that is consistent with the common carrier obligation established in ICA section 1(4), the section 1(6) prohibition of unjust and unreasonable classifications, regulations, and practices, and the section 3(1) provision forbidding any undue or unreasonable preference or advantage.").

[171] *Mid-America Pipeline Co., LLC*, 106 FERC ¶ 61,094, at P 14 (2004) (noting that no single prorationing method exists and that "pipelines should have some latitude in crafting capacity allocation methods to meet circumstances specific to their operations." citing *SFPP, L.P.*, 86 FERC ¶ 61,022, at 61,115 (1999))).

[172] The contract carriage regime has developed incrementally since the 1990s, often through declaratory orders. The concept of contractual commitments to support major pipeline projects and ensure capacity access to project supporters began with seminal orders in *Proteus Pipeline*, 102 FERC ¶ 61,333 (2003) and *Caesar Pipeline*, 102 FERC ¶ 61,339 (2003) (both issued under FERC's Outer Continental Shelf Lands Act authority) and *Express Pipeline*

Rates. The rates for common carrier service are generally expected to be just and reasonable.[173] The parameters of what is just and reasonable have evolved over time.[174] Though, for a regulated common carrier, the cost of providing a service is often a touchstone for the regulator, there is now wide recognition that where a carrier operates in competitive markets its rates will be driven to competitive levels and therefore be reasonable.[175] Similarly, as noted above, it has been recognized that, within parameters that afford customers a reasonable opportunity to participate, open seasons for new or expanding pipeline capacity can provide market-responsive pricing of transportation capacity.

Project support. As the evolving development of "contract carriage" under FERC's declaratory order process since the 1990s demonstrates, there could also be advantages for carbon dioxide pipeline project development if regulators were similarly open and responsive to a flexible, market-responsive "contract carriage" regime for such projects. Such a regime could accommodate a range of innovative contractual arrangements offered through public "open season" processes. Such processes could provide financial assurances and risk mitigation to pipeline developers, resulting in investments in a range of large-scale carbon dioxide pipeline projects.

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P'ship, 76 FERC ¶ 61,245. The regime has been creatively and expansively elaborated over time. *See, e.g.*, *Kinder Morgan Pony Express Pipeline LLC and Belle Fourche Pipeline Co.*, 141 FERC ¶ 61,180, at PP 22-23 (2012) (accepting the terms of the transportation services agreement finding them consistent with Commission precedent and noting such terms "would be upheld and applied during the established terms of the agreements between the pipelines and the shippers that made volume commitments during the open season.").

[173] 49 U.S.C. app § 1(5); 49 U.S.C. § 15501.

[174] *See generally Williams Pipe Line Co.*, 31 FERC ¶ 61,377 (1985) (establishing cost-based rates as just and reasonable for oil pipelines); Order No. 561, *Revisions to Oil Pipeline Regulations Pursuant to the Energy Policy Act of 1992*, FERC Stats & Regs. ¶ 30,385 (1993), *affirmed*, *Association of Oil Pipe Lines v. FERC*, 83 F.3d 1424 (D.C. Cir. 1996) (setting forth the requirements of establishing initial rates and rate changes *i.e.* indexing, settlement rates, market-based rates, and cost-of-service rates).

[175] *See e.g.*, *Mobil Pipe Line Co. v. FERC*, 676 F.3d 1098, 1099-1100 (D.C. Cir. 2012) (explaining that market-based rates are generally permissible in competitive markets and allow rates to be "both efficient and just and reasonable." quoting *Market-based Ratemaking for Oil Pipelines*, 59 Fed. Reg. 59,148 (1994)); *BNSF Ry. Co. v. Surface Transp. Bd.*, 748 F.3d 1295, 1298-99 (D.C. Cir. 2014) (describing the use of the hypothetical Stand-Alone Railroad as the method for simulating a competitive market and thus should be used to determine a rate that can be reasonably charged in a non-competitive market because the "rate of the hypothetical Stand-Alone Railroad represents the rate that the actual railroad would charge if the industry were competitive.").