NOTE

Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network

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ABSTRACT

Carbon Capture and Sequestration ("CCS") is one of the most promising technologies to curb greenhouse gas emissions from coal-fired electric generation. Although the technology for capturing and storing carbon dioxide ("CO_2") is proven and in operation, the United States needs additional pipeline infrastructure before CCS can be implemented on a national scale. However, the lack of a federal regulatory regime or consistent state regulations of CO_2 pipelines will continue to hinder the private investment necessary to build the necessary infrastructure.

This Note argues that Congress should pass legislation that would create a regulatory regime for CO_2 pipelines that promotes the construction of new CCS infrastructure. Specifically, the legislation should (1) allow a CO_2 pipeline to charge market-based rates despite the monopoly power of the CO_2 pipeline, (2) provide for certain customer protections that would prevent the pipeline from taking advantage of its monopoly power, (3) grant eminent domain authority for constructing CO_2 pipelines, and (4) allow the Federal Energy Regulatory Commission to implement and enforce the legislation.

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TABLE OF CONTENTS

INTRODUCTION

Rising food prices,[1] mass migration,[2] new endangered species,[3] severe droughts[4]—scientists have linked each of these harms to increased emissions of greenhouse gases, and if such harms persist, they will fundamentally change the way human beings live their lives.[5] To combat these harms, the Environmental Protection Agency ("EPA") recently announced that, for the first time, the United States will regulate the emissions of greenhouse gases from power plants under the Clean Air Act.[6]

One of the largest emitters of greenhouse gases is coal-fired electricity.[7] Coal-fired power generation accounts for roughly one-third of all greenhouse gas emissions in the United States.[8] Despite its contribution to climate change, the United States' reliance on coal-fired power is increasing: the Energy Information Administration estimates that coal power will account for over forty percent of United States electricity generation in 2035.[9] Carbon Capture and Sequestration ("CCS") is one of the most promising technologies to curb greenhouse gas emissions from coal-fired electric generation.[10]

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1 Paul Krugman, Op-Ed., *Droughts, Flood and Food*, N.Y. TIMES, Feb. 7, 2011, at A23.

2 Neil MacFarquhar, *No Consensus on Addressing Climate Shift*, N.Y. TIMES, July 21, 2011, at A9 (noting that climate change leads to mass migrations of populations).

3 Andrew C. Revkin, *Walrus on Endangered Species Waiting List*, N.Y. TIMES: DOT EARTH (Feb. 8, 2011, 10:22 PM), http://dotearth.blogs.nytimes.com/2011/02/08/walrus-on-endangered-species-waiting-list/?ref=globalwarming.

4 Randal C. Archibold & Kirk Johnson, *No Longer Waiting for Rain, an Arid West Takes Action*, N.Y. TIMES, Apr. 4, 2007, at A1.

5 *See supra* notes 1–4.

6 Clean Air Act § 111, 42 U.S.C. § 7411 (2006); Proposed Settlement Agreement, Clean Air Act Citizen Suit, 75 Fed. Reg. 82,392, 82,392–93 (Dec. 30, 2010) (notice and request for public comment) (stating that, by May 2012, all new power plants will be required to comply with greenhouse gas emission standards).

7 *See* U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2008, at ES-6, 2-21 (2010). For instance, in 2008, the United States emitted 6016.4 million metric tons of greenhouse gases, of which 1962.6 metric tons were in the form of carbon dioxide from coal. *Id.*

8 *See id.* at 2-21.

9 U.S. DEP'T OF ENERGY, U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2011, at 3 (2010).

10 Based on the early success of CCS projects, the White House issued a presidential memorandum on February 3, 2010, stating that the Administration is pursuing "a set of concrete initiatives to speed the commercial development of safe, affordable, and broadly deployable CCS technologies . . . with a goal of bringing 5 to 10 commercial demonstration projects online by 2016." A Comprehensive Federal Strategy on Carbon Capture and Storage, 75 Fed. Reg. 6087, 6087–88 (Feb. 5, 2010).

CCS is a process whereby carbon dioxide ("CO_2") is separated from the power plant emissions and transported and stored in underground reservoirs.[11] CCS prevents the release of CO_2 into the atmosphere and effectively eliminates greenhouse gas emissions from the power plant operations.[12]

Although the technology for capturing and storing CO_2 has been proven in operation,[13] the United States does not have adequate infrastructure to implement CCS on a national scale. Specifically, tens of thousands of miles of CO_2 pipelines must be constructed to transport the CO_2 from the power plants to underground reservoirs.[14] Currently, there is no comprehensive federal regulation of CO_2 pipelines and existing state regulations are limited.[15] The uncertainty of this regulatory framework will prevent the development of much-needed CO_2 pipelines.[16] Given the harms that will arise because of greenhouse gas emissions and the continued reliance on coal as a source of electricity, it is imperative that Congress pass legislation that promotes the construction of new CO_2 pipelines.[17]

The most effective way to create certainty in CO_2 pipeline regulation is for Congress to pass a preemptive regulatory regime. Specifically, Congress should pass legislation that (1) allows a CO_2 pipeline to charge market-based rates[18] despite the monopoly power of the

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11 Press Release, Int'l Energy Agency, IEA Urges a Quick and Global Push to Develop and Deploy Carbon Capture and Storage (CCS) Technologies (Oct. 20, 2008), *available at* http://www.iea.org/press/pressdetail.asp?PRESS_REL_ID=272; *Carbon Dioxide Capture and Storage (CCS)*, WORLD RESOURCES INST., http://www.wri.org/project/carbon-dioxide-capture-storage (last visited Jan. 17, 2012); *see also* REPORT OF THE INTERAGENCY TASK FORCE ON CARBON CAPTURE AND STORAGE 7 (2010), *available at* http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf (noting that "CCS could play an important role in achieving national and global greenhouse gas (GHG) reduction goals").

12 Current technologies allow for the capture of up to eighty-five to ninety-five percent of the CO_2 emitted from the power plant. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CARBON DIOXIDE CAPTURE AND STORAGE 4 (2005).

13 *See infra* Part I.C.

14 *See* JJ Dooley et al., *Comparing Existing Pipeline Networks with the Potential Scale of Future U.S. CO_2 Pipeline Networks*, 1 ENERGY PROCEDIA 1595, 1598 (2009).

15 *See infra* Part II.

16 *See* CCSREG PROJECT, POLICY BRIEF: REGULATING CARBON DIOXIDE PIPELINES FOR THE PURPOSE OF TRANSPORTING CARBON DIOXIDE TO GEOLOGIC SEQUESTRATION SITES 3, 5 (2009), *available at* http://www.ccsreg.org/pdf/PipelineTransport_07013009.pdf (finding that regulatory uncertainty hinders private investment in new CO_2 pipelines).

17 *See id.*

18 A market-based rate is a rate that is negotiated between and agreed to by the pipeline company and the shipper. U.S. GEN. ACCOUNTING OFFICE, ELECTRICITY REGULATION: FACTORS AFFECTING THE PROCESSING OF ELECTRIC POWER APPLICATIONS 3 (1993).

CO_2 pipeline, (2) provides for certain customer[19] protections that would prevent the pipeline from taking advantage of its monopoly power, (3) grants eminent domain authority for constructing CO_2 pipelines, and (4) allows the Federal Energy Regulatory Commission ("FERC") to implement and enforce the legislation.

This Note first discusses the challenges of global warming, the role of coal-fired electricity generation in the Unites States, and how CCS technology can combat global warming. Next, it describes the current regulation of CO_2 pipelines on both the federal and state level, and examines analogous federal pipeline regulations for both oil and natural gas. Finally, it argues that Congress should pass legislation that creates a federal regulatory regime for CO_2 pipelines.

I. GLOBAL WARMING, COAL-FIRED ELECTRICITY, AND THE ROLE OF CARBON CAPTURE AND SEQUESTRATION

A. The Impact of Coal-Fired Generation on Global Warming

In 2007, the Intergovernmental Panel on Climate Change ("IPCC"), a scientific body that reviews and assesses the most recent data regarding climate change, released a report concluding that "warming of the climate system is unequivocal," and that human activity is likely the cause of such warming.[20] Increases in atmospheric concentration of greenhouse gases are one of the major drivers of global climate change, and the largest growth in greenhouse gas emissions has come from energy, transportation, and industrial sources.[21] Should global greenhouse gas emissions continue along their current projections, the IPCC report predicts the following impacts in North America alone: (1) competition for over-allocated water resources; (2) major challenges for crops that are near the warm end of their suitable range; and (3) increased number, intensity, and duration of heat waves during the course of the next century.[22]

Eighty-three percent of CO_2 emissions from electricity generation in the United States in 2008 came from coal-fired power plants.[23] Because of increased electricity consumption, CO_2 emissions from coal rose by over twenty-five percent between 1990 and 2008.[24] As a point

19 Pipelines, like other shippers, do not own the commodity that they transport. Rather, customers contract with the pipeline to get their cargo from point *A* to point *B*.

20 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 30–39 (2007).

21 *Id.* at 36.

22 *Id.* at 52.

23 *See* U.S. ENVTL. PROT. AGENCY, *supra* note 7, at 3–5.

24 *See id.*

of comparison, the amount of greenhouse gas emissions from one month's worth of home electricity use (from coal-fired generation) is equivalent to driving a car 1500 miles.[25]

Although the United States has yet to pass comprehensive climate change legislation, regulation of greenhouse gas emissions is likely. In December 2010, EPA issued a plan for establishing greenhouse gas pollution standards under the Clean Air Act.[26] The plan allows EPA to propose emission limits for all new power generation, including coal-fired generation, as early as July 2011.[27] Although some lawmakers have attempted to prevent EPA from moving forward, any attempt to curb EPA's power is likely to fail.[28] Additionally, in his 2011 State of the Union Address, President Obama set a goal of using clean energy sources to produce eighty percent of the electricity used in the United States[29] by 2035.[30] Finally, in 2010, Congress took significant steps to regulate greenhouse gas emissions when the House of Representatives passed climate change legislation and the Senate proposed a climate change bill.[31] Although there is no current regulation of greenhouse gases, regulation is further along and more likely to happen than ever before.

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25 A coal-fired power plant generates 760 kilograms of CO_2 per megawatt hour. EDWARD S. RUBIN, A PERFORMANCE STANDARDS APPROACH TO REDUCING CO_2 EMISSIONS FROM ELECTRIC POWER PLANTS 7 (2009). Each home uses approximately one megawatt-hour per month. *How Much Electricity Does an American Home Use?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3 (last visited Jan. 17, 2012). This equates to driving a car approximately 1500 miles. U.S. ENVTL. PROT. AGENCY, EMISSION FACTS: AVERAGE ANNUAL EMISSIONS AND FUEL CONSUMPTION FOR PASSENGER CARS AND LIGHT TRUCKS (2000), *available at* http://www.epa.gov/oms/consumer/f00013.pdf.

26 Proposed Settlement Agreement, Clean Air Act Citizen Suit, 75 Fed. Reg. 82,392, 82,392 (Dec. 30, 2010) (notice and request for public comment).

27 U.S. ENVTL. PROT. AGENCY, FACT SHEET: SETTLEMENT AGREEMENTS TO ADDRESS GREENHOUSE GAS EMISSIONS FROM ELECTRIC GENERATING UNITS AND REFINERIES 1 (2011), *available at* http://www.epa.gov/airquality/pdfs/settlementfactsheet.pdf.

28 *See* John M. Broder, *House Panel Votes to Strip E.P.A. of Power to Regulate Greenhouse Gases*, N.Y. TIMES, Mar. 11, 2011, at A18 (explaining that President Obama has vowed to veto the proposed bill that strips EPA's power to regulate greenhouse gases).

29 "Clean energy" is energy that does not release greenhouse gases into the environment. As such, CCS is considered a "clean energy" source and would contribute to the President's goal. *See* INTERAGENCY TASK FORCE ON CARBON CAPTURE & STORAGE, *supra* note 11, at 7 (stating that CCS can be used to achieve greenhouse gas emissions goals).

30 Address Before a Joint Session of the Congress on the State of the Union, 2011 DAILY COMP. PRES. DOC. 1 (Jan. 25, 2011).

31 John M. Broder, *House Backs Bill, 219-212, to Curb Global Warming*, N.Y. TIMES, June 27, 2009, at A1; Juliet Eilperin, *Senators Set for Last Gasp at Climate Bill*, WASH. POST, Apr. 24, 2010, at A2 (noting that the Kerry-Lieberman climate change legislation proposed a seventeen percent reduction in greenhouse gas emissions from 2005 levels by 2020).

B. *The Role of Coal in the United States Energy Portfolio*

In the United States, coal-fired power generation accounts for approximately forty-five percent of all electricity consumed.[32] Coal-fired generation is the most prevalent form of electricity because coal is abundant and less expensive than alternative sources of energy.[33] Specifically, the United States' coal reserve accounts for approximately twenty-five percent of the total coal in the world.[34] This coal reserve represents more potential energy than the amount of oil worldwide.[35] Because coal is readily available, the cost of producing electricity from coal is significantly less than other technologies. For example, the fuel costs associated with coal-fired generation are approximately seventy-five percent less than natural gas electricity.[36] Because of the low costs, the amount of electricity generated from coal rose by 5.4% between 2009 and 2010, even though the total increase in electricity generation was only 4.3%.[37]

Coal-fired generation also serves the essential purpose of baseload generation. Baseload power is electricity that is generated at a constant rate to continuously supply a given demand.[38] In contrast with solar and wind power, whose electricity generation varies depending on factors outside the control of the power plant, coal-fired generation produces electricity at a constant rate.[39] As a result, regardless of how many solar panels or windmills are put in operation, the United States will continue to need baseload power from reliable energy sources to counter the varying supply of clean energy output.[40] Other fuel sources, such as natural gas and nuclear power, are also

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32 *See* U.S. DEP'T OF ENERGY, U.S. ENERGY INFO. ADMIN., ELECTRIC POWER MONTHLY: MARCH 2011, at 19 (2011).

33 *See* U.S. DEP'T OF ENERGY, U.S. ENERGY INFO. ADMIN., ELECTRIC POWER ANNUAL 2009, at 7 (2011); *Coal*, ENERGY.GOV, http://www.energy.gov/energysources/coal.htm (last visited Jan. 17, 2012).

34 *Coal*, *supra* note 33.

35 *See id.*

36 *See* U.S. DEP'T OF ENERGY, *supra* note 33, at 7.

37 *See* U.S. DEP'T OF ENERGY, *supra* note 32, at 19.

38 MATTHEW CORDARO, UNDERSTANDING BASE LOAD POWER 2 (2008).

39 *See* Frank Clemente, *Wind Power: Limited, Expensive, Remote, and Iffy*, ENERGY FACTS WKLY. (Energy-Facts.org, State College, Pa.), June 21, 2010, at 1, *available at* http://www.energy-facts.org/LinkClick.aspx?fileticket=JA8PXEfZq9A%3d&tabid=100.

40 Most wind farms or solar power projects are constructed to supplement existing baseload power plants. *See* CORDARO, *supra* note 38, at 3. That is, the baseload plant remains on "standby" mode until the electricity demand exceeds the capacity of the wind or solar plant. As a result, the wind farm or solar project displaces, but does not completely eliminate the need for, coal-fired generation. *See id.*

used in baseload generation, but have specific drawbacks that make coal a stronger alternative.

Fuel costs associated with natural gas-fired electricity are seventy-five percent higher than that of coal,[41] and the United States must import natural gas from foreign sources to meet the current demand.[42] Therefore, creating an energy portfolio that relies heavily on natural gas would require the United States to further rely on foreign sources of energy and increase the costs associated with electricity generation.

Nuclear energy can also provide baseload power without emitting greenhouse gases.[43] However, recent events in Japan have shifted public opinion against the use of nuclear power because of concerns related to plant safety. On March 11, 2011, an earthquake and tsunami hit northern Japan, resulting in three nuclear reactors at the Fukushima Daiichi Nuclear Power Station partially melting down and releasing radioactive matter into the environment.[44] In the immediate aftermath, these releases caused increased radioactivity in California,[45] and in time, contaminated Japan's food supply.[46] As a result of the meltdown, public support for new nuclear power in the United States decreased from sixty-four percent to forty-six percent.[47] This lack of public support makes it unlikely that nuclear power will ever replace coal as the primary source of baseload generation.

Coal will continue to serve as the primary fuel source in baseload power generation because of its abundance and relative low cost. Despite its reliance on coal and the known impact that coal has on global warming, the United States lacks long-term planning regarding the promotion of technologies that achieve the benefits of coal while minimizing its negative impacts on climate change.

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41 *See* U.S. DEP'T OF ENERGY, *supra* note 33, at 7.

42 The amount of natural gas imported into the United States from foreign sources more than doubled between 1991 and 2009. *See U.S. Natural Gas Imports*, U.S. ENERGY INFO. ADMIN., http://www.eia.doe.gov/dnav/ng/hist/n9100us2A.htm (last visited Jan. 17, 2012).

43 MASS. INST. OF TECH., THE FUTURE OF NUCLEAR POWER 17 (2003).

44 David E. Sanger & David Jolly, *Reactor Core Was Severely Damaged, U.S. Official Says*, N.Y. TIMES, Apr. 2, 2011, at A6.

45 Keith Darce, *Traces of Radiation Detected in San Diego*, SAN DIEGO UNION-TRIB., Mar. 26, 2011, at A1.

46 Hiroko Tabuchi, *Japan's Premier Says Nuclear Crisis Is Over, but Critics Say He's Premature*, N.Y. TIMES, Dec. 17, 2011, at A8 (citing increased radioactive Cesium in a wide range of food products).

47 Bruce Henderson, *Need for Nuclear Plants Touted*, CHARLOTTE OBSERVER, Nov. 19, 2011, at 3B.

C. *Carbon Capture and Sequestration—Lowering Emissions While Still Utilizing the United States' Coal Resources*

CCS is a multistep process that involves separating CO_2 from the exhaust of a power plant, transporting the CO_2 via pipeline to an underground storage reservoir, and storing the CO_2 underground so that it is not released into the atmosphere.[48] CCS is considered one of the most promising technologies to combat global warming because it allows the United States to continue to rely on a fuel source that is abundantly available while virtually eliminating the greenhouse gas emissions associated with it.[49] Available CCS technology can reduce CO_2 emissions from each individual power plant by eighty to ninety percent.[50]

The United States has already invested more than $5 billion in CCS to lower the amount of greenhouse gas emissions from coal-fired generation, in recognition of the United States' reliance on coal as a fuel source for electricity generation and the impact coal has on carbon emissions.[51] For example, in 2009, the Department of Energy ("DOE") provided $979 million of funding to spur the construction of three new CCS projects in West Virginia, Alabama, and Texas.[52]

CO_2 could be removed from plant emissions using one of three technologies: postcombustion, precombustion, and oxyfuel.[53] Each of these technologies effectively removes CO_2 from the plant's emissions. Postcombustion carbon capture technologies typically use an organic solvent to remove CO_2 from the flue gas[54] produced by the power plant.[55] Precombustion technologies process the fuel prior to its use in the power plant.[56] Oxyfuel combustion uses oxygen instead

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48 *Carbon Dioxide Capture and Storage (CCS)*, *supra* note 11.

49 Although no single technology will reduce emissions to the needed levels, "CCS has the potential to reduce overall [climate change] mitigation costs and increase flexibility in achieving greenhouse gas emission reductions." INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 3.

50 *Id.* at 4.

51 *See* Matthew L. Wald, *Stimulus Money Puts Clean Coal Projects on a Faster Track*, N.Y. TIMES, Mar. 17, 2009, at B1.

52 *Secretary Chu Announces $3 Billion Investment for Carbon Capture and Sequestration*, ENERGY.GOV (Dec. 4, 2009), http://energy.gov/articles/secretary-chu-announces-3-billion-investment-carbon-capture-and-sequestration.

53 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 24–25.

54 A flue gas is the exhaust gas that is produced from burning coal (or other fuels) and is "released from an incinerator's chimney." THOMAS M. PANKRATZ, ENVIRONMENTAL ENGINEERING DICTIONARY AND DIRECTORY 103 (2001); *see* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 24–25.

55 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 25.

56 Processing the fuel involves mixing the fuel (typically pulverized coal) with steam and

of air in the combustion process to produce a flue gas that has a high concentration of CO_2.[57]

Once the CO_2 is captured, the gas stream can be stored underground in geologic formations that would prevent the greenhouse gases from reaching the atmosphere.[58] The natural gas industry has been using many of the same technologies for geologic gas storage since as early as 1935.[59] Generally, so long as a cap rock—a rock with very low permeability that acts as a lid on the storage reservoir—confines the geologic formation, the CO_2 can be stored with little fear of being released into the atmosphere.[60] The National Energy Technology Laboratory ("NETL"), a division of the DOE, estimates that there is enough geologic storage in the southeastern Unites States alone to last more than 900 years at current CO_2 emission levels in that region.[61]

One example of successful underground storage of carbon is at the Sleipner gas field in the North Sea, approximately 155 miles from the coast of Norway.[62] At Sleipner, Statoil, an oil and natural gas company, produces natural gas with high concentrations of CO_2—concentrations that are too high for normal industrial use.[63] Rather than stripping the CO_2 from the natural gas and releasing the CO_2 to the atmosphere, Statoil removes the CO_2 from the natural gas and stores it in a geologic formation approximately 3000 feet underground.[64] By storing the CO_2 produced by Statoil underground, Norway has re-

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air to produce a stream of hydrogen, which is used to generate electricity, and a stream of CO_2, which can be separated and stored. *Id.* at 25.

57 *Id.*

58 *Id.* at 31–37.

59 *Id.*; *see also U.S. Total Natural Gas Injection into Underground Storage*, U.S. ENERGY INFO. ADMIN., http://205.254.135.7/dnav/ng/hist/n5050us2a.htm (last visited Jan. 17, 2012). Similar to CCS, natural gas is stored underground in geologic formations. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 31. Additionally, because natural gas can contaminate drinking water, the industry has developed technologies that identify underground storage formations that act as a sealed container and ensure that no gas leakage takes place. *See id.* at 31–37.

60 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 31–37.

61 *See* U.S. DEP'T OF ENERGY, NAT'L ENERGY TECH. LAB., 2010 CARBON SEQUESTRATION ATLAS OF THE UNITED STATES AND CANADA 89 (2010).

62 *RD&D Database*, IEAGHG, http://www.ieaghg.org/index.php?/RDD-Database.html (enter "Sleipner" in "Keyword" field; then follow "Sleipner Project" hyperlink) (last visited Jan. 17, 2012); *Sleipner Vest*, STATOIL, http://www.statoil.com/en/TechnologyInnovation/ProtectingTheEnvironment/CarboncaptureAndStorage/Pages/CarbonDioxideInjectionSleipnerVest.aspx (last visited Jan. 17, 2012).

63 *RD&D Database*, *supra* note 62.

64 *Id.*

duced its total CO_2 emissions by approximately three percent since the Sleipner field began operating in 1996.[65]

There are several CCS projects already operating in the United States. For example, the Weyburn-Midale project, launched in 2000,[66] sequesters approximately fifty percent of the CO_2 emissions from a coal gasification plant in North Dakota.[67] Once the plant captures the CO_2, it is transported by pipeline approximately 205 miles north to an oil field in Southern Canada.[68] The oil field operator injects the CO_2 underground to facilitate enhanced oil recovery ("EOR").[69] Additionally, Duke Energy is constructing the first full-scale coal-fired electric generation plant with CCS in Edwardsport, Indiana.[70] The Edwardsport plant is a new 618 megawatt coal-fired power plant that is capable of capturing carbon emissions.[71] Once completed, the plant will be "one of the cleanest and most efficient coal-fired power plants in the world."[72]

Although the United States has made some progress in deploying CCS technology through direct government investment, these projects are relatively small compared to the total amount of coal-fired generation in the United States. For example, the three projects partially funded by the DOE[73] have a power generation capacity of 795 megawatts.[74] This represents only 0.25% of the total coal-fired generation in operation.[75] The full deployment of CCS technology will require significant private investment in not only the power plants themselves, but also in the related CO_2 transportation infrastructure.

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65 *Id.*

66 *Weyburn-Midale CO_2 Project*, PETROLEUM TECH. RES. CENTRE, http://www.ptrc.ca/weyburn_overview.php (last visited Jan. 17, 2012).

67 *CO_2 Capture and Storage*, DAKOTA GASIFICATION COMPANY, http://www.dakotagas.com/CO2_Capture_and_Storage/index.html (last visited Jan. 17, 2012).

68 *Id.*

69 *Id.* EOR is the process of injecting CO_2 into the oil field to increase oil production. The CO_2 remains underground and sequestered as the oil is produced. *See* Jeffrey D. Sachs, Keynote Address, 17 FORDHAM ENVTL. L. REV. 159, 171 (2006).

70 Wald, *supra* note 51. This is in contrast with the Weyburn-Midale project because the CO_2 emissions are not being used for EOR. *See Weyburn-Midale CO2 Project*, *supra* note 66.

71 *Project Overview*, DUKE ENERGY, http://www.duke-energy.com/about-us/edwardsport-overview.asp (last visited Jan. 17, 2012).

72 *Id.*

73 *See supra* note 52 and accompanying text.

74 *See Secretary Chu Announces $3 Billion Investment for Carbon Capture and Sequestration*, *supra* note 52.

75 *See* U.S. DEP'T OF ENERGY, *supra* note 33, at 17.

D. *Deploying Carbon Capture and Sequestration Nationwide—the Need for a CO_2 Pipeline Regulation*

As stated above, the technologies for CCS have been developed and are proven to be effective at reducing the amount of greenhouse gases emitted from power plants. Should the United State pass significant greenhouse gas emissions regulations, it would become necessary to develop policies that allow for the immediate deployment of CCS infrastructure.

A major aspect of this deployment involves transportation pipelines for CO_2.[76] Because the location of power plants and storage formation can be hundreds, if not thousands of miles apart, a network of CO_2 pipelines must be built to support the development of CCS.[77] For example, NETL estimates that Louisiana, Montana, Wyoming, and Texas have the four largest capacities for CO_2 storage.[78] However, in December 2010, the states with the four highest coal-fired electricity consumption were Texas, Indiana, Pennsylvania, and Ohio.[79] Transporting CO_2 from a power plant in Akron, Ohio, to a storage reservoir in Shreveport, Louisiana, requires the construction of a 1000-mile pipeline.

Storing eighty percent of current CO_2 emissions from electric power production requires the transportation of approximately 1800

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76 CCS projects planned or currently in operation have not required an extensive pipeline system because they happen to be located near CO_2 storage reservoirs. *See, e.g.*, *Good Spring IGCC*, GLOBAL CCS INST., http://www.globalccsinstitute.com/projects/good-spring-igcc (last visited Jan. 17, 2012) (noting that the Good Springs project anticipates a pipeline of less than fifty kilometers in length); *Mountaineer Commercial Scale Carbon Capture and Storage Project*, GLOBAL CCS INST., http://www.globalccsinstitute.com/projects/mountaineer-commercial-scale-carbon-capture-and-storage-project (last visited Jan. 17, 2012) (noting that the Mountaineer project anticipates a pipeline of less than fifty kilometers in length); *Sleipner CO2 Injection*, GLOBAL CCS INST., http://www.globalccsinstitute.com/projects/sleipner%C2%A0co2-injection (last visited Jan. 17, 2012) (noting that there is no transportation pipeline associated with the Sleipner project).

77 The projects currently in operation or development have been specifically chosen because of their proximity to CO_2 storage sites. *See Status of CCS Project Database*, GLOBAL CCS INST., http://www.globalccsinstitute.com/resources/data/dataset/status-ccs-project-database (last updated Jan. 16, 2012) (showing that the longest CO_2 pipeline associated with a planned or operational CCS project in the United States is only 370 kilometers in length). A nationwide deployment of CCS would not have this luxury because coal-fired generators are located throughout the United States.

78 *See* U.S. DEP'T OF ENERGY, *supra* note 61, at 159.

79 *See* U.S. DEP'T OF ENERGY, *supra* note 32, at 26. Texas, Indiana, Pennsylvania, and Ohio are ranked first, sixteenth, nineteenth, and seventeenth, respectively, in storage capacity. *See* U.S. DEP'T OF ENERGY, *supra* note 61, at 159 (basing ranking on low estimate of storage capacity).

million tons ("Mt") of CO_2 per year.[80] By comparison, the 300,000 miles of natural gas pipelines currently in existence transport the equivalent of only 450 Mt of CO_2 per year.[81] Although the exact size is difficult to determine,[82] even low-end estimates predict the need to construct approximately 20,000 miles of CO_2 pipelines.[83] Materials, labor, and property costs associated with constructing the pipeline system would require a capital investment of approximately seventy-billion dollars.[84]

To ensure private capital investments in CO_2 pipelines, Congress must develop a regulatory framework that promotes the building of CO_2 pipelines. Indeed, CCSReg, a collaborative effort led by Carnegie Mellon University that examines regulations for CCS,[85] stated, "Large-scale, commercial implementation of CCS will . . . require . . . further delineation of a CO_2 pipeline transportation regulatory regime . . . to provide increased regulatory certainty for CO_2 pipeline infrastructure developers that will be necessary for widespread deployment of CCS."[86] Specifically, CCSReg notes that certainty in the regulatory regime would help facilitate project financing because project developers will be able to evaluate the regulatory risks.[87] As discussed below, the absence of federal regulation of CO_2 pipelines creates the very uncertainty that would limit private investment.[88]

II. CURRENT REGULATION OF CO_2 PIPELINES

State and federal governments generally control CO_2 pipelines by regulating rates and services as well as siting.[89] Regulation of rates and services involves a government entity determining how the pipe-

80 Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L.J. 85, 87 (2009) (explaining that a plausible CO_2 capture rate is eighty percent).

81 *Id.*

82 It is difficult to know precisely how many miles of CO_2 pipeline are needed because a significant factor in determining the length of a pipeline is the availability and location of underground storage. *See id.* at 88.

83 *See* Dooley et al., *supra* note 14, at 1598.

84 The cost of the system was estimated using the price of a representative natural gas pipeline. *See* WYO. NATURAL GAS PIPELINE AUTH., WHAT IS THE ROCKIES EXPRESS NATURAL GAS PIPELINE (REX)? 1 (2006), *available at* http://www.wyopipeline.com/mission/REX%20Pipeline_Q_A.pdf.

85 *CCSReg Project*, CCS REG, http://www.ccsreg.org/index.html (last visited Jan. 17, 2012).

86 CCSREG PROJECT, *supra* note 16, at 3.

87 *See id.* at 5, 8 n.26 (noting that investors are concerned with regulatory modification of contracts that already exist).

88 *See infra* Part II.C.

89 Additionally, certain safety aspects of a CO_2 pipeline's operations are regulated by the Department of Transportation. 49 U.S.C. § 60102(a) (2006); Joel Mack & Buck Endemann,

line must offer its services and what it may charge for those services.[90] When discussing regulation of rates and services, it is important to note that a pipeline does not own the commodity that it is shipping.[91] It merely provides the service of getting the commodity from point *A* to point *B*, like a postal carrier.[92] By contrast, siting regulation involves the government entity regulating the location and construction of the pipeline.[93] This may include a right to obtain properties through eminent domain.[94]

This Part of the Note first discusses the current state of federal CO_2 pipeline regulation. Next, it describes how states regulate CO_2 pipelines that are in operation. Last, it examines the problems that will arise if the current piecemeal system of regulation is not changed.

A. Federal Regulation of CO_2 Pipelines

Currently there is no comprehensive federal regulation of transportation rates and services for CO_2 pipelines or federal eminent domain authority for acquiring land to construct CO_2 pipelines.[95] Three federal agencies have specifically addressed their lack of jurisdiction with respect to CO_2 pipelines: FERC, the Surface Transportation Board ("STB"), and the Bureau of Land Management ("BLM").[96]

FERC is a federal agency that regulates natural gas pipelines pursuant to the Natural Gas Act ("NGA")[97] and oil pipelines pursuant to the Interstate Commerce Act.[98] In *Cortez Pipeline Co.*,[99] FERC specifically disclaimed jurisdiction over CO_2 pipelines.[100] In that case, Cortez Pipeline Company requested that FERC issue a declaratory

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Making Carbon Dioxide Sequestration Feasible: Toward Federal Regulation of CO_2 Sequestration Pipelines, 38 ENERGY POL'Y 735, 736–38 (2010).

90 *See, e.g.*, 18 C.F.R. § 284.7–.10 (2010) (setting forth regulations for the rates and services of interstate natural gas pipelines). Rates and services are regulated because pipelines often have monopoly power insomuch as only one pipeline services a particular market area. *See* Apache Corp. v. FERC, 627 F.3d 1220, 1221 (D.C. Cir. 2010).

91 Diana M. Leibmann et al., *Recent Developments in Texas and United States Energy Law*, 4 TEX. J. OIL GAS & ENERGY L. 363, 413 (2009).

92 *Id.*

93 *See, e.g.*, 18 C.F.R. § 380.15 (setting forth regulations for the siting and maintenance of interstate natural gas pipelines).

94 Eminent domain is the process by which the state or federal government takes land from private citizens for public use. *See infra* Part II.B.

95 Nordhaus & Pitlick, *supra* note 80, at 88.

96 *Id.*

97 Natural Gas Act, 15 U.S.C. §§ 717–717z (2006).

98 49 U.S.C. 60502 (2006); *see also infra* Part III.B.

99 Cortez Pipeline Co., 7 FERC ¶ 61,024, at 61,040 (1979).

100 *Id.* at 61,042.

order disclaiming jurisdiction of a CO_2 pipeline connecting a CO_2 reservoir in Colorado to an oil field in Texas for EOR.[101] FERC did just that, ruling that it did not have jurisdiction over the pipeline because CO_2 is not a "natural gas" under the NGA.[102]

Similarly, the STB—which is responsible for rate and service regulation of certain interstate common carriers,[103] such as rail transportation[104]—disclaimed jurisdiction over CO_2 pipelines.[105] Although the term "common carrier" typically is associated with modes of transportation—buses, planes, trains, etc.—a pipeline that ships commodities is also characterized as a common carrier because the pipeline transports commodities for a fee.[106] With respect to pipeline regulation, the STB regulates pipelines "when transporting a commodity other than water, gas, or oil."[107] The STB's predecessor, the Interstate Commerce Commission,[108] disclaimed jurisdiction over CO_2 pipelines,[109] issuing a declaratory order to Cortez finding that the transportation of CO_2 falls within the statutory exemption for "water, gas, or oil."[110]

The BLM has exercised jurisdiction over CO_2 pipeline rates in limited cases.[111] The BLM has the responsibility for granting rights-of-way to pipelines on federal lands managed by the Department of the Interior.[112] Pursuant to the Mineral Leasing Act,[113] the BLM has authority to impose common carrier requirements[114] on pipelines that

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101 *Id.* at 61,040–41.

102 *Id.* at 61,041–42.

103 *About STB: Overview*, SURFACE TRANSP. BOARD, http://www.stb.dot.gov/stb/about/overview.html (last visited Jan. 17, 2012).

104 SURFACE TRANSP. BD., FY 2010 ANNUAL REPORT 1 (2011).

105 Cortez Pipeline Co., 45 Fed. Reg. 85,177, 85,177–78 (Interstate Commerce Comm'n Dec. 24, 1980) (petition for declaratory order).

106 *See* BLACK'S LAW DICTIONARY 242 (9th ed. 2009).

107 49 U.S.C. § 15301(a) (2006).

108 *About STB: Overview*, *supra* note 103.

109 Cortez Pipeline Co., 45 Fed. Reg. at 85,177–78.

110 *Id.* (finding that CO_2 is a gas and therefore exempted from STB jurisdiction).

111 See BUYS & ASSOCS., INC., ENVIRONMENTAL ASSESSMENT FOR ANADARKO E&P COMPANY L.P. MONELL CO_2 PIPELINE PROJECT (2003) for an evaluation of the environmental effects of a pipeline right-of-way authorized under the Mineral Leasing Act of 1920, Pub. L. No. 66-146, 41 Stat. 437 (codified as amended in scattered sections of 30 U.S.C.). Pipelines that have rights-of-way approved under the Mineral Leasing Act are subject to common carrier regulations. 30 U.S.C. § 185(r).

112 *See* Nordhaus & Pitlick, *supra* note 80, at 93.

113 Mineral Leasing Act of 1920, Pub. L. No. 66-146, 41 Stat. 437 (codified as amended in scattered sections of 30 U.S.C.).

114 Common carrier requirements are discussed in detail with respect to oil pipelines in Part III.B.

obtain rights-of-way from the BLM.[115] As such, when a CO_2 pipeline crosses federal land managed by the Department of the Interior, the BLM imposes common carrier regulations on it.[116] This is the only situation where a CO_2 pipeline is subject to any federal regulatory scheme.[117]

B. State Regulation of CO_2 Pipelines

Because of the lack of federal regulation, several states have imposed regulatory regimes on CO_2 pipelines located within their borders.[118] The states that have CO_2 pipelines to support EOR have the most comprehensive regulations.[119] These regulatory regimes cover both the construction and siting of new pipelines and the regulation of rates and services.[120]

1. Rate and Service Regulation by the States

The states that have regulated the rates and services of CO_2 pipelines have done so in two ways: (1) by placing common carrier requirements on pipelines, which require the pipeline to offer the same rate for the same services, or (2) by requiring rates to be "just and reasonable"—rates set by a government agency based on the cost of service and a fixed rate of return.[121] Each of these regulatory regimes involves a government agency determining the rate that the pipeline may charge.[122] The biggest difference between the two regulatory regimes is that under a just and reasonable system, pipeline customers (or shippers) may reserve long-term capacity on a given pipeline and the pipeline guarantees that the capacity will be available.[123] Conversely, a common carrier pipeline offers service only thirty days in advance, and a shipper may be required to reduce its capacity if a

115 *See* Exxon Corp. v. Lujan, 970 F.2d 757, 762–63 (10th Cir. 1992) (upholding the BLM's interpretation that CO_2 pipelines are governed by the Mineral Leasing Act as reasonable).

116 For a more detailed discussion of the federal agency cases regarding CO_2 pipeline jurisdiction, see Nordhaus & Pitlick, *supra* note 80, at 88–95.

117 The BLM's common carrier requirements would be similar to those imposed on oil pipelines. *See infra* Part III.B.

118 Mack & Endemann, *supra* note 89, at 736.

119 *Id.* at 736–38.

120 *Id.*

121 *See id.* at 737.

122 For a more detailed discussion of common carrier and just and reasonable regulation, see *infra* Part III.

123 *See infra* Part III.A. This allows shippers to sign long-term contracts for a guaranteed amount of service.

pipeline is oversubscribed.[124] Although these are the two most common regulatory regimes, the vast majority of states do not offer any guidance on the regulation of CO_2 pipelines.[125] As a consequence, there is a great disparity in how a CO_2 pipeline is regulated based on the state that it is passing through.

2. *Eminent Domain Authority in the States*

Eminent domain is the process by which the state or federal government takes land from private citizens for public use.[126] Although eminent domain has been sharply criticized as impairing private property rights,[127] Senate Majority Leader Harry Reid has noted, "The national railroad system, the interstate highway system, [and] all the natural gas pipeline systems could not have been built without the power of federal eminent domain."[128]

To meet the constitutional requirements to satisfy the use of eminent domain, the taking of private property must be for a public use.[129] The public use requirement of the Fifth Amendment serves as the basis for all state grants of eminent domain.[130] Although the state cannot take property from one party for the sole purpose of transferring it to another private party, the state may transfer property to a

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124 *See infra* Part III.B. A common carrier pipeline becomes oversubscribed when it receives requests for service in excess of its capacity. *See* Kern River Gas Transmission Co., 96 FERC ¶ 61,012, at 61,045, 61,045–46 (2001). When this occurs, the pipeline must reduce each shipper's requested service. *Id.*

125 Currently, only seven states have enacted legislation or provided regulatory authority to a state agency for the transportation of CO_2 for sequestration. *See State CCS Policy*, CCS REG, http://www.ccsreg.org/billtable.php?component=Transportation (last visited Jan. 17, 2012).

126 *See* BLACK'S LAW DICTIONARY 601 (9th ed. 2009). The state may also authorize a private party to take land for a public use:

> When any holder of a certificate of public convenience and necessity cannot acquire by contract, or is unable to agree with the owner of property to the compensation to be paid for, the necessary right-of-way to construct, operate, and maintain a pipe line or pipe lines for the transportation of natural gas, . . . it may acquire the same by the exercise of the right of eminent domain in the district court of the United States for the district in which such property may be located, or in the State courts.

15 U.S.C. § 717f(h) (2006). The state action in such cases is the granting of a certificate of public convenience and necessity to the pipeline company.

127 *See, e.g.*, Abraham Bell & Gideon Parchomovsky, *The Uselessness of Public Use*, 106 COLUM. L. REV. 1412, 1423–26 (2006) (discussing the negative reactions to the Supreme Court's decision in Kelo v. City of New London, 545 U.S. 469 (2005)).

128 Kathleen Hart, *Reid Calls for FERC Eminent Domain Powers to Site Electric Transmission*, MOVEIT! MOVEIT! (Aug. 11, 2009, 6:04 PM), http://moveitmoveit.org/issue-links/reid-calls-for-ferc-eminent-domain-powers-to-site-electric-transmission.

129 U.S. CONST. amend. V.

130 *Id.*

private party if "future use by the public is the purpose of the taking."[131] Further, the U.S. Supreme Court has stated that it will not strike down a condemnation on the basis that it lacks a public use so long as the taking is rationally related to a conceivable public purpose.[132] In *Kelo v. City of New London*,[133] the Court specifically cited common carriers as examples of the proper use of eminent domain.[134]

Eminent domain authority in the pipeline context has not been uniformly established throughout the Nation. For example, the Fifth Circuit has held that eminent domain authority for interstate natural gas pipelines does not constitute taking of private property for a private use.[135] This is because the public use associated with natural gas pipelines is the supplying of natural gas to the consuming public.[136] This is true despite the fact that the state authorizes a private company to take land through eminent domain proceedings.[137] By contrast, Illinois denied the use of eminent domain to an interstate oil pipeline because there was already an adequate supply of oil being delivered into the state and thus, there was no public use for the pipeline.[138]

Most states have not addressed the eminent domain issue with respect to CO_2 pipelines.[139] The states that have addressed the issue, however, have employed various justifications. For example, in Mississippi, the right to eminent domain for a CO_2 pipeline is dependent on the pipeline being used for EOR.[140] It is doubtful that Mississippi would grant eminent domain authority for a pipeline carrying CO_2 for sequestration only. Conversely, Texas treats CO_2 pipelines as common carriers, and the state grants all common carriers the power of eminent domain.[141] Under this scheme, the end use of CO_2 is irrelevant and a CO_2 pipeline for sequestration would have the same rights

131 *Kelo*, 545 U.S. at 477 (internal quotation marks omitted).

132 Haw. Hous. Auth. v. Midkiff, 467 U.S. 229, 241 (1984).

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

134 *Id.* at 477.

135 Thatcher v. Tenn. Gas Transmission Co., 180 F.2d 644, 648 (5th Cir. 1950).

136 *See* Columbia Gas Transmission Corp. v. An Exclusive Gas Storage Easement, 578 F. Supp. 930, 933 (N.D. Ohio 1983).

137 *See supra* note 126 and accompanying text.

138 *See* Lakehead Pipeline Co. v. Ill. Commerce Comm'n, 696 N.E.2d 345, 354 (Ill. App. Ct. 1998).

139 *See State CCS Policy*, *supra* note 125 (showing that only seven states have even addressed CO_2 transportation regulation in any form).

140 MISS. CODE. ANN. § 11-27-47 (West 2011).

141 TEX. NAT. RES. CODE ANN. §§ 111.011, .013, .019 (West 2011).

as one for EOR.[142] The majority of states, however, have not addressed eminent domain in the context of CO_2 pipelines at all.[143]

This Note argues that CO_2 pipelines used for CCS are the proper subject of eminent domain. CO_2 pipelines serve a public use because they are directly tied to the national policy of promoting energy that limits the emission of greenhouse gases.[144] Because of the potential harms of global warming caused by greenhouse gases,[145] a statute granting eminent domain to CO_2 pipelines for sequestration would meet the Supreme Court's test of being rationally related to a "conceivable public purpose."[146] Therefore, there is little doubt that a state *could* grant CO_2 pipelines eminent domain authority. Without a federal regulatory regime specifically granting such authority, however, each state is left to its own discretion as to whether CO_2 pipelines *will* be granted eminent domain.

C. *Problems with the Current System of CO_2 Pipeline Regulation*

The current lack of a federal regulatory regime coupled with inconsistent state regulations creates three distinct problems that will limit the construction of CO_2 pipelines and hinder the development of CCS technology: (1) uncertainty in the regulations of CO_2 pipelines,[147] (2) a single state's ability to prevent the construction of a pipeline due to the uncertainty of eminent domain issues,[148] and (3) a single landowner's ability to either require a pipeline to incur a substantial cost or prevent the construction of the pipeline altogether because of the lack of universal eminent domain authority.[149]

First, the current state of regulation provides complete uncertainty regarding the regulation of CO_2 pipelines. Because no federal policy currently exists for CO_2 pipeline regulation, states have the

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142 *See id.*

143 *See State CCS Policy*, *supra* note 125.

144 CCSREG PROJECT, *supra* note 16, at 2.

145 *See supra* notes 2–5 and accompanying text.

146 Haw. Hous. Auth. v. Midkiff, 467 U.S. 229, 241 (1984) (analyzing the public purpose in reducing the concentration of land ownership).

147 CCSREG PROJECT, *supra* note 16, at 1 (noting the need for a workable regulatory framework); *see also* S. REP. NO. 109-78, at 8 (2005) (noting that regulatory uncertainty in electric transmission lines hinders needed infrastructure investment).

148 CCSREG PROJECT, *supra* note 16, at 5 (discussing the federal "backstop" authority for electricity transmission siting that allows a federal agency to issue a permit if a state fails to act).

149 *See* THOMAS J. MICELI & C.F. SIRMANS, THE HOLDOUT PROBLEM, URBAN SPRAWL, AND EMINENT DOMAIN 4–6 (2007), *available at* http://www.business.uconn.edu/Realestate/publications/pdf%20documents/351%20Holdout%20Problem%20and%20Urban%20Sprawl.pdf (discussing the holdout problem).

complete responsibility to determine how a pipeline should operate and the adequate rate of return for the pipeline. As discussed above, states differ in their regulation of CO_2 pipelines, with some requiring a just and reasonable rate, others imposing common carrier requirements, and still others having no current regulation at all.[150] This disparity could create a situation where a pipeline that transports CO_2 from a power plant in West Virginia to a storage reservoir in Texas would be subject to the regulations of at least six different states and have to adjust its rates and services in six different ways.[151]

Given this disparity in regulation, it is not clear how long-term capacity guaranteed under a just and reasonable system would be affected by an adjoining state requiring common carrier shippers to reduce their capacity when the pipeline is oversubscribed. For example, if a power plant has a long-term contract for capacity in West Virginia, but is subject to common carrier regulations in Ohio, there might be instances where the entire amount of CO_2 cannot be transported along the entire pipeline. This is because the common carrier restrictions would require the power plant to reduce the volume of CO_2 shipped when the pipeline in Ohio is oversubscribed. This reduction in CO_2 volume downstream, in Ohio, would lead to the underutilization of capacity upstream, in West Virginia, because, although the power plant has contracted for the necessary volume, Ohio's regulations would prevent that full volume from reaching the end point. The ultimate result is a pipeline system that is inadequate to meet the power plant's needs for CCS.

CO_2 sequestration fairs no better in states without regulation: long-term regulation of the project would be uncertain because the state could pass regulation after the pipeline is already placed into service. Additionally, pipeline customers would have no oversight agency to prevent the pipeline from taking advantage of the regulatory gap.[152] For example, if a customer did not have a long-term contract with the pipeline, the pipeline could threaten to stop operating in order to drive up the customer's rate.

In total, this lack of consistent regulation of CO_2 pipelines creates uncertainty for both pipelines and their customers. Pipelines will be unwilling to invest the large amount of capital necessary to build the

150 *See supra* Part II.B.

151 "The existing [regulatory] regime has worked for the small CO_2 pipeline system built for EOR, but is unlikely to be sufficient to support the infrastructure build out necessary for large scale commercial deployment of CCS." CCSREG PROJECT, *supra* note 16, at 1.

152 *See State CCS Policy*, *supra* note 125.

needed infrastructure without clarity relating to regulations,[153] and customers will be unwilling to commit to long-term CCS projects without reliable information concerning the total future CO_2 transportation costs.[154]

The second major problem with a lack of federal regulation of CO_2 pipelines is that a single state may prevent a pipeline from being built. As stated above, a pipeline that connects a power plant in West Virginia to a storage reservoir in Texas must cross at least six states, with each state's regulatory agency having authority to regulate the pipeline location. Should two states disagree about the location of a particular pipeline, or if a state is unwilling to permit a pipeline that does not directly provide transportation to customers within its boundaries, the entire project could be derailed.

These concerns were of particular importance in the siting of interstate electric transmission lines.[155] As a result, Congress passed section 1221 of the Energy Policy Act of 2005 ("EPAct 2005"),[156] adding section 216 to the Federal Power Act.[157] Section 216(b) provides that FERC may issue permits to construct or modify certain electric transmission facilities if a state does not have the authority to approve the siting of the facilities, the state withholds approval of the facilities, or if the state imposes conditions on the construction of facilities that make the project not economically feasible.[158] This provision shows that Congress recognized the possibility of a single state preventing the construction of necessary energy infrastructure.

The third major problem with the current regulatory environment is that, without nationwide eminent domain authority, a single landowner could cause a pipeline to incur additional expenses by rerouting the pipeline or preventing it from being built altogether.[159] Because the current regime allows each state to grant or deny eminent domain authority, there is no guarantee that a pipeline will receive the prop-

153 CCSREG PROJECT, *supra* note 16, at 5.

154 *Id.* at 3–4 (noting that no federal agency has affirmatively claimed the power to prevent rate increases in this context).

155 S. REP. NO. 109-78, at 8 (2005) ("Billions of dollars need to be invested in the national transmission grid to ensure reliability and to allow markets to function. Siting challenges, including a lack of coordination among States, impede the improvement of the electric system.").

156 Energy Policy Act of 2005, Pub. L. No. 109-58, § 1221, 119 Stat. 594, 946 (codified at 16 U.S.C. § 824p (2006)).

157 Federal Power Act § 216, 16 U.S.C. § 824p.

158 *Id.*

159 *See* Abraham Bell & Gideon Parchomovsky, *The Hidden Function of Takings Compensation*, 96 VA. L. REV. 1673, 1674 (2010); Nicole Stelle Garnett, *The Neglected Political Economy of Eminent Domain*, 105 MICH. L. REV. 101, 138 (2006).

erty rights necessary to build an entire project.[160] Further, states may find it politically difficult to claim a public use justification if the interstate pipeline does not directly benefit that particular state.[161] For example, as stated above, Mississippi ties its eminent domain authorization for CO_2 pipelines to the development of oil resources within the state.[162] Thus, if the CO_2 pipeline transported emissions from power plants in Ohio to reservoirs in Texas, the CO_2 pipeline would merely pass through Mississippi without directly providing the state with any benefits. Accordingly, the state may not grant eminent domain authority.[163]

Eminent domain is important to the promotion of new pipeline construction because it ensures that the property rights necessary to build the project will be obtainable. Without eminent domain, the pipeline project must negotiate individually with each landowner across the entire pipeline path. Although the company may be able to reroute its pipeline around recalcitrant landowners who own small parcels of land, the entire project may be stopped or the pipeline may no longer find it economically feasible to continue if an industrial landowner with thousands of acres refuses to negotiate.[164] In such cases, a federal regime with the ability to grant eminent domain in the federal interest is necessary to ensure the construction of CO_2 pipelines.

To combat these problems and promote the construction of CO_2 pipelines, CCSReg proposed an opt-in model for CO_2 pipeline regulation.[165] Specifically, CCSReg would give each pipeline the option to continue under state regulations or opt in to a federal regulatory scheme that includes both eminent domain authority and the regulation of rates and services.[166] Although the opt-in proposal would ensure that CO_2 pipelines are provided access via federal eminent domain authority, it might lead to a regulatory gap if the pipeline, whose pipes travel through states without any regulation, does not

160 CCSREG PROJECT, *supra* note 16, at 3.

161 *See, e.g.*, Lakehead Pipeline Co. v. Ill. Commerce Comm'n, 696 N.E.2d 345, 348–50, 255 (Ill. App. Ct. 1998).

162 MISS. CODE. ANN. § 11-27-47 (West 2011).

163 *See id.* However, a pipeline could attempt to claim a general benefit to the state in the overall reduction of greenhouse gas emissions nationwide.

164 For a further discussion of the economic effects regarding holdouts, see MICELI & SIRMANS, *supra* note 149, at 3–5.

165 CCSREG PROJECT, *supra* note 16, at 5–6. Other commentators have also suggested an opt-in proposal. *See, e.g.*, Nordhaus & Pitlick, *supra* note 80, at 102.

166 CCSREG PROJECT, *supra* note 16, at 5–6.

choose to opt in to the federal system.[167] In this scenario, if a pipeline does not choose to opt in to the federal system and is allowed to operate without any regulatory oversight,[168] customers would not be protected from even the most egregious business practices of the pipeline, such as a pipeline manipulating the transportation market by hiding how much capacity is actually available.[169]

Additionally, as the CO_2 pipeline network expands, there may be instances where a shipper uses multiple pipelines to get their CO_2 emissions to a storage reservoir. If each of the pipelines used by the shipper is subject to multiple regulatory regimes (because they are located in different states and subject to different state regulations or if some pipelines opt in and others do not), the shipper could face the same problems as under the current system regarding multiple regulations of rates and services. The only way to ensure that a pipeline is subject to, and the shipper is protected by, a uniform system of rules and regulations is through a federal regulatory regime that preempts all state pipeline regulations.

Therefore, Congress should adopt a comprehensive federal regulatory regime that promotes the construction of new pipelines; recognizes the national interest in a CO_2 pipeline network that promotes CCS, thus contributing to the reduction of greenhouse gas emissions; and prevents single states and landowners from stopping the construction of CO_2 pipelines.

III. FEDERAL REGULATION OF OTHER PIPELINES

Although there are no comprehensive federal regulations for CO_2 pipelines, there are federal regulations for both oil and natural gas pipelines. Analyzing these two regulatory regimes provides important insight into how the regulation of CO_2 pipelines should be conducted. In fact, many proposals for CO_2 pipeline regulation directly advocate for the implementation of similar regulations.[170]

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167 *See supra* Part II.B.

168 However, pipelines, like other businesses, would still be subject to general consumer protections, such as the antitrust laws. *See* 15 U.S.C. §§ 1–7 (2006).

169 This is a real possibility because currently only seven states provide any regulation of CO_2 pipelines. *See State CCS Policy*, *supra* note 125.

170 *See, e.g.*, CCSREG PROJECT, *supra* note 16, at 5–6 (proposing that CO_2 pipelines that opt in to the federal system be subject to rate regulation similar to that of oil pipelines); Jennifer S. Horne, *Getting from Here to There: Devising an Optimal Regulatory Model for CO_2 Transport in a New Carbon Capture and Sequestration Industry*, 30 J. LAND RESOURCES & ENVTL. L. 357, 394 (2010) (proposing that CO_2 pipelines be regulated like interstate natural gas pipelines).

A. *Natural Gas Pipelines*

FERC, pursuant to the NGA, regulates interstate natural gas pipelines.[171] With respect to the regulation of transportation rates and services, the NGA provides that all rates "shall be just and reasonable," and that the pipeline cannot grant any customer "undue preference" or subject any customer to "undue prejudice" (collectively, these terms will be referred to as "undue discrimination").[172] As interpreted by FERC, this means that the pipeline must treat similarly situated customers equally.[173] For example, FERC would not allow the natural gas pipeline to offer one customer a special short-term transportation service without giving every potential customer the opportunity to sign up for the same service. FERC possesses broad authority to determine a just and reasonable rate and to investigate the occurrence of undue discrimination.[174]

Under its current policy, FERC establishes a just and reasonable rate based on the cost of the natural gas pipeline (both initial capital investment and operating costs) and a fixed rate of return.[175] The pipeline offers this rate to all customers for all available capacity.[176] Requiring a pipeline to make all of its capacity available at the just and reasonable rate prevents the pipeline from withholding capacity to extract a higher rate from customers. FERC authority to set the rate of a pipeline ensures that the pipeline is not abusing its monopoly position.[177]

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171 *See generally* 15 U.S.C. § 717.

172 *Id.* § 717c(a)–(b).

173 *See* Williston Basin Interstate Pipeline Co., 85 FERC ¶ 61,247, at 62,026, 62,028–30 (1998). Again, it is important to note that pipelines do not own the commodity that is being transported. The pipeline merely acts as a means for getting the gas from point *A* to point *B*.

174 *See generally* 15 U.S.C. § 717c(e); *see also* Iberdola Renewables, Inc. v. FERC, 597 F.3d 1299, 1301 (D.C. Cir. 2010) (describing the different ways in which FERC enforces the just and reasonable standard).

175 *See* Pub. Sys. v. FERC, 606 F.2d 973, 978 n.24 (D.C. Cir. 1979); *cf.* Fed. Power Comm'n v. United Gas Pipeline Co., 386 U.S. 237, 243 (1967) (stating that the Federal Power Commission's—the precursor to FERC—duties include determining just and reasonable rates that are sufficient to permit a company to recover its costs and a reasonable return on investment).

176 Pipelines maintain Electronic Bulletin Boards that detail the amount of capacity available on a daily basis. *See* 18 C.F.R. § 284.8(d) (2010).

177 *See* Pub. Serv. Comm'n v. Mid-La. Gas Co., 463 U.S. 319, 327 (1983) (stating that the NGA "was enacted in response to reports suggesting that the monopoly power of interstate pipelines was harming consumer welfare"). Natural gas pipelines are considered to have monopoly power because in many market areas a single pipeline serves every customer. Apache Corp. v. FERC, 627 F.3d 1220, 1221 (D.C. Cir. 2010) (stating that "the owner of a pipeline typically possesses a monopoly in its respective region").

FERC allows the pipeline to offer its services at market-based rates when a natural gas pipeline is not a monopoly.[178] Market-based rates allow the pipeline to negotiate with customers individually to determine the rate and terms of service.[179] When determining if the pipeline lacks monopoly power, FERC examines a series of economic indicators, such as market concentration or availability of alternative pipelines.[180] If FERC finds that the pipeline lacks monopoly power, FERC authorizes the pipeline to charge market-based rates.[181]

Typically, a natural gas pipeline offers two types of service: long-term firm service and short-term interruptible service.[182] The long-term firm service is transportation capacity that a customer reserves and that takes priority over all other transportation offered by the pipeline.[183] That is, if Customer *A* signs a firm transportation agreement for a certain volume per day, the pipeline guarantees that the customer will receive that capacity.[184] Thus, unlike oil pipelines,[185] a natural gas customer can be assured that a fixed amount of capacity will be available for the length of its firm service contract. Conversely, interruptible capacity is a transportation service offered on a short-term basis that may be unavailable on any given day.[186] For example, if the firm customers of a natural gas pipeline have used all the available capacity, the interruptible customers will not be able to ship their natural gas.[187] It is not undue discrimination to refuse service to the interruptible customer while maintaining service for firm customers because interruptible customers and firm customers are not similarly situated (by the nature of their contracts).[188]

The pipeline allocates available capacity on a first-come, first-served basis.[189] As such, it is not undue discrimination to deny a cus-

178 Alternatives to Traditional Cost-of-Service Ratemaking for Natural Gas Pipelines and Regulation of Negotiated Transportation Services for Natural Gas Pipelines, 74 FERC ¶ 61,076, at 61,224, 61,234–36 (1996).

179 *Id.* at 61,226. Generally, all consumer purchases of goods and services, such as purchasing groceries, electronics, or legal advice, are done at market-based rates.

180 *Id.*

181 *Id.*

182 *See* 18 C.F.R. §§ 284.7, .9 (2010).

183 *See id.* § 284.7(a)(3).

184 Additionally, Customer *A* is required to pay for the capacity even if it is not used. Leibmann et al., *supra* note 91, at 413.

185 *See infra* Part III.B.

186 *See* 18 C.F.R. § 284.9(a)(3).

187 *Id.* § 287.9(a)(3).

188 *Id.* §§ 284.7(a)–(b), .9(a).

189 *See id.* § 284.7(a).

tomer capacity because none is available due to a prior contract.[190] However, if capacity is available, the prohibition against undue discrimination requires the natural gas pipeline to provide service to the new customer.[191] FERC also considers it to be undue discrimination if a pipeline terminates a transportation service merely because it no longer wants to provide a particular service.[192]

In addition to regulating the rates and services of interstate natural gas pipelines, FERC also permits new pipeline construction.[193] Specifically, to receive authority to construct a pipeline, the project must be in the public convenience and necessity.[194] To determine if a project is in the public convenience and necessity, FERC balances the need for the project, the impact on existing customers and pipelines, and the environmental impacts on landowners.[195] Once FERC grants a certificate to construct a pipeline, the NGA grants the natural gas pipeline the eminent domain authority needed to acquire any lands for the project.[196] There are, however, limits on the pipeline's ability to enforce its eminent domain authority. In *Transwestern Pipeline Co. v. 17.19 Acres of Property Located in Maricopa County*,[197] the Ninth Circuit held that the NGA did not give the pipeline quick-take authority.[198] Quick-take authority would allow the pipeline to gain possession of the property immediately upon receiving a certificate without going through a condemnation proceeding.[199] In light of *Transwestern Pipeline Co.*, the pipeline must secure an order of condemnation from the district court before exercising its eminent domain authority.[200]

Pipeline construction must also abide by all applicable environmental regulations, with FERC acting as the lead agency for coordinating applicable federal environmental authorizations.[201] As part of this environmental review, FERC analyzes the environmental impacts

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190 *See id.* § 284.7(b), (f).

191 *See id.* § 284.7(a), (f).

192 *See* Transcon. Gas Pipe Line Co., 129 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,255, at 62,437, 62,422–43 (Dec. 17, 2009).

193 15 U.S.C. § 717f (2006).

194 *Id.*

195 Certification of New Interstate Natural Gas Pipeline Facilities, 88 FERC ¶ 61,227, at 61,736, 61,745–50 (1999).

196 15 U.S.C. § 717f(h).

197 Transwestern Pipeline Co. v. 17.19 Acres of Prop. Located in Maricopa Cnty., 550 F.3d 770 (9th Cir. 2008).

198 *Id.* at 774.

199 *Id.*

200 *Id.* at 777.

201 15 U.S.C. § 717n(b).

of the proposed project; encourages the pipeline to communicate with relevant federal and state natural resources agencies,[202] Indian tribes, and state water quality agencies; ensures that all applicants perform the necessary studies to make an informed decision regarding the environmental impact of the project; places conditions on construction authorizations to reduce environmental impacts; and addresses concerns of impacted landowners.[203]

The natural gas model has many strengths but perhaps its greatest strength is its customer protections. Because pipelines are required to offer their services at predetermined rates, customers (or shippers) know precisely how much their transportation will cost.[204] Additionally, the requirement of no discrimination ensures that each shipper has an opportunity to get transportation services if capacity is available.[205] The natural gas regulatory model also provides shippers with great flexibility in transportation options where multiple pipelines are located near each other.[206] Because no pipeline can refuse service if capacity is available, even on a short-term basis, natural gas producers can respond quickly to changing demand and provide gas to multiple market areas.[207]

The natural gas model, however, does not ideally fit the needs of CO_2 pipelines. First, requiring the pipeline to operate at a fixed rate of return limits immediate investment because pipelines cannot maximize their profits, particularly when the pipeline is first starting up.[208] Even if FERC can establish a rate of return that is high enough to spur investment, the most effective means to determine what the precise rate of return should be is through direct negotiation between pipelines and customers (CO_2 shippers).[209] Further, because CO_2 pipelines would be located throughout the country and would vary in length and size, a single, fixed rate of return for all pipelines may be inadequate for particular projects.[210]

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202 The agencies with which a pipeline company consults vary depending on the location of a proposed project.

203 *FERC: Natural Gas: Environment*, FED. ENERGY REG. COMMISSION, http://www.ferc.gov/industries/gas/enviro.asp (last updated June 28, 2010).

204 *See supra* notes 172–76 and accompanying text.

205 *See supra* notes 172–76 and accompanying text.

206 *See supra* notes 178–81 and accompanying text.

207 *See* 18 C.F.R. § 284.7(a), (f) (2010).

208 *See infra* Part IV.A.

209 *See infra* Part IV.A.

210 *See supra* notes 76–84 and accompanying text.

Unlike the natural gas pipeline system, which has been built over many decades,[211] reduction in greenhouse gas emissions must occur in the very short term given EPA's recent commitment to regulate greenhouse gases under the Clean Air Act.[212] Limiting the return on investment with a cost-based rate will not promote the immediate investment in new CO_2 pipelines that is needed.[213] Second, the flexibility that FERC's regulations allow with respect to responding to different markets is not applicable to CO_2 pipelines. For CCS projects, prior to construction, transportation customers will know how much CO_2 will be transported and where it will be going because, unlike natural gas, the CO_2 shippers are not responding to changing market conditions.[214] The CO_2 shipper will be transporting a fixed amount of CO_2 every day to a particular sequestration reservoir.[215] Conversely, natural gas shippers often transport gas to various market areas depending on the demand and price of natural gas at a given location.[216] Regulatory rules that allow for short-term transportation contracts to respond to market demand would be burdensome and unnecessary.

B. Oil Pipelines

FERC regulates interstate oil pipelines as common carriers pursuant to 49 U.S.C. § 60502.[217] Common carriers are required to charge equal rates for like services.[218] For example, if Customer *A* wants to transport 100 barrels of oil from Houston, Texas, to Austin, Texas, the pipeline must charge the same rate for any other customer that wants to transport CO_2 along the same route.

Oil pipelines must provide their services at reasonable rates and charge all shippers the same rate for the service.[219] The initial rate for

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211 Natural Gas Act of 1938, ch. 556, 52 Stat. 821 (codified as amended at 17 U.S.C. §§ 717–717z (2006)) (establishing federal regulation of interstate natural gas pipelines).

212 *See supra* notes 26–27 and accompanying text.

213 *See infra* Part IV.A.

214 *See supra* Part I.B–C.

215 *See supra* Part I.B–C.

216 Alternatives to Traditional Cost-of-Service Ratemaking for Natural Gas Pipelines and Regulation of Negotiated Transportation Services for Natural Gas Pipelines, 74 FERC ¶ 61,076, at 61,224, 61,233–35 (1996).

217 49 U.S.C. § 60502 (2006).

218 18 C.F.R. § 341.3(b)(7) (2010). For example, Texas law states, "No common carrier in its operations as a common carrier may charge, demand, collect, or receive either directly or indirectly from anyone a greater or lesser compensation for a service rendered than from another for a like and contemporaneous service." TEX. NAT. RES. CODE ANN § 111.017(a) (West 2011).

219 *See* 18 C.F.R. § 341.3(b)(7)–(8).

a pipeline is established by one of two methods.[220] First, an oil pipeline may file a cost-of-service rate.[221] This is similar to the just and reasonable rate of natural gas pipelines.[222] Second, a pipeline can use the negotiated rate of a nonaffiliated shipper.[223] The pipeline simply files an affidavit stating that the nonaffiliated shipper agreed to a particular rate and that it is the initial rate.[224] If another shipper protests this negotiated rate, the pipeline must file a cost-of-service rate.[225] Establishing rates in this manner ensures that the pipeline offers services at either a cost-based rate or at a rate that customers are willing to pay.

This initial rate is called the Index Ceiling.[226] The oil pipeline may charge any rate at or below the Index Ceiling.[227] The rate that the pipeline charges can vary throughout the year so long as it does not exceed the Index Ceiling.[228] FERC adjusts the Index Ceilings annually using a multiplier based on an economic index.[229] If a company cannot economically operate a pipeline at the Index Ceiling, it may file for a higher rate in two ways. First, the pipeline may make a new "cost of service" filing to establish the new Index Ceiling.[230] Second, it may file a rate that has been agreed to by all current shippers.[231] The agreed-upon rate would then establish the new Index Ceiling.[232]

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220 Rates for pipelines operating prior to 1992 were established to be just and reasonable by law. *See* Revisions to Oil Pipeline Regulations Pursuant to the Energy Policy Act of 1992, 58 Fed. Reg. 58,753, 58,756 (Nov. 4, 1993) (codified at 18 C.F.R. pts. 341–47, 360, 361, 374). For pipelines not yet in operation, regulations provide pipelines the option of two methodologies to set initial rates. 18 C.F.R. § 342.2. Additionally, similar to market-based rates for natural gas transportation, oil pipelines may establish market-based rates if they are found to lack market power. *Id.* § 342.4(b).

221 18 C.F.R. § 342.2(a).

222 *See supra* Part III.A.

223 18 C.F.R. § 342.2(b). A nonaffiliated shipper is a pipeline customer that is not directly or indirectly controlled by the same parent company. *See id.* § 352. For example, Calnev Pipe Line LLC is affiliated with shippers, BP West Coast Products LLC and Chevron Products Company. BP W. Coast Prods. LLC v. SFPP, L.P., 121 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,239, at 61,150, 61,150–51 (Dec. 7, 2007).

224 18 C.F.R. § 342.2(b).

225 *Id.*

226 *See id.* § 342.3(d).

227 *Id.* § 342.3(a). The oil pipeline may charge below the Index Ceiling to attract more customers where the market is competitive.

228 *See id.*

229 *Id.* § 342.3(d).

230 *Id.* § 342.4(a).

231 *Id.* § 342.4(c). As discussed below, because capacity is allocated every thirty days, the list of current shippers may vary depending on when the pipeline files.

232 *Id.* § 342.4.

Unlike natural gas transportation, oil pipelines do not provide transportation on a first-come, first-served basis.[233] Typically, shippers request service thirty days in advance.[234] If shippers nominate more volume than the line can carry, the pipeline operator allocates space in a nondiscriminatory manner, usually on a pro rata basis, also called apportionment.[235] Therefore, the oil pipeline reduces the transportation volume of each shipper.[236] Thus, unlike natural gas pipelines,[237] oil pipeline shippers cannot establish long-term contracts for transportation services—everything is done based on the thirty-day nominations.[238] Additionally, because FERC does not regulate the construction or abandonment of oil pipelines, the pipeline has complete discretion to provide a new service, establish an initial service, or terminate an existing service.[239]

Finally, there is no federal authority granting oil pipelines eminent domain.[240] Although many states provide eminent domain authority to interstate oil pipelines, some states have not granted eminent domain because of a lack of public use.[241]

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233 *See* Texaco Pipeline Inc., 74 FERC. ¶ 61,071, at 61,200, 61,201 (1996) (rejecting a pipeline's proposal to give preferential treatment to shippers that contract with the pipeline in advance); *see also* ALLEGRO ENERGY GRP., HOW PIPELINES MAKE THE OIL MARKET WORK—THEIR NETWORKS, OPERATION AND REGULATION 14 (2001), *available at* http://www.pipeline101.com/reports/Notes.pdf.

234 *See, e.g.*, SUNOCO PIPELINE L.P., CRUDE PIPELINE SYSTEM NOMINATION PROCEDURES 2–3 (2009).

235 *See, e.g., id.* at 3; *see also* ALLEGRO ENERGY GRP., *supra* note 233, at 14.

236 Apportionment is generally conducted on a historic pro rata basis rather than on an equitable basis. *See, e.g.*, Explorer Pipeline Co., 87 FERC ¶ 61,374, at 62,384, 62,387 n.14 (1999). That is, the apportionment is based on a shipper's yearly nominations instead of simply lowering all shippers' nominations by a required percentage. *Id.*

237 *See supra* note 183 and accompanying text.

238 However, FERC has recently allowed pipelines to establish firm transportation (not subject to apportionment) for oil shippers on pipeline expansions to facilitate the construction of new infrastructure. TransCanada Keystone Pipeline, LP, 125 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,025, at 61,074, 61,076–77 (Oct. 8, 2008). FERC's approval of firm transportation is based on the determination that shippers making term and volume commitments were not similarly situated to uncommitted shippers and on the determination that all potential shippers had the opportunity through the open-season process to make such term and volume commitments. *Id.* This is very similar to how natural gas transportation operates, but is limited to expansion of existing pipelines. Additionally, FERC requires that approximately ten percent of the capacity be set aside for new shippers with the normal apportionment procedure. *Id.*

239 Unlike natural gas pipelines, an oil pipeline may terminate a service so long as it is not unduly discriminatory. *See supra* note 192 and accompanying text.

240 Christopher J. Barr, *Growing Pains: FERC's Responses to Challenges to the Development of Oil Pipeline Infrastructure*, 28 ENERGY L.J. 43, 49–50 (2007).

241 *Id.*

The biggest strength of common carrier regulation is that it allows new transportation customers to gain service. Unlike natural gas, where firm service contracts typically last several years, oil pipelines offer transportation every thirty days. Thus, a new oil producer only has to wait thirty days to gain access to transportation to get its product to the market. Additionally, the common carrier regulation provides pipelines with more flexibility regarding the rates that can be charged. Rather than only being able to offer service at cost-based rates, the pipeline is freer to negotiate maximum rates with customers.

The common carrier model, however, would not be an ideal way of regulating CO_2 pipelines. First, the thirty-day nomination procedure would not ensure power plants that their CO_2 could be transported long term. This would be problematic because, unlike oil producers, power plants could not slow down the production of CO_2 based on available transportation, nor could the power plant simply store the CO_2 in tanks until capacity becomes available.[242] Moreover, each power plant must design its system in advance with the appropriate equipment to capture CO_2.[243] Therefore, the most important feature of any CO_2 pipeline system would be its reliability in carrying the power plant's emissions. Additionally, even though establishing a transportation rate through customer negotiation would be positive for CO_2 pipeline development, the ability of customers to ensure a cost-of-service rate would prevent the development of CO_2 pipelines because customers would have no incentive to negotiate a rate above the cost-of-service rate. This could limit the development of CO_2 pipelines because the pipeline companies might not get an adequate return on their investment.

Finally, as with oil pipelines, a lack of federal eminent domain authority might prevent the immediate development of a CO_2 pipeline network. For example, Illinois's decision to deny eminent domain authority to an oil pipeline resulted in the termination of the proposed project.[244] Although the pipeline may not have given any specific pub-

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242 A 1000 megawatt coal-fired power plant produces 18,240 metric tons of CO_2. *See* RUBIN, *supra* note 25, at 7. To store one day's worth of emissions on site, the power plant would be required to have a tank approximately 1000 meters wide and 4000 meters tall. *See Liquid Carbon Dioxide (CO2) Storage Tank Specifications*, UNIVERSAL INDUS. GASES, INC., http://www.uigi.com/co2tanks.html (last visited Jan. 17, 2012) (scaling up the size of a fifty-ton tank proportionally).

243 *See* Didier Favreau, *Economics Act Against CCS Retrofits*, OIL & GAS J., Oct. 4, 2010, at 106.

244 *See* Lakehead Pipeline Co. v. Ill. Commerce Comm'n, 696 N.E.2d 345, 354 (Ill. App. Ct. 1998).

lic use to the citizens of Illinois, an increase in the available oil supplies would have benefited the country as a whole. This case is analogous to a CO_2 pipeline that is transporting CO_2 through a state, but not necessarily providing that particular state a direct benefit. Preventing the construction of these projects would severely hinder the development of a CO_2 pipeline network.

It is important to recognize the differences between CO_2 transportation and the transportation of other commodities such as oil and gas. The most effective regulation of CO_2 pipelines should adapt the most advantageous practices of current regulatory schemes in a way that recognizes the pressing need for the development of a CO_2 pipeline network.

IV. PROPOSAL FOR A NEW REGULATORY SCHEME FOR CO_2 PIPELINES

To promote the construction of CO_2 pipelines, Congress should pass legislation that (1) allows CO_2 pipelines to charge market-based rates despite the pipeline's monopoly power, (2) provides for certain customer protections that would prevent the pipeline from taking advantage of its monopoly power, (3) grants eminent domain authority for constructing CO_2 pipelines, and (4) allows FERC to enforce the legislation. This regulatory framework would promote the construction of CO_2 pipelines by providing the necessary incentives to ensure investment in pipeline infrastructure.

A. Market-Based Rates

Market-based rates for transportation services create an incentive to build a CO_2 pipeline infrastructure that is necessary for the development of CCS projects. This is particularly true as pipeline infrastructure first begins to be built because market-based rates ensure an adequate return on investment. For example, when the first CO_2 pipelines are built for CCS, it would be unlikely that the entire capacity of the pipelines would be utilized right at the start. This is because pipelines are "overbuilt" to allow for future expansion as new sources of supply come online.[245] Rather, as more CCS projects are developed, the pipeline would "fill up" over time until it reached its maximum capacity. If pipelines were only allowed to charge a cost-based

245 For example, Equitrans, LP, a natural gas pipeline, recently proposed a new pipeline project in which less than half of the capacity was sold. *See* Equitrans, L.P.'s Request for Prior Notice Authorization Pursuant to Blanket Certificate, No. CP12-13-000 (Fed. Energy Regulatory Comm'n filed Nov. 5, 2011).

rate—a fixed rate based on their cost of service and available capacity—the underutilization in the early operations of the project would result in either a low rate of return or an outright loss. Therefore, it is important that the pipeline be allowed to negotiate with each customer to determine a rate that ensures that the pipeline would receive an adequate return on investment in both the short and long term. Market-based rates would essentially allow the pipeline and customers to negotiate rates and terms that benefit both parties.

Congress passed similar legislation regarding needed energy infrastructure in the EPAct 2005.[246] In the EPAct, Congress added section 4(f) to the NGA to promote the construction of new natural gas storage infrastructure.[247] Section 4(f) provides FERC with the ability to grant a storage company authority to charge market-based rates even in instances where the company has monopoly power.[248] FERC, however, must find that the project's customers are adequately protected.[249] Section 4(f) has been very successful at promoting the construction of new storage infrastructure. Between January 2008 and May 2011, FERC has approved the construction of 59.6 billion cubic feet ("Bcf") of new natural gas storage to companies that possess market power.[250] Of this, forty-five percent was approved using market-

246 Energy Policy Act of 2005, Pub. L. No. 109-58, § 312, 119 Stat. 594, 688 (codified at 15 U.S.C. § 717c(f) (2006)).

247 *Id.*

248 *Id.*

249 *Id.*

250 *See* Centerpoint Energy-Miss. River Transmission Corp., No. CP11-51-000, 2011 WL 1519145 (F.E.R.C. Apr. 21, 2011) (approving 1.2 Bcf of capacity at cost-based rates); N. Natural Gas Co., No. CP10-449-000, 2011 WL 1164317 (F.E.R.C. Mar. 30, 2011) (approving 2.0 Bcf of capacity at cost-based rates); Natural Gas Pipeline Co. of Am., LLC, No. CP10-452-000, 2010 WL 4144238 (F.E.R.C. Oct. 21, 2010) (approving 0.5 Bcf of capacity at cost-based rates); S. Star Cent. Gas Pipeline, Inc., No. CP10-2-001, 2010 WL 4144221 (F.E.R.C. Oct. 21, 2010) (approving 1.4 Bcf of capacity under section 4(f)); Colo. Interstate Gas Co., 132 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 62,207, at 64,573 (Sept. 30, 2010) (approving 0.9 Bcf of capacity at cost-based rates); Tex. Gas Transmission LLC, 132 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,227, at 62,274 (Sept. 16, 2010) (approving 4.1 Bcf of capacity at cost-based rates); S. Star. Cent. Gas Pipeline, Inc., 131 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,154, at 61,674 (May 20, 2010) (approving 2.6 Bcf of capacity under section 4(f)); Kinder Morgan Interstate Gas Transmission LLC, 128 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 62,233, at 64,671 (Sept. 30, 2009) (approving 1.2 Bcf of capacity at cost-based rates); Dominion Transmission, Inc., 128 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 62,153, at 64,457 (Sept. 1, 2009) (approving 0.1 Bcf of capacity at cost-based rates); Columbia Gas Transmission Corp., 126 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,237, at 62,325 (Mar. 19, 2009) (approving 6.7 Bcf of capacity under section 4(f)); Natural Gas Pipeline Co. of Am., 124 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,154, at 61,764 (Aug. 11, 2008) (approving 10 Bcf of capacity at cost-based rates); Colo. Interstate Gas Co., 123 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,099, at 61,712 (Apr. 30, 2008) (approving 7.0 Bcf of capacity at cost-based rates); N. Natural Gas Co., 122 Fed. Energy Reg. Comm'n Rep. (CCH)

based rates under section 4(f).[251] Further, when including natural gas storage projects from providers that do not possess monopoly power, over ninety percent of all natural gas storage approved by FERC since 2008 has been granted authority to charge market-based rates.[252] This experience shows that providing companies with the opportunity to charge market-based rates would promote the construction of new projects and quickly develop the needed pipeline infrastructure.[253]

Additionally, market-based rates authority addresses a key problem with the current regulatory system. As discussed previously, CO_2 pipelines are currently subject to multiple regulation regimes from each state, making it more difficult to determine what the overall rate would be for a transportation service that crosses multiple states.[254] Congressional establishment of market-based rates for all CO_2 pipelines would preempt state regulation and allow the pipelines and customers to negotiate transportation rates across the entire pipeline.

B. Customer Protection

The authority to negotiate rates directly with customers requires an adequate form of customer protection to ensure that the pipeline does not take advantage of customers. Although the exact contours of what amounts to customer protection should be left to FERC, there are several requirements that Congress should mandate as minimum protections.[255]

¶ 61,227, at 62,267 (Mar. 12, 2008) (approving 8.0 Bcf of capacity under section 4(f)); Tex. Gas Transmission, LLC, 122 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,190, at 62,100 (Feb. 29, 2008) (approving 8.2 Bcf of capacity under section 4(f)); Columbia Gas Transmission Corp., 122 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,021, at 61,098 (Jan. 14, 2008) (approving 5.7 Bcf of capacity at cost-based rates).

251 *See S. Star Cent. Gas Pipeline, Inc.*, No. CP10-2-001, 2010 WL 4144221 (F.E.R.C. Oct. 21, 2010) (1.4 Bcf); *S. Star. Cent. Gas Pipeline, Inc.*, 131 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,154, at 61,674 (May 20, 2010) (2.6 Bcf); *N. Natural Gas Co.*, 122 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,227, at 62,267 (8.0 Bcf); *Tex. Gas Transmission, LLC*, 122 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,190, at 62,100 (8.2 Bcf); *Columbia Gas Transmission Corp.*, 126 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 61,237, at 62,325 (6.7 Bcf).

252 *See* FED. ENERGY REGULATORY COMM'N, CERTIFIED STORAGE PROJECTS SINCE 2000 FOR EXPANSION OF OR NEW CAPACITY (2011), *available at* http://www.ferc.gov/industries/gas/indus-act/storage/certificated.pdf.

253 This is especially true in instances where a regulatory body is able to impose customer protections along with market-based rates. Without these protections, the company's monopoly power could take advantage of customers.

254 *See supra* Part II.B.

255 Because neither this Note nor Congress can envision every situation that may arise, allowing FERC to establish its own rules for customer protection would allow the agency to quickly adapt to new tactics that a pipeline might use to take advantage of customers.

First, Congress should require that pipelines give customers the option to renew their initial contracts at a rate adjusted for inflation. The initial contract between a pipeline and a customer would be negotiated prior to the construction of the pipeline and would be the most accurate indication of the rate that would be necessary for a pipeline to invest in the infrastructure. Additionally, prior to the pipeline being built, the customer would have maximum bargaining power because it could negotiate with several companies who are considering investing in a CO_2 pipeline. For example, there are more than 100 interstate natural gas pipeline companies operating in the United States[256] and many of them serve the same market areas.[257] Therefore, allowing the customer to continue at this initial rate would ensure both that the pipeline would be making an adequate return on investment and that the customer would be charged a rate that was negotiated when the customer had adequate bargaining power. Further, providing the customer with the option to renew the contract would prevent the pipeline from extorting an even higher rate after the customer had designed its power plant in reliance on the transportation capacity. Finally, as more pipelines are built, customers would have more options regarding transportation services. This competition for customers among the pipelines would drive down transportation prices in the long term and limit the ability of the pipeline to take advantage of its monopoly power. Therefore, although a pipeline customer would have the option to renew its contract, it could still refuse to renew if it could find a better rate with a competing pipeline.

Second, if there is available capacity on a pipeline, the pipeline operator should be required to set up periodic auctions for the available capacity. The pipeline, however, should be allowed to set the minimum rate and length of contract for qualifying bids. The auction would serve three important purposes. First, it would notify potential customers of available capacity and the rate that the pipeline believes would be needed to provide an adequate return on investment. This would promote transparency in information available to customers and prevent pipelines from operating in a discriminatory manner. Second, the auction would provide a starting point to begin negotiations between customers and the pipeline if no party agreed to the

256 *See eTariff Company List*, FED. ENERGY REG. COMMISSION, http://www.ferc.gov/about/offices/oemr/oemr-div/alletariffentities.pdf (last updated Jan. 6, 2012) (listing companies regulated by FERC under the NGA).

257 *See generally* U.S. DEP'T. OF ENERGY, ABOUT U.S. NATURAL GAS PIPELINES (2007), *available at* http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/fullversion.pdf (describing the interstate pipeline system and including regional maps).

terms that the pipeline initially requested. Last, the auction procedure would provide the pipeline with the assurance that it would not be required to offer transportation services at rates that would not ensure an adequate return on investment.

Third, the legislation should provide customers with a method to challenge the practices of the pipeline to ensure that the pipeline is not purposefully manipulating the CO_2 transportation market. Purposeful manipulation would consist of a pipeline operating its system in a manner to extort higher rates from customers. Specifically, the legislation should allow customers and potential customers to file a complaint to FERC regarding the activity of a pipeline. FERC should be given significant leeway and investigative powers in determining if a purposeful manipulation has occurred. Although this Note cannot discuss every practice that would be considered purposeful manipulation, one particular example might be helpful. If a pipeline were to purposely schedule its maintenance at times when its customers were in the most need of CO_2 transportation[258] and try to extract a higher fee in exchange for delaying the maintenance activity, the pipeline would be guilty of purposefully manipulating the transportation market.

Allowing a pipeline to charge market-based rates for its transportation service would promote the development of needed pipeline infrastructure. Additionally, Congress could significantly mitigate the potential abuses of market-based rates by adding customer protections such as renewal rights, auction procedures, and a prohibition on purposeful manipulation.

C. *Eminent Domain*

Regulatory legislation should grant the pipeline eminent domain authority for the property necessary to construct and operate the pipeline to ensure that single states or single landowners cannot prevent the development of needed CO_2 pipelines. The pipeline, however, should be required to pay a fixed percentage above market value for any land rights taken through eminent domain. This would result in a balanced treatment of CO_2 pipelines—the benefit of market-

258 For example, a power plant may have more of a need for transportation capacity at the end of a month or year in order to comply with the emission requirements of the Clean Air Act. *See* 42 U.S.C. §§ 7401–7431 (2006).

based rates and the penalty of having to pay higher than market value in eminent domain proceedings.[259]

Granting pipelines a right to eminent domain would effectively prevent two of the major problems with the lack of comprehensive federal regulation. First, eminent domain applies to not only individual landowners, but states as well. Therefore, once FERC approves a project under the federal regulation, neither a state nor a landowner could hold out and prevent the pipeline from being built. Rather, the pipeline would institute a state court proceeding to gain title to the land that is necessary for construction.

In addition, the requirement that pipelines pay a fixed rate above market value in eminent domain proceedings would encourage both the landowner and the pipeline to settle without resorting to eminent domain proceedings in court. Eminent domain power would guarantee that the necessary land would be taken and all that would be left to negotiate would be money. Pipelines would have the incentive to deal honestly with landowners to avoid the costs associated with litigating an eminent domain proceeding in state court. With the knowledge that the landowner would receive higher than market value, the pipeline would be more willing to offer higher settlements, which might induce landowners to settle more quickly. Additionally, requiring pipelines to pay higher than market value would promote settlement with landowners because landowners would be more likely to feel that they were receiving an adequate price for their property.

Finally, Congress should specify the fixed percentage above market value. In determining what the exact percentage would be, Congress should evaluate the following two factors: (1) the point at which the cost of land acquisition prohibits the development of CO_2 pipelines and (2) the percentage that will make land owners want CO_2 pipelines built on their property. By examining the first factor, Congress would ensure that the purpose of the regulatory regime—building CO_2 pipelines—would not be undermined by requiring the pipeline to pay too much in land acquisition costs. The second factor serves two purposes. First, it would ensure that the public fully supports the construction of a CO_2 pipeline network because landowners who are most affected would be more likely to want a pipeline built on their property. Second, it would promote settlement prior to any eminent domain proceeding because the pipeline would have an incentive not to go through a court proceeding, and the landowner

259 *See* Garnett, *supra* note 159, at 142–43 (discussing higher compensation for eminent domain).

would be compensated in an amount that he considered fair. Further, promoting settlement prior to eminent domain proceedings would promote the overall purpose of the legislation—the construction of a CO_2 pipeline network.

D. Federal Energy Regulatory Commission as the Lead Agency

Because no federal agency currently has jurisdiction over CO_2 pipelines, Congress should give FERC jurisdiction over the administration of the new regulatory regime for CO_2 pipelines due to its expertise in pipeline regulation.[260] FERC should be given responsibility over the environmental aspects of siting a pipeline, as well as limited authority regarding a pipeline's operations. This would ensure that the pipeline complied with the protections that the regulatory regime would provide.

The main responsibility of FERC would be to conduct an environmental review of the proposed pipeline prior to construction. As with natural gas pipelines,[261] FERC environmental review would consist of examining the proposed project to ensure that the pipeline operator obtained the appropriate permits and complied with all applicable federal and state law. Additionally, during the review process, landowners and state agencies would have the opportunity to comment on the proposed pipeline construction plan. Based on these comments, FERC and the pipeline operator could make minor variations in the route to accommodate the comments, if necessary. Finally, FERC would monitor the pipeline throughout the construction process to ensure that the pipeline was complying with all permitting conditions and environmental laws.

Once the pipeline is operating, FERC would have limited regulatory responsibility over the pipeline.[262] For example, FERC would have certain reporting requirements that ensure that a pipeline operator is complying with the customer protection requirements (both congressionally mandated and FERC-developed), but no comprehensive review of pipeline operations. The pipeline operator would have to notify FERC of all pipeline outages due to maintenance to ensure no purposeful manipulation was occurring. Additionally, the pipeline op-

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260 *See supra* Part III.

261 *See* 15 U.S.C. § 717n(b) (2006).

262 Safety compliance of the CO_2 pipeline while in operation would be the responsibility of the Department of Transportation as is the case for all other pipelines. *See PHMSA and Pipelines FAQs*, U.S. DEPARTMENT TRANSP., http://www.phmsa.dot.gov/about/faq (follow "PHMSA and Pipelines FAQs" hyperlink) (last updated Aug. 29, 2007).

erator would provide FERC with reports regarding the amount of capacity that was transported to ensure the pipeline was properly reporting the amount of available capacity. The other aspect of FERC oversight relates to complaints filed by a customer or potential customer against the pipeline. As discussed above, in this case, FERC would have broad investigative and remedial powers to adjudicate such claims. For example, FERC would have the power to compel pipelines to provide documents and information necessary to investigate a claim and fashion the appropriate monetary penalties to ensure that the pipeline complied with the customer protection requirements. This form of light-handed regulation would serve to decrease the burden on pipeline companies while still ensuring that the transportation customers have adequate means of protecting themselves.

FERC is the ideal agency to administer these regulations because it has extensive expertise and experience in regulating pipelines associated with the energy industry. Currently, FERC is responsible for both the siting and economic regulation of all interstate natural gas transportation projects and the economic regulation of interstate oil pipelines. This experience would be invaluable as the administrative agency works through issues regarding the siting of new CO_2 pipelines. For example, FERC environmental staff routinely deals with landowner complaints and works with both the pipeline and landowner to resolve specific issues.[263] Additionally, FERC's experience regulating the rates and terms of service of both oil and natural gas pipelines would be invaluable when setting up a comprehensive set of administrative regulations to ensure that CO_2 pipeline customers were adequately protected. Finally, FERC's enforcement division investigates complaints from pipelines and customers. Therefore, rather than creating a new agency, Congress should rely on FERC's expertise and allow it to lead in the area of CO_2 pipelines.

CONCLUSION

In order to mitigate the most drastic effects of climate change while continuing to utilize coal resources in the United States, CCS projects must be implemented immediately. However, regardless of how many power plants are capable of capturing greenhouse gas emissions, the benefits of CCS will not be realized without the construction of a vast network of CO_2 pipelines. The most effective way for Con-

263 *See, e.g.*, FED. ENERGY REGULATORY COMM'N, AN INTERSTATE NATURAL GAS FACILITY ON MY LAND? (2010), *available at* http://www.ferc.gov/for-citizens/citizen-guides/citz-guide-gas.pdf.

gress to promote the construction of new CO_2 pipelines is through a regulatory regime that (1) allows CO_2 pipelines to charge market-based rates, (2) protects pipeline customers from abuses of the market-based rates authority, (3) grants eminent domain authority for constructing CO_2 pipelines, and (4) allows FERC to enforce the legislation. In so doing, Congress would encourage the development of a technology that fully takes advantage of the United States' natural resources while protecting against the environmental harms caused by climate change.