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COMMENT

DEEP IN THE HEART OF TEXAS: HOW CARBON SEQUESTRATION WILL AFFECT VALUATION OF THE SUBSURFACE

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The purpose of this Comment is to examine substantive and procedural legal issues surrounding the valuation of the subsurface in Texas, with a particular emphasis on how such valuation will affect, and be affected by, large-scale geological sequestration of carbon dioxide. This Comment also addresses the kinds of claims available to property owners wishing to recover for the use of their subsurface, with a particular focus on how Texas practitioners can circumvent the current trend toward non-recognition of a claim for subsurface trespass.

For practical reasons,[1] this Comment assumes: (1) climate change is occurring; (2) greenhouse gas (GHG) emissions, carbon dioxide in particular, contribute in a significant way to climate change; and (3) efforts

1. Those practical reasons include convenience, clarity, and conventional wisdom. Perhaps this assumption is also practical because most Americans (70% according to one recent study) hold this belief. *Climate Change in the American Mind: Americans' Global Warming Beliefs and Attitudes in September 2012*, YALE PROJECT ON CLIMATE CHANGE COMMUNICATION 3 (Sept. 2012), *available at* http://environment.yale.edu/climate-communication/files/Climate-Beliefs-September-2012.pdf. In addition, most Americans now believe climate change is caused by human activities, and, for an added sense of urgency, about 40% believe that global warming will harm them personally, their family, and/or others in their community. *Id.*

to reduce carbon dioxide emissions will be of paramount importance in every sector of our economy and society in the near future.[2]

It would be impossible, or at least incomplete, to attempt a discussion of the legal implications of carbon capture and geological sequestration without first acknowledging the elephant in the courtroom—the tense and contentious political milieu of climate change policy. Congressional opposition to attempts to regulate the energy industry also has a presence in the courts, discouraging the creation of legal precedent that might force the Environmental Protection Agency (EPA) or other agencies to regulate GHG emissions.[3] If no emissions caps are implemented due to a political stalemate, the outlook for the future climate appears rather dire.

INTRODUCTION: THE CLIMATE CHANGE POLICY DEBATE

Most scientists and the world community generally accept that global warming is a worldwide problem that must be addressed immediately, with urgency, and on a far-reaching scale if any efforts to reduce GHG emissions are to have an ameliorative effect on climate change.[4] The United States, despite making substantial investments in climate change

2. *See UN Climate Talks and Power Politics—It's Not About the Temperature: Hearing Before the Subcomm. on Oversight and Investigations and Comm. on Foreign Affairs*, 112th Cong. 35–43 (2011) (statement of Elliot Diringer, Vice President for International Strategies, Pew Center on Global Climate Change), *available at* https://www.hsdl.org/?view&did=705087 (speaking about environmental, security, and economic risks associated with climate change).

3. *See* Native Vill. of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 857–58 (9th Cir. 2012) (dismissing the suit because the Clean Air Act limited standing to bring such a claim to the EPA). The trend among courts, when hearing a challenge to a particular utility's carbon emissions, is to deny standing because the plaintiff should instead bring a citizen's action against the EPA to challenge its permitting decisions. In this way, courts may kick the can down the road, so to speak, to the EPA. *See, e.g., id.* (finding an avenue for recovery of damages); La. Envtl. Action Network v. McDaniel, No. CIV.A.06-4161, 2008 WL 803407 at *3–4 (E.D. La. Mar. 12, 2008) (discussing alternative causes of action).

4. *Advancing the Science of Climate Change*, NAT'L ACAD. OF SCI. 1–5 (2010), *available at* http://www.nap.edu/catalog.php?record_id=12782 ("[T]here is a strong, credible body of evidence, based on multiple lines of research, documenting that climate is changing and that these changes are in large part caused by human activities . . . ."); *UN Climate Talks and Power Politics—It's Not About the Temperature: Hearing Before the Subcomm. on Oversight and Investigations and Comm. on Foreign Affairs*, 112th Cong. 35–43 (2011) (statement of Elliot Diringer, Vice President for International Strategies, Pew Center on Global Climate Change), *available at* https://www.hsdl.org/?view&did=705087 (observing that the formulation of domestic energy policy should recognize climate change as a global threat); *see Background on the UNFCCC: The International Response to Climate Change*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/essential_background/items/6031.php (last visited Nov. 2, 2013) (noting the consequences of climate change are not merely for the environment, but further implicate "poverty, economic development, population growth, sustainable development[,] and resource management").

research[5] and regularly participating in global climate discussions, has maintained a cagey wait-and-see posture—stopping just shy of joining other world leaders in committing to a binding framework of GHG emissions-reduction goals.[6] Beginning in the 1990s, while the global community began to recognize global warming as a legitimate threat to the world's environment, economy, and society and started to take action to address climate change,[7] the United States' domestic energy policy-makers steadily thwarted efforts to purposefully regulate GHG emissions, including carbon dioxide—the worst offender in the GHG pantheon.[8]

Some of the biggest polluters, stationary power sources,[9] are releasing unrestricted quantities of carbon dioxide into the atmosphere—subject

5. *See* American Recovery and Reinvestment Act of 2009, Pub. L. No.111–5, 123 Stat. 115 (codified as amended in scattered sections of 19 U.S.C., 26 U.S.C., and 42 U.S.C.) (earmarking roughly $80 billion for research, development, and implementation of clean and efficient energy initiatives). *But see* Jenna Goodward, Alexander Perera, Nicholas Bianco & Christina Heshmatpour, *Is the Fit Right?: Considering Technological Maturity in Designing Renewable Energy Policy*, WORLD RESEARCH INST. ISSUE BRIEF (World Research Inst., D.C.), June 2011, at 3, *available at* http://pdf.wri.org/is_the_fit_right.pdf (commenting that "[a]ccording to the International Energy Agency, the United States was the world leader in renewable energy [research and development] investment from 1990 to 2006 (in total dollars spent)," with the investment peaking in 2009 at near all-time high investment levels; but in the three following years, funding has decreased).

6. John M. Broder, *Obama to Go to Copenhagen with Emissions Target*, N.Y. TIMES (Nov. 26, 2009), http://www.nytimes.com/2009/11/26/us/politics/26climate.html?_r=0&pagewanted=print (criticizing Congress because it "has never enacted legislation that includes firm emissions limits or ratified an international global warming agreement with binding targets"); *see* Richard Harris, *Ahead of Climate Talks, U.S. Leadership In Question*, NAT'L PUB. RADIO (Nov. 28, 2011), http://www.npr.org/2011/11/28/142714839/ahead-of-climate-talks-u-s-leadership-in-question (referring to "the 20-year-long struggle to develop a meaningful climate treaty").

7. *UN Climate Talks and Power Politics—It's Not About the Temperature: Hearing Before the Subcomm. on Oversight and Investigations and Comm. on Foreign Affairs*, 112th Cong. 35–43 (2011) (statement of Elliot Diringer, Vice President for International Strategies, Pew Center on Global Climate Change), *available at* https://www.hsdl.org/?view&did=705087 (highlighting the history of American involvement with global climate change initiatives, starting with President George H.W. Bush signing the United Nations Framework Convention on Climate Change in 1992, the subsequent refusal by Congress to adopt the Kyoto Protocol in 1997, and the failure to formally adopt the Copenhagen Accord in 2009—largely due to the lack of a firm U.S. commitment to emissions targets).

8. James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration By Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 262 (2011) (stating that carbon dioxide emissions account for more than 80% of man-made GHG emissions in the United States); *Climate Change 101: Federal Action*, PEW CTR. ON GLOBAL CLIMATE CHANGE 1–2 (2011), *available at* http://www.c2es.org/docUploads/climate101-federal.pdf (noting that Congress has failed to adopt a comprehensive approach to reduce carbon emissions, despite the fact that "[c]arbon dioxide . . . from fossil fuel combustion accounts for about 80[%] of total United States GHG emissions, and fossil fuels account for more than 80[%] of total United States primary energy consumption . . . .").

9. *Carbon Capture and Storage (CCS)*, CTR. FOR CLIMATE & ENERGY SOLUTIONS 1 (Oct. 2012), *available at* http://www.c2es.org/docUploads/CCS-factsheet-10-12.pdf (stating that coal- and natural

only to reporting requirements of the EPA.[10] The EPA implemented the "Tailoring Rule" in 2010[11] in response to the seminal case *Massachusetts v. EPA*[12] in which the Supreme Court of the United States determined that the effects of global warming "are serious and well recognized."[13] The Court thus held that the EPA must regulate carbon dioxide emissions as "air pollutants," using its authority under the Clean Air Act (CAA).[14] Implemented in stages,[15] the regulations under the Tailoring Rule apply only to newly-built power plants and to modifications of existing power plants.[16] In March of 2012, the EPA proposed the third stage of GHG emissions regulations since *Massachusetts v. EPA—Carbon Pollution Standards for New Power Plants*,[17] which were also limited in their scope of application to new plants or modifications to existing plants.[18]

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gas-fueled electricity generation was responsible for 33% of carbon dioxide emissions in the United States in 2010).

10. *See Carbon Pollution Standard for New Power Plants*, U.S. ENVTL. PROT. AGENCY, http://epa.gov/carbonpollutionstandard/index.html (last updated Feb. 22, 2013) (discussing EPA regulations); *see also* Richard Harris, *EPA Creates Website to ID Biggest Emitters of Greenhouse Gases*, NAT'L PUB. RADIO NEWS BLOG (Jan. 11, 2012), http://www.npr.org/blogs/thetwo-way/2012/01/11/145052073/epa-creates-website-to-id-biggest-emitters-of-greenhouse-gases (reporting that the EPA is making emissions data available to the public via the website).

11. Robin Bravender, *EPA Issues Final 'Tailoring Rule' For Greenhouse Gas Emissions*, N.Y. TIMES (Mar. 13, 2010), http://www.nytimes.com/gwire/2010/05/13/13greenwire-epa-issues-final-tailoring-rule-for-greenhouse-32021.html (announcing new regulations); *see also* 40 C.F.R. §§ 51–52, 70 (2012) (publishing the rules).

12. Massachusetts v. EPA, 549 U.S. 497 (2007) (5–4 decision).

13. *Id.* at 499.

14. *See id.* at 501 ("Under the [Act's] clear terms, [the] EPA can avoid taking regulatory action . . . only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine whether they do."); *see generally* Jim Braddock, *Greenhouse Gas Regulation Under the Federal and Texas Clean Air Acts*, 41 TEX. ENVTL. L.J. 129, 132, 137 (2011) (explaining which provisions of the Federal and Texas Clean Air Acts could be used to regulate carbon dioxide emissions); Daniel Brian, *Regulating Carbon Dioxide Under the Clean Air Act as a Hazardous Air Pollutant*, 33 COLUM. J. ENVTL. L. 369 (2008) (speculating on the implications of *Massachusetts v. EPA* by detailing the provisions of the Clean Air Act that give the EPA regulatory authority to place caps on GHG emissions).

15. 40 C.F.R. § 52 (2012) (relating that the first stage of carbon dioxide regulations became effective on January 2, 2011, and the second stage of regulations was effective on June 1, 2011). *See generally* Jim Braddock, *Greenhouse Gas Regulation Under the Federal and Texas Clean Air Acts*, 41 TEX. ENVTL. L.J. 129, 132–137 (2011), (discussing both federal and Texas legislation).

16. *See Update on Selected Regulatory Issues for CO_2 Capture and Geological Storage*, CO_2 CAPTURE PROJECT 17 (Nov. 2010), *available at* http://www.co2captureproject.org/reports/regulatory_report.pdf ("[F]rom January 2011, electricity producers, manufacturers and oil refineries that emit 75,000 tonnes of CO_2 (or GHG equivalent) or more per year, and that are already regulated under the Clean Air Act need to obtain an operating permit. To obtain a permit, the operator must demonstrate that it is using the best available technology (BAT) to limit emissions.").

17. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule Step 3, GHG Plantwide Applicability Limitations and GHG Synthetic Minor Limitations, 77 Fed. Reg.

In 2010, President Barack Obama pledged a reduction of GHG emissions in the range of 17% by 2020 and 80% by the year 2050,[19] but the pledge was contingent on cooperation from Congress—cooperation that ultimately was not forthcoming.[20] While a few skeptics in Congress stubbornly persist in their dubiety of climate models and whether human activity has any effect on the warming of the planet,[21] they have steadily lost plausible deniability.[22] The political argument has now been reframed

14,226 (proposed Mar. 8, 2012) (to be codified at 40 C.F.R. pts. 51, 52, 70, 71) (proposing the third step for phasing in GHG emissions standards and requesting comments from the public); *Climate Change: Carbon Dioxide Capture and Sequestration*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/climatechange/ccs/index.html (last updated June 21, 2013).

18. Standards of Performance for GHG Emissions for New Stationary Sources: Electric Utility Generating Units, 77 Fed. Reg. 22,391, 22,397 (Apr. 13, 2012) (to be codified at 40 C.F.R. pt. 30) ("The standard established in this proposal would help create the regulatory certainty that CCS is the path forward for new coal-fired generation."). After slow progress in permitting at the state level in the first two stages, the EPA chose not to lower the GHG emissions threshold again in the third stage in 2012. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule Step 3 and GHG Plantwide Applicability Limits, 77 Fed. Reg. 41,051, 41,058 (July 12, 2012) (to be codified at 40 C.F.R. pt. 52) (emphasizing that the "small amount of incremental environmental benefit from lowering the thresholds, coupled with the additional burden associated with permitting these sources (in light of the lack of increase in state resources and experience as well as the lack of streamlining measures), supports the reasonableness of our determination").

19. Letter from Todd Stern, U.S. Special Envoy for Climate Change, U.S. Dep't of St., to Yvo de Boer, Exec. Sec'y of U. N. Framework Convention on Climate Change (Jan. 28, 2010), *available at* http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/unitedstatescphaccord_app.1.pdf (containing the submission of the United States' conditional emissions reduction pledge, to be incorporated in the Cancun Agreement).

20. *See* David Biello, *Cancun Talks Yield Climate Compromise*, SCI. AM. (Dec. 11, 2010), http://www.scientificamerican.com/article.cfm?id=cancun-talks-yield-climate (warning that, despite President Obama's commitment to the American emissions reduction targets incorporated into the Cancun Agreement, "his political opponents dispute the reality of climate change as well as any funding to fight it. A letter from four Republican senators . . . warned that 'we remain opposed to the United States commitment to full implementation of the Copenhagen Accord, which will transfer billions of United States taxpayer dollars to developing nations in the name of climate change'"); *see also* Shelley DuBois, *Why Obama Didn't Attend the Cancun Climate Talks*, CNN MONEY (Dec. 9, 2010), http://money.cnn.com/2010/12/09/news/economy/obama-cancun-climate-talks.fortune/index.htm (reporting that, while the UNFCC was holding climate talks in Cancun, President Obama did not attend—perhaps a wise decision considering the tense political climate surrounding the issue).

21. *See Frontline: Climate of Doubt* (PBS television broadcast Oct. 23, 2012), *available at* http://www.pbs.org/wgbh/pages/frontline/climate-of-doubt (last visited Nov. 2, 2013) (reporting on the history and science of climate change, the high profile and vocal climate change doubters in the United States government, as well as lobbying groups, and how they influence energy policy).

22. *See* John Collins Rudolf, *Climate Scientist Sues Skeptic for Libel*, N.Y. TIMES (Feb. 8, 2011), http://green.blogs.nytimes.com/2011/02/08/climate-scientist-sues-skeptic-for-libel (reviewing a libel suit filed by Dr. Weaver, the lead author of the 2007 U.N. Intergovernmental Panel on Climate Change report, against the author of an article, describing him "as lacking a basic understanding of climate science"). For an example of one converted skeptic, see Richard. A. Muller, *The Conversion of a Climate-Change Skeptic*, N.Y. TIMES (July 28, 2012), http://www.nytimes.com/2012/07/30/opinion/the-conversion-of-a-climate-change-skeptic.html?pagewanted=all&_r=0.

in terms of economics—questioning the advisability of committing to the sizable investment required to achieve emissions reduction during an economic downturn;[23] questioning whether alternative energy production methods are technologically feasible, commercially viable, or timely enough to make an impact on global warming;[24] and questioning under what authority government regulators may impose strict emissions caps and other regulations upon the energy industry.[25]

A. *The Energy Policy Debate in the Courts*

Texas has been particularly resistant to emissions regulations, to any regulations for that matter,[26] and regularly sues the EPA.[27] Courts at the

23. Josh Lederman, *House Approves GOP Plan to Quash Coal, Gas Rules in Election-Year Swipe at Obama*, NAT'L POLITICS (Sept. 21, 2012), http://www.dfmpolitics.com/?third_party=house-approves-gop-plan-to-quash-coal-gas-rules-in-election-year-swipe-at-obama (observing that opposition to new environmental policies and regulations in Congress is largely drawn along party lines and principled on arguments that the economy is too weak to absorb the cost of major new GHG regulations and that such policies will hurt the job market); *see also* Clifford Krauss, *Bigger Than Either of Them?*, N.Y. TIMES (Oct. 24, 2012), http://www.nytimes.com/2012/10/24/business/energy-environment/us-energy-policy-caught-in-the-vise-of-economics-and-politics.html?pagewanted=all&_r=0 (writing that within the context of the 2012 Presidential election, energy regulation was framed as "a pocketbook issue").

24. Matt Cover, *EPA Regulations Will Close Coal Plants, Raise Electricity Prices, GAO Says*, CNSNEWS.COM (Aug. 22, 2012), http://cnsnews.com/news/article/epa-regulations-will-close-coal-plants-raise-electricity-prices-gao-says (reporting that the Government Accounting Office predicts rate increases and plant closures would result from new regulations proposed by the EPA); Paul Driessen, *EPA Anti-Energy Regulations Killing Jobs: Bogus Green Schemes Harm Americans*, WASH. TIMES (Oct. 13, 2012), http://www.washingtontimes.com/news/2012/oct/23/epa-anti-energy-regulations-killing-jobs/ (asserting that the EPA's "actions make it increasingly expensive to fill gas tanks, heat and cool homes and offices, operate hospitals and factories, and buy food and consumer goods"); *see* Blanche Lincoln, *EPA's Regulatory Balancing Act*, NAT'L. J. (Aug. 8, 2011), http://energy.nationaljournal.com/2011/08/epas-regulatory-balancing-act.php (suggesting that due to the high costs involved, the political focus should be on ensuring compliance with existing energy regulations rather than imposing new regulations in a weak economy); *cf. IPCC Special Report on Carbon Dioxide Capture and Storage: Summary for Policy Makers*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 21 (2005), *available at* https://docs.google.com/viewer?srcid=0B1gFp6Ioo3akWFVURndxRU5xU1E&pid=explorer&efh=false&a=v (charting the various types of injection sites for carbon dioxide sequestration and the stages of development of the technology in various industries).

25. *See* Ruth King, *The Lone Star State Takes Aim at Illegal Carbon Rules*, RUTHFULLY YOURS (Oct. 11, 2010), http://www.ruthfullyyours.com/2010/10/11/the-lone-star-state-takes-aim-at-illegal-carbon-rules/ ("Texas filed an unusual lawsuit last week with the D.C. appeals circuit calling it an '*ultra vires*' act—literally, 'beyond the powers'—and requesting an emergency stay of the EPA's regulations because of the imminence of irreparable harm.").

26. See *Texas v. United States*, 497 F.3d 491 (5th Cir. 2007), for an example of a suit by the state of Texas to challenge the Department of the Interior's regulations on gaming.

27. *Update On Selected Regulatory Issues For CO_2 Capture and Geological Storage*, CO_2 CAPTURE PROJECT 17–18 (Nov. 2010), *available at* http://www.co2captureproject.org/reports/regulatory_report.pdf ("Several states (including Texas) have informed the EPA that they are unable to comply

state level have made it patently clear that individual property owners who assert property rights in the subsurface will be trumped by the energy industry.[28] Energy production is tantamount to delivering a public service,[29] evinced most aptly by the grant of eminent domain power to private companies for the purposes of building pipelines[30] and seasonal storage of natural gas in the subsurface.[31] The energy industry has a pseudo-mandate to increase domestic production of fossil fuels.[32] Still further, both the industry and its advocates in political office regularly espouse the argument that furthering the policy of "Drill, Baby, Drill"[33] insulates even the most profitable players in the energy industry from any burdensome cost increases that tougher environmental regulations would impose.[34] Such costs, so the argument goes, would ultimately be borne by consumers,[35] and thus threaten the health of our economy, which is wholly dependent on fossil fuel-derived energy.[36]

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with the January 2011 mandate under the GHG rule and have filed lawsuits against EPA for pushing through its plans without consulting or informing the states."); *see also* Texas v. EPA, 690 F.3d 670 (5th Cir. 2012) (involving challenges to the EPA's rejection of Texas's submissions for permitting under the Clean Air Act); Texas v. EPA, No. 10-60961, 2011 WL 710598 (5th Cir. Feb. 24, 2011) (challenging the EPA's rejection of Texas's Clean Air Act permitting submissions).

28. *See* Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 30 (Tex. 2008) (Willett, J., concurring) (arguing that an action for subsurface trespass does not exist in Texas, and addressing the dissenting opinion that would allow such a claim to be maintained).

29. *See id.* ("Amid soaring demand and sagging supply, Texas common law must accommodate cutting-edge technologies able to extract untold reserves from unconventional fields."); R.R. Comm'n of Tex. v. Manziel, 361 S.W.2d 560, 568 (Tex. 1962) ("It cannot be disputed that such operations should be encouraged, for as the pressure behind the primary production dissipates, the greater is the public necessity for applying secondary recovery forces. It is obvious that secondary recovery programs could not and would not be conducted if any adjoining operator could stop the project on the ground of subsurface trespass.").

30. Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L.J. 85, 97 (2009) (citing TEX. NAT. RES. CODE ANN. § 111.002 (2008)).

31. Natural Gas Act, 15 U.S.C. § 717f (2011); White v. N.Y. St. Natural Gas Corp., 190 F. Supp. 342, 345 (W.D. Pa. 1960).

32. *See Develop and Secure America's Energy Resources*, WHITE HOUSE.GOV, http://www.whitehouse.gov/energy/securing-american-energy (last visited Nov. 2, 2013) ("We need to deploy American assets, innovation, and technology so that we can safely and responsibly develop more energy here at home and be a leader in the global energy economy.").

33. Jeffrey Ball, *Palin's Policy: Drill, Baby, Drill*, WALL ST. J. (Sept. 4, 2008), http://blogs.wsj.com/environmentalcapital/2008/09/04/palins-policy-drill-baby-drill (reporting the slogan "Drill, Baby, Drill" was used at the 2008 Republican National Convention by Michael Steele and then quickly was adopted and made famous by then–vice presidential candidate, Sarah Palin).

34. *"The President's Backward Energy Policy Won't Help Lower Gasoline Prices": Energy Myths & Facts*, AM. PETROL. INST. 2 (2012), *available at* http://www.api.org/~/media/Files/Policy/Exploration/Energy-Myths-and-Facts.pdf (responding to proposed regulation of the energy industry by warning that "[t]his potential avalanche of new rules will discourage further natural gas development (if not outright prohibit it), reducing investment, reducing energy production[,] and costing jobs").

35. Nicolas Loris, *The Assault on Coal and American Consumers*, HERITAGE FOUND. (July 23,

Regardless of the politics, the lack of mandatory emissions caps hampers progress toward energy efficiency and in the investment, research, and development of new and cleaner energy technology.[37] A review of leading studies in this area reveals that the absence of clear, mandatory emissions caps in the United States is the key obstacle to such progress, not just domestically, but also globally.[38] In the simplest of terms, without the caps, there can be no trade.

The lack of political will at the legislative and executive levels has created a leadership vacuum, filled more often than not at the judicial level with the efforts of private citizens, environmental groups, and local and state governments.[39] In *Massachusetts v. EPA*,[40] a majority of the Supreme Court acknowledged climate change affected not just the political and social landscape, but the physical landscape of our nation as well, such that

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2012), http://www.heritage.org/research/reports/2012/07/the-assault-on-coal-and-american-consumers (predicting that "regulations will not only drive up the costs of goods and services that promote public health, such as access to affordable heating and air conditioning, but also divert resources away from activities that could truly improve America's public health").

36. *Id.* (reasoning that higher consumer prices result from higher operating costs).

37. *Update on Selected Regulatory Issues for CO_2 Capture and Geological Storage*, CO_2 CAPTURE PROJECT 15 (Nov. 2010), *available at* http://www.co2captureproject.org/reports/regulatory_report.pdf ("[T]he lack of comprehensive climate change legislation acts as the key barrier to CCS deployment in the US."); *see also* Elizabeth Shogren, *Lack of Carbon Policy Prevents Emissions Innovation*, NAT'L PUB. RADIO (Sept. 27, 2009), http://www.npr.org/templates/story/story.php?storyId=113204003 (quoting a top energy executive at a green energy company as saying "the industry could have commercially viable full-scale greenhouse gas pollution controls ready for power plants by 2015—but only if governments move quickly to regulate greenhouse gas pollution").

38. Elizabeth Shogren, *Lack of Carbon Policy Prevents Emissions Innovation*, NAT'L PUB. RADIO (Sept. 27, 2009), http://www.npr.org/templates/story/story.php?storyId=113204003.

39. *See generally* Am. Elec. Power Co. v. Connecticut, 131 S. Ct. 2527, 2529 (2011) (4–4 decision) (holding that the separate claims from eight states, New York City, and three land trusts against electric power corporations for the ongoing public nuisance of global warming, and their request for the setting of an emissions cap, was a justiciable political question under *Massachusetts v. EPA*); GenOn Mid-Atl., LLC v. Montgomery Cnty., Md., 650 F.3d 1021, 1022 (4th Cir. 2011) (deciding the issue of whether a county's levy of a "tax" on electric utility for its carbon emissions constituted a "regulation"); Tex. Citizens For a Safe Future and Clean Water v. R.R. Comm'n of Tex., 254 S.W.3d 492, 495 (2007) (hearing an action by a private citizens group to challenge the Railroad Commission's decision to award a permit to a commercial waste disposal injection well); *see also Climate Change 101: Federal Action*, PEW CTR. ON GLOBAL CLIMATE CHANGE 5 (2011), *available at* http://www.c2es.org/docUploads/climate101-federal.pdf (citing cases brought by states and environmental groups against the EPA to force regulation of GHGs, as well as litigation against the EPA from industry groups to overturn the EPA's GHG Endangerment Finding); *Environmental Groups and Chevron Phillips Chemical Co. Agree To Settlement Of Clean Air Act Lawsuit*, NAT'L ENVTL. LAW CTR. (Nov. 18, 2010), http://www.nelconline.org/active-cases/active-cases11/environment-texas-and-sierra-club-vs.-chevron-phillips-cedar-bayou (reporting that a major energy company settled a Clean Air Act lawsuit with an environmental group, the Sierra Club, which required major changes to the company's plant).

40. Massachusetts v. EPA, 549 U.S. 497 (2007) (5–4 decision).

it has produced cognizable harm and ripe, justiciable claims.[41] While, for better or worse, most plaintiffs have not shared Massachusetts's success,[42] this breed of environmental litigation forebodes that current legal concepts of rights, duties, and property are becoming cloudier as the earth gets warmer. Climate change will generate novel legal questions, and the judicial branch should be prepared to supply clarity, particularly in the post-*Massachusetts v. EPA* world where plaintiffs now have legal standing—albeit precarious as it is—to seek relief from the harms caused by climate change.[43]

B. *Overview of Topics*

Part I begins with a discussion of the widely recognized advantages of implementing market-based policies to reduce carbon dioxide emissions. While curbing emissions is a laudable goal, one seemingly cogent argument against emissions caps is that regulating the energy industry will curb economic growth and weaken our competitiveness with other world powers.[44] Credible research and real-world evidence show market-based policies can reduce carbon emissions effectively and efficiently while also creating new markets and jobs, with a realistic probability of return for those who invest in cleaner, more efficient technology.[45] This data

41. *Id.* at 521

42. *Compare id.* at 498 (holding that plaintiffs had Article III standing to bring climate change–related claims), *with* Native Vill. of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 853 (9th Cir. 2012) (holding that the Clean Air Act preempted the plaintiffs' common law nuisance claim), *and* La. Envtl. Action Network v. McDaniel, No. 06-4161, 2008 WL 803407 at *1 (E.D. La. Mar. 12, 2008) (reconsidering and again denying that an environmental group had standing to sue a utility), *and* Blue Skies Alliance v. Tex. Comm'n on Envtl. Quality, 283 S.W.3d 525, 528 (Tex. App.—Amarillo 2009, no pet.) (rejecting an environmental group's challenge to the granting of a permit to build a pulverized coal plant).

43. *Am. Elec. Power Co.*, 131 S. Ct. at 2535 (holding that the plaintiffs had Article III standing to bring claims related to injury from climate change, but only by an equally divided court).

44. *See* Josh Lederman, *House Approves GOP Plan to Quash Coal, Gas Rules in Election-Year Swipe at Obama*, NAT'L POLITICS (Sept. 21, 2012), http://www.dfmpolitics.com/?third_party=house-approves-gop-plan-to-quash-coal-gas-rules-in-election-year-swipe-at-obama (reporting that climate change policy is at a stalemate, in part because Conservative law makers will not agree to any regulatory action that they perceive will hurt job growth or the economy); Richard Harris, *Ahead of Climate Talks, U.S. Leadership in Question*, NAT'L PUB. RADIO (Nov. 28, 2011), http://www.npr.org/2011/11/28/142714839/ahead-of-climate-talks-u-s-leadership-in-question (observing that members of Congress are concerned that capping carbon emissions will harm America's economic competitiveness).

45. Florian Bressand, et al., *Wasted Energy: How the US Can Reach its Energy Productivity Potential*, MCKINSEY GLOBAL INST. 5–6 (June 2007), *available at* http://www.mckinsey.com/insights/mgi/research/natural_resources/how_us_can_reach_its_energy_potential; Nicholas Stern, THE STERN REVIEW, THE ECONOMICS OF CLIMATE CHANGE xvi, viii (2006), *available at* http://mudancas climaticas.cptec.inpe.br/~rmclima/pdfs/destaques/sternreview_report_complete.pdf ("With strong,

illustrates that carbon capture and geological sequestration, as one component of a market-based energy policy, is technologically feasible and commercially viable,[46] and it therefore warrants this discussion of the legal issues it raises.

Part II consists of a brief overview of the carbon capture process at stationary sources, namely coal-fired power plants. While this Comment is not a technical paper, by focusing on the scope, process, and logistics behind implementation of carbon capture and sequestration (CCS), practical legal questions concerning subsurface property interests become immediately apparent. Power plants in the United States and throughout the world are already utilizing CCS technology, and more projects are planned in the near future.[47] In order to be an effective tool for reducing carbon emissions, CCS must be implemented on a large scale.[48] Because of the anticipated scope of CCS, and because lawmakers have already invested significant resources into CCS-related research and development,[49] a number of government agencies and private groups make information about CCS readily available and accessible for the general public.[50]

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deliberate policy choices, it is possible to 'decarboni[z]e' both developed and developing economies on the scale required for climate stabili[z]ation, while maintaining economic growth in both."); Jenna Goodward, Alexander Perera, Nicholas Bianco & Christina Heshmatpour, *Is the Fit Right?: Considering Technological Maturity in Designing Renewable Energy Policy*, WORLD RESEARCH INST. ISSUE BRIEF (World Research Inst., D.C.), June 2011, at 2, *available at* http://pdf.wri.org/is_the_fit_right.pdf.

46. *See* Nicholas Stern, THE STERN REVIEW, THE ECONOMICS OF CLIMATE CHANGE xvi, viii (2006), *available at* http://mudancasclimaticas.cptec.inpe.br/~rmclima/pdfs/destaques/sternreview_report_complete.pdf (concluding that carbon capture and storage is essential to protect the atmosphere if there is a continued use of fossil fuels); Florian Bressand, et al., *Wasted Energy: How the US Can Reach its Energy Productivity Potential*, MCKINSEY GLOBAL INST. 12 (June 2007), *available at* http://www.mckinsey.com/insights/mgi/research/natural_resources/how_us_can_reach_its_energy_potential ("There are enough opportunities—using existing technologies with an [internal rate of return] of 10[%] or more . . . . Capturing these opportunities would more than compensate for growing end-use demand and enable the United States to cap annual energy consumption and CO_2 emissions at their current levels by 2020.").

47. *Carbon Capture & Storage: Technological and Regulatory Considerations*, NAT'L ASS'N OF REGULATORY UTIL. COMM'RS 7–8 (Mar. 2008), *available at* http://www.naruc.org/grants/Documents/CarbonCaptureStorageTechnologies.pdf.

48. Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 U. ILL. L. REV. 363, 423 (2010).

49. *The Economic Impact of the American Recovery and Reinvestment Act of 2009 Supplement to the Third Quarterly Report: The ARRA and the Clean Energy Transformation*, WHITE HOUSE.GOV, http://www.whitehouse.gov/administration/eop/cea/factsheets-reports/economic-impact-arra-3rd-quarterly-report/supplement_greenjobs (last visited Nov. 2, 2013) (explaining that the American Recovery and Reinvestment Act of 2009 allocated $3.4 billion to provide incentives and funds for the research and development of carbon capture and sequestration technologies).

50. *See Key R&D Programs and Initiatives*, U.S. DEPT. OF ENERGY, http://www.fossil.

While other commentators have written extensively about ownership of subsurface pore space,[51] issues for long-term storage of carbon dioxide,[52] and what new laws or regulations may need to be enacted to accommodate expanded use of the subsurface, Part III of this Comment assumes these inquiries are, for all practical purposes, settled or can easily be settled using existing substantive and procedural law.[53] The more pressing—and more

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energy.gov/programs/sequestration/index.html (last visited Nov. 2, 2013) (highlighting the Department of Energy's current research and development projects for carbon capture and sequestration technologies); *Presidential Memorandum-A Comprehensive Federal Strategy on Carbon Capture and Storage*, WHITE HOUSE.GOV, http://www.whitehouse.gov/the-press-office/presidential-memorandum-a-comprehensive-federal-strategy-carbon-capture-and-storage (last visited Nov. 2, 2013) (creating a task force to address carbon capture and sequestration as a climate change mitigation strategy for the United States); *What is the CO_2 Capture Project?*, CO_2 CAPTURE PROJECT, http://www.co2captureproject.org/about_us/what_is_CCP.html (last visited Nov. 2, 2013) (providing approachable, plain-language information to educate the public about all aspects of carbon capture and sequestration).

51. *See generally* Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 U. ILL. L. REV. 363, 391–93 (2010) (detailing ownership rights); Madeline Matthews, *Carbon Sequestration and Pore Space Ownership in Texas*, 41 TEX. ENVTL. L.J. 205, 211–18 (2011) (providing an overview of pore space ownership); Russell W. Murdock, *The State of CO_2 Sequestration in the State of Texas*, 41 TEX. ENVTL. L.J. 65, 74–75 (2010) (commenting on ownership); James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration By Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 268–74 (2011) (discussing subsurface ownership).

52. Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change and Carbon Sequestration: Assessing A Liability Regime for Long-Term Storage of Carbon Dioxide*, 58 EMORY L.J. 103 (2008).

53. *Carbon Capture & Storage: Technological and Regulatory Considerations*, NAT'L ASS'N OF REGULATORY UTIL. COMM'RS 10 (Mar. 2008), *available at* http://www.naruc.org/grants/Documents/CarbonCaptureStorageTechnologies.pdf; *Update On Selected Regulatory Issues For CO_2 Capture and Geological Storage*, CO_2 CAPTURE PROJECT iii, 56–57 (Nov. 2010), *available at* http://www.co2captureproject.org/reports/regulatory_report.pdf.

> In the US, storage activities will be regulated at a federal level through the existing Underground Injection Control (UIC) permitting program. Some US states are also actively engaged in the process of developing their own regulatory frameworks for permitting CO_2 storage activities, requiring close attention between federal and state level requirements, as well as legal complexities involving permitting across more than one state.

Id.

For example, it is settled that the subsurface estate is part of the surface estate, in the absence of some act of severance in Texas. *Update on Selected Regulatory Issues for CO_2 Capture and Geological Storage*, CO_2 CAPTURE PROJECT 56–57, 60 (Nov. 2010), *available at* http://www.co2captureproject.org/reports/regulatory_report.pdf ("[Landowners in the United States] have right of possession to subsurface strata below that estate. By conferring ownership on individual owners, the subsurface domain is therefore considered to be privately owned by owners of the surface estate or, by mineral estate owners where the mineral estate has been severed from the surface estate."). In addition, traditional tort doctrine seems readily adaptable to impose some measure of duty on carbon dioxide injectors for negligence purposes, or possibly even strict liability under an abnormally dangerous activity theory of recovery. *Id.* at 73, 76 (illustrating with a chart the various areas of liability associated with CCS). "Liabilities . . . are well understood and can mainly be covered by contract and

interesting—questions hinge on the proper method of valuation of subsurface real estate, particularly within the contexts of remedy and recovery when such property has been encroached or trespassed upon. Courts offer an interesting vantage point to witness the early waves of any sociopolitical sea change. As property owners and energy producers litigate their respective rights, courts may be challenged to create the initial framework for valuation of the subsurface.

While commentators almost universally cite *United States v. Causby*[54] as evidence of the unsuitability of the heaven-to-hell doctrine in modern times,[55] the analogy is not necessarily a suitable one for subsurface property. Courts and practitioners should anticipate challenges in order to adopt legal definitions that fit the times, where modern energy demands and the accompanying technological innovations that enable expanded use of the subsurface are leading to the inevitable, if not already realized, commodification of the subsurface. In light of the large scale, permanent geological sequestration proposed, the notion that the subsurface is unusable and valueless property is no longer valid. Practically speaking, there are few actual uses for the subsurface;[56] consequently, and perhaps paradoxically, a market value for these uses is readily ascertainable. On this ground, the law should distinguish hell from heaven.

Part IV evaluates case law, particularly in Texas, that addresses property interests in the subsurface. Landowners generally will bring a trespass cause of action when their subsurface property is usurped or invaded for purposes related to energy production, including for unauthorized natural gas or waste storage, fractures from neighboring fracing operations, and geological surveys. Most jurisdictions, with a particular staunchness in Texas, require plaintiffs to prove some actual damage to their property

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traditional risk transfer. Furthermore, analogous activities such as [enhanced oil recovery] demonstrate that operational environment, health[,] and safety risks can also be managed successfully." *Id.* at 73.

54. United States v. Causby, 328 U.S. 256 (1946).

55. Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 U. ILL. L. REV. 363, 386–89 (2010); Madeline Matthews, *Carbon Sequestration and Pore Space Ownership in Texas*, 41 TEX. ENVTL. L.J. 205, 211–12 (2011); James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration By Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 271–75 (2011).

56. James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration by Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 275 (2011) (discussing subsurface uses). One factor in subsurface trespass cases is that the judiciary is, as a general rule, slow to recognize changes in technology. *See* Jeff Bleich & Kelly Klaus, *Hurtling into Cyberspace as the Court Guides New Technology Through Old Law—Expect A Few Bumps*, FED. L., May 1998, at 38, 39 ("Throughout its history, the Court has not had an easy time adapting legal principles to respond to new technology, perhaps because the goals of technology and law are often at odds.").

before they may recover for a subsurface trespass claim.[57] This requirement is largely justified by the notion that use of the subsurface is limited or nonexistent.[58] Why, courts have asked, should a surface owner be compensated for wastewater or natural gas in their pore space, or even fractures in the sand two miles below their home, if they have no proven use for the subsurface, and the trespass has no effect on the actual use and enjoyment of their property?[59] Moreover, Texas seems poised to deny that a cause of action for subsurface trespass exists in this state.[60]

Part V recommends that property owners in Texas should pursue theories of recovery that are based in restitution, rather than compensatory damages, in the case of a subsurface trespass.[61] Texas courts continue to affirm that damages for subsurface trespass will only be awarded for actual harm to the surface estate or loss to the property owner, measured in real dollars. If the judicial system is lagging behind industry in recognizing the value of the subsurface as a commodity, or worse, stubbornly refusing to do so in order to insulate the energy industry from increased production

57. Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 4 (Tex. 2008) (denying that any claim for subsurface trespass can be maintained absent a showing of actual harm or damage to the surface property).

58. *See* FPL Farming Ltd. v. Envtl. Processing Sys., L.C., 305 S.W.3d 739, 744–45 (Tex. App.—Beaumont 2009) (holding originally that, because the defendant had obtained a permit to inject fluids into the deep subsurface, the plaintiff could not maintain an action for subsurface trespass, even when the fluids migrated across property lines at deep levels into the subsurface of their nearby tracts of land), *rev'd*, 351 S.W.3d 306 (Tex. 2011). On appeal, the Supreme Court of Texas clarified that a permit from the Railroad Commission is not a shield to liability for tortious activity, such as trespass, and remanded the case without deciding whether a subsurface trespass cause of action can be maintained in Texas, or whether the plaintiff in this case had standing to bring such a claim. FPL Farming Ltd. v. Envtl. Processing Sys., L.C., 351 S.W.3d 306, 314–15 (Tex. 2011). On remand, the court held that the plaintiff landowner had standing to bring its case, that the landowner had a cause of action against the well operator, and that the burden of proof was on the well operator to prove the landowner consented to the presence of the wastewater plume in their subsurface. FPL Farming Ltd. v. Envtl. Processing Sys., L.C., 383 S.W.3d 274, 280 (Tex. App.—Beaumont 2012, pet. granted).

59. *Coastal Oil*, 268 S.W.3d at 4; *FPL Farming*, 305 S.W.3d at 745.

60. *Coastal Oil*, 268 S.W.3d at 4.

61. This Comment does not address in great detail the issues associated with valuation in condemnation proceedings. However, it should be noted that measuring damages based on principles of restitution might arguably violate the so-called value-to-the-taker rule. Within the context of the energy industry, where condemnation power has been granted to private companies, recent cases have challenged the parameters of this rule. For an example of this, see Enbridge Pipelines (E. Tex.) L.P. v. Avinger Timber, LLC, 386 S.W. 3d 256, 259–64 (Tex. 2012), *reh'g denied* (Oct. 14, 2012). The ideas of this Comment support compensation to property owners based on the value of the storage capacity of the subsurface in all cases. The subsurface could, arguably, only be marketed for use as a storage site. Therefore, the fair market value of the subsurface would always be equal to the value-to-the-taker in the case of subsurface condemnation. The challenge for the property owner, in such a case, may be proving that the *only* commercial use of their subsurface is also their *intended* use, for purposes of condemnation valuation.

costs, it is unwise to seek tort-based theories of recovery when compensatory damages will be difficult to prove. Attorneys should pursue other causes of action that allow alternative theories of recovery within the existing substantive and procedural law.

This Comment recommends that practitioners should try to capitalize on Texas's observance of the doctrine of waiver of tort.[62] The underlying principles of restitution remedies and common law waiver of tort and assumpsit fit squarely within the fact patterns common to subsurface trespass cases. Thus, rather than applying harsh, rigid, and categorical rules, courts ought to consider equitable remedies as a viable alternative for property owners who, absent a showing of actual harm for which compensatory damages may be recoverable, are generally left uncompensated for the value of the use of their subsurface property.

Part VI concludes the Comment with a justification for compensating property owners who ostensibly will suffer no actual damage or ill effects from carbon dioxide injected deep under the surface of their property. The energy industry plays a critical role in society because energy consumption is what drives essentially everything in America, from our cars to our economy.[63] There are incredibly important policy reasons supporting no or nominal consideration for the use of subsurface property by the energy industry.[64] For one, if subsurface storage becomes more expensive and cumbersome, it would logically discourage carbon capture and geological sequestration efforts from moving forward.[65] Obviously, it could also increase the cost that average consumers pay for their energy needs.[66] These concerns are valid, but are based in part on a false assumption that CCS represents an expense for the energy industry and

62. Villarreal v. Grant Geophysical, Inc., 136 S.W.3d 265, 269 (Tex. App.—San Antonio 2004, pet. denied) (discussing how a Texas landowner's ability to waive a trespass claim enabled recover in assumpsit).

63. Nicolas Loris, *The Assault on Coal and American Consumers*, HERITAGE FOUND. (July 23, 2012), http://www.heritage.org/research/reports/2012/07/the-assault-on-coal-and-american-consumers (asserting that "everything Americans use and produce requires energy").

64. *See, e.g.*, Lone Star Gas Co. v. Murchison, 353 S.W.2d 870, 878 (Tex. Civ. App.—Dallas 1962, writ ref'd n.r.e.) (deciding an issue involving natural gas storage). The court wrote, "The policy arguments in favor of the court's decision are incredibly strong. It has become essential to build up a large storage reserve in the summer months to meet the heavy demands .... Natural underground reservoirs are the only economically feasible way to store such reserves." *Id.*

65. James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration by Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 289–91 (2011).

66. Paul Driessen, *EPA Anti-Energy Regulations Killing Jobs: Bogus Green Schemes Harm Americans*, WASH. TIMES (Oct. 13, 2012), http://www.washingtontimes.com/news/2012/oct/23/epa-anti-energy-regulations-killing-jobs.

consumers without any potential economic gains; the larger costs attributable to climate change and the status quo are also ignored.

PART I: MARKET-BASED POLICIES ARE A SUPERIOR MEANS TO ACHIEVE EFFICIENCY AND EMISSIONS REDUCTION GOALS

In terms of easing the economic impact of an expanded regulatory scheme, studies show curbing carbon emissions with market-based policies,[67] rather than with traditional command-and-control regulations, could actually stimulate the economy.[68] Market-based policies include cap-and-trade, a carbon credit-trading scheme, a carbon tax, and tax subsidies.[69] A cap-and-trade system offers polluters an opportunity to actually profit from an emissions cap by becoming more efficient than required and by selling their surplus allowances on a carbon trading market.[70] Tax subsidies could facilitate employment of new and more efficient technologies at the producer and consumer levels by allowing the cost of implementation to be spread out over all of society rather than concentrated on energy producers.[71]

A. *The Economic Impact of Regulation and Market Failure*

Historically, economic fears have crippled legislative action to regulate carbon emissions in the energy industry.[72] These fears may be somewhat misguided, as they tend to focus on the potential costs of regulating GHG emissions to energy producers[73] without acknowledging that the status

67. *Market Mechanisms: Understanding the Options,* CTR. FOR CLIMATE AND ENERGY SOLUTIONS 2 (Mar. 23, 2012), *available at* http://www.c2es.org/docUploads/market-mechanisms-brief.pdf.

68. *Id.* at 9–11.

69. *Id.*

70. *Climate Change 101: Cap and Trade,* PEW CTR. ON GLOBAL CLIMATE CHANGE 3 (Jan. 2011), *available at* http://www.c2es.org/docUploads/Cap&Trade.pdf.

71. *Market Mechanisms: Understanding the Options,* CTR. FOR CLIMATE AND ENERGY SOLUTIONS 3 (Mar. 23, 2012), *available at* http://www.c2es.org/docUploads/market-mechanisms-brief.pdf.

72. Josh Lederman, *House Approves GOP Plan to Quash Coal, Gas Rules in Election-Year Swipe at Obama,* NAT'L POLITICS (Sept. 21, 2012), http://www.dfmpolitics.com/?third_party=house-approves-gop-plan-to-quash-coal-gas-rules-in-election-year-swipe-at-obama.

73. *See* Matt Cover, *EPA Regulations Will Close Coal Plants, Raise Electricity Prices, GAO Says,* CNSNEWS.COM (Aug. 22, 2012), http://cnsnews.com/news/article/epa-regulations-will-close-coal-plants-raise-electricity-prices-gao-says (reporting that new regulations proposed by the EPA will force energy producers to close plants and lay off workers); Paul Driessen, *EPA Anti-Energy Regulations Killing Jobs: Bogus Green Schemes Harm Americans,* WASH. TIMES (Oct. 13, 2012), http://www.washingtontimes.com/news/2012/oct/23/epa-anti-energy-regulations-killing-jobs/ (alleging that EPA regulations will lead to prohibitively expensive utility bills for residential consumers).

quo has a rather large price tag for society in its own right.[74] Energy production, and the concomitant pollution and carbon emissions, imposes all kinds of external costs on the average citizen that are not reflected in their utility bill; this disparity is what economists refer to as a market failure.[75] The price of energy does not reflect its true cost[76] because it fails to factor in the tax subsidies that the energy industry receives,[77] health care costs for pollution-related illnesses,[78] damage to the environment—both reversible and irreversible[79]—and the astronomical, though speculative, costs attributable to global warming for natural disasters.[80] This has led to an imbalance from high demand at the

74. *Cf.* Ruth Greenspan Bell & Dianne Callan, *More than Meets the Eye: The Social Cost of Carbon in U.S. Climate Policy, in Plain English*, ENVTL. LAW INST. & WORLD RESOURCES INST. 1–3 (July 2011), *available at* http://pdf.wri.org/more_than_meets_the_eye_social_cost_of_carbon.pdf (explaining that all proposed regulations must be evaluated against the government's Social Cost of Carbon (SCC) calculation, which estimates the benefit to society for every metric ton of carbon not emitted as a result of the regulation, and concluding that the SCC as of 2009, at around $21, is likely a gross undervaluation).

75. *See* Doug Koplow, *Ten Most Distortionary Energy Subsidies*, EARTHTRACK 1–2 (Jan. 2007), *available at* http://www.earthtrack.net/files/EgySubsTopTen.pdf (suggesting that the lack of GHG emissions regulations has skewed energy prices, but that "[p]roperly integrating GHG constraints into the pricing of goods and services would provide a far more neutral playing field on which the thousands of possible solutions to reduce emissions could compete").

76. *See, e.g.*, *id.* at 1–3 (listing ten areas of policy and regulation that, if calculated into the cost of energy, would "materially realign price signals to more effectively achieve energy market end goals[,]" including the absence of costs for pollution associated with GHG emissions, oil security, and tax credits and subsidies provided each year to the energy industry).

77. Adenike Adeyeye, et al., *Estimating U.S. Government Subsidies to Energy Sources: 2002–2008*, ENVTL. LAW INST. 3, 25 (Sept. 2009), *available at* http://www.elistore.org/Data/products/d19_07.pdf (estimating that the fossil fuel energy industry received $72 billion in tax subsidies during the years 2002 through 2008, and noting that the study did not account for the absence of emissions regulations as an additional benefit to the industry).

78. *See* Dylan Walsh, *The Baffling Nexus of Climate Change and Health*, N.Y. TIMES (Sept. 6, 2012), http://green.blogs.nytimes.com/2012/09/06/the-baffling-nexus-of-climate-change-and-health/ (discussing the effects of climate change on health care prices and the public's health in general); *see also* Dylan Walsh, *The Budding Health Care Costs of Climate Change*, N.Y. TIMES (Dec. 10, 2012), http://green.blogs.nytimes.com/2012/12/10/the-budding-health-care-costs-of-climate-change (addressing the uncertainty surrounding progressively more severe weather extremes and their financial effect on health care costs).

79. *See* Ruth Greenspan Bell & Dianne Callan, *More than Meets the Eye: The Social Cost of Carbon in U.S. Climate Policy, in Plain English*, ENVTL. LAW INST. & WORLD RESOURCES INST. 8 (July 2011), *available at* http://pdf.wri.org/more_than_meets_the_eye_social_cost_of_carbon.pdf (noting the difficulty in calculating the true cost of carbon emissions on society for many reasons, including "the difficulty of estimating particular damages that are not usually monetized—for example, the loss of endangered species and of certain kinds of vegetation").

80. *See* Frank Ackerman & Elizabeth A. Stanton, *Climate Risks and Carbon Prices: Revising the Social Cost of Carbon*, ECONS. FOR EQUITY AND THE ENV'T 15–18 (2011), *available at* http://www.e3network.org/papers/Climate_Risks_and_Carbon_Prices_executive-summary_full-report_comments.pdf (finding that the U.S. government's calculation for the social cost of carbon was underestimated).

consumer end because "society produces and consumes too many pollution-creating products (like fossil fuels) resulting in additional GHG emissions being put into the atmosphere."[81]

Correcting this market failure would entail forcing energy producers—by some form of cap or tax on carbon—to account for the external costs of the pollution they generate.[82] Such accountability comes with a large price tag for the producers of pollution, hence the reluctance to act at the political level.[83]

B. *Market-Based Policies Are a Boon to the Economy*

Compared to traditional command-and-control regulations, market-based policies are widely touted as the superior method of regulating emissions because they allow polluters wide latitude and flexibility in choosing how to become compliant.[84] Furthermore, market-based policies place a financial incentive on innovation, research, and development.[85] A variety of new technologies are currently in development for carbon mitigation and energy efficiency.[86] This nascent industry is filled with investment and job opportunities for research, development, implementation, compliance, manufacturing, and construction, but it cannot fully blossom without federal action to impose industry-wide carbon emissions regulations.[87]

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81. *Market Mechanisms: Understanding the Options*, CTR. FOR CLIMATE AND ENERGY SOLUTIONS 1 (Mar. 23, 2012), *available at* http://www.c2es.org/docUploads/market-mechanisms-brief.pdf.

82. *See id.* at 3 (determining that the failure to account for externalities has led to deceptively low energy costs that should be corrected by incorporating externalities into the cost of energy).

83. Josh Lederman, *House Approves GOP Plan to Quash Coal, Gas Rules in Election-Year Swipe at Obama*, NAT'L POLITICS (Sept. 21, 2012), http://www.dfmpolitics.com/?third_party=house-approves-gop-plan-to-quash-coal-gas-rules-in-election-year-swipe-at-obama; Clifford Krauss, *Bigger Than Either of Them?*, N.Y. TIMES (Oct. 24, 2012), http://www.nytimes.com/2012/10/24/business/energy-environment/us-energy-policy-caught-in-the-vise-of-economics-and-politics.html?pagewanted=all&_r=0.

84. *Market Mechanisms: Understanding the Options,* CTR. FOR CLIMATE AND ENERGY SOLUTIONS 2–8 (Mar. 23, 2012), *available at* http://www.c2es.org/docUploads/market-mechanisms-brief.pdf.

85. *See Climate Change 101: Cap and Trade*, PEW CTR. ON GLOBAL CLIMATE CHANGE 9 (Jan. 2011), *available at* http://www.c2es.org/docUploads/Cap&Trade.pdf (linking cap and trade policy to cost-effective and expedited implementation of emissions-reduction technologies).

86. *See generally* Florian Bressand, et al., *Wasted Energy: How the U.S. Can Reach its Energy Productivity Potential*, MCKINSEY GLOBAL INST. 5–6 (June 2007), *available at* http://www.mckinsey.com/insights/mgi/research/natural_resources/how_us_can_reach_its_energy_potential (investigating a wide variety of possible carbon mitigation strategies and technologies, and concluding that some combination of many of them are needed in order to curb the effects of climate change).

87. *See id.* at 15 (asserting that "[a] number of market inefficiencies are at work, which prevent consumers and companies from securing the available savings").

There are examples throughout the world of functioning cap-and-trade systems. Member states of the European Union began regulating GHG emissions in 2005 by implementing a cap-and-trade program known as the Emissions Trading System (ETS).[88] As a result, a functioning carbon dioxide trading market has developed in a relatively short period of time.[89] Ten New England and Mid-Atlantic states[90] adopted the Regional Greenhouse Gas Initiative (RGGI) in 2009 to stabilize carbon emissions in the power sector in the 2009–2014 period.[91] In 2011, two years into the RGGI, the cost increase of the cap on carbon emissions to the average residential consumer household was 43 cents per month[92]—a negligible amount that was further offset by reinvestment of the proceeds from carbon allowance auctions into energy efficient technologies.[93] The program already boasts "a $617 million investment in the region's energy future: reducing energy bills, helping businesses become more competitive, accelerating the development of local clean and renewable energy sources,

88. *See Climate Change 101: Cap and Trade*, PEW CTR. ON GLOBAL CLIMATE CHANGE 8 (Jan. 2011), *available at* http://www.c2es.org/docUploads/Cap&Trade.pdf (proclaiming that the ETS is the centerpiece of EU efforts to achieve mandatory targets to reduce greenhouse gas emissions 20% below 1990 levels, and to increase renewables to 20% of its energy mix by 2020); *UN Climate Talks and Power Politics—It's Not About the Temperature: Hearing Before the Subcomm. on Oversight and Investigations and Comm. on Foreign Affairs*, 112th Cong. 35–43 (2011) (statement of Elliot Diringer, Vice President for International Strategies, Pew Center on Global Climate Change), *available at* https://www.hsdl.org/?view&did=705087(discussing the United States' involvement with the ETS and the effect on GHG emissions since its inception).

89. *Climate Change 101: Cap and Trade*, PEW CTR. ON GLOBAL CLIMATE CHANGE 8 (Jan. 2011), *available at* http://www.c2es.org/docUploads/Cap&Trade.pdf. Data collected from the ETS since implementation in 2005 is instructive, showing that market-based policies could potentially take the sting out of emissions regulations for the energy industry. *See, e.g.*, *UN Climate Talks and Power Politics—It's Not About the Temperature: Hearing Before the Subcomm. on Oversight and Investigations and Comm. on Foreign Affairs*, 112th Cong. 35–43 (2011) (statement of Elliot Diringer, Vice President for International Strategies, Pew Center on Global Climate Change), *available at* https://www.hsdl.org/?view&did=705087 (noting that in 2010 the EU reached $81 billion worth of clean energy investments, and between 2004 and 2008, the EU realized a 9.8% growth in gross domestic product, while reducing GHG emissions by 4.1%).

90. *See* Mireya Navarro, *Christie Pulls New Jersey From 10-State Climate Initiative*, N.Y. TIMES (May 26, 2011), http://www.nytimes.com/2011/05/27/nyregion/christie-pulls-nj-from-greenhouse-gas-coalition.html?_r=1&ref=nyregion&pagewanted=print (reporting that New Jersey, at the behest of Governor Chris Christie, became "the first state to withdraw from a 10-state trading system, the Regional Greenhouse Gas Initiative"). "[Govenor Christie] took more than $65 million in the state's designated RGGI money to help offset a $10.7 billion budget deficit . . . . The state has so far received more than $100 million in proceeds from RGGI." *Id.*

91. *The RGGI CO_2 Cap*, REG'L GREENHOUSE GAS INITIATIVE, http://www.rggi.org/design/overview/cap (last visited Nov. 2, 2013).

92. *Fact Sheet*, REG'L GREENHOUSE GAS INITIATIVE, http://www.rggi.org/docs/Documents/RGGI_Fact_Sheet_2012_09_28.pdf (last visited Nov. 2, 2013).

93. *Id.*

and limiting the release of harmful pollutants into the air and atmosphere, while spurring the creation of jobs in the region."[94]

Energy producers are currently eligible to receive a federal tax credit for voluntarily participating in CCS.[95] This tax credit is a strong indication that CCS will play a role in future carbon mitigation strategies and that market-based policies will play a strong role in facilitating CCS implementation. Many states have also embraced CCS as a carbon mitigation option by providing market-based incentives for CCS and CCS-related research and development.[96]

It logically follows that extensive geological sequestration of carbon dioxide will augment the utility of subsurface property, such that a market could naturally develop for underground storage real estate within the energy production sector.[97] This emerging market is precisely what policymakers and economists are looking for to justify the additional expenses associated with mandatory emissions caps or a tax on carbon.[98]

PART II: CCS IN A NUTSHELL

The basic process of CCS is relatively simple to grasp. Up to 90% of carbon dioxide emissions are "captured" at a stationary industrial source rather than being released into the atmosphere.[99] Carbon dioxide can be

94. *RGGI Benefits*, REG'L GREENHOUSE GAS INITIATIVE, http://www.rggi.org/rggi_benefits (last visited Nov. 2, 2013); *see also* Doug Struck, *Cap-and-Trade Program Creates Green Jobs*, SCI. AM. (Apr. 23, 2009), http://www.scientificamerican.com/article.cfm?id=cap-and-trade-creates-jobs&print=true (reporting that the RGGI is encouraging energy efficiency programs, which has quickly lead to more jobs in the region).

95. 26 U.S.C. § 45Q (2012).

96. *See Financial Incentives for CCS*, CTR. FOR CLIMATE AND ENERGY SOLUTIONS, http://www.c2es.org/us-states-regions/policy-maps/ccs-financial-incentives (last visited Nov. 2, 2013) (providing a map and details for states that provide financial incentives for CCS).

97. Cal Cooper, ed., *A Technical Basis for Carbon Dioxide Storage*, CO_2 CAPTURE PROJECT 3 (2009), *available at* http://unfccc.int/resource/docs/2011/smsn/ngo/276.pdf (predicting that "[i]nvestments in storage sites will also drive investments to improve site selection criteria and monitoring techniques").

98. *See UN Climate Talks and Power Politics—It's Not About the Temperature: Hearing Before the Subcomm. on Oversight and Investigations and Comm. on Foreign Affairs*, 112th Cong. 35–43 (2011) (statement of Elliot Diringer, Vice President for International Strategies, Pew Center on Global Climate Change), *available at* https://www.hsdl.org/?view&did=705087 (detailing the EU's cap-and-trade program and its ability to reduce emissions while increasing average gross domestic output).

99. *Climate Change: Carbon Dioxide Capture and Sequestration*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/climatechange/ccs/index.html (last updated June 21, 2013); *see IPCC Special Report on Carbon Dioxide Capture and Storage: Summary for Policy Makers*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 4 (2005), *available at* https://docs.google.com/viewer?srcid=0B1gFp6Ioo3akWFVURndxRU5xU1E&pid=explorer&efh=false&a=v (estimating that a power plant with capture technology could reduce emissions by 80 to 90%).

captured using several different processes,[100] and currently, the United States is investing in a variety of research and development projects.[101] Captured carbon dioxide is condensed into a supercritical liquid state[102] and then transported via pipelines to sequestration sites.[103] There it is injected anywhere from 800 feet to two miles below the earth's surface.[104] Once injected, it will remain permanently sequestered.[105] The fourth step in the process is some form of monitoring of the sequestered carbon dioxide in order to safeguard the integrity of the injection site.[106]

Storage sites for carbon dioxide include depleted oil and gas reservoirs, deep saline formations, and coal bed formations, both onshore and offshore.[107] The Department of Energy estimates that the United States has at least 2,400 billion metric tons of carbon dioxide storage capacity in saline formations, depleted oil and gas reservoirs, and unmineable coal seams.[108] A good site is judged on its porosity (because liquid carbon dioxide is dissolved into porous rock formations), permeability/storage security, injectivity, as well as other factors, such as accessibility for pipelines and monitoring.[109] The oil and gas industry has accrued a

100. *Carbon Capture & Storage: Technological and Regulatory Considerations*, NAT'L ASS'N OF REGULATORY UTIL. COMM'RS 1–4 (Mar. 2008), *available at* http://www.naruc.org/grants/Documents/CarbonCaptureStorageTechnologies.pdf.

101. *See 2011 Department of Energy Investments in Carbon Capture Technologies*, U.S. DEPT. OF ENERGY, http://energy.gov/maps/2011-department-energy-investments-carbon-capture-technologies (last visited Nov. 2, 2013) (showing a map of various projects designed to develop solvent, sorbent and membrane capture technologies).

102. Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L. J. 85, 87 (2009) (describing the process of capturing carbon dioxide).

103. *Id.*

104. Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration (GS) Wells, 40 C.F.R. §§ 144–47 (2012) (providing general injection well requirements); *see also Site Selection*, CO_2 CAPTURE PROJECT, http://www.co2captureproject.org/site_selection.html (last visited Nov. 2, 2013) (noting that carbon dioxide is often injected at depths greater than 800 meters).

105. *See* 40 C.F.R. §§ 124, 144–47 (2012) (explaining that, although there are examples of geological formations that have held carbon dioxide for millions of years, the actual timeframe for sequestration depends on the specific properties of each individual injection site).

106. *See IPCC Special Report on Carbon Dioxide Capture and Storage: Summary for Policy Makers*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 14 (2005), *available at* https://docs.google.com/viewer?srcid=0B1gFp6Ioo3akWFVURndxRU5xU1E&pid=explorer&efh=false&a=v ("Given the long timeframes associated with geological storage of CO_2, site monitoring may be required for very long periods.").

107. Cal Cooper, ed., *A Technical Basis for Carbon Dioxide Storage*, CO_2 CAPTURE PROJECT 12 (2009), *available at* http://unfccc.int/resource/docs/2011/smsn/ngo/276.pdf.

108. *DOE's Carbon Utilization and Storage Atlas Estimates at Least 2,400 Billion Metric Tons of U.S. CO_2 Storage Resource*, U.S. DEPT. OF ENERGY (Dec. 19, 2012), http://www.netl.doe.gov/publications/press/2012/121219_does_carbon.html.

109. *Carbon Capture & Storage: Technological and Regulatory Considerations*, NAT'L ASS'N OF

wealth of geological information over the past century, and with increasingly sophisticated geological mapping technologies, operators have access to voluminous data about the character and capacity of subsurface pore space.[110]

A. *Site Integrity and Risk*

Obviously, one of the greatest concerns with geological sequestration is ensuring the integrity of the site; usually this entails an acceptably small risk of leakage.[111] The consensus in the energy industry is that, given available technology, geological data, and ample experience with secondary recovery projects, the risk to the public is negligible.[112] Touted safety notwithstanding, there are potential areas of risk that could create liability for injectors should carbon dioxide escape from a pipeline during transport or from a subsurface formation in a large enough concentration to be dangerous.[113] In general, carbon dioxide is only harmful in high concentrations;[114] in any case, liability for any accidental release would generally fall within the existing framework of tort liability.[115]

REGULATORY UTIL. COMM'RS 4–5 (Mar. 2008), *available at* http://www.naruc.org/grants/Documents/CarbonCaptureStorageTechnologies.pdf.

110. *See, e.g., Petroleum Data for Texas and New Mexico*, THE SUBSURFACE LIBRARY, http://www.subsurface.info/Home.html (last visited Nov. 2, 2013) (providing a data collection from over one million well logs that is made available to the site's members).

111. Yingqi Zhang, Curtis M. Oldenburg, Stefan Finsterle, Preston Jordan, & Keni Zhang, *Probability of CO_2 Leakage Through Faults at Geologic Carbon Sequestration Sites*, GREENHOUSE GAS CONTROL TECHNOLOGIES (GHGT) CONFERENCE 1 (Nov. 16–20, 2008), *available at* http://www.co2captureproject.org/viewresult.php?downid=147.

112. *See, e.g., FAQs—About CCS: Storage, Monitoring and Verification*, CO_2 CAPTURE PROJECT, http://www.co2captureproject.org/faq_storage.html (last visited Nov. 2, 2013) (suggesting that, in addition to ample experience with enhanced oil recovery operations, carbon sequestration is safe because "any potential leaks are gradual and can be quickly detected to prevent the escape of any further CO_2").

113. *See IPCC Special Report on Carbon Dioxide Capture and Storage: Summary for Policy Makers*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 12 (2005), *available at* https://docs.google.com/viewer?srcid=0B1gFp6loo3akWFVURndxRU5xU1E&pid=explorer&efh=false&a=v ("[A] sudden and large release of CO_2 would pose immediate dangers to human life and health, if there were exposure to concentrations of CO_2 greater than 7–10% by volume in air.").

114. Cal Cooper, ed., *A Technical Basis for Carbon Dioxide Storage*, CO_2 CAPTURE PROJECT 2 (2009), *available at* http://unfccc.int/resource/docs/2011/smsn/ngo/276.pdf (assuring that carbon dioxide is only dangerous in high concentrations).

115. *See Carbon Capture & Storage: Technological and Regulatory Considerations*, NAT'L ASS'N OF REGULATORY UTIL. COMM'RS 10 (Mar. 2008), *available at* http://www.naruc.org/grants/Documents/CarbonCaptureStorageTechnologies.pdf (discussing risk and liability implications in respect to CO_2 storage facilities); *Update on Selected Regulatory Issues for CO_2 Capture and Geological Storage*, CO_2 CAPTURE PROJECT iii, 56–57 (Nov. 2010), *available at* http://www.co2captureproject.org/reports/regulatory_report.pdf (examining property rights, and the varying considerations present due

B. *Is Eminent Domain Imminent?*

Use of the subsurface for storage was recognized to be in the best interest of the public decades ago in order to meet seasonal fluctuations in demand for natural gas.[116] Utilities were granted private eminent domain power to condemn subsurface property in order to store natural gas during the low demand summer season by federal and state versions of the Natural Gas Act.[117] It has been suggested that condemnation power should be extended to energy producers seeking subsurface pore space to inject carbon dioxide.[118]

Operators of carbon dioxide pipelines in Texas currently have the option of becoming designated as common carriers and thereby receiving eminent domain power.[119] Carbon dioxide pipeline operators are not required to obtain a certificate of need and public convenience to be granted this authority.[120] Siting—the determination of the route a pipeline will take—is performed by the operator.[121] This freedom will likely facilitate new carbon dioxide pipeline construction in Texas, allowing operators to decide the most convenient paths to connect power plants to injection sites.

C. *Classification of Injected Carbon Dioxide*

Legal classification calls for precision; therefore, the rather tedious question of how to classify, and when to reclassify, carbon dioxide within the context of CCS is worth considering. In gas form, carbon dioxide is a greenhouse gas, and as an emission, it is styled an "air pollutant" by the

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to the complexity and setting of each individual project).

116. *See generally* White v. N.Y. St. Natural Gas Corp., 190 F. Supp. 342, 345 (W.D. Pa. 1960) (stating that "[t]he underground storage of gas . . . in depleted pools . . . is essential to meet the public demand for gas . . . during the winter season"); Lone Star Gas Co. v. Murchison, 353 S.W.2d 870, 876 (Tex. Civ. App.—Dallas 1962, writ ref'd n.r.e.) (claiming that an efficient distribution of gas is crucial to "[t]he health and well-being of great numbers of people").

117. Natural Gas Act, 15 U.S.C. § 717f (2012); *White*, 190 F. Supp. at 349.

118. Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 U. ILL. L. REV. 363, 423 (2010) (arguing for condemnation power).

119. *See* Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L.J. 85, 97 (2009) (explaining "common carrier" status in Texas).

120. *Id.* (noting the omission). *But see* Tex. Rice Land Partners, Ltd. v. Denbury Green Pipeline-Texas, LLC, 363 S.W.3d 192, 200–01 (finding that "a CO_2 pipeline owner is not a common carrier if the pipeline's only end user is the owner itself or an affiliate[,]" and that a status determination that a pipeline owner is a common carrier by the Railroad Commission is subject to judicial review), *reh'g denied*, 381 S.W.3d 465 (Tex. 2012).

121. Robert R. Nordhaus & Emily Pitlick, Carbon Dioxide Pipeline Regulation, 30 ENERGY L.J. 85, 97 (2009) (defining "siting").

EPA and regulated accordingly.[122] However, once compressed into a supercritical liquid state[123] and permanently injected deep into the subsurface, the classification of carbon dioxide as an "air pollutant" is no longer technically accurate, and perhaps not legally accurate either.[124] In late 2010, the EPA passed a rule creating a new class of wells, Class VI, to regulate geologically sequestered carbon dioxide under the Underground Injection Control (UIC) Program and the Safe Drinking Water Act (SDWA).[125]

Further complicating classification is the possibility of impurities and contaminants, such as mercury, in the carbon dioxide stream. These contaminants meet the definition of "hazardous substances" regulated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).[126] In the instance of a hazardous substance being present in the injection well, the injector or operator could incur liability under one or both of these acts for cleaning up contamination and any damage caused thereby.[127]

PART III: MODERN USES OF SUBSURFACE PROPERTY REQUIRE A REEVALUATION OF VALUATION METHODS

The subsurface currently has several valuable uses,[128] providing apt comparisons for carbon sequestration.[129] Natural gas storage provides one fitting analogue[130] and has generated a wealth of statutory and judicial

122. 40 C.F.R. §§ 52, 86 (2011); *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/climatechange/endangerment/ (last updated June 21, 2013).

123. Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L. J. 85, 87 (2009).

124. 40 C.F.R. §§ 124, 144–47 (2012) (defining carbon dioxide and specifying that "[t]his subpart does not apply to any carbon dioxide stream that meets the definition of a hazardous waste under 40 CFR part 261" and also asserting that carbon dioxide is not a drinking water contaminant on its own, but makes a weak acid when dissolved into water).

125. *See id.* (providing the most recent version).

126. *Update on Selected Regulatory Issues for CO_2 Capture and Geological Storage*, CO_2 CAPTURE PROJECT 52 (Nov. 2010), *available at* http://www.co2captureproject.org/reports/regulatory_report.pdf.

127. *Id.* at 52–53.

128. *See* Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 U. ILL. L. REV. 363, 378 (2010) (noting that the subsurface is used commercially for "water recovery, hydrocarbon production, natural gas storage, or liquid waste disposal").

129. *Carbon Capture & Storage: Technological and Regulatory Considerations*, NAT'L ASS'N OF REGULATORY UTIL. COMM'RS 10 (Mar. 2008), *available at* http://www.naruc.org/grants/Documents/CarbonCaptureStorageTechnologies.pdf.

130. R. Lee Gresham & Owen L. Anderson, *Legal and Commercial Models for Pore-Space Access and*

material to draw upon when speculating how sequestration could affect the rights of property owners. In *Lone Star Gas Co. v. Murchison*,[131] the court could just as easily have been discussing carbon dioxide sequestration when it wrote "[t]he policy arguments . . . are incredibly strong. It has become essential to build up a large storage reserve . . . . Natural underground reservoirs are the only economically feasible way to store such reserves."[132]

The development of a market in subsurface property is susceptible to policy arguments that the additional costs to sequester carbon will overburden the industry. If carbon dioxide pipelines and sequestration, like the seasonal storage of natural gas, are deemed "public uses" of subsurface property, owners may only realize a nominal consideration for the condemned land in the interest of public policy.[133] Compensation could be statutorily capped at the federal level to keep the implementation costs of CCS low; but such action would curtail the development of the subsurface as a commodity.[134]

The determination of compensation is also guided by principles of constitutional just compensation, in that the determination of compensation must be decided based on each individual, unique piece of property being taken.[135] If courts must determine what just compensation for subsurface property is under the Constitution,[136] the tension between these competing interests must be resolved and will most likely be resolved in favor of energy companies. But, in light of our sacred tradition of sanctifying the rights of property ownership, including the right to exclude, this should not be the case.

Use for Geologic CO_2 Sequestration, 72 U. PITT. L. REV. 701, 705–06 (2011).

131. Lone Star Gas Co. v. Murchison, 353 S.W.2d 870 (Tex. Civ. App.—Dallas 1962, writ ref'd n.r.e.).

132. *Id.* at 878.

133. *See* Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 U. ILL. L. REV. 363, 423–24 (2010) (discussing "public use").

134. *See id.* at 422 (suggesting Congress should declare pore space has no value, thereby creating a rebuttable presumption that landowners should not receive compensation for subsurface property appropriated for carbon sequestration).

135. *See* Miss. River Trans. Corp. v. Tabor, 757 F.2d 662, 675 (5th Cir. 1985) (reviewing just compensation).

136. U.S. CONST. amend. V (stating "nor shall private property be taken for public use, without just compensation").

A. *Case Law Illustrates There Is an Existing Market for the Right to Store in the Subsurface*

In *Burlington Resources Oil & Gas Co. v. Lang & Sons, Inc.*,[137] a landowner sued an oil and gas lessee for trespass related to the use of the subsurface pore space of an abandoned well to dispose of wastewater from oil and gas production.[138] The Montana Supreme Court cited several Texas cases that considered the subsurface estate to be part of the surface estate.[139] Ultimately, the Montana court held that Lang could not maintain his trespass claim because Burlington had an incident right to dispose of the wastewater as a by-product of its other drilling operations.[140]

This case is important because, just as in several Texas cases of note,[141] it calls into question whether an operator can be shielded from trespass liability when waste is injected pursuant to a properly obtained permit.[142] In the instant case, Burlington applied for and received a permit to inject the wastewater.[143] When Burlington informed the landowner (Lang), he explicitly denied Burlington's waste storage rights and rejected its offer of compensation; nevertheless, Burlington proceeded with the injection under the authority of the permit.[144] Lang then asked Burlington to stop injecting the wastewater into his subsurface property, which Burlington refused to do; so Lang brought suit.[145]

Lang also sued for compensation under a Montana statute that entitled a landowner to recover damages for "loss of agricultural production and

137. Burlington Res. Oil & Gas Co. v. Lang & Sons, Inc., 259 P.3d 766 (Mont. 2011).

138. *Id.* at 768.

139. *Id.* at 770 (citing Moser v. U.S. Steel Corp., 676 S.W.2d 99, 102 (Tex.1984); Emeny v. United States 412 F.2d 1319 (Ct. Cl. 1969); Humble Oil & Ref. Co. v. West, 508 S.W.2d 812, 815 (Tex.1974)).

140. *Id.* at 769.

141. *See* FPL Farming Ltd. v. Envtl. Processing Sys., L.C., 351 S.W.3d 306, 312 (Tex. 2011) (holding that a permit does not insulate the operator from tort liability for trespass); Gregg v. Delhi-Taylor Oil Corp., 344 S.W.2d 411, 415–16 (Tex. 1961) (considering the argument of whether the court could maintain jurisdiction when the Oil and Gas Commission had already issued a permit for the subsurface trespass at issue, the court ultimately determined it did have jurisdiction to hear the trespass claim because it was "primarily judicial in nature"); Corzelius v. Harrell, 186 S.W.2d 961 (Tex. 1945) (discussing the "quasi-judicial" power of the Railroad Commission).

142. *Compare Burlington*, 259 P.3d at 769 (recognizing that as a byproduct of the parties' drilling operations, the lessee possessed an incident right to dispose of the wastewater) *with* Berkley v. R.R. Comm'n of Tex., 282 S.W.3d 240, 242–43 (Tex. App.—Amarillo 2009, no pet.) (affirming the holding in *FPL Farming* as logical, that a permit does not excuse tortious conduct and "is much like getting a driver's license") *and FPL Farming*, 351 S.W.3d at 310–11 (holding a permit does not insulate the operator from tort liability for trespass).

143. *Burlington*, 259 P.3d at 769.

144. *Id.*

145. *Id.*

income, lost land value, and lost value of improvements" as a result of oil and gas operations.[146] Startlingly, the Montana court held that Lang was not entitled to any separate compensation for the right to store waste because Burlington's appraiser testified that he "had never valued, or heard of any other appraiser valuing pore space ... [and] that no demonstrable market exist[ed] for pore space."[147]

The Montana court narrowly construed "lost land value" as being limited in scope to the market value for the pore space itself, as a piece of real estate, and did not consider a market value for the right to store waste in the pore space as an element of "lost land value."[148] What makes the reasoning of the case remarkable is that the court ignored substantial evidence offered by Lang that a market did exist for the right to use pore space for waste storage; seven witnesses testified that, as a "matter of industry custom," landowners were generally paid a waste disposal fee.[149] The court noted that Lang had not explicitly pleaded for "lost land value," but rather requested "separate compensation."[150] This was a trifling and insignificant flaw in the pleadings, which the court should have allowed Lang to amend and correct because it ultimately proved fatal to his case.

Burlington Resources represents precisely the kind of judicial posture that landowners will have to overcome in order to be compensated for the value of the right to dispose of carbon dioxide under their property. In trespass claims and in any condemnation proceedings, practitioners should stress in their pleadings and with evidence that the correct measure of lost market value of subsurface property is the value for the right to subsurface storage, for which a well-developed market does in fact exist.[151] Because of the limited uses of the subsurface,[152] its only value, aside from oil or mineral extraction, derives from storage capacity, such that any occupation of the pore space without consent from the landowner should be sufficient evidence of interference with a reasonably foreseeable use.

Ample case law affirms that landowners have the exclusive right to convey gas storage rights in their subsurface strata. In *Emeny v. United*

146. *Id.* at 770–71.

147. *Id.* at 771.

148. *Id.*

149. *Id.*

150. *Id.* at 771–72.

151. *See* Cassinos v. Union Oil Co., 18 Cal. Rptr. 2d 574, 577 (Cal. Ct. App. 1993) (identifying evidence offered by a landowner of the exact rate per barrel to store wastewater in the area and at the time of the subsurface trespass).

152. James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration By Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 275 (2011).

States,[153] the court explicitly held that a surface owner who executes a lease for gas or mineral production retains ownership of any subsurface "structure that might be suitable for the underground storage of 'foreign' or 'extraneous' gas produced elsewhere."[154] In *Humble Oil & Refining Co. v. West*,[155] the Texas Supreme Court explained that "the matrix of the underlying earth, i.e., the reservoir storage space"[156] is part of the surface estate, even when there is a valid gas or mineral lease producing on the property. *Ellis v. Arkansas Louisiana Gas Co.*[157] affirmed the same principle when the Tenth Circuit addressed the issue of which party—the surface owner or the mineral estate owner—had the right to grant natural gas storage rights.[158] Other cases have held the same,[159] and the mere fact that there is such a wealth of case law on the issue illustrates that owning the right to subsurface storage has real, recognized value. Otherwise, none of these plaintiffs would have bothered with litigation to try to obtain judicial recognition of such a right.

B. *Synergy Between CCS and EOR: Too Good to Be True?*

CCS is a viable option for carbon mitigation in the United States largely because it is seen as a kind of bridging technology,[160] and because captured carbon dioxide can be used in secondary, tertiary, or enhanced oil recovery projects (EOR).[161] Simply stated, EOR involves three essential

153. Emeny v. United States, 412 F.2d 1319 (Ct. Cl. 1969).

154. *Id.* at 1323.

155. Humble Oil & Ref. Co. v. West, 508 S.W.2d 812 (Tex. 1974).

156. *Id.* at 815 (explaining ownership of the reservoir when there is a valid lease on the land).

157. Ellis v. Ark. La. Gas Co., 450 F. Supp. 412 (E.D. Okla. 1978), *aff'd*, 609 F.2d 436 (10th Cir. 1979).

158. *Id.* at 423 (granting the reservoir itself to the surface estate owner).

159. *See* Sunray Oil Co. v. Cortez Oil Co., 112 P.2d 792, 795 (Ky. 1941) (stating the surface owner "has the right to so use the surface and substrata of her land as she sees fit, or permit others so to do, so long as such use does not injure or damage other persons"); Tate v. United Fuel Gas Co., 71 S.E.2d 65, 72 (W. Va.1952) (holding the surface owner possessed the authority to grant a gas storage lease). *But see* Cent. Ky. Natural Gas Co., v. Smallwood, 252 S.W.2d 866, 868–69 (Okla. 1952) (proclaiming the mineral owner held ultimate authority in granting gas storage leases).

160. *What is CO_2 Capture & Storage?*, CO_2 CAPTURE PROJECT, http://www.co2captureproject.org/what_is_co2_capture_storage.html (last visited Nov. 2, 2013) (explaining that "CCS has an important role to play as a bridge to a low-carbon energy future").

161. *See* Occidental Permian Ltd. v. Helen Jones Found., 333 S.W.3d 392, 397 (Tex. App.—Amarillo 2011, pet. denied) (documenting the history of carbon dioxide used in enhanced oil recovery projects since the 1980s); *see also Basin Oriented Strategies For CO_2 Enhanced Oil Recovery: East & Central Texas*, ADVANCED RESOURCES INT'L 1 (Feb. 2006), *available at* http://www.adv-res.com/pdf/Basin%20Oriented%20Strategies%20-%20East%20&%20Central%20Texas.pdf ("[R]egions of East and Central Texas have nearly 74 billion barrels of oil which will be left in the ground, or 'stranded', following the use of today's oil recovery practices. A major portion of this

steps.[162] The first step involves injecting carbon dioxide into a reservoir after the primary drilling efforts have been exhausted; the second step involves recovering and separating the oil or natural gas from the carbon dioxide; the final step involves re-injecting the carbon dioxide back into the well, and possibly storing it permanently in the depleted reservoir after the operator's lease expires.[163] The carbon dioxide bonds with residual oil that is not reachable with standard drilling, thus enhancing well productivity.[164] EOR has been part of the oil industry for decades; so there is a well-developed body of knowledge and expertise for the technique.[165] Profits from EOR should offset some of the costs associated with implementing capture technology at stationary power plants,[166] a symbiotic relationship that makes investment in CCS attractive to both the government and private sectors.[167]

The question of whether carbon dioxide should have a separate classification for use in EOR remains unclear. This is important because while in use for EOR, the carbon dioxide injection is incident to the oil or gas extraction.[168] But after operations have ceased, there is a question of whether the carbon dioxide can be left in the depleted well as a waste by-product without further compensation to the property owner. Litigation of similar issues provides some interesting analogies.

In *Cassinos v. Union Oil Co.*,[169] offsite wastewater was injected into a property adjacent to the plaintiff,[170] who sued for subsurface trespass,

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'stranded oil' . . . appear[s] to be technically and economically amenable to enhanced oil recovery (EOR) using carbon dioxide (CO_2) injection.").

162. *Occidental Permian Ltd.*, 333 S.W.3d at 397.

163. *See id.* (explaining that "CO_2 . . . follows a continuous cycle of injection, recovery, processing and re-injection").

164. *Carbon Capture & Storage: Technological and Regulatory Considerations*, NAT'L ASS'N OF REGULATORY UTIL. COMM'RS 4 (Mar. 2008), *available at* http://www.naruc.org/grants/Documents/CarbonCaptureStorageTechnologies.pdf.

165. *See id.* (noting that EOR generates a "revenue stream that can improve the economics of undertaking CO_2 storage").

166. *Id.*

167. *See Basin Oriented Strategies For CO_2 Enhanced Oil Recovery: East & Central Texas*, ADVANCED RESOURCES INT'L 5, 8 (Feb. 2006), *available at* http://www.adv-res.com/pdf/Basin%20Oriented%20Strategies%20-%20East%20&%20Central%20Texas.pdf (declaring that under various scenarios, cheaper CO_2 would make more oil economically recoverable in Texas using EOR and that CO_2 prices could be lowered by incentivizing carbon capture, as well as asserting that "large supplies of low concentration CO_2 emissions would be available from the large power plants and refineries in the region, assuming affordable cost CO_2 capture technology is developed").

168. *See* Occidental Permian Ltd. v. Helen Jones Found., 333 S.W.3d 392, 397 (Tex. App.—Amarillo 2011, pet. denied) (explaining how CO_2 is used for EOR).

169. Cassinos v. Union Oil Co., 18 Cal. Rptr. 2d 574 (Cal. Ct. App. 1993).

170. *Id.* at 576.

nuisance, and quasi-contract when the wastewater migrated into his subsurface property.[171] The landowner was able to recover damages measured by "the fair market value of the disposal rights taken by Union."[172] Thus, the landowner was compensated because Union Oil Co. committed a willful bypass of the market by failing to contract with the plaintiff before obtaining a storage benefit from his subsurface.[173]

This case illustrates a logical and fair outcome for cases of subsurface trespass. In *Cassinos*, the plaintiff presented credible evidence that the market had established a price for the storage for wastewater, a readily ascertainable amount, and the court accepted that evidence in calculating damages not based on trespass, but for the willful bypass of the market.[174] Clearly, the injector of the wastewater obtained a benefit from the act of disposing this wastewater in the plaintiff's subsurface property, and a reasonably certain value was readily ascertainable for that benefit based on the going rate for the same volume of wastewater disposed of in the area and at the time of the injection.[175] *Cassinos* illustrates that quasi-contractual principles fit squarely and neatly into the fact pattern typical of a subsurface trespass.

C. *An Incident Right to Sequester Carbon Dioxide?*

The wastewater in *Cassinos* may arguably be distinguishable from carbon dioxide in EOR because it was generated offsite and was not produced as a result of any drilling operations on that site. In EOR operations, the carbon dioxide initially comes from offsite, but becomes a by-product of oil or gas production.[176] The ultimate question will be whether the operator, by virtue of his lease to produce oil or gas, has the additional right to leave the carbon dioxide in the depleted well once recovery efforts have ceased by virtue of its reclassification as a by-product of onsite

171. *Id.* at 576–77.

172. *Id.* at 577.

173. *See, e.g., id.* at 576–77 (showing that Union Oil Co. obtained permission from the adjacent property owner and a permit to inject the offsite wastewater, but they did not obtain or seek to obtain permission from the plaintiff landowner).

174. *See id.* at 577 (noting that the plaintiff brought evidence showing "that the fair market value of such rights was $1.75 per barrel of water disposed" and that "[o]il operators, including Union, paid this price in this area during the pertinent period of time"). The plaintiff also asserted an entitlement to transportation costs. *Id.*

175. *Id.* at 577.

176. *See generally* L. Stephen Melzer, *Carbon Dioxide Enhanced Oil Recovery (CO_2 EOR): Factors Involved in Adding Carbon Capture, Utilization and Storage (CCUS) to Enhanced Oil Recovery*, NAT'L ENHANCED OIL RECOVERY INITIATIVE 3–4 (Feb. 2012), *available at* http://neori.org/Melzer_CO2EOR_CCUS_Feb2012.pdf (delineating the changing role of CO_2 in EOR processes).

operations.

The onsite/offsite distinction is important because California, where *Cassinos* occurred, observes the same rule as Texas and most other states, giving the holder of a mineral lease incident rights to use land to the extent needed for purposes of extraction.[177] This means that the leaseholder may temporarily store wastewater produced onsite as a by-product of drilling or mining activities, or any other use of the land within the scope of gas or mineral extraction.[178] These ancillary rights terminate with the lease, such that once all gas or minerals have been extracted, the pore space reverts to the surface estate.[179] The question is whether the landowner is entitled to the return of an empty pore space or any compensation for the value of lost storage capacity.

Because carbon dioxide used in EOR becomes a by-product of production, litigation may arise over whether the right of carbon dioxide storage in the depleted well could be characterized as an incident right to use land for the production of oil or gas. The scope of that incident right is another potential source of litigation. Courts may have to decide at what point a property owner is entitled to additional compensation for storage rights, considering what stage of production the well is in and whether the lease covers multiple production wells, some of which are not actively being produced and are merely used for storage of carbon dioxide from other wells.[180]

In one case, for example, when considering whether injected saltwater that damaged the plaintiff's property exceeded these incident rights, the court in *Brown v. Lundell*[181] stated, "If either party exceeds those rights he becomes a trespasser."[182] The court in *Department of Transportation v. Goike*[183] held:

177. *See Cassinos,* 18 Cal. Rptr. 2d at 578–79 (discussing the rights incident to a lease for purposes of producing under the lease, and the scope of those incident rights); Burlington Res. Oil & Gas Co., LP v. Lang & Sons Inc., 259 P.3d 766, 770 (Mont. 2011) ("Montana law permits the owner of a dominant mineral estate to use reasonably the surface estate in the production of the mineral.").

178. Brown v. Lundell, 344 S.W.2d 863, 865 (Tex. 1961).

179. Ellis v. Ark. La. Gas Co., 450 F. Supp. 412 (E.D. Okla. 1978), *aff'd*, 609 F.2d 436, 418–19 (10th Cir. 1979).

180. *See Cassinos*, 18 Cal. Rptr. 2d at 580 ("Union's injection of offsite wastewater 'to maintain production of oil on leases other than the Escolle Lease' exceeded the scope of consent under the lease.").

181. Brown v. Lundell, 344 S.W.2d 863 (Tex. 1961).

182. *Id.* at 866.

183. Dep't of Transp. v. Goike, 560 N.W.2d 365 (Mich. Ct. App. 1996).

> [A] surface owner possesses the right to the storage space created after the evacuation of underground minerals or gas. While defendants may, of course, 'store' any fluid minerals or gas native to the chamber that has not yet been extracted, they cannot introduce any foreign or extraneous minerals or gas into the chamber.[184]

Another issue of scope concerns the granting of easements for the purpose of gas storage. If operators obtain a permit or an easement for carbon sequestration, the extent of that easement or permit ought to be strictly adhered to in order to protect the storage rights of neighboring tracts of land in the case of migration. *Columbia Gas Transmission Corp. v. An Exclusive Gas Storage Easement*[185] is a prime example of a rather entitled operator exceeding the scope of its easement. When natural gas migrated underground beyond the area covered by its easement, Columbia Gas Transmission Corporation argued that "[its] right to obtain easements through eminent domain travel[ed] with the underground gas."[186] In other words, the operator was arguing that his easement had no fixed geographic boundary, but would extend, presumably without limit, to wherever the plume happens to migrate. This argument was rightfully rejected by the court, but exemplifies the critical role that courts evaluating claims for subsurface trespass should play in scrutinizing the use of eminent domain power when it has been granted to private companies.

PART IV: CHALLENGES FACED BY PLAINTIFFS IN TEXAS SUBSURFACE TRESPASS CASES

While subsurface trespass has been explicitly recognized as a cause of action in Texas,[187] several cases suggest that the claim cannot be maintained absent a showing that the trespass has caused actual damage to the property.[188] In *Chance v. BP Chemicals, Inc.*,[189] the court created a

184. *Id.* at 366.

185. Columbia Gas Trans. Corp. v. An Exclusive Gas Storage Easement, 578 F. Supp. 930 (N.D. Ohio 1983), *aff'd*, 776 F.2d 125 (6th Cir. 1985).

186. *Id.* at 934.

187. *See* FPL Farming Ltd. v. Envtl. Processing Sys., L.C., 383 S.W.3d 274, 280 (Tex. App.—Beaumont 2012, pet. filed) (recognizing a cause of action for trespass, where wastewater migrated into the plaintiff's subsurface and contaminated water, causing actual damage to the plaintiff's property); *see also* Villarreal v. Grant Geophysical, Inc., 136 S.W.3d 265, 268 (Tex. App.—San Antonio 2004, pet. denied) (acknowledging subsurface trespass as a cause of action, but denying a claim for geophysical trespass, when an operator obtained geological information about the plaintiff's subsurface using seismic exploration without the plaintiff's permission, because maintaining a trespass action in Texas requires physical entry onto land).

188. *See, e.g.*, Coastal Oil & Gas Corp v. Garza Energy Trust, 268 S.W.2d 1,11 (Tex. 2008).

standard for actionability that may be all but impossible for landowners to meet. When addressing whether injected waste that mixed with subsurface brine water was a trespass, the court explained that the plaintiffs' ownership rights in their subsurface was limited, such that their right to exclude invasions of the subsurface property extended only to invasions which "actually interfere[d] with [their] reasonable and foreseeable use of the subsurface."[190] The appeals court determined it was proper to require the appellants to prove physical damage to their property or some actual interference with a reasonable and foreseeable use of the subsurface real estate[191] in order to maintain the trespass claim. In other words, the standard could only be met if the landowners proved that they attempted to use their subsurface storage capacity or attempted to sell the rights of storage, but were unable to do so because of the presence of BP Chemicals' wastewater on their property.

The unworkable nature of this standard becomes apparent when applied to a trespass of surface property. For instance, no court would deny a plaintiff's right to maintain a trespass action for a holdover tenant until the owner produced evidence that she was attempting to occupy, rent, or sell the property in question.[192] Actionability for trespass should not be based on whether there is proof that the property owner actually attempted to exercise the rights of ownership that were compromised by the trespass.

Unworkable as it may be, public policy is often used as a justification for imposing the standard. In *Nunez v. Wainoco Oil & Gas Co.*,[193] the Supreme Court of Louisiana limited the landowner's right to exclude from his subsurface property, and thus precluded the plaintiff's ability to maintain an action for trespass. The court justified its decision by citing the public interest in creating pooling and unitization agreements to facilitate drilling. The court wrote, "Since established private property law concepts, such as trespass, have been super[s]eded in part by Louisiana's Conservation Law when a unit has been created by order of the Commissioner, we do not find that a legally actionable trespass has occurred in this instance."[194] The United States District Court in *Raymond*

189. Chance v. BP Chems., Inc., 670 N.E.2d 985 (Ohio 1996).

190. *Id.* at 992.

191. *Id.* at 993.

192. *See* Aspenwood Apartment Corp. v. Coinmach, Inc., 349 S.W.3d 621, 631–32 (Tex. App.— Houston [1st Dist.] 2011, pet. granted) (discussing trespass and holdover tenants).

193. Nunez v. Wainoco Oil & Gas Co., 488 So. 2d 955 (La. 1986).

194. *Nunez*, 488 So. 2d at 964.

v. Union Texas Petroleum Corp.[195] found no actionable trespass absent a showing of actual property damage, relying on the decision in *Nunez*.[196]

The analysis in *Nunez*, which relied on government-sanctioned pooling and unitization agreements, seems to be in direct conflict with *FPL Farming Ltd. v. Environmental Processing Systems, L.C.*,[197] which clarified that even if injection is conducted pursuant to a permit, the injector will not be shielded from tort liability for trespass if the injected substance migrates into adjacent subsurface property.[198] Just as a permit cannot shield an operator from tort liability for trespass, a pooling or unitization agreement also should not be used as a vehicle for infringing on individual property rights without impunity.

A. *Fracing and Subsurface Trespass*

Texas courts have all but conclusively denied an actionable claim for subsurface trespass resulting from hydraulic fracturing or "fracing" operations.[199] Briefly stated, fracing is a recovery process whereby water and other injectants are blasted at high pressure into the subsurface to create fractures in rock, thus releasing trapped natural gas and making it available for production.[200] Texas fracing operations, like all other gas, oil, and mineral development, are governed by the rule of capture, which means that the operator is entitled to all of the oil or gas it can extract out of the ground, regardless of where it is located in-place.[201]

Coastal Oil & Gas Corp. v. Garza Energy Trust[202] is a pointed opinion by the Supreme Court of Texas. The court held that because of the rule of capture,[203] the plaintiffs could not recover trespass damages for stimulation-induced fractures that extended into their subsurface property

195. Raymond v. Union Tex. Petrol. Corp., 697 F. Supp. 270 (E.D. La. 1988).

196. *Id.* at 273–74; *Nunez*, 488 So. 2d at 955.

197. FPL Farming Ltd. v. Envtl. Processing Sys., L.C., 351 S.W.3d 306 (Tex. 2011).

198. FPL Farming Ltd. v. Envtl. Processing Sys., L.C., 305 S.W.3d 739, 746 (Tex. App.—Beaumont 2009), *rev'd*, 351 S.W.3d 306 (Tex. 2011).

199. Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 1 (Tex. 2008) (denying any recovery for subsurface trespass resulting from fracing operations); Geo Viking, Inc. v. Tex-Lee Operating Co., 1992 WL 80263 (Tex. Apr. 22, 1992) (recognizing a cause of action for subsurface trespass caused by fracing operations, but then immediately withdrawing the opinion), *opinion withdrawn and superseded on overruling of reh'g*, Geo Viking, Inc. v. Tex-Lee Operating Co., 839 S.W.2d 797 (Tex. 1992).

200. *What Is Hydraulic Fracturing?*, WHAT-IS-FRACKING.COM, http://www.what-is-fracking.com/what-is-hydraulic-fracturing/ (last visited Nov. 2, 2012).

201. *See Coastal Oil*, 268 S.W.3d at 42–47 (Johnson, J., concurring in part, dissenting in part) (discussing the interpretation of the rule of capture in Texas energy production).

202. Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1 (Tex. 2008).

203. *Id.* at 13–17.

absent "misconduct that is illegal, malicious, reckless, *or intended to harm another without commercial justification* . . . ."[204] The court reasoned that capturing oil by way of a fracing operation is a commercial justification for stimulation-induced fractures that extend onto the subsurface property of an adjacent tract of land, which precludes an action for trespass.[205] The concurring opinion by Justice Willett goes one step further, asserting that not only is such a claim not actionable on the facts of that case, but that "it's no trespass at all."[206]

Whether the prohibition of subsurface trespass for fracing operations will be extended to cases of wastewater disposal or to natural gas and carbon dioxide storage is yet to be determined. The extension seems improbable if the holding of *Coastal Oil & Gas Corp.* applies only to situations where the rule of capture applies—in other words, only for claims involving extraction and not injection. However, *Coastal Oil & Gas Corp.* may have created a "commercial justification" affirmative defense to subsurface trespass actions in Texas. Within the energy industry, companies involved in either extraction or injection can readily assert a commercial justification for any subsurface trespass caused by their operations.[207] Extension of a commercial justification affirmative defense to all subsurface trespass claims, including those involving carbon storage, is therefore a real concern to the viability of such claims in the future. Based on the language of *Coastal Oil & Gas Corp.*, when balanced against the interests of individual property owners, the commercial justification of energy production may provide a sufficient affirmative defense to bar an action for trespass in the case of subsurface migration of carbon dioxide.

B. *A Tale of Two Trespasses*

Classification of injected carbon dioxide matters in terms of liability, permitting, and licensing for the injector, but classification also could

204. *Id.* at 17 (emphasis added).

205. *Id.*

206. *Id.* at 29 (Willett, J., concurring).

207. *Id.* at 17 (majority opinion) (holding that the rule of capture bars recovery for a claim of subsurface trespass in the context of fracing operations). It is unclear the extent to which the Supreme Court intended for "commercial justification" to become available as an affirmative defense to all subsurface trespass claims, or if its holding depended solely upon the rule of capture and applied only to fracing operations. In such a case, the holding in *Coastal Oil & Gas Corp.* would not apply in the carbon sequestration context, where the purpose is waste disposal, rather than hydrocarbon production. However, it would seem that the strong policy arguments in favor of hydrocarbon development, coupled with the sacredness of the rule of capture in Texas, could provide the energy industry with blanket immunity for subsurface trespass claims, if the discussion of "commercial justification" in *Coastal Oil & Gas Corp.* is taken literally and applied liberally.

affect what causes of action are available to surface property owners should the injected carbon dioxide migrate beyond its intended reservoir. Whether the migration is classified as a continuing or a permanent trespass is a distinction with real impact on recovery; it affects when the claim accrues for purposes of determining when the statute of limitations will begin to run,[208] the possibility of future suits to recover ongoing damages over time,[209] and what remedies are available, including the appropriate measure of monetary damages.[210]

The distinction between permanent and continuing trespass seems intuitively obvious. However, it becomes tricky when the nature of the trespass has characteristics of permanence, but also the possibility of abatement, or if the trespass does not permanently damage property, or if more trespasses will likely occur indefinitely into the future, but without regularity—things like water seepage, emissions, soot and cinder, or foul odors from a landfill.[211]

The Texas Supreme Court defined continuing trespass as "so irregular or intermittent over the period leading up to filing and trial that future injury cannot be estimated with reasonable centrality."[212] Continuing trespass is not available for claims involving permanent injury to real property.[213] A permanent trespass "involves an activity of such a character and existing under such circumstances that it will be presumed to continue indefinitely."[214]

Initially the most obvious concern for practitioners is the fact that migration occurs deep under the surface, making discovery of the migration difficult.[215] In general, there is a two-year statute of limitations for trespass causes of action, which begins to run as soon as the first trespass accrues.[216] If carbon dioxide migrates 800 meters beneath one's property,[217] certainly it would not be immediately observable. Continuing

208. Schneider Nat'l Carriers, Inc. v. Bates, 147 S.W.3d 264, 279 (Tex. 2004).

209. *Id.* at 278.

210. *Id.* at 276.

211. *Id.* at 272–74.

212. *Id.* at 281.

213. *See* Krohn v. Marcus Cable Assocs., L.P., 201 S.W.3d 876, 880–81 (Tex. App.—Waco 2006, pet. denied) (holding that a cable company committed a permanent trespass by laying cable without landowner's consent, thus precluding claim for continuing trespass).

214. *Schneider Nat'l Carriers, Inc.*, 147 S.W.3d at 272.

215. Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 16 (Tex. 2008) (explaining subsurface trespass is difficult to prove because "the material facts are hidden below miles of rock, making it difficult to ascertain what might have happened").

216. TEX. CIV. PRAC. & REM. CODE ANN. § 16.003 (West 2002).

217. *Site Selection*, CO_2 CAPTURE PROJECT, http://www.co2captureproject.org/site_select

trespass offers a procedural advantage in cases like this. It is an exception to the rule in Texas—the statute of limitations will not begin to run until the trespass has ceased, rather than upon the first occurrence, because each isolated occurrence is viewed as a separate and distinct claim.[218] For that same reason, a continuing trespass will not be barred by res judicata and leaves open the possibility of future suits if the trespass continues to cause further damage.[219]

The uncertain nature of future harm distinguishes a continuing trespass from a permanent trespass.[220] In an action for continuing trespass in Texas, a landowner is only entitled to recover for the lost use of property that has already accrued as of the time of the suit; damages can be measured as lost rental value, and the plaintiff may bring future suits to recover further damages for the continuing trespass.[221] On the other hand, if a trespass is permanent, a landowner can recover based on the diminution in the market value of the property, but may only bring suit once.[222] A further distinction is that injunctive relief is available for continuing trespass. Because future damages are impossible to calculate, a property owner may seek to end the cause of the trespass. Injunctive relief is not available for a permanent trespass action because the damages, in theory, fully compensate the property owner for that portion of property compromised by such a trespass.[223]

The distinction between a continuing and a permanent trespass is based on the underlying facts and nature of the individual trespass; so claimants may not simply opt for one version of trespass over the other to suit their needs.[224] The measure of damages in lost rental value, along with the tolling of the statute of limitations and option for future suits, as well as the availability of injunctive relief makes continuing trespass the preferable classification for subsurface trespass plaintiffs. However, it seems more likely that courts will decide permanent trespass is the appropriate cause of

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ion.html (last visited Nov. 2, 2013).

218. *See* Upjohn Co. v. Freeman, 885 S.W.2d 538, 542 (Tex. App.—Dallas 1994, writ denied) (explaining that a continuing tort cause of action does not accrue until the defendant's tortious acts have stopped).

219. *Schneider Nat'l Carriers, Inc.*, 147 S.W.3d at 281 n.62.

220. *Id.* at 281.

221. *Id.* at 276.

222. *Id.*

223. *Id.* at 281.

224. *Id.* at 281–82; *see also* Markwardt v. Tex. Indus., Inc., 325 S.W.3d 876, 882 (Tex. App.—Houston [14th Dist.] 2010, no pet.) (affirming that a plaintiff may not elect whether to assert a claim for permanent or continuing trespass because the claims are based on the underlying facts of the trespass).

action in most cases.

Looking at the nature of the subsurface trespass of migrating carbon dioxide, it is somewhat difficult to see exactly how this claim would be categorized because the plume is not necessarily permanent. The possibility of abatement is not dispositive in this classification,[225] but it certainly factors into the analysis. While the migration may be abatable, it could be so unlikely or cost-prohibitive that the trespass is deemed permanent. The intent of the injector to store carbon permanently could also weigh into the analysis. The distinction can also be controlled by whether the trespassing defendant has condemnation power.[226] If energy companies were granted the power of eminent domain to condemn subsurface property for the storage of carbon dioxide, migration would likely be classified as a permanent trespass as a matter of law. A permanent trespass, similar to a condemnation, is like a forced sale with damages awarded for the full lost market value of the property.[227] If the courts do not recognize any market value for subsurface property, landowners could be completely cut off from any recovery if the trespass is classified as permanent.[228]

C. *Eminent Domain and Unjust Compensation*

Eminent domain could make the issue of migrating carbon dioxide problematic for landowners. If energy companies have the power of eminent domain, migrating carbon dioxide may be a de facto permanent trespass because an operator could have condemned the same property, for the same purpose, in any case.[229] It is also possible that a trespass action could be denied altogether, and the landowner would have to bring a claim for inverse condemnation.[230]

Just compensation in these cases ought to be measured not by the

225. *Schneider Nat'l Carriers, Inc.*, 147 S.W.3d at 285.

226. *See* Corsello v. Verizon N.Y., Inc., 967 N.E.2d 1177, 1182 (finding that a permanent trespass can be converted into a de facto taking when the property has been taken by one possessing eminent domain condemnation power), *reargument denied*, 973 N.E.2d 187 (2012).

227. Meridien Hotels, Inc. v. LHO Fin. P'ship I, L.P., 255 S.W.3d 807, 821 (Tex. App.—Dallas 2008, no pet.) ("Damages for permanent injury to real property include the difference in the market value of the land, the difference in market value of a building, and the value of lost minerals." (citations omitted)).

228. *See id.* (explaining that the market value of the property is necessary to calculate damages).

229. *See Corsello*, 967 N.E.2d at 1182 (deciding that when the trespasser has condemnation power, a permanent trespass is converted into a de facto taking).

230. *See* Columbia Gas Trans. Corp. v. An Exclusive Natural Gas Storage Easement, 747 F. Supp. 401, 404 (N.D. Ohio 1990) (recognizing that a landowner may bring a claim for inverse condemnation when there has been a taking of their property by government).

market value of the subsurface property as a piece of real estate, but rather by the value of the storage rights in the subsurface. The onus is on the landowner to bring evidence of the highest and best use of the property.[231] In an inverse condemnation situation, this burden may be eased somewhat by the fact that the subsurface is already in use as a carbon storage site. In Texas, there is a presumption that the current use of the land is the highest and best use.[232]

In normal condemnation proceedings for a partial taking, the measure of compensation is generally calculated using the before-and-after rule—in other words, the value of the land before the taking compared to the value after.[233] By this measure, the court would likely look only at the diminution in market value of the remaining surface estate.[234] The real value of subsurface real estate is derived not from actual market value of the property itself, but from the right to store waste—the right to occupy it. It is more aptly described as a taking of the right to use land, rather than the taking of land itself, and so it is more akin to an easement.

Market value has also been described as the sum that a willing buyer would pay the landowner, if they were so inclined to become a willing seller, at the time and place of the taking.[235] By this plain-language measure, courts should take notice that the only willing buyers of subsurface property, absent the presence of gas or mineral reserves, would be motivated by a narrow set of possible uses, to whit, as a storage site for waste, natural gas, or carbon dioxide.

The proper measure of compensation would be the same sum if measured by the value of the highest and best use of the subsurface.[236] The burden of proving the highest and best use is significant, though unnecessarily so, in that courts generally require some evidence that the landowner contemplated or intended to use the property for whatever purpose they are claiming is its highest and best use.[237] Further still,

231. Olson v. United States, 292 U.S. 246, 255 (1934).

232. Exxon Pipeline Co. v. Zwahr, 88 S.W.3d 623, 628 (Tex. 2002).

233. *Id.* at 627.

234. *Id.*

235. City of Harlingen v. Estate of Sharboneau, 48 S.W.3d 177, 182 (Tex.2001).

236. *See* TEX. PROP. CODE ANN. § 21.041 (West 2000) (listing elements of evidence for assessing just compensation in eminent domain proceedings); Bauer v. Lavaca-Navidad River Auth., 704 S.W.2d 107, 109 (Tex. App.—Corpus Christi 1985, writ ref'd n.r.e.) (stating that the market value of property in determining just compensation includes consideration of the highest and best use of the property).

237. *See* Chance v. BP Chems., Inc., 670 N.E.2d 985, 993 (Ohio 1996) (describing the burden of the movant); *see also Exxon Pipeline Co.*, 88 S.W.3d at 628 (discussing highest and best use valuation and landowner's ability to offer evidence to rebut court's presumption).

Texas follows the value-to-the-taker rule; so, the value can only be measured by the landowner's loss and not the value of the property to the condemner.[238] Practitioners should anticipate that courts may be very hesitant to hold that just compensation is anything but nominal, absent strong evidence that the landowner actually intended to use the subsurface for carbon sequestration or was actively marketing the property for that use at the time of the taking.[239]

Courts should acknowledge that the subsurface has exceedingly limited potential uses,[240] albeit valuable ones, namely the storage of things that we do not want on the surface. In this sense, Texas courts should allow evidence that the subsurface estate is "a self-sufficient separate economic unit"[241] and base compensation on the commercial value of subsurface waste storage or carbon sequestration for the capacity of the pore space involved. The highest and best use in these types of condemnation cases happens to also be the only use, for all practical purposes, of the subsurface.[242] It would be unjust compensation for courts to apply rigid rules to deny recovery for what is clearly the only meaningful use of the property.

D. *The Fear Factor*

For valuation purposes, surface land over sequestered carbon could go the way of cows near power lines with public fears of a possible leak bringing down the property value.[243] Whether the fears of potential buyers are substantiated seems to be decisive in Texas as to whether said diminution in property value can be admissible as valuation evidence in a condemnation hearing, insofar as it has been applied to power line and

238. City of Dallas v. Rash, 375 S.W.2d 502, 505 (Tex. Civ. App.—Dallas 1964, writ ref'd n.r.e.).

239. *See Chance*, 670 N.E.2d at 985 (emphasizing the lack of evidence presented); *see also* Cravens v. City of Amarillo, 309 S.W.2d 903, 908 (Tex. Civ. App.—Amarillo 1958, writ dism'd) (explaining that evidence must be of a reasonable use for which the land is suited and adaptable, not a speculative use).

240. James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration by Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 275 (2011).

241. *Exxon Pipeline Co.*, 88 S.W.3d at 628.

242. *See* James Robert Zadick, *The Public Pore Space: Enabling Carbon Capture and Sequestration By Reconceptualizing Subsurface Property Rights*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 257, 275 (2011) ("Beneficial deep subsurfaces uses almost uniformly involve mineral extraction and storage or chemical waste disposal").

243. *See generally Field Guide to Effects of Power Lines on Property Values*, NAT'L ASS'N OF REALTORS, http://www.realtor.org/field-guides/field-guide-to-effects-of-power-lines-on-property-values (last updated Nov. 2011) (pointing out the effect that public knowledge and perception has on the value of properties close to power lines).

pipeline cases.[244] Generally, the plaintiffs bear the burden of showing that the material carried in the pipeline is toxic and that the pipeline to be placed on their property has the same material characteristics as some other pipeline that actually ruptured.[245]

Heddin v. Delhi Gas Pipeline Co.[246] is a prime example of this analysis. In that case, the property owners could not simply give evidence that their property value was reduced due to the presence of the pipeline, or even that the reduction was proximately caused by the public's fear that the presence of a pipeline made the property unsafe. Instead, the property owners had to provide evidence that the fear was founded on "reason and experience[,]"[247] not "fancy, delusion[,] or imagination"[248] on the part of the public.[249] *Heddin* may be instructive for situations involving geologically sequestered carbon dioxide.

In the case of subsurface trespass claims, the Ohio court in *Chance v. BP Chemicals, Inc.*[250] held that evidence of "speculative stigma damages" could be excluded when determining what damages the plaintiffs incurred as a result of subsurface migration of waste injectant.[251] It is reasonable to assume the same will hold true in the case of subsurface carbon dioxide.

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244. *Compare* Delhi Gas Pipeline Co. v. Mangum, 507 S.W.2d 631, 635 (Tex. Civ. App.—Tyler 1974, no writ) ("There is Texas authority that fear of pipelines can be taken into consideration as an element of damage affecting the market value of land in condemnation suits provided there exists actual danger of future leaks, ruptures or explosions, and the land suffers a present depreciation in value" (citing Delhi Gas Pipeline Co. v. Reid, 488 S.W.2d 612 (Tex. Civ. App.—Waco, 1972, writ ref'd, n.r.e.); Buzzard v. Mapco, Inc., 499 S.W.2d 352 (Tex. Civ. App.—Amarillo, 1973, writ ref'd, n.r.e.))), *with* Delhi Gas Pipeline Corp. v. Gibbs, 643 S.W.2d 492 (Tex. App.—Tyler 1982, writ ref'd n.r.e.) (holding that the "pipeline was not shown to have been generally similar in characteristics to line at issue, [therefore] admission of evidence of rupture in Mississippi pipeline, for purpose of proving that market value of condemnees' property was substantially decreased by fear of possible escape of toxic gas from pipeline, was reversible error").

245. *See Gibbs*, 643 S.W.2d at 495 ("Where the proof, as here, fails to show that the two pipelines are generally similar in their essential characteristics, then proof of an explosion on one line offers no reasonable basis for depreciating the market value of the land housing the dissimilar line.").

246. Heddin v. Delhi Gas Pipeline Co., 522 S.W.2d 886 (Tex. 1975).

247. *Id.* at 888.

248. *Id.*

249. *See id.* (holding that there is no claim for fear-induced market value reduction based on an unfounded danger) (citing Ne. Gas Transmission Co. v. Lapham, 117 A.2d 441 (Conn. 1955); E. St. Louis Light & Power Co. v. Cohen, 164 N.E. 182 (Ill. 1928); Yagel v. Kan, Gas & Elec. Co., 291 P. 768 (Kan. 1930); Ky. Hydro Elec. Co. v. Woodard, 287 S.W. 985 (Ky. 1926); Onorato Bros. v. Mass. Tpk Auth., 142 N.E.2d 389 (Mass. 1957); Johnson v. Airport Auth. of City of Omaha, 115 N.W.2d 426 (Neb. 1962)).

250. Chance v. BP Chems., Inc., 670 N.E.2d 985 (Ohio 1996).

251. *Id.* at 993.

PART V: ALTERNATIVES TO TRESPASS

A. *Unjust Enrichment and the Inadequacy of Remedy at Law*

Unjust enrichment is recognized as an independent cause of action in Texas jurisprudence[252] with a two-year statute of limitations.[253] Texas common law explains that:

> A person is unjustly enriched when he obtains a benefit from another by fraud, duress, or the taking of an undue advantage. Unjust enrichment is an equitable principle holding that one who receives benefits unjustly should make restitution for those benefits. Unjust enrichment occurs when the person sought to be charged has wrongfully secured a benefit or has passively received one which it would be unconscionable to retain. Unjust enrichment characterizes the result or failure to make restitution of benefits received under such circumstances as to give rise to implied or quasi-contract to repay. It has also been said that recovery under unjust enrichment is an equitable right and is not dependent on the existence of a wrong.[254]

Courts have precluded recovery of unjust enrichment damages,[255] reasoning that the equitable remedy is not available when there is an adequate remedy at law—the so-called "adequate remedy" being compensatory damages from a trespass claim. In denying that there is a maintainable cause of action for subsurface trespass, at least as it arises out of a fracing operation, Texas courts may have opened themselves up to unjust enrichment claims. In the case of fracing, there may be no available remedy at law if the court determines that Texas will not recognize an action for subsurface trespass. Without a cause of action for subsurface trespass, equitable remedies for unjust enrichment should therefore become available.

However, a similar pattern of logic was dismissed by the court in

252. St. Farm Bank, F.S.B. v. Manheim Auto. Fin. Servs., Inc., No. 310-CV-00519-L, 2010 WL 3156008 (N.D. Tex. Aug. 6, 2010) (taking note of the Texas Supreme Court's recognition of unjust enrichment claims).

253. Elledge v. Friberg–Cooper Water Supply Corp., 240 S.W.3d 869, 869–70 (Tex. 2007) (explaining that the two-year statute of limitations applies to claims of conversion of property, while the four-year statute of limitations applies to claims based on debt, and holding that, because unjust enrichment was founded more upon principles of conversion rather than debt, a two-year limitation period applies).

254. Villarreal v. Grant Geophysical, Inc., 136 S.W.3d 265, 270 (Tex. App.—San Antonio 2004, pet. denied) (internal citations, quotes, and brackets omitted).

255. *See* Boudreaux v. Jefferson Island Storage & Hub, LLC, 255 F.3d 271, 276 (5th Cir. 2001) (denying recovery for plaintiff's unjust enrichment claim).

Villarreal v. Grant Geophysical, Inc.,[256] a case of subsurface trespass arising out of a geological survey, to deny the plaintiff recovery for a claim of unjust enrichment. In that case, because the surveyors did not physically "occupy" any part of the Villarreals' property to conduct their survey, the Villarreals' cause of action for geophysical trespass failed.[257] The court then used what can best be described as circular logic to dispose of the Villarreals' claim for unjust enrichment as well. The court relied on the letter, rather than the spirit, of the definition of an unjust enrichment claim, reasoning that Grant Geophysical "did not wrongfully secure a benefit nor did they passively receive one which would be unconscionable to retain."[258] In other words, to prevail in a claim for unjust enrichment, the benefit must be obtained by the defendant intentionally *and* wrongfully (in the sense that it constitutes an actionable trespass). If not obtained wrongfully, the benefit must have been obtained passively. Because the data was obtained by Grant Geophysical intentionally, but not wrongfully, the claim failed. In making this ruling, the court should have considered the real issue of whether Grant Geophysical had indeed secured a benefit from the geological data it was able to gather because of the unauthorized survey. The wrongful nature of the defendant's conduct was relevant in tort, but does not generally apply to quasi-contractual claims such as unjust enrichment. Obviously, Grant Geophysical did not passively obtain the data, but the distinction of unjust enrichment is that it does not necessarily matter how one obtained a benefit, wrongfully or passively, but rather whether retention of that benefit without compensating the plaintiff would be unjust.

B. *Is "Quantum Meruit" Latin for "Just Compensation" in Texas?*

A case involving migrating carbon dioxide "is a *land use* case, not a *land damages* case."[259] If courts deny recovery, or even the existence of an actionable subsurface trespass claim, absent a showing of real damage to the property,[260] landowners may have a right without a remedy, or at least, without a compensatory remedy in cases of subsurface trespass.

256. Villarreal v. Grant Geophysical, Inc., 136 S.W.3d 265 (Tex. App.—San Antonio 2004, pet. denied).

257. *Id.* at 270.

258. *Id.*

259. Corley v. Entergy Corp., No. 1:98-CV-2006, 2004 WL 5627176 at *4 (E.D. Tex. Apr. 14, 2004).

260. *See* Phillips Petrol. Co. v. Cowden, 241 F.2d 586, 592 (5th Cir. 1957) (reciting the defendant's argument that, absent a showing of property damage, the plaintiff could not maintain an action for geothermal trespass).

Practitioners should look to other methods for getting to quasi-contractual claims and restitution-based remedies. Restitution is considerably better suited to the facts of subsurface trespass cases because, for all intents and purposes, operators will receive a substantial benefit when carbon dioxide migrates outside of its prescribed reservoir. Restitution remedies aim to correct such willful bypasses of the market[261] by measuring damages by the operator's gain.[262]

Practitioners should capitalize on Texas's observance of the minority rule for the doctrine of waiver of tort, whereby the tort of trespass is waived and suit may be brought in assumpsit[263] for restitution.[264] Assumpsit is a vehicle for landowners to recoup in restitution what they are denied as compensatory relief: the value to the operator of use of the subsurface to store carbon dioxide.[265] In many jurisdictions, the doctrine of waiver of tort is not available for naked trespass—a trespass that does not permanently damage the property, or for which nothing has been taken from the soil.[266] However, Texas follows the minority rule and allows a plaintiff to waive a naked trespass and sue in assumpsit for the value of the use of the land.[267]

Estes v. Browning[268] is one of the first cases in Texas to mention the doctrine of waiver of tort. In an action involving default on a sale of land,

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261. *See* Olwell v. Nye & Nissen Co., 173 P.2d 652, 653–54 (Wash. 1946) (compensating plaintiff for the benefits obtained from the use of an egg washing machine, where defendant was offered machine for sale, refused to purchase it, but used it in his egg washing business).

262. *Id.* at 653 ("Where the defendant [tortfeasor] has benefited by his wrong, the plaintiff may elect to 'waive the tort' and bring an action in assumpsit for restitution. Such an action arises out of a duty imposed by law devolving upon the defendant to repay an unjust and unmerited enrichment.").

263. Assumpsit is a Latin word literally meaning, "he promised." St. Paul-Mercury Indem. Co. v. City of Hughes, 331 S.W.2d 106, 109 (Ark. 1960).

264. *See* Estes v. Browning, 11 Tex. 237, 237 (1853) (giving an alternative to a suit for trespass); *Cowden*, 241 F.2d at 592 (stating, after analysis of the majority rule, that "Texas belongs to the minority of states that permit a landowner to waive the trespass and sue in assumpsit for the reasonable value of the use and occupation").

265. *See Estes*, 11 Tex. at 237 ("The trespass may be waived, and suit be brought for the value of the use and occupation."); Harrell v. F. H. Vahlsing, Inc., 248 S.W.2d 762, 772 (Tex. Civ. App.—San Antonio 1952, writ ref'd n.r.e.) (noting that Texas follows the minority rule, "permitting a quasi-contract or assumpsit recovery in a land trespass case, seemingly without regard to whether or not anything of value is taken from the land" (citing *Estes*, 11 Tex. at 237)).

266. Raven Red Ash Coal Co. v. Ball, 39 S.E.2d 231, 237 (Va. 1946) (distinguishing the majority and minority rules for application of waiver of tort to naked trespass, the court observed that it is illogical to hold "a trespasser who benefits himself by cutting and removing trees from another's land is liable on an implied contract, and that another trespasser who benefits himself by the illegal use of another's land is not liable on an implied contract").

267. *Estes*, 11 Tex. at 237.

268. Estes v. Browning, 11 Tex. 237 (1853).

the court asserted simply and unequivocally: "The trespass may be waived, and suit be brought for the value of the use and occupation."[269] *Estes* was cited more than a century later by the court in *Phillips Petroleum Co. v. Cowden*,[270] a case involving a seismograph survey done without the landowner's consent.[271] In *Cowden*, the plaintiffs were able to forego any dispute regarding the actionability of a geophysical trespass by waiving the tort and suing for the defendant's use of their land to gain geological data.[272]

The *Cowden* court held that the plaintiff was entitled to the reasonable value of the use of their property, rather than the value of the data the defendant obtained from the unauthorized seismograph survey.[273] This discussion in *Cowden* seems to hint that there may be nuanced distinctions between damages for an assumpsit claim, measured by the value of the use of the land or the rental value, and damages by a restitution-based measure, which focuses entirely on what the defendant has gained from the transaction. The Virginia Supreme Court in *Raven Red Ash Coal Co. v. Ball*[274] briefly touched on this issue when the defendant in that case argued that the appropriate measure of damages was not the value of the benefit of the trespass to them, "but what the plaintiff actually lost through interference with his business, loss of rent and the like."[275] The court dismissed the argument, writing:

> This position would place a premium on trespassing, because it makes the position of the trespasser more favorable than that of one lawfully contracting. If a man's house is vacant with no prospect of a tenant and no intention on his part of occupying it himself, and a trespasser occupies it, he must pay as damages for the trespass the value of the use and occupation, for this would be the duty of a tenant contracting upon a quantum meruit for the use, by consent, of that which the trespasser uses without consent.[276]

Raven Red Ash applies to subsurface migration of carbon dioxide to the

269. *Id.*

270. Phillips Petrol. Co. v. Cowden, 241 F.2d 586 (5th Cir. 1957).

271. *Id.*

272. *Id.* at 592 (reciting the defendant's argument that, absent a showing of property damage, the plaintiff could not maintain an action for geothermal trespass).

273. *Id.* at 593 (noting, for purposes of a waiver of tort situation, "it is necessary to establish the reasonable market value of the use appellants made of appellees' property, and this value is independent of the benefit that appellants actually received from that use").

274. Raven Red Ash Coal Co. v. Ball, 39 S.E.2d 231 (Va. 1946).

275. *Id.* at 238–39.

276. *Id.* at 239.

extent that plaintiffs should not have to prove actual losses with, for instance, evidence of foregone opportunities to sell their subsurface storage rights. In order to recover under an assumpsit claim, it is sufficient for a plaintiff to show that the defendant has in fact obtained the subsurface storage rights, and thus a promise to pay should be implied.[277]

Because the value of the right to store is really the only value of the pore space, "trespass may be waived and the value alone of the use and occupation be demanded."[278] Waiving trespass essentially supplants the wrongfulness of the occupation itself[279] and shifts that wrongfulness onto the defendant's failure to compensate the plaintiff for a benefit obtained.[280] Instead of measuring damages in terms of compensation for what the plaintiff has lost, the assumpsit claim puts the measure of damages in terms more akin to a debt or an action for money owed;[281] so the plaintiff is required to show facts upon which the law will impute a promise to pay.[282]

Assumpsit is appropriate for subsurface trespass cases also because pricing information for the value of waste disposal and gas storage is readily ascertainable. This proves that within the industry,[283] contracts are made for the same waste disposal activity that the defendant has engaged

277. *See* King v. Tubb, 551 S.W.2d 436, 442 (Tex. Civ. App.—Corpus Christi 1977, no writ) (explaining the elements of an assumpsit claim).

278. Harrell v. F. H. Vahlsing, Inc., 248 S.W.2d 762, 773 (Tex. Civ. App. —San Antonio 1952, writ ref'd n.r.e.).

279. *Ball*, 39 S.E.2d at 235.

280. *Id.* at 234.

281. Consider the discussion in *Elledge v. Friberg–Cooper Water Supply Corp.*, recounting that an unjust enrichment claim is based upon conversion, rather than debt, so a two-year statute of limitations applies to such claims. Elledge v. Friberg–Cooper Water Supply Corp., 240 S.W.3d 869, 869–70 (Tex.2007). If assumpsit is construed as an action principled upon debt, rather than conversion, property owners may therefore argue that a four-year statute of limitations should apply to their claims, rather than the two-year statute that applies to permanent trespass claims. This would be particularly beneficial in cases of subsurface trespass because it may not be immediately apparent on the surface estate, and property owners would likely have to invest in geological testing to detect the location of a migrating plume of carbon dioxide. Another argument for applying a four-year statute of limitations to the waiver of tort doctrine is that an assumpsit action is principled on an implied-in-law contract. H. Russell Taylor's Fire Prevention Serv., Inc. v. Coca Cola Bottling Corp., 99 Cal. App. 3d 711, 723 (Cal. Ct. App. 1979) (applying the four-year statute of limitations, which applied to a contract claim under the California Commercial Code, to an assumpsit claim). "Generally, where there is a waiver of tort and suit in assumpsit, the statute of limitations relating to actions of assumpsit rather than tort applies, although the determination of what limitation period is appropriate may depend on the substance of the action and the nature of the right violated rather than the form of action." *Id.*

282. *Ball*, 39 S.E.2d at 234.

283. *See* Phillips Petrol. Co. v. Cowden, 241 F.2d 586, 590–93 (5th Cir. 1957) (noting that geological surveys are an important source of valuable information in Texas, such that land owners have a protectable property interest in the right to explore for minerals in their subsurface property).

in without the plaintiff's consent.[284] Logically speaking, the doctrine of waiver of tort fits quite squarely within the fact patterns to be addressed by migrating carbon dioxide or any other subsurface trespass.

PART VI: A JUSTIFICATION FOR JUST COMPENSATION

In *Starrh & Starrh Cotton Growers v. Aera Energy LLC*,[285] a California court made the distinction between permanent and continuing trespass by finding that "characterization of a trespass as either permanent or continuing is based on whether the trespass will actually continue into the future or is likely to be discontinued at some later date."[286] In that case, the plaintiff was able to recover millions of dollars based on a measure of damages for the value of the defendants' use of Starrh & Starrh's subsurface property to dispose of wastewater from its nearby drilling operations.[287] The trespass was held to be continuing because Aera Energy was still regularly disposing of wastewater at the same site, thereby indicating that additional wastewater would migrate into Starrh & Starrh's subsurface.

California amended its Civil Code in 1992 to include the value of the use or fair rental value in wrongful occupation cases.[288] The change was made by the Legislature in response to "some polluters [who] would dump their waste on unoccupied land of little value (e.g., desert land) in order to avoid expensive toxic waste disposal fees."[289] Because the land was relatively worthless, even if the owners did file suit, they were unable to recover because their actual property damage was minimal. As the Legislature took notice of this illegal dumping, they saw a need to remove the economic incentive for the improper disposal.

This fact pattern has obvious parallels to the case of subsurface storage of carbon dioxide, especially in cases where it has migrated from the original site into adjacent pore space. The nominal value of subsurface property as real estate should not be an economic incentive for the energy industry to dispose of carbon dioxide waste without compensating property owners for the reasonable, fair market value of the right to store in their subsurface.

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284. Lloyd v. Hough, 42 U.S. 153, 159 (1843) (explaining that even the term assumpsit anticipates a contract).

285. Starrh & Starrh Cotton Growers v. Aera Energy LLC, 63 Cal. Rptr. 3d 165 (Cal. Ct. App. 2007).

286. *Id.* at 175.

287. *Id.* at 167–68.

288. *Id.* at 179.

289. *Id.*

CONCLUSION

The Texas and Federal governments ought to take notice of the possibility that something as seemingly innocuous as which method is used to calculate value or damages for subsurface trespass could actually encourage wrongful conduct by encouraging injectors to intentionally inject carbon dioxide beyond the known storage capacity of a reservoir, causing migration onto neighboring property. Furthermore, if there is no economic consequence for subsurface migration, injectors may be encouraged to inject carbon dioxide without gathering a full set of data or information concerning the characteristics of the pore space into which the injected carbon dioxide could eventually migrate outside of the designated reservoir. Injectors could also become less diligent in tracking and monitoring permanently injected carbon dioxide, or less able to do so, by virtue of simply not knowing exactly where it has migrated. The government should not incentivize sloppy information-gathering when carbon dioxide leakage poses a threat to human life.

Courts assessing what amount will justly compensate landowners for taking of subsurface property or the measure of damages in a subsurface trespass case ought to bear in mind that "[t]he very essence of the nature of property is the right to its exclusive use."[290] The right to exclude from one's private property is essential to the American way. If a benefit is derived from the use of subsurface property for carbon dioxide storage, those who produce pollution ought to pay to receive that benefit. Government should not facilitate a bypass of the market of subsurface property for carbon sequestration.

Overall, government action is required to de-incentivize carbon dioxide emissions, and market-based strategies offer more carrots than sticks to energy producers to help lessen the blow to the economy. Also, there is a growing need for carbon mitigation strategies, including carbon capture and sequestration. While the grant of eminent domain accompanied by some legislative decree that the subsurface property is valueless would undoubtedly facilitate wide deployment of CCS, this would prove to be another unfairness in the story of climate change policy regarding who should pay for carbon dioxide pollution.[291] Energy producers must continue to deliver what is concededly a public service, but also must be responsible for their fair share of the cost of being in a business that

290. Olwell v. Nye & Nissen Co., 173 P.2d 652, 654 (Wash. 1946).

291. *See* Daniel A. Farber, *Adapting to Climate Change: Who Should Pay*, 23 J. LAND USE & ENVTL. L. 1, 18 (2007) (discussing whether the public, government or private industry should bear the costs of climate change).

pollutes the environment and contributes to global climate change. Actual just compensation for the right to store carbon dioxide would help stimulate the economy by furthering the commodification of the subsurface. Considering principles of fairness under the Constitution and our *laissez-faire* economic principles, it is a very American approach to handling climate change and the inevitable expansion of government regulation necessary and critical to address it.