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Made in America: Why the Shale Revolution in America is Not Replicable in China and Argentina

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MADE IN AMERICA: WHY THE SHALE REVOLUTION IN AMERICA IS NOT REPLICABLE IN CHINA AND ARGENTINA

I. INTRODUCTION

The “shale boom,”¹ as many inside and outside the industry call it, has been sweeping the United States since 2011, specifically in Texas, Ohio, West Virginia, and Pennsylvania.² Technology such as hydraulic fracturing, known as “fracking,”³ has given energy producers a new reason to tap into the rock formation known as shale and extract its oil and gas.⁴ Although many outside of the energy industry have heard an increasing amount of discussion about shale and fracking in the United States, few within that group—and arguably a small number of people involved in the industry itself—have heard much discussion concerning shale development in other countries. Big economic powers, such as China, Brazil, Argentina, and Australia, have recently begun drilling shale reserves domestically like the United States.⁵ Unfortunately, the similarities between the United States and these other countries mentioned both begin and end with drilling domestically, despite the United States’

1. The U.S. Energy Information Administration stated in its June 2013 report on shale that “shale gas resources have revolutionized U.S. oil and natural gas production, providing 29 percent of total U.S. crude oil production and 40 percent of total U.S. natural gas production in 2012.” *U.S. Energy Information Administration*, U.S. ENERGY INFORMATION ADMINISTRATION (June 10, 2013), <http://www.eia.gov/todayinenergy/detail.cfm?id=11611>. See U.S. Energy Information Administration, *Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States*, June 10, 2013, available at <http://www.eia.gov/analysis/studies/worldshalegas/pdf/fullreport.pdf> for more information on projected numbers. See also Robert Bryce, *America Needs the Shale Revolution*, WALL ST. J., June 13, 2011, available at <http://online.wsj.com/article/SB10001424052702304432304576369140191493#> (arguing that the shale revolution has set up the United States for an “industrial renaissance.”); See also Bryce, *infra* note 2.

2. Robert Bryce, *Shale and Its Discontents*, NAT’L REV. ONLINE (July 15, 2011), <http://www.nationalreview.com/articles/271890/shale-and-its-discontents-robert-bryce>; See also U.S. Energy Information Administration, *Shale Gas Map* (May 9, 2011), http://www.eia.gov/oil_gas/rpd/shale_gas.pdf.

3. There is some dispute over whether the spelling should be “fracking” or “fracing.” Thomas Kurth, *American Law and Jurisprudence on Fracing*, 58 ROCKY MTN. MIN. L. INST. § 4.01, .04.05, at 6 (2012); See also GRAVES, *infra* note 17.

4. See GRAVES, *infra* note 17.

5. According to the EIA, the world has about 32 countries with technically recoverable shale. U.S. Energy Information Administration, *World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States* (Apr. 2011), <http://www.adv-res.com/pdf/ARI%20EIA%20Intl%20Gas%20Shale%20APR%202011.pdf>.

efforts to serve as a model in drilling shale.⁶ The economic prosperity the United States has experienced as a result of the shale revolution has yet to occur in the aforementioned countries, especially China and Argentina.

In this Note, I argue that the economic prosperity and apparent success the United States has experienced (“the boom”) in drilling shale will not be replicated in China, where the shale reserves are estimated to be significantly larger than in the United States.⁷ Many have claimed the shale boom in the United States is unique, but none have articulated specifically why China will not be able to generate the immediate and continuous prosperity the United States has had.⁸ Legal factors distinctive to the United States, such as private ownership of mineral rights; well-established environmental and regulatory mechanisms; contract law principles; and a free market system demonstrate that China—which has recently commenced exploration and production of shale domestically—will not be able to replicate the economic boom the United States has seen

6. Susan L. Sakmar, *The Global Shale Gas Initiative: Will the United States Be the Role Model for the Development of Shale Gas Around the World?*, 33 HOUS. J. INT’L L. 369, 373 (2011).

The United States launched the GSGI in April 2010 as part of an effort to ‘promote global energy security and climate security around the world.’ Recognizing that shale gas has been a ‘terrific boon’ that many countries would want to replicate, the GSGI seeks to share information about the ‘umbrella of laws and regulations’ that exist in the United States. *Id.*

Polish Delegation Attends First Multilateral Meeting of the Global Shale Gas Initiative, EMBASSY OF POLAND, Aug. 24 2010, available at <http://poland.usembassy.gov/shalegas.html>. Although the Global Shale Gas Initiative sounds good in theory, only three countries have signed on so far—China, India and Poland. David L. Goldwyn, *Global Shale Gas Initiative: Balancing Energy Security and Environmental Concerns*, U.S. DEPARTMENT OF STATE DIPNOTE (Sept. 3, 2010), <https://blogs.state.gov/stories/2010/09/03/global-shale-gas-initiative-balancing-energy-security-and-environmental-concerns>. Additionally, countries that have signed the initiative have not practically applied the regulations and there do not appear to be changes made in order to apply the regulations. David L. Goldwyn, Briefing on the Global Shale Gas Initiative Conference at U.S. Department of State (August 24, 2010), available at <http://www.state.gov/s/ciea/rmk/146249.htm> (noting there are follow-up steps which need to be taken in the respective countries who have signed on).

7. Olivia Chung, *China Joins Shale Gas Hunt*, ASIA TIMES (Aug. 24, 2011), http://www.atimes.com/atimes/China_Business/MH24Cb02.html.

8. See generally Leonardo Maugeri, *The Shale Oil Boom: A U.S. Phenomenon*, Discussion (Belfer Ctr. for Sci. and Int’ Affairs & Harvard Kennedy School, Paper 2013–05, 2013); But see *Is the U.S. Shale Revolution Replicable?*, HOU. BUS. J., Aug. 21, 2013, available at <http://www.bizjournals.com/houston/blog/2013/08/is-the-us-shale-revolution.html?page=all> (Although it will take time, science and economics will win out in the end and will overcome the most significant barriers to shale development—the political ones. Advances in technology will also find a way to overcome many of the technical, geologic and cost obstacles currently hindering development).

Maugeri ultimately concludes that shale development will eventually occur, little by little, all over the world. *Id.* However, my argument differs. Mainly, the development of shale in other countries will undoubtedly occur, but it will come at a high cost and only after a realization that their governments need to reform the legal and political structures in their countries. Also, the development will not amount to the economic prosperity, or “boom” the United States has seen in terms of jobs, infrastructure, and regulatory safeguards.

with shale development in the past two years. There is a glimmer of hope, however, for the country of Argentina,⁹ which has a hybrid of regulatory, contract, and property laws between those of China and the United States, possibly opening the door for a successful shale revolution in the future.¹⁰

Part II will offer a brief technical overview of shale drilling and the historical background of the development of oil and gas laws in the United States, China, and Argentina. This section will set out the general laws on the books and the regulatory framework the three countries have concerning oil and gas, which will likely be the same laws and regulations that apply to shale exploration and production.

Part III will divulge the legal and policy implications of having a free-market system versus a state-run economic system in the context of ease of production, innovation and technology, and corporate attraction. I will also discuss the way in which Argentina has recently changed its laws as a way to accommodate oil and gas companies seeking to extract oil from shale.¹¹

Part IV will establish the regulatory framework in the context of oil and gas law. The focus will mainly be directed to environmental laws and oversight.

Parts V and VI will reveal the skeletal property and contract laws in China and Argentina, while contrasting them with the fleshed out version in the United States. The argument here circles back to the fact that the United States' freedom of contract laws facilitate production and economic prosperity, whereas China's do not.

II. HISTORICAL AND TECHNICAL BACKGROUND ON SHALE OIL AND GAS

This Part will offer a quick review of what shale is and how the oil and gas within it is extracted, followed by an overview of the history and basic laws of energy development in the United States, China, and Argentina.

9. Argentina also has significantly large shale reserves. See EIA, *supra* note 5.

10. According to the U.S. Energy Information Administration (EIA), the "Top 3" in terms of shale gas endowment are China, the U.S., and Argentina. See U.S. Energy Information Administration, *World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States* (Apr. 2011), available at www.eia.gov/analysis/studies/worldshalegas/.

11. See *infra* note 184 and accompanying text.

In simple terms, shale is a rock,¹² but it is a very valuable¹³ one if tapped into properly.¹⁴ The reason why shale has been on the energy industry's radar is not because engineers and geologists recently discovered this type of formation, but because they recently developed the technology to stimulate the formation in a cost-effective way.¹⁵ In fact, shale was first tapped into in the 1930s, less than one hundred years after the first oil and gas well was drilled at Drake's Well in Pennsylvania.¹⁶ In the 1930s, oil and gas producers threw nitroglycerin down the well and cracked the rock formation to exploit the resource.¹⁷ Now, safer and more cost-effective technology exists with hydraulic fracturing, changing the way we exploit resources.¹⁸ The process of fracking involves the opening of space or cracks within shale through the high pressure application of

12. JOHN S. LOWE, OWEN L. ANDERSON, ERNEST E. SMITH, DAVID E. PIERCE, AND CHRISTOPHER S. KULANDER, *CASES AND MATERIALS ON OIL AND GAS LAW* (6th ed. 2013); *See generally* HOWARD R. WILLIAMS & CHARLES J. MEYERS, *MANUAL OF OIL AND GAS TERMS* 700 (14th ed. 2009). Shale is a formation in which oil and gas is formed through intense heat and pressure in addition to organic material over time. *Id.* Most geologists believe 95% of the oil and gas remains in rocks which have not been tapped into. *Id.* Shale is a geographic formation with low permeability and the source of hydrocarbons. *Id.* Development requires some type of well stimulation. *Id.*

13. The International Energy Agency has stated that “[e]nergy developments in the United States are profound and their effect will be felt well beyond North America—and the energy sector. The recent rebound in US oil and gas production, driven by upstream technologies that are unlocking light tight oil and shale gas resources, is spurring economic activity . . . and steadily changing the role of North America in global energy trade.” INT’L ENERGY AGENCY, *WORLD ENERGY OUTLOOK 2012* 23 (2012), available at <http://www.worldenergyoutlook.org/publications/weo-2012/>.

14. *See Hydraulic Fracturing*, AM. PETROLEUM INST., <http://www.api.org/hydraulic-fracturing> (last visited Apr. 5, 2011); *see also Advanced Drilling Techniques*, AM. PETROLEUM INST., <http://www.api.org/oil-and-natural-gas-overview/exploration-and-production/natural-gas/advanced-drilling.aspx> (last visited Oct. 20, 2014) (explaining “horizontal drilling” techniques).

15. *See HALLIBURTON, U.S. SHALE GAS: AN UNCONVENTIONAL RESOURCE, UNCONVENTIONAL CHALLENGES 1* (2008), available at <http://www.halliburton.com/en-US/ps/solutions/unconventional-resources/default.page?node-id=h8cyv98q>; *See also* U.S. Energy Information Administration, *supra* note 10, at 1. Most oilmen owe a debt of gratitude to George Mitchell, a Texas oilman who, through years of trial and error, finally developed a cost effective way to tap into shale: “The work of this legendary oilman, who died last week at age 94 in Galveston, is the reason the United States is in the midst of an energy renaissance.” *Father of Fracking George Mitchell Changed a Nation*, DALLAS NEWS, July 30, 2013, available at <http://www.dallasnews.com/opinion/editorials/20130730-editorial-father-of-fracking-george-mitchell-changed-a-nation.ece>.

16. Lowe, *supra* note 12, at 2.

17. Am. Oil & Gas Historical Society, *Shooters—A Fracking History*, <http://aoghs.org/oilfield-technologies/shooters-well-fracking-history/> (last visited Oct. 20, 2014); *See also* JOHN GRAVES, *FRACKING: AMERICA'S ALTERNATIVE ENERGY REVOLUTION* 101 (2013).

18. David Brooks, *Shale Gas Revolution*, N.Y. TIMES, Nov. 3, 2011, at A31. *See also* Amy Myers Jaffe, *How Shale Gas Is Going to Rock the World*, WALL ST. J., May 10, 2010, at R1 (“Since there’s no longer an urgent need to make [alternative fuels] competitive immediately through subsidies, since we can use natural gas now, we can pour that money into R&D—so renewable will be ready to compete without lots of help when shale supplies run low, decades from now.”).

water, chemicals, and sand.¹⁹ The cracks open up and the oil or gas seeps up through the drill rig.²⁰

With these large-scale operations involving dozens of chemicals and drilling hundreds of feet below the surface (and below aquifers), however, comes regulation.²¹ And all regulations are not created the same. In the United States, regulations surrounding drilling for oil and gas evolved from failures in the pure free market system, which created economic waste rather than economic prosperity.

One example is the oil and gas boom in Morrow County, Ohio in the 1960s, where drill rigs were set up within inches of each other with some overlapping with one another in a small area.²² This massive oil frenzy was due to the lack of regulations on setting up wells and rigs, which eventually led to the development of spacing regulations and a duty to not interfere with one's neighbor unreasonably.²³ The original lack of spacing requirements added to the original framework of drilling helped bolster the common law property doctrine of the rule of capture. The famous property law case of *Pierson v. Post*²⁴ is an example of "catching" oil and gas.²⁵ This common law concept does still apply, but with severe limitations, such as spacing restrictions, environmental concerns, and regulatory framework.²⁶ By reducing the number of rigs that could be in a certain

19. GRAVES, *supra* note 17, at 99; *See also id.* (for more information on different types of fracking, what chemicals might be used, and the history of fracking since the turn of the twentieth century).

20. *Id.*

21. *See Sakmar, supra* note 6, at 372 ("So far, Congress has introduced legislation known as the 'FRAC Act' that, if passed, will place stricter regulations on the shale gas industry").

22. Jeff Fort, *Ohio's Oil Boom—Why It Will Be Different This Time*, OIL & GAS LAW REPORT (Aug. 24, 2012), available at <http://www.oilandgaslawreport.com/2012/08/24/ohios-oil-boom-why-it-will-be-different-this-time/>.

23. *Id.*; *See also* R.C. 1509.01(I) Spacing regulations (requiring that wells be 1,000 feet apart on a 40 acre property, along with the "Doctrine of Correlative Rights," which states that landowners have reciprocal obligations to act in a manner that does not unreasonably interfere with the rights of their neighbors).

24. *Pierson v. Post*, 1805 WL 781, 179 (N.Y. Sup. Ct. 1805) (holding that occupancy can be acquired only by possession).

25. Lowe, *supra* note 12, at 3.

26. *See Kelly v. Ohio Oil*, 39 L.R.A 764 (Ohio 1897) (holding that whatever oil or gas gets into the well belongs to the owner of the well, no matter where it came from, even if it was by fraud or deceit). As long as the well is lawfully drilled, the driller can keep the resource. Motive does not matter. *See also* THERE WILL BE BLOOD (Paramount Vantage & Miramax Films 2007). *See also* Harris v. Ohio Oil Co., 57 OHIO ST. 118, 127 (1897) (holding that where an oil lease that is silent as to the number of wells to be drilled includes an implied covenant that the lessee shall reasonably develop the lands and reasonably protect the lines). More recent cases on reducing waste include *Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1, 12–13 (Tex. 2008) (discussing the rule of capture in the context of fractures and holding that, where hydraulic fracturing runs onto another's property, the driller, and not the landowner, still claims the oil or gas extracted).

space, states like Ohio reduced problems of waste, resulting in a good balance between the free market system and regulation. Texas will be another example analyzed later in the context of property laws.²⁷

The history of oil and gas development in China is encapsulated within its state-run economic system and cultural beliefs, having changed little over the course of its history with drilling, save for the allowance of private oil companies recently.²⁸ Oil was discovered in China in 1959²⁹ and the state was self-sufficient up until 1993.³⁰ After transitioning through the Mao Revolution, which led to some changes in regulatory models,³¹ China ventured out to import oil and gas, using its cultural partnership tactic of “soft power” in making cooperative partnerships with other countries in order to import oil and gas.³² Soft power is still highly emphasized in China, and has been used to develop its own drilling and hydraulic fracturing technologies.³³ Despite the apparent strength of the government in China, however, there is a huge gap in environmental

27. See *infra* note 142 and accompanying text.

28. Yong Huang, Shan Jiang, Diana Moss, & Randy Stutz, *China's 2007 Anti-Monopoly Law: Competition and the Chinese Petroleum Industry*, 31 ENERGY L.J. 337, 339 (2010).

29. RICHARD MCGREGOR, THE PARTY: THE SECRET WORLD OF CHINA'S COMMUNIST RULERS 113–15 (2010)

30. *Id.* at 113.

31. Huang, *supra* note 28, at 339.

It has been suggested that . . . the Chinese energy industry has gone through three divisible time periods marking three distinct regulatory models. The first period extended from 1949 until 1982, and consisted of centralized management; the second from 1982 until 1998, marked by industrial division, or the creation of SOEs; and the third from 1998 through the present, as the Chinese economy has moved from a command-and- control system toward a market-based system.

Wesley N. Harris, *China Energy: A Crossroads Historiography*, 37 T. MARSHALL L. REV. 255, 274–75 (2012).

32. See BATES GILL & YANZHONG HUANG, *Sources and Limits of 'Chinese Soft Power'*, 48 SURVIVAL 24, 24–26 (2006), available at <http://taylorandfrancis.metapress.com/openurl.asp?genre=article&id=doi:10.1080/00396330600765377> (explaining China's utilization of “soft power” to foster productive relationships with other countries).

33. *Id.*; See also Gabriel Dominguez, *Soft Power—China's Expanding Role in the Middle East*, Apr. 2, 2015, available at <http://www.dw.de/soft-power-chinas-expanding-role-in-the-middle-east/a-18233271>.

laws³⁴ and laws overseeing the safety of drilling. This gap will be discussed in more depth later.³⁵

Argentina, unlike China and the United States, has a very different history of oscillating between heavy government oversight and complete privatization within the energy sector. In the 1980s, the Argentinean government controlled the gas and oil industry in its entirety until the election of Carlos Menem in 1989, when he took measures to privatize industry and increase the value of the peso after a severe spike in inflation that swept most of Latin America.³⁶ In 2001, the energy industry took another turn due to new leadership and a recession, only this time the laws³⁷ were heavy in regulation.³⁸ Then, in 2004, the pendulum swung back once again, but not completely.

The current Argentinian legal framework, known as the Second Generation Reforms, developed a happy medium of privatization with cautious government oversight in conducting business.³⁹ These involved incentives for foreign investment⁴⁰ and renewable energy technologies,⁴¹ along with some government regulation.⁴² More recently, in 2012, Argentina passed a series of laws pertaining to shale called the National

34. See Li Jing, *Ex-minister blames China's pollution mess on lack of rule of law*, South CHINA MORNING POST (Jan. 21, 2013), available at <http://www.scmp.com/news/china/article/1132566/ex-minister-blames-chinas-pollution-mess-lack-rule-law> (explaining that since the 1970s, China has failed to abide by the environmental rules it has passed); See also Simon Denyer, *Choking smog paralyzes cities in northeast China, closing schools, airports*, WASH. POST, Oct. 22, 2013, available at http://www.washingtonpost.com/world/choking-smog-paralyzes-cities-in-northeast-china-closing-schools-airports/2013/10/22/ba2c46d6-3b04-11e3-b0e7-716179a2c2c7_story.html.

35. See *infra* note 83 and accompanying text.

36. Daniel Bianchi, *Privatization of the Oil and Gas Industry in Argentina-A Model for Latin America?*, 39 RMMLF-INST 17 (1993); See also Jay Martin, *An Overview of the Privatization of the Latin American Oil and Gas Sector*, 103A RMMLF-INST 9 (1999) (explaining that the debt crisis in Latin America caused some countries to tighten government authority and some to loosen government authority); Martin Lythgoe, *Renewable Generation in Argentina: Past Failures and A Plan for Future Success*, 31 HOUS. J. INT'L L. 263, 289 (2009) (discussing Menem's success in privatizing Argentina's oil and gas industries).

37. Law No. 25,561, July 1, 2002, B.O.

38. Larry B. Pascal, *Summary of Oil and Gas Developments in South America* (2006), 13 L. & BUS. REV. AM. 521, 522-23 (2007) ("[I]n December 2001, Argentina passed the Emergency Law, revoking its currency board/convertibility policy and officially ending Argentina's experiment with neo-liberal economic policies. Argentina's economic crisis, felt in all sectors of the economy, affected the successful oil and gas industry in a particularly severe way").

39. Martin Lythgoe, *Renewable Generation in Argentina: Past Failures and A Plan for Future Success*, 31 HOUS. J. INT'L L. 263, 304 (2009).

40. Law 25,019, Oct. 19, 1998, [29008] B.O. 1, art. 1; Law No. 26190, art. 7.

41. Law 26,190, art. 4(a) (defined as "non-fossil energy sources").

42. Law No. 26,190, art. 14 (establishing set premiums over market prices).

Plan,⁴³ which set the resource's development as a goal for public policy.⁴⁴ It also has these same incentives,⁴⁵ but control over market prices remains.⁴⁶

All three countries have a very diverse history, representing both extremes and the middle ground with free markets systems and state-run dictatorships. This survey leads me to my first contention: The differences in economic systems from the United States are differences which will hinder a shale boom in China and Argentina.

III. ECONOMIC SYSTEMS IN THE CONTEXT OF INVESTMENT AND RISK ASSESSMENT

As this Note is not a review of the current economic system in the United States,⁴⁷ I will simply contrast that system with China's and Argentina's systems.

China's economic system is indeed an interesting and complex combination of authoritarian leadership with heavy oversight in the

43. Law No. 26,741.

44. *Id.*

Upon examining of Law No. 26,741, three main issues may be highlighted: (i) Self-sufficiency in hydrocarbons as a matter of national public policy; (ii) creation of the Federal Council on Hydrocarbons; and (iii) The expropriation of 51% of the equity of YPF S.A. and Repsol YPF Gas S.A. as public benefit.

Amalia Sáenz, *Argentina: An Overview of the Argentine Regulatory Framework and Main Changes in 2012 Scenario: Regulatory Prospects for 2013 in the Light of High Consumer Demand*, 2013 NO. 2 RMMLF-INST PAPER NO. 12C, 12C-3 (2013); *See also* Alex Máculus, *Shall We Dance an Unconventional Tango?*, 2013 NO. 2 RMMLF-INST PAPER NO. 13A, 13A-14 (2013).

45. Sáenz, *supra* note 44, at 12C-4-12C-5. The National Plan outlines a few policy goals which are to be implemented by a government committee. These goals include the following:

- (i) An increase and maximization of investments in the exploration, exploitation, refining, transportation and commercialization of hydrocarbons;
- (ii) The integration of public and private, national and foreign, capital into strategic alliances aimed at exploring and exploiting conventional and non-conventional hydrocarbons.

Id.

46. *Id.* at 12C-5.

47. Most are familiar with the United States' economic system being principally free market-based capitalism with a balance of some government regulation in the context of utilities. For a brief discussion on the capitalist system, *see generally* MIKE O'CONNOR, *DEMOCRATIC CAPITALISM IN THE UNITED STATES* (2006) (providing a good overview of both historical and current trends of American capitalism in a democratic society); *See also* John Williamson, Institute for International Economics, *A Short History of the Washington Consensus* (Sept. 24–25, 2004), *available* at <http://www.iie.com/publications/papers/williamson0904-2.pdf>.

markets and prolific subsidies to businesses,⁴⁸ but it is not one that is conducive to drilling shale domestically. China's economic system and its global influence have been coined the "Beijing Consensus"⁴⁹ by Joshua Cooper Ramo,⁵⁰ and that designation has been adopted by many economists, historians, and political scientists.⁵¹ In response to an article entitled the "A Short History of the Washington Consensus,"⁵² Ramo argues that developing countries are not adopting the United States economic system; rather, these countries prefer the Chinese model of heavy state control combined with government subsidies for companies and "soft-power"⁵³ commercial partnerships with nations who will support China when asked to do so.⁵⁴

Arguably, the Beijing Consensus, or China Model, works extremely well in the context of exploiting other nation's resources,⁵⁵ and likewise has guided them through an industrial revolution resulting in technological improvements, quality of life improvements, and economic prosperity.⁵⁶ In fact, PetroChina and Sinopec, the state-owned oil and gas companies, have expanded rapidly in recent years;⁵⁷ however, drilling shale domestically

48. Yang Yao, *The End of the Beijing Consensus: Can China's Model of Authoritarian Growth Survive?*, FOREIGN AFF. (Feb. 2, 2010), <http://foreignaffaires.com/articles/65947/the-end-of-the-beijing-consensus> (calling China's economic model an "unconventional approach to economic policy—a combination of mixed ownership, basic property rights, and heavy government intervention.").

49. See generally STEFAN HALPER, *THE BEIJING CONSENSUS, HOW CHINA'S AUTHORITARIAN MODEL WILL DOMINATE THE TWENTY-FIRST CENTURY* (2010).

50. Joshua Cooper Ramo, *The Beijing Consensus*, FOREIGN POL'Y CTR., May 11, 2004, at 1.

51. *The Beijing consensus is to keep quiet*, THE ECONOMIST, May 6, 2010, available at <http://www.economist.com/node/16059990>.

52. See generally Williamson, *supra* note 47 (arguing that the American economic model has had a strong global influence on developing countries).

53. See *supra* note 32 and accompanying text for a discussion of Chinese soft power.

54. Halper, *supra* note 49, at 109.

This kind of diplomatic support was further evident when China sought to thwart Japan's attempt to gain a permanent seat on the UN Security Council. In that instance, the Chinese mobilized various African states [which had partnered with China economically] . . . to stop the summit from endorsing a Japanese seat.

Id. at 109–10.

55. See generally Julie Jiang & Jonathan Sinton, *Overseas Investments by Chinese National Oil Companies*, EIA (Feb. 2011), available at http://www.iea.org/publications/freepublications/publication/overseas_china.pdf ("Chinese oil companies are now operating in 31 countries and have equity production in 20 of these countries, though their equity shares are mostly located in four countries: Kazakhstan, Sudan, Venezuela and Angola").

56. Graeme Wearden, *Chinese Economic Boom Has Been 30 Years in the Making*, THE GUARDIAN, Aug. 16, 2010, available at <http://www.theguardian.com/business/2010/aug/16/chinese-economic-boom> (noting that China's economy has grown at a ten percent increase rate).

57. See Yvonne Lee, *Sinopec's First-Half Net Rises 24%, Outperforming PetroChina*, DOW JONES BUSINESS NEWS, Aug. 25, 2013, available at <http://www.marketwatch.com/story/sinopecs->

presents a challenge that foreign economic partnerships simply cannot solve alone. There are three economics-based reasons for this.⁵⁸

The first is that China lacks the technological ingenuity to develop ways to explore and produce shale oil and gas over its rocky terrain. American National security expert Peter Rodman, along with many others, has reasoned that China lacks the notably independent technologic ingenuity the United States has always maintained.⁵⁹ While China and its state-run oil companies are excellent hunters in the search for oil and gas overseas,⁶⁰ they lack the individual entrepreneurial spirit necessary to develop ways to exploit their own landscape. This lack of technologic ingenuity is apparent in the number of intellectual property rights violations China has had in recent years as it tries to develop into a high-tech country.⁶¹ In 2009, the United States filed a complaint at the World Trade Organization, attempting to point out the violations and reform the intellectual property laws in China in order to make it less risky for foreign investors.⁶² China did reform its laws,⁶³ but many agree that these reforms are difficult to implement practically.⁶⁴ In the oil and gas industry, the

first-half-net-rises-24-2013-08-25 See also *China's Natural Gas Market Report*, PETROMIN PIPELINER, <http://www.pm-pipeliner.safan.com/mag/ppljanmar13/r16.pdf> (last visited Oct. 20, 2014) (“In 2011, the Chinese NOCs have made 8 gas-related overseas acquisition and investment offers, which amounted to around US\$12 billion.”).

58. Contract arguments are in Part V. See *infra* note 150 and accompanying text.

59. Halper, *supra* note 49, at 105; See also Donald Zagoria, *Between Friendship and Rivalry: China and America in the 21st Century*, FOREIGN AFFAIRS (1998), <http://www.foreignaffairs.com/articles/54357/donald-zagoria/between-friendship-and-rivalry-china-and-america-in-the-21st-cen> (citing some of China's economic and political weaknesses).

60. David L.O. Hayward, *China's Oil Supply Dependence*, J. OF ENERGY SEC., June 18, 2009, available at http://www.ensec.org/index.php?option=com_content&view=article&id=197:chinas-oil-supply-dependence&catid=96:content%20&Itemid=345.

61. See Chris Buckley & Jonathan Lynn, *China, U.S. trade barbs over WTO piracy case*, REUTERS, Mar. 20, 2009, available at <http://www.reuters.com/article/2009/03/20/us-china-usa-wto-idUSTRE52J3T920090320> (discussing the WTO's ruling on China's illegal violations of copyright laws and push to reform); See also Mike Bartol and Rick Choate, *Doing Business in China: Trademark, Patent and Corporate Basics*, BOSE MCKINNEY & EVANS LLP 2011 (explaining the need to protect trademarks, patents, and copyrights when doing business in China); See also Jessica Mintz, *China, FBI bust software counterfeiters*, USA TODAY, July 24, 2007, available at http://usatoday30.usatoday.com/tech/products/2007-07-24-98073_5197_x.htm.

62. See Daniel Gervais, *China—Measures Affecting the Protection and Enforcement of Intellectual Property Rights*, 103 AM. J. INT'L L. 549 (2009); See also Peter K. Yu, *The U.S.-China Dispute Over Over TRIPS Enforcement*, Drake L.R., available at <http://www.law.drake.edu/clinicsCenters/ip/docs/ipResearch-op5.pdf>.

63. *Outline of the National Intellectual Property Strategy (issued by the State Council of the People's Republic of China on June 5, 2008)*, CHINESE GOV'T'S OFFICIAL WEB PORTAL (June 21, 2008), http://www.gov.cn/english/2008-06/21/content_1023471.htm.

64. Emily Gische, *Repercussions of China's High-Tech Rise: Protection and Enforcement of Intellectual Property Rights in China*, 63 HASTINGS L.J. 1393, 1408–09 (2012); See also Office of

main reason shale has become cost-effective is the improved technology in hydraulic fracturing, which often involves trademarked formulas for the frack fluids pushed into the wells⁶⁵ and patented engineering methods.⁶⁶ The possibility of foreign investors losing that technology to China's state-owned companies presents a high risk for them and an obstacle for China to drill domestically.

Continuing along this same line of logic, the second reason why China's economics will hinder domestic success is that China's state-owned oil and gas companies do not always operate within the bounds of Chinese law, which makes foreign investors, again, hesitant to invest and share their technology. Known as "Bamboo Capitalism,"⁶⁷ it is common practice for Chinese companies to tag-team with select private entrepreneurs and operate outside of the law.⁶⁸

Finally, China's economic structure and "soft-power" decisions hinder a domestic shale boom because a significant and disproportional amount of infrastructure is invested overseas and not in China domestically.⁶⁹ Essentially, China will simply run out of the capital to fund a state project for drilling, given that foreign investors are hesitant to come to China. To an extent, this hesitancy is already occurring.⁷⁰

U.S. Trade Rep., 2010 Special 301 Rep. 19 (2010), at 23, available at <http://www.ustr.gov/about-us/press-office/reports-and-publications/2010-3> (reporting that the enforcement of the new intellectual property laws in China has been "hampered by poor coordination among Chinese government ministries and agencies, local protectionism and corruption, high thresholds for initiating investigations and prosecuting criminal cases, lack of training, and inadequate and non-transparent processes."). See also Veronica Weinstein & Dennis Fernandez, *Recent Developments in China's Intellectual Property Laws*, 3 CHINESE J. INT'L L. 227, 228 (2004); Julia Ya Qin, *The Impact of WTO Accession on China's Legal System: Trade, Investment and Beyond* 20–22 (Wayne St. U. L. Sch. Legal Stud., Research Paper Series No. 07-15, 2007), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=985321.

65. Until recently, most drilling companies had protected the frack fluid formulas under trade secrets, but recently twenty-one U.S. states have adopted disclosure rules, which will ultimately lead to companies filing their formulas under trademarks or patents. See Jeff Tollefson, *Secrets of Fracking Fluids Pave the Way for Cleaner Recipe*, SCIENTIFIC AMERICA (Sept. 11, 2013), available at <http://www.scientificamerican.com/article.cfm?id=secrets-of-fracking-fluids-pave-way-for-cleaner-recipe>.

66. See *supra* notes 14, 15 and accompanying text.

67. *Bamboo Capitalism*, THE ECONOMIST, Mar. 10, 2011, available at <http://www.economist.com/node/18332610>.

68. *Id.*; See also *Let a Million Flowers Bloom*, THE ECONOMIST, Mar. 10, 2011, available at <http://www.economist.com/node/18330120> (briefing of several private entrepreneurs who are operating outside of China's laws and regulations); See generally PITTMAN POTTER, CHINA'S LEGAL SYSTEM 92 (2013), (discussing China's preferred, informal relationship with investors, known as "guanxi").

69. See Hayward, *supra* note 60.

70. As of 2013, the only foreign investor pouring a significant amount of capital into China's shale reserves was RoyalDutch Shell. Unfortunately, they have not had much success in producing from the formations, despite already spending billions of dollars. Brian Spegele and Justin Scheck,

Argentina, on the other hand, does not have all of the same problems China has in the context of state-run economics, but it does have some issues that might discourage foreign investors. Argentinean oil and gas companies are in fact nationally owned, but they have been significantly deregulated since the 1990s,⁷¹ as mentioned in the historical section of this Note.⁷² Still, the country maintains a burdensome tax regime imposed on oil and gas producers (foreign and domestic), making it costly for investors to set up rigs in Argentina.⁷³ Additionally, there is a twelve percent royalty given to the state for all sales of hydrocarbons.⁷⁴ The real reason for these taxes is fairly transparent: Argentina is still strapped with debt, recovering from a 2002 recession.⁷⁵ With high debt, and a history of high inflation,⁷⁶ Argentina is a huge risk for foreign investors.⁷⁷ It would appear that the economy simply could not support the rapid development the United States has generated.

Overall, while the Chinese market might be favorable to investments overseas, the economy cannot handle domestic drilling and shale investments. Furthermore, in Argentina, huge debt and uncertainty detracts from the likelihood of any economic revitalization. In the United States, the economy and free market system support innovation and attract investors.⁷⁸ Men like George Mitchell,⁷⁹ the oilman who found a cost effective way to tap into shale through horizontal drilling and hydraulic

Energy-Hungry China Struggles to Join Shale-Gas Revolution, THE WALL ST. J., Sept. 5, 2013, available at <http://online.wsj.com/news/articles/SB10001424127887323980604579030883246871124> [hereinafter *China Faces Steep Climb to Exploit Its Shale Riches*]; See also Katie Hunt, *China Faces Steep Climb to Exploit its Shale Riches*, N.Y. TIMES, Sept. 30, 2013, available at <http://www.nytimes.com/2013/10/01/business/energy-environment/china-faces-steep-climb-to-exploit-its-shale-riches.html?pagewanted=1>.

71. José Martínez de Hoz, Tomás Lanardonne, & Alex Máculus, *Shale We Dance an Unconventional Tango?*, 6(3) J. OF WORLD ENERGY LAW & BUS. 179, 179–209 (2013) [hereinafter *Shale We Dance*].

72. See *supra* note 36 and accompanying text.

73. *Shale We Dance*, *supra* note 71 (internal citations omitted). The 35% tax rate applies to legal entities and Argentine branches of foreign entities. *Id.* Individuals are subject to progressive rates, the top one being 35%. *Id.*

74. See Law No. 17319, June 23, 1967, [Title II, Art. 59] (Arg.).

75. Katie Linthicum, *Argentina's policies hinder development of vast oil, gas reserves*, LA TIMES, Aug. 30, 2013, available at <http://articles.latimes.com/2013/aug/30/world/la-fg-argentina-economy-20130830>.

76. See *supra* note 36 and accompanying text.

77. *Id.*

78. See generally CARL J. SCHRAMM, THE ENTREPRENEURIAL IMPERATIVE (2006); See also Joseph Bankman & Ronald J. Gilson, *Why Start-ups?*, 51 STAN. L. REV. 289, 289–90 (1999) (concluding that the entrepreneurial myth, or American Dream, holds true in Silicon Valley).

79. See *supra* note 15.

fracturing, would never have taken the risk in experimenting with technology under a state-run economy, where failing would have damaged the public welfare, as opposed to private interests in the United States. Even then, investors are somewhat protected by United States laws.⁸⁰ Additionally, the relative certainty that companies operate within the boundaries of the law—and that the laws will be enforced⁸¹—lowers the risk in developing shale in the United States. Overall, the United States has struck the correct balance given the booming economy of shale development.⁸²

The uncertainty in authoritarian-centered economies in both Argentina and China presents a risk to investors, which leads me to my next contention: the environmental regulatory frameworks in both China and Argentina are unpredictable and unstable, which also present a risk to investors that will hinder successful domestic shale production.

IV. THE REGULATORY REGIME: ADMINISTRATIVE AND ENVIRONMENTAL LAWS

This Part discusses the difficulties in navigating administrative law in China and Argentina, and it also goes into depth about why a lack of environmental laws is actually something that will hinder shale development in those countries.

As China's economy has flourished, concern about and oversight of the environment has wilted. Air pollution, smog, and thick clouds of dust currently hover over northern provinces, causing people to either wear masks outside or move out of the province entirely.⁸³ Although most of the

80. D. Gordon Smith & Masako Ueda, *Law and Entrepreneurship: Do Courts Matter?*, 1 ENTREPRENEURIAL BUS. L.J. 353, 358–63 (2006) (pointing out entrepreneurs' interest in protecting investors).

81. *Id.* See also Charles Tait Graves & James A. DiBoise, *Do Strict Trade Secret Laws and Non-Competition Laws Obstruct Innovation?*, 1 ENTREP. BUS. L.J. 323 (2006) (noting that the United States has successfully balanced laws which might otherwise compete with entrepreneurship and innovation, such as the interaction between trade secrets rules and intellectual property or non-competition laws).

82. *Id.* See also Keith Robinson, *Purdue Study: Shale Oil and Gas a Long-term Boon to Economy*, PURDUE UNIVERSITY (Oct. 8, 2013), <http://www.purdue.edu/newsroom/releases/2013/Q4/purdue-study-shale-oil-and-gas-a-long-term-boon-to-economy.html> (concluding that “[t]he increasing production of shale oil and gas should benefit the U.S. economy by raising the nation’s gross domestic product by an average of 3.5 percent annually through 2035”).

83. Li, *supra* note 34; see also *China Seeks to Curb Worst Air Pollution in 50 years*, THE GUARDIAN, Dec. 18, 2013, available at <http://www.theguardian.com/global-development-professionals-network/2013/dec/18/china-air-pollution-smog>; see also Yin Lu, *Fleeing the Pollution*, GLOBAL TIMES, Dec. 22, 2013, available at <http://www.globaltimes.cn/content/833495.shtml#UrdgprSKbkg>.

blame has been directed at coal,⁸⁴ the environmental damage has already occurred, making the development of natural gas significantly more difficult.⁸⁵ Additionally, the peculiar structure of administrative law in China⁸⁶ hinders innovative environmental laws and also places public health and safety low on the list of priorities.⁸⁷

The basic structure of administrative law in China is the antithesis of the American regulatory state.⁸⁸ Known as a “top-down” structure,⁸⁹ nearly all of Chinese regulatory law is made through bureaucrats passing regulations rather than judge-made law from plaintiff litigation or legislatively-made law.⁹⁰ Because of this top-heavy system, the

84. *Coal Blamed for Heavy Pollution*, GLOBAL TIMES, Dec. 22, 2013, available at <http://www.globaltimes.cn/NEWS/tabid/99/ID/833572/Coal-blamed-for-heavy-pollution.aspx>.

85. Brian Spegele & Justin Scheck, *Energy-Hungry China Struggles to Join Shale-Gas Revolution*, WALL ST. J., Sept. 5, 2013, available at <http://online.wsj.com/news/articles/SB10001424127887323980604579030883246871124>. Fracking has also presented water pollution issues, as many of the drilling sites are located in more agricultural areas. *Id.* Crops are either dying, or the water sources from nearby are contaminated. *Id.*

86. See *infra* note 89 and accompanying text.

87. See *190 Million Chinese Drinking Polluted Water*, PEOPLE’S DAILY, Apr. 22, 2011, available at <http://english.peopledaily.com.cn/90001/98649/7359043.html>.

88. Litigators on behalf of the NRDC attended an environmental conference in China and reported that “[b]asic precepts of the American legal system—such as the notion that judges must enforce the positive law and cannot allow the use of illegal means to achieve political benefits, or economic gain or high moral benefit—seemed novel to many of the Chinese lawyers participating in the conference.” *Environmental Law in China*, NATURAL RESOURCES DEFENSE COUNCIL (Dec. 19, 2006), <http://www.nrdc.org/international/ochinalaw.asp>.

89. Joel B. Eisen, *China’s Renewable Energy Law: A Platform for Green Leadership?*, 35 WM. & MARY ENVTL. L. & POL’Y REV. 1, 6 (2010). The top-down structure has been widely criticized for its weak implementation by local officials. Many are subject to political pressure, falsify reports, and officially close down plants which violate environmental regulations, only to secretly reopen them. Some officials would even close down all plants in the area for months before the deadlines for reports in order to meet the energy standards. This was called *lazha xiandian*, meaning “to pull the breakers and limit power.” [Forced Power Outages Flourishing Everywhere, Five Major Unresolved Questions], [Red Net] (Nov. 11, 2010), <http://hlj.rednet.cn/c/2010/11/11/2108956.htm>.

90. *Environmental Law in China*, *supra* note 88.

If the U.S. federal bureaucracy were equivalent in scope to China’s, it would include: the entire U.S. cabinet, state governors and their deputies, the mayors of major cities, the heads of all federal regulatory agencies, the chief executives of GE, Exxon-Mobile, Wal-Mart and about fifty of the remaining largest U.S. companies, the justices on the Supreme Court, the editors of the New York Times, the Wall Street Journal and the Washington Post, the bosses of the TV networks and cable stations, the presidents of Yale and Harvard and other big universities, and the heads of think-tanks like the Brookings Institution and the Heritage Foundation.

Alex L. Wang, *The Search for Sustainable Legitimacy: Environmental Law and Bureaucracy in China*, 37 HARV. ENVTL. L. REV. 365, 379 (2013).

implementation of the regulations passed has been notoriously weak.⁹¹ Although China's Eleventh Five-Year Plan has outlined many new environmental standards,⁹² the corruption resulting from the top-down cadre system has not made it effective.⁹³ A lack of local officials supporting national environmental policies has led to fraud, bribery, and cutting corners.⁹⁴ As a result, drill sites have been set up in the middle of farms, water is polluted, and crowded villages must live with noise pollution from natural gas drilling and fracking.⁹⁵ Thus, while strong national policy is in place, local enforcement is fragmented.⁹⁶

The legal difficulties involved in basic enforcement for drilling will cost China significantly. Some legal scholars claim the next Five-Year Plan promises tighter enforcement,⁹⁷ but the enforcement and clean-up

91. "One provincial environmental official recounted how their department had become aware of a power plant that was surreptitiously turning off its desulfurization equipment in order to save energy and other operating costs. Before they could organize an enforcement effort against the enterprise, the provincial bureau in charge of energy efficiency work issued a public commendation honoring the factory for its efficient use of energy." *Id.* at 422.

92. *Id.* at 367. "China's Eleventh Five-Year Plan committed to . . . a 20% energy-intensity reduction target. In December 2009 . . . China pledged to implement the domestic binding target of reducing carbon emissions by 40–45% by 2020, compared to the 2005 level." Hao Zhang, *China's Energy Conservation and Carbon Emissions Reduction System: Development and Status Quo of the Regulatory and Institutional Framework*, 42 ENVTL. L. REP. NEWS & ANALYSIS 10260, 10262 (2012); See also Letter from Director General, Department of Climate Change, National Development and Reform Commission, China, to Executive Secretary, UNFCCC Secretariat, Germany (Jan. 28, 2010), available at http://www.chinafaqs.org/files/chinainfo/China_CPH_Accord_Submission_Letter.pdf.

93. See generally Wyatt F. Golding, *Incentives for Change: China's Cadre System Applied to Water Quality*, 20 PAC. RIM L. & POL'Y J. 399, 425 (2011). Here, Golding explains and criticizes the cadre system in dealing with water pollution in China. *Id.* Additionally, the author offers incentives for improving the system, which include accurate reporting measures, excluding local officials from becoming stakeholders in certain projects, and making data more transparent for citizen involvement. *Id.*

94. See *supra* notes 89, 90 and accompanying text.

95. See *supra* note 85; See also China Faces Steep Climb to Exploit Its Shale Riches, *supra* note 70.

96. See Danny Marks, *China's Climate Change Policy Process: Improved but Still Weak and Fragmented*, 19 J. CONTEMP. CHINA 971 (2010); Yiping Fang & Yong Zeng, *Balancing Energy and Environment: The Effect and Perspective of Management Instruments in China*, 32 ENERGY 2247 (2007).

97. Hao Zhang, *China's Energy Conservation and Carbon Emissions Reduction System: Development and Status Quo of the Regulatory and Institutional Framework*, 42 ENVTL. L. REP. NEWS & ANALYSIS 10260, 10266–67 (2012). Zhang reminds the readers that the "Chinese climate change law regime is in its infancy." *Id.* He also adds that over the last two decades, China has increased environmental policies in number. *Id.* Additionally, the author argues that the cause of the fragmentation in local and national policies can be attributed to the 1990s decentralization of the post-Mao regime. *Id.* See generally KENNETH G. LIEBERTHAL & DAVID M. LAMPTON, *BUREAUCRACY, POLITICS, AND DECISION MAKING IN POST-MAO CHINA* (1992). Others are equally hopeful for China's new Five-Year Plan. See generally Stephen S. Roach, *China's 12th Five-Year Plan: Strategy vs. Tactics*, MORGAN STANLEY (Apr. 2011), http://www.law.yale.edu/documents/pdf/cbl/China_12th_

will come too late for a successful shale revolution. It is already estimated the air pollution clean-up hovering over Beijing will cost trillions of yuan or 160 million U.S. dollars.⁹⁸ The much needed time and money spent to resolve its pollution issues will certainly slow down China's involvement in the shale revolution and prevent them from having the same economic boom as the United States. Additionally, even without current pollution, the extraction of shale requires careful disposal of frack fluid in order to prevent water pollution.⁹⁹ Without local oversight, pollution in China will persist and make the economic viability of shale worthless.

In the United States, the Environmental Protection Agency and state natural resource departments regulate the extraction of shale¹⁰⁰ and other practices that cause pollution. Without going into the controversies over whether there is enough regulation,¹⁰¹ the present regulatory regime for frack fluid disposal is the Resource Conservation and Recovery Act, which is a detailed command-and-control regulatory program for materials classified as "hazardous waste" under the EPA's regulations.¹⁰² For example, a Class II injection well is one of three ways to dispose of the fluid used in hydraulic fracturing.¹⁰³ A Class II injection well is essentially

Five_Year_Plan.pdf (describing the new plan as a "watershed event in the development of modern China").

98. Lauren Holdcroft, *Beijing's Pollution Clean-Up Plan will Cost Almost a Trillion Yuan*, SHANGHAIIST (Oct. 20, 2013), http://shanghaiist.com/2013/10/20/beijings_five_year_plan_to_clean_up.php.

99. See *supra* note 85.

100. There is some debate over whether at the present moment there is enough regulation for shale drilling in place. For example, "Shale Play" recently ran a large story about the Ohio Department of Natural Resources affirming the revocation of D&L Energy's drilling permits in Youngstown, Ohio for illegally dumping frack fluid next to a fault, causing an earthquake. John Funk, *Waste-Water Injection Well Caused 12 Earthquakes in Ohio, Investigation Shows*, CLEVELAND.COM (Mar. 9, 2012), http://www.cleveland.com/business/index.ssf/2012/03/shale_gas_drilling_caused_smal.html See also Brenda J. Linert, *Two Indicted in Ohio Brine Dumping Case*, SHALE PLAY: MARCELLUS AND UTICA SHALE NEWS (Mar. 1, 2013), www.shaleplayohiovalley.com/page/content.detail/id/500532/Two-. The news article questioned whether there were enough regulations in place to prevent private companies from illegally dumping frack fluid. *Id.* Additionally, documentaries and films such as *Gasland* and *Promised Land* have sparked debate over whether the United States' practices are safe and environmentally sound. Ideas for reform include federal legislation such as the FRAC Act, which would mandate drilling companies to disclose the chemicals in and quantities of frack fluid, and lobbying efforts "to repeal the SDWA's hydraulic fracturing exception since the Energy Policy Act passed in 2005." Rebecca Jo Reser & David T. Ritter, *State and Federal Legislation and Regulation of Hydraulic Fracturing*, 57 THE ADVOC. (Texas) 31, 33 (2011).

101. See *supra* note 100.

102. Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580 (1976), 90 Stat. 2795.

103. *Id.* The other ways include separating the fluids through evaporation, or gathering the used fluid back up from the rig, diluting it with freshwater, and piping it to another project as a way to use it again.

an empty vertical well, which has been deemed a disposal site by the EPA under the Clean Water Act and through a permit called the National Pollutant Discharge Elimination System.¹⁰⁴ The injection wells are constantly monitored by individual states' Department of Natural Resources in compliance with the EPA, and, among other precautions, the wells cannot be close to faults or contaminate freshwater aquifers.¹⁰⁵ Additionally, frack fluids are never exposed to outside air and are injected well-below impermeable rock formations.¹⁰⁶

These regulations have been successful due to the United States' bottom-up structure that encompasses both state and federal enforcement. Additionally, plaintiff litigation by environmental groups has made this administrative structure successful at balancing the interests of the environment and the interests of economic development. For example, the National Environmental Policy Act ("NEPA")¹⁰⁷ serves as an index of the environmental effects agencies must consider before moving forward with a project on state land.¹⁰⁸ NEPA, like its Chinese equivalent, is a federal policy, but all federal, state and local agencies alike must take certain steps¹⁰⁹ in assessing environmental damage before approving a project

104. Lowe, *supra* note 12, at 856–57.

105. *Id.* See also *supra* note 100 (discussing the illegal dumping of frack fluid in Youngstown, which reportedly caused an earthquake).

106. Lowe, *supra* note 12, at 856–57.

107. National Environmental Policy Act (NEPA) of 1969, 42 USCA § 4321 (1969). "NEPA was born in an era that had faith in bureaucratic comprehensive rationality, the idea that predictive analysis of a broad class of administrative decisions would produce a rational decision making that would consider environmental impacts." Daniel Mandelker, *The National Environmental Policy Act: A Review of Its Experience and Problems*, 32 WASH. U. J.L. & POL'Y 293, 294 (2010).

108. Mandelker, *supra* note 107, at 293; See also S102(2)(C) ("Congressional reasons for adopting NEPA are not entirely clear, but the consensus is that NEPA was adopted to limit so-called program, or mission-oriented agencies that carried out agency programs at the expense of the environment."). See also DANIEL MANDELKER, NEPA LAW AND LITIGATION (2d ed. 1992 & Supp. 2011). For additional information on the history of NEPA litigation in the United States as well as how other statutes on land use balance out economics and protect the environment, see generally Matt McKeown, *Using NEPA and Other Federal Land Management Statutes to Analyze Air Quality Impacts*, NO. 1 RMMLF-INST PAPER NO. 5 (2013); Michael C. Blumm & Marla Nelson, *Pluralism and the Environment Revisited: The Role of Comment Agencies in Napa Litigation*, 37 VT. L. REV. 5 (2012).

109. Mandelker, *supra* note 107, at 293. See also *Calvert Cliffs' Coordinating Comm., Inc. v. United States Atomic Energy Comm'n*, 449 F.2d 1109, 1112 (D.C. Cir. 1971) (Wright, J., writing):

NEPA, first of all, makes environmental protection a part of the mandate of every federal agency and department. The Atomic Energy Commission, for example, had continually asserted, prior to NEPA, that it had no statutory authority to concern itself with the adverse environmental effects of its actions. Now, however, its hands are no longer tied. It is not only permitted, but compelled, to take environmental values into account.

such as drilling, mining, or even building a highway.¹¹⁰ If an agency does not consider the environmental effects according to the guidelines in NEPA, it will likely be hauled into court by an environmental group where a judge will decide whether the agency abused its discretion.¹¹¹ Furthermore, NEPA and other land use statutes alike ensure that environmental protection will not go so far as to trump a pronounced long-term economic benefit, such as shale development,¹¹² coal development, or a highway project.¹¹³

There is no such check or balance in China, making it difficult to enforce national policies without local involvement or plaintiff litigation. Additionally, with shale specifically, the United States has already seen

110. Prior to NEPA, “[e]xisting agencies were established to supervise the development of our natural resources consistent with the ethic which has prevailed throughout this country’s history and, thus, they tended to overstress the benefits of development and to explore insufficiently the less environmentally detrimental alternatives to current methods of meeting their programmed objectives.” Dan Tarlock, *Balancing Environmental Considerations and Energy Demands: A Comment on Calvert Cliffs’ Coordinating Committee, Inc. v. AEC*, 47 IND. L.J. 645, 658 (1972).

111. For more information on the role of NEPA and its development, see L. CALDWELL, *THE NATIONAL ENVIRONMENTAL POLICY ACT: AN AGENDA FOR THE FUTURE* (1998); Symposium, *NEPA at 40: How a Visionary Statute Confronts 21st Century Impacts*, 39 ENVTL. L. REP. (ELI) 10615 (2009); Linda Luther, CRS 33152, *THE NATIONAL ENVIRONMENTAL POLICY ACT: BACKGROUND AND IMPLEMENTATION* 34–35 (2005), available at <http://www.enviro-lawyer.com/NEPASummary.pdf>; James A. Connaughton, *Modernizing the National Environmental Policy Act: Back to the Future*, 12 N.Y.U. ENVTL. L.J. 1 (2003); James T. B. Trip & Nathan G. Alley, *Streamlining NEPA’s Environmental Review Process: Suggestions for Agency Reform*, 12 N.Y.U. ENVTL. L.J. 74 (2003); Lynton Caldwell, *Beyond NEPA: Future Significance of the National Environmental Policy Act*, 22 HARV. ENVTL. L. REV. 203 (1998); Stephanie Pollack, *Reimagining NEPA: Choices for Environmentalists*, 9 HARV. ENVTL. L. REV. 359 (1985). For studies of NEPA practices in federal agencies see William Funk, *NEPA at Energy: An Exercise in Legal Narrative*, 20 ENVTL. L. 759 (1990); Note, *Federal Highways and Environmental Litigation: Toward a Theory of Public Choice and Administrative Reaction*, 27 HARV. J. LEGIS. 229 (1990).

112. See *Envtl. Def. Fund, Inc. v. Andrus*, 619 F.2d 1368, 1381 (10th Cir. 1980) (holding that the plan submitted by lessees under prototype oil shale leasing program was sufficiently detailed and did not violate NEPA); *Ctr. for Biological Diversity v. Bureau of Land Mgmt.*, 937 F. Supp. 2d 1140, 1160 (N.D. Cal. 2013) (holding that the Mineral Licensing Act cannot be read to impose a mandate to employ certain technologies for shale leasing, even if they are economically viable).

113. For NEPA cases holding that agencies can consider cost and cost-effectiveness in rejecting certain environmental alternatives, see *City of Grapevine, Tex. v. Department of Transp.*, 17 F.3d 1502, 1506 (D.C. Cir. 1994) (holding that it is permissible for an agency to consider the economic goals of a project); *Sierra Club v. U.S. Dep’t of Transp.*, 310 F. Supp. 2d 1168, 1193–94 (D. Nev. 2004) (concluding that the agency was not arbitrary and capricious in refusing to consider a fixed guideway alternative because the alternative evaluated did not meet the project’s Purpose and Need when it was too costly); See also *Alliance for Legal Action v. F.A.A.*, 69 Fed.Appx 617, 622–23 (4th Cir. 2003) (holding that it was permissible under NEPA for the agency to consider only the alternatives which support effective cargo hub operations where the project’s Purpose and Need was to minimize delays and enhance airport operations).

shale-specific litigation¹¹⁴ which may further perfect the delicate balance between protecting the environment or the health and safety of citizens, on the one hand, and leading a unique economic revolution, on the other.

Some might argue that the United States does not have enough regulation.¹¹⁵ An alternative model is the regulatory regime in Argentina, where there has been a longstanding history of strong environmental protection laws since the 1881 enactment of Law 2797 prohibiting the dumping of waste or sewage into Argentinian waters.¹¹⁶ Many claim Argentina's regulatory structure is far more developed and organized than that of the United States due to its use of national, provincial, and municipal agencies to enforce policies; however, other label it as confusing and inefficient overall.¹¹⁷ Regardless, the basic framework of environmental law is similar to the United States. For example, Argentinean agencies are generally¹¹⁸ required to compose Environmental Impact Assessments, as agencies do under NEPA. There are also well-established environmental and public safety laws in place;¹¹⁹ however, case precedent indicates that Argentina's environmental laws are too strict to promote the economic benefit of shale development. One example involves an Argentinian agency prohibiting a cell phone tower from being

114. Earl Hagstrom, *Hydraulic Fracturing Litigation Is on the Rise*, HYDRAULIC FRACTURING DIGEST, Sept. 2011, available at <http://www.sedgwicklaw.com/hydraulic-fracturing-litigation-is-on-the-rise-09-19-2011/>; See also *Wiser v. Enervest Operating, L.L.C.*, 803 F. Supp. 2d 109 (N.D.N.Y. 2011); *Beardslee v. Inflection Energy, LLC*, 904 F. Supp. 2d 213 (N.D.N.Y. 2012); *Ctr. for Biological Diversity v. Bureau of Land Mgmt.*, 937 F. Supp. 2d 1140 (N.D. Cal. 2013).

115. See Resser & Ritter, *supra* note 100.

116. *The Environmental Laws in Argentina*, ALFARO LAW, <http://www.alfarolaw.com/tapa/The%20Environmental%20Laws%20in%20Argentina.pdf> (last visited Oct. 21, 2014). (Sewage and harmful waste from industrial plants shall not be discharged into the rivers of the Argentine Republic unless they are previously submitted to an effective purification process." Law No. 2797; See also the first Argentinean case on environmental protection: "The Barracas Slaughter Houses" [1887] (prohibiting the slaughter house from disposing of their waste in the Riachuelo River until they adopted more hygienic measures).

117. Silvia C. Nonna, *The Environment and Its Regulation in Argentina*, National Register of Generators and Operators of Hazardous Waste Coordinator, Secretariat of Environment and Sustainable Development, San Martin 459, 1° Subs., Buenos Aires, Argentina 59, available at <http://www.inece.org/conf/proceedings1/ProceedingsBook%20%20%20%20%20%2059-72.pdf> ("Taking into account the overlapping roles among the National Government and local administrations and the frequent changes of institutional structures, the general scenario shows different legal requirements and authorities competing for enforcement resources and responsibility").

118. Although there is no national law in Argentina requiring Environmental Impact Assessments, there are equivalent provincial laws in force. *Id.* at 61–62.

119. Some examples include Law on Industrial and Service Activities Waste Management (Law 25,612); Law on National Environmental Policy (Law 25,675); Law on Polychlorinated Biphenyls—Standards for Management and Elimination (Law 25,670); Law on the use of Public Waters (Law 25,688); Law on access to environmental information (Law 25,831); Law on Residential Waste (Law 25,916); Law on Environmental Protection of Native Forests (Law 26,331).

built because it would allegedly harm the environment.¹²⁰ Similar cases have followed.¹²¹

In the context of shale regulation, laws similar to those in the U.S., including the Hazardous Waste Law and the General Environmental Law, govern shale exploration.¹²² However, the Argentinian government has been controlling oil and gas prices at depressed levels since around 2002.¹²³ This strong control has simultaneously deterred foreign investors from entering the Argentinian shale market, leading to more price regulation.¹²⁴ On the other hand, after such a long tradition of being an environmentally conscientious state, many locals have voiced their opposition, including Argentine Nobel Peace laureate Adolfo Perez Esquivel who claims YPF, the state-run oil company, has been polluting.¹²⁵

Despite the seemingly overprotective measures and enforcement in place, there is some question as to whether they are being implemented effectively. Many of the statutes passed nationally are only “minimum provisions,” meaning provincial and municipal agencies have broad discretion as to how to comply.¹²⁶ Finally, because Argentina is a civil law country, there is no plaintiff litigation to work out difficulties in enforcement or the effectiveness of the regulation. There is promise in the government revisiting “Waste Electric and Electronic Equipment” (WEEE) in regards to fracking in the Vaca Muerta and Neuquèn shale regions.¹²⁷ Again, though, with either overprotective measures or jumbled

120. Giménez Juan Ramon c. Telecom [2008].

121. See Agüero c. Municipalidad de Cañuelas [2007] (suspending the installment of a cell phone tower planned to be erected close to a kindergarten), available at <http://www.kaplankirsch.com/files/Comparative%20Law%20-%20Argentinean.pdf> (last visited June 14, 2015); CO.DE.CI. [2005] (suspending the development of a mining project).

122. Law No. 24,051 and Law No. 25,675. See also NORTON ROSE FULBRIGHT, SHALE GAS HANDBOOK 19 (2013), available at <http://www.nortonrosefulbright.com/files/norton-rose-fulbright-shale-gas-handbook-108992.pdf>.

123. See *supra* note 42.

124. *Argentina: A Step-by-Step Walk in the Road Toward the Shale Miracle?*, KING & SPALDING, ENERGY NEWSLETTER, Jan. 10, 2014, available at <http://www.jdsupra.com/legalnews/argentina-a-step-by-step-walk-in-the-ro-51849/> (“In the case of natural gas, the Government, through the “Commission for Strategic Planning and Coordination of the National Hydrocarbon Investment Plan” (the “Commission”), implemented a package of measures whereby the Government basically pays to producers the difference between the “market-interfered” price . . . and a guaranteed minimum price . . .”).

125. Liliana Samuel, *Shale Oil Boom Fuel Argentina’s Dreams*, PSYS.ORG (Oct. 3, 2013), <http://phys.org/news/2013-10-shale-oil-boom-fuel-argentina.html#jCp>.

126. Nonna, *supra* note 117.

127. *Environmental Law and Practice in Argentina: An Overview*, THOMSON REUTERS LEGAL SOLUTION (Oct. 1, 2012), <http://us.practicallaw.com/8-500-1340>. Additionally, “[i]n Patagonia, where

enforcement, Argentina does not appear to have struck the right balance for an economic shale boom. A clearer policy direction in the future might help them achieve it, though.

Overall, it would appear that the United States has well-established oversight in place, which has proven effective through legislation and plaintiff litigation. China does not have such a system, and they will (and have begun to) pay the price for the environmental damage and lack of regulatory enforcement. Argentina offers a potential model for the tighter regulation some Americans wish to see in the United States; however, in past cases, that regulation has either halted economic prosperity or been completely ignored.

V. PROPERTY LAW AND OWNERSHIP RIGHTS

Perhaps the easiest difference to identify between the United States, China, and Argentina is that only one permits its citizens to own, lease, and sell land. This country is the United States, but over time, Argentina and China have relinquished some powers of ownership from the State to the citizens, albeit in a controlled manner.

In China, property law has slowly been moving from public to private since the Mao Revolution. From 1949 to around the late 2000s, communism dominated Chinese culture where private property symbolized the bourgeoisie and everything wrong with capitalism.¹²⁸ In 2007, after years of revisions and debates,¹²⁹ the National People's Congress of China passed the Property Law of China,¹³⁰ making property rights available to citizens. Some parties expressed hope with this new law, while others expressed strong suspicion.¹³¹ The assessment in this

most of the hydrocarbon activity takes place specific rulings applicable to non-conventional exploration techniques (shale gas and shale oil, tight gas sands, and so on) are expected to come into force, with particular emphasis on the sustainable use of water resources." *Id.* Even so, there do not appear to be any recent statutes passed on the subject of shale.

128. Mo Zhang, *From Public to Private: The Newly Enacted Chinese Property Law and the Protection of Property Rights in China*, 5 BERKELEY BUS. L.J. 317, 321 (2008). Zhang asserts that private property rights were only repressed by the PRC until China's Opening Door Policy in 1978, but that policy only led to exploring freedoms, not citizen private property rights. *Id.*

129. *Id.* at 321–23.

130. Zhonghua Renmin Gongheguo Wuquan Fa (中华人民共和国物权法) [Property Rights Law of the People's Republic of China] (promulgated by Nat'l People's Cong., Mar. 16, 2007, effective Oct. 1, 2007), translation available at <http://www.lehmanlaw.com/resource-centre/laws-and-regulations/general/property-rights-law-of-the-peoples-republic-of-china.html>.

131. "The latest law is only one step in the slow trudge China is making out of the blind alley of Maoism . . . But the constitution is less a prescriptive document than a constantly changing description of what has just happened. So nothing changed." *China's Next Revolution*, THE ECONOMIST, Mar. 8, 2007, available at <http://www.economist.com/node/8815075>.

Note shares the same suspicion, especially in the context of land rights; despite the 2007 law, China does not allow citizens to own or market land.¹³² Even though the law makes land use rights available, it does not allow for owners to use the resources below the land.¹³³ Possibly the most basic, historic, and essential property right out of all the bundle of sticks still does not exist in China, and it proves a large hurdle in mirroring America's shale revolution.

For one, China has proved itself deficient in enforcing national laws locally. The lack of enforcement for national environmental laws may be an indication of how the national property laws will be enforced, or will not be.¹³⁴ With a lack of enforcement, land use rights are meaningless. Peasants working lands cannot even "use their land as security on which they could borrow and invest to boost productivity."¹³⁵ Without citizen participation to spur an efficient use of the land as a whole, the economic benefits will remain untapped.

Even though there is no citizen participation, the Chinese government has been successfully portioning off land to set up rigs and explore the shale reserves. Some might argue it has been easier to explore shale without land use rights, but reports show it has not worked out as fluidly as one would expect. I mentioned news reports¹³⁶ earlier in this Note regarding the pollution of agricultural lands and waters, and those same arguments apply under property law. Without effective regulations in place concerning land use, it will be easy for the government to take possession of the land and then use it for all of its resources, causing the same problems coal has caused with environmental pollution. In this case, the issue would be land devastation and ultimately not using the land as efficiently as it could be when drilling.¹³⁷

Finally, this point ties back to where we began with citizen participation. With the new property laws in place, some citizens have begun pushing back against government takings of property. One famous

132. *Id.* "Indeed, [this law] will not meet the most crying need: to give peasants marketable ownership rights to the land they farm." *See supra* note 128, 129.

133. Zhonghua Renmin Gongheguo Tudi Guanli Fa (中华人民共和国土地管理法) [Land Administrative Law of the People's Republic of China] (promulgated by Ministry of Land & Resources, Aug. 29, 1998), translation available at http://www.mlr.gov.cn/mlrenglish/laws/200710/t20071011_656321.htm; *see also* PATRICK RANDOLPH & LOU JIANBO, CHINESE REAL ESTATE LAW 19 (2000), at 85.

134. *See supra* note 96.

135. *See supra* note 131.

136. *See supra* note 95.

137. Fort, *supra* note 22.

case, known as the “Nail House,” garnered international attention as a husband and wife in the city of Chongqing fought to receive higher compensation for their home against expropriation by the Chinese government.¹³⁸ In the end, after the Property Laws passed, the couple received higher compensation through settlement and simultaneously ensured that private property rights are now a dominant culture in China.¹³⁹ This litigation represents another point, however. Without citizen participation through private land use development in the shale revolution, actions brought by citizens demanding compensation will bog down the Chinese government, preventing an economically viable end result from drilling.

The United States contrasts almost entirely from China’s property law, and though the mineral rights laws vary from state to state, I will look at the ever-popular oil and gas state of Texas as well as the federal laws.

As mentioned earlier,¹⁴⁰ the *ad coelum* doctrine is a common law concept of property ownership, where the landowner owns everything above the surface of his land to the heavens and everything below the surface of his land to hell. This concept, having been reiterated in *Del Monte Mining*, plays out in reality where the owner of a piece of land has the right to all the oil and gas he extracts through wells located on his property. Even in this early case demonstrating the *ad coelum* doctrine, there was a slight modification in dictum, where if the owner extracts resources from his neighbor’s land, as long as the well is on his property and not his neighbors, it is lawful. That dictum illustrates the rule of capture, mentioned at the beginning of this Note.¹⁴¹ Conceptually, and in common law, when *ad coelum* combines with the rule of capture, oil and gas law is modified to allow a landowner to capture oil and gas from beneath his neighbor’s land so long as the well is on his property. The common law was further modified by the doctrine of correlative rights, which establishes that landowners have reciprocal obligations to act in a manner that does not unreasonably interfere with the rights of their neighbors.

138. Dennis Schmelzer, *Takings for Granted: The Convergence and Non-Covergence of Property Law in the People’s Republic of China and the United States*, 19 DUKE J. COMP. & INT’L L. 133, 136–37 (2008). “Their two-year legal battle to save their property might have gone unnoticed in China if not for the photographs of their home that emerged in online sources, which made the building look like a nail that could not be pulled out of the construction site.” *Id.* at 137.

139. *Id.*

140. See discussion *supra* note 26.

141. *Id.*

The common law was further refined by the states. In light of the rise in horizontal drilling, the Supreme Court of Texas faced a clash between the modification of *ad coelum* and the rule of capture in *Coastal Oil & Gas Corp v. Garza Energy Trust*.¹⁴² There, the court held that if fracture lines from hydraulic fracturing and horizontal drilling reach another's unleased property line and oil or gas is extracted over that property line, the rule of capture still applies. Justice Willett's concurrence gives a convincing explanation for why the court upheld the rule of capture, reasoning it leads to economic freedom, growth in new technology, and good income from severance taxes in the State of Texas.¹⁴³

Justice Willet illustrates why the shale revolution in the United States works. The economy relies on oil and gas production, and any state will not see economic growth if the courts inhibit areas where oil and gas can be extracted.¹⁴⁴ Furthermore, there must be a fine balance between regulations and court holdings that encourage safety and prevent unreasonable interferences, but with horizontal drilling and fracking, those are taken care of well below the surface. Additionally, allowing technology to be used encourages more technologic developments and perhaps even safer, non-evasive ways of producing oil and gas. Finally, the individual negotiations with landowners who own their own land rights foster competition and maintain a mutually beneficial balance between economy and citizen rights, which I will also discuss in the contracts section.¹⁴⁵

Argentina experiences many of the same struggles China has under property law, given there is no individual property ownership. Unlike China, however, Argentina has specific property laws concerning hydrocarbon exploration. Law No. 17,319¹⁴⁶ was further refined in 2007 under Law No. 26,197 whereby the power to grant exploration permits can be either in the hands of the national government or local provinces.¹⁴⁷

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

143. *Id.* at 27 (Willett, J., concurring).

144. *Id.*

145. See *infra* note 169 and accompanying text. Laurent Poncet of Statoil, discussing negotiating with landowners in the United States, stated: "In a sense it's a pain because you have to negotiate rights with so many stakeholders and sign so many checks at the end of the month, but at the same time we are under scrutiny all the time, so you have to go in and do a good job." Jeff McMahon, *Six Reasons Fracking Has Flopped Overseas*, FORBES, April 7, 2013, available at <http://www.forbes.com/sites/jeffcmahon/2013/04/07/six-reasons-fracking-has-flopped-overseas/>.

146. Law No. 17,319 dictates that oil and gas fields belong solely to the government and are separate from surface land use rights. NORTON ROSE FULBRIGHT, *supra* note 122, at 14–16.

147. *Id.*

Under this law, once the oil and/or gas has been extracted, the product belongs to the usually government-owned company.¹⁴⁸ The transportation, marketing, and sale is also heavily regulated under the Hydrocarbon Law by the Secretariat of Energy.¹⁴⁹ As in China, there is little citizen participation regarding mineral rights, but there is one subtle difference between Argentina's and China's regimes. Local provinces in Argentina are able to hold onto the title of land and even enter into service agreements with the state-run oil and gas companies. In fact, these agreements are typically required before a company may explore on the land.

This type of hybrid approach does resolve some of the issues China has. Local participation is more likely to attract investment because investors can ensure they will not be confronted with faceless national bureaucrats. Additionally, local enforcement serves as an intermediary between the government and citizen land rights. Furthermore, local enforcement agencies simply know the land better and are likely to have "home field" advice if companies encounter drilling difficulties or are being careless with environmental procedures.

These advantages do not necessarily translate if local bureaucrats enforce too strictly. The problem we saw with environmental enforcement being too strict earlier in this Note are likely to occur with property use as well due the overlap between land use oversight and property oversight.¹⁵⁰ Overall, foreign investors may become uncomfortable with their permits in the hands of local bureaucrats with little national control or room to negotiate with individual citizens.

Property laws represent one part of the picture regarding mineral rights, however. Contract laws also have a profound effect in attracting foreign investors and making a shale revolution economically viable.

VII. CONTRACT LAWS AND MINERAL LEASES

In China, the Mineral Resources Law governs mining activities including investment, exploration rights, mineral rights, and leasing.¹⁵¹

148. *Id.*

149. *Id.* at 16. The Secretariat of Energy is similar to the Department of Energy in the United States. It is the enforcement authority specifically for the hydrocarbon regime. Other agencies also take part in hydrocarbon regulation, such as the Committee for Strategic Planning and Coordination of the Nation Plan of Hydrocarbons Investments. Ente Nacional Regulador del Gas (ENARGAS) regulates the transportation and distribution of gas. *Id.*

150. *See supra* note 119 and accompanying text on environmental regulations.

151. Ella Chou, *Shale Gas in China: Development and Challenges*, HARVARD L. BLOG (Jul. 11,

However, several agencies oversee mineral contracts, but without much guidance or clear division of jurisdiction.¹⁵² Nevertheless, China does have a licensing scheme for mineral leasing. Generally, a company may apply and register for an exploration permit for a three year term from the Provincial Bureau of Land and Resources.¹⁵³ When the drill is found to produce, the permit holder may apply for a two-year retention.¹⁵⁴ However, the holder may only reapply twice for a total of four years.¹⁵⁵ Additionally, in order to retain the permit, the holder must report expenditures, updates, and payments to the agency as well as the local county.¹⁵⁶

To some, China's permit process with local oversight appears too tedious, especially for foreign investors. But this is not necessarily the element in Chinese contract law that deters and will continue to deter foreign investors interested in shale. Underneath the written law of contract in China is a thick layer of regulation and suspicion of foreign investors "based not so much on the type of contract involved, but rather on the citizenship of the parties to the contract."¹⁵⁷ This mistrust creates a troublesome dynamic now that foreign investors are interested in exploring shale in China. In fact, foreign companies may only explore shale through non-majority joint ventures with China's state-run companies, namely, PetroChina, Sinopec, and China National Petroleum Corporation.¹⁵⁸ With Royal Dutch Shell already pouring billions of dollars into exploration, it may no longer be economically feasible or efficient to stay in a non-majority position, especially given the strict oversight and control through contract law.

In the United States, the contract laws are relaxed, with few government intrusions beyond blatantly unconscionable terms or unjust enrichment. Additionally, most companies are aware that landowners will

2013), <http://blogs.law.harvard.edu/ellachou/files/2013/07/Shale-Gas-in-China-Draft.pdf>.

152. *Id.*

153. *Id.* at 6.

154. *Id.*

155. *Id.* See also Song Wang (宋·王安石), *Woguo Tanlu Yeyan Qi Jiang* (我国探路页岩气监管) [*Our Pathfinder Shale Gas Revolution*], CHINA MINING JOURNAL, Jan. 21, 2013, available at http://www.mlr.gov.cn/xwdt/jrxw/201301/t20130121_1176816.htm.

156. See *supra* note 152, at 6.

157. Michael Burke, *People's Republic of China*, 34 INT'L LAW. 883 (2000). Although this has changed slightly into more paternalistic measures with added oversight rather than outright mistrust, skepticism still exists. *Id.* at 883–84.

158. CHUNG, *supra* note 7; See also Chen Aizhu, *Shell, Sinopec Drilling for Shale Gas in Central China*, REUTERS, November 13, 2013, available at <http://www.reuters.com/article/2013/11/14/shell-sinopec-shale-idUSL4N0IY0VR20131114>.

hire lawyers to read their contracts, so even the boilerplate language will pass constitutional muster. I will analyze two of these terms, but it is important to remember that there are many more terms such as spacing, land use, and using multiple properties for one rig.¹⁵⁹

There are two parts to a typical mineral rights lease. A primary term is the amount of time the lessee—the oil and gas company—can hold onto a lease without drilling.¹⁶⁰ The oil and gas company might use this term in order to survey the land leased, conduct seismic tests, unitize or pool other properties in the area, or solicit investors for financing the drilling operation.¹⁶¹ In most cases, the lessee must pay a delay rental fee annually to keep the primary term open.¹⁶² Alternatively, instead of paying a delay rental fee, a lessor might require the lessee to “commence drilling operations” in order to keep the primary term lease going.¹⁶³

A secondary term follows the primary lease after the drilling crew begins production, and this term gives the lessee rights to keep the lease going for however long the well is producing and is economically profitable.¹⁶⁴ This term can be one year, five years or indefinite—the only thing that matters is that the well is continuing to produce a profitable product. Here, it is easy to see the legal issues that may arise. First, the secondary term theoretically could be indefinite, but in practice, the lease will terminate when the well is not producing.¹⁶⁵ This may sound simple, but sometimes, even if production has stopped, the well is still capable of producing, and with a shut-in royalty in a lease, the lease continues even without constant production. Still some leases require production “in

159. Pooling is a way in which oil and gas companies meet spacing requirements for drilling. More technically, pooling is a right to combine adjacent tracts of land in order to meet those spacing requirements. Voluntary pooling occurs when a landowner agrees to sign a lease which contains a provision on pooling or unitization. Forced pooling, in some states like Ohio, occurs where, after the oil and gas company has exhausted all reasonable attempts to gain a voluntary pooling agreement from the landowner, the company asks the state Department of Natural Resources to force the landowners (or owners of the mineral interests if the rights are severed) to comply with the pool. *See generally* Howard R. Williams, *The Effect of Pooling and Unitization upon Oil and Gas Leases*, 45(4) CAL. L. REV. 411 (1957), available at [http://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=3249&context=californialaw review](http://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=3249&context=californialaw%20review).

160. Lowe, *supra* note 12, at 208.

161. *Id.* at 208–09.

162. *Id.*

163. *Id.* There is of course substantial disagreement over the definition of “commencing drilling operations,” but the case *Breaux v. Apache Oil Corp.*, 240 So.2d 589 (La. App. 3d Cir. 1970), establishes fairly concretely that anything contributing to the drilling operation as a whole will be considered “commencing drilling operations,” even if it is simply beginning to build the site pad or clearing the land for the rig. *Id.* at 225.

164. *Id.* at 230.

165. *Id.*

paying quantities,” and courts look at this contract term through a two-part test.¹⁶⁶ They first balance out revenue along with operating costs to determine whether producing has made a real profit.¹⁶⁷ If the company has not made a profit, the court then assesses whether it is reasonable for the company to continue production while losing money. Additionally, “actual production” also includes a good faith effort in marketing the product and infrastructure considerations, such as pipelines and transport methods.¹⁶⁸

Overall, the primary and secondary terms of a lease are complementary because they both motivate constant economic efficiency and prevent land waste. The primary term encourages an oil and gas company to use the land leased in a reasonable amount of time rather than holding onto the lease and dragging the lessor along without contributing to the oil and gas market or using the land. The primary term limit gives the oil and gas company an opportunity to produce, and if that does not occur, another oil and gas company may move in and try to produce or the land can be used for other economically efficient purposes. Furthermore, the secondary lease encourages continuous production. Again, rather than setting up a rig and then not using the land to its fullest capabilities, there is a limitation. The freedom of contract in the United States produces the perfect balance between oversight and efficiency.¹⁶⁹

Contracts in Argentina pursuant to the Federal Hydrocarbon Law operate under a slightly different system than China. While the mineral rights are exclusively owned by the State, the state will make concessions through permits and award exclusive rights to explore and exploit the piece of land.¹⁷⁰ During this time, which usually lasts around fifteen years, the permit holder takes title and receives all the royalties.¹⁷¹ However, the concessions in the permit contracts carry severe monetary obligations including production fees, windfall profits, and taxes.¹⁷²

166. *Id.* at 230–35; *See also* Clifton v. Koontz, 325 S.W.2d 684 (Tex.1959).

167. *Id.* at 232–35.

168. *Id.* at 237; *See also* Stanolind Oil & Gas Co. v. Barnhill, 107 S.W.2d 746 (Tex. Civ. App. 1937).

169. For more examples of mineral leases, *see* JOHN S. LOWE, FORMS MANUAL TO ACCOMPANY CASES AND MATERIALS ON OIL AND GAS LAW 145–206 (5th ed. 2004).

170. Law No. 17,319; *See also* Sections 2, 3 and 6 from Title II Federal Hydrocarbons Law.

171. *See* Law No. 2,615 of the Province of Neuquén and Decree No. 3,089 of the Province of Mendoza, which fix the terms and conditions; *See also* Jose Martinez de Hoz, *Shall We Dance an Unconventional Tango?*, PAGBAM, available at <http://www.pagbam.com.ar/files/Other/Shale%20we%20Dance%20an%20Uncoventional%20Tango.pdf>.

172. *Id.* “The most important taxes are the following: National taxes: Income tax: 35% on the net taxable income. VAT: 21% applied on domestic sales of oil and gas, which is added onto the producer’s sales invoices and passed on to the payer. Provincial taxes: Turnover tax: 1% to 3%. For oil

Additionally, unlike China, Argentina does not require foreign investors to join a local entity or corporation in order to obtain exploration permits. However, they are required to establish a branch of their own corporation in Argentina.¹⁷³ There is also a wide variety of types of branch corporations investors can choose from, such as LLCs or Incorporations¹⁷⁴ However, while it would appear foreign investors have wide latitude to contract, certain resolutions prohibit freedoms that are typical in the United States. These include not being able to contract with third parties for logistical, technical, or appraisal operations.¹⁷⁵ Although Argentina does have substantially more freedom in contracting and exploration permits compared to China, it does not reach a point attractive to foreign investors. The tight constraints on contracting with third parties and the establishment of a branch company make the cost of drilling in Argentina higher and more risky than it would be in the United States. Until Argentina drops these restraints, it is likely a shale revolution will not occur.

VIII. WHERE ARE THEY NOW?

The United State Energy Information Administration (“EIA”) estimates that China has nearly 1,115 trillion cubic feet of technically recoverable shale gas and 32 billion barrels of technically recoverable shale oil.¹⁷⁶ Argentina possesses 802 trillion cubic feet of technically recoverable shale gas and 27 billion barrels of shale oil.¹⁷⁷ The United States is far behind in technically recoverable shale gas, with only 665 trillion cubic feet.¹⁷⁸ Despite the numbers, the EIA and most shale data collection agencies point out the difference between technically recoverable shale resources and economically recoverable shale resources.¹⁷⁹ Large companies who

and gas it is usually 2%. Stamp tax: 1% to 2% (depending on the provincial jurisdiction).” NORTON ROSE FULLBRIGHT, *supra* note 145, at 18.

173. *Id.* at 17.

174. *Id.*

175. *Id.* at 18; *See also* Resolution 194/2013.

176. *See U.S. Energy Information Administration, supra* note 1.

177. *Id.*

178. *Id.* The United States does, however, surpass Argentina with technically recoverable shale oil. *Id.*

179. *Id.* “Technically recoverable resources represent the volumes of oil and natural gas that could be produced with current technology, regardless of oil and natural gas prices and production costs. Economically recoverable resources are resources that can be profitably produced under current market conditions. The economic recoverability of oil and gas resources depends on three factors: the costs of drilling and completing wells, the amount of oil or natural gas produced from an average well over its lifetime, and the prices received for oil and gas production.” *Id.*

have been trying to tap into China's plentiful shale resources since 2009 are considering pulling out entirely. In fact, Shell has already taken steps to pull out of China by canceling refinery projects partnered with Sinopec.¹⁸⁰

From another perspective, the Chinese government has spotted its domestic economic troubles and is now partnering with and investing in American shale projects in addition to African and Russian endeavors.¹⁸¹ Furthermore, China's government officials and industry analysts have been quoted suggesting that China itself does not believe a shale revolution is possible as it looks to foreign sources more and more.¹⁸²

Argentina does not necessarily share the same struggles with exploitation as China does, but the country's seizure of their largest oil and gas company, YPF, shocked foreign investors, causing many to pull out or cancel plans to invest.¹⁸³ This sudden nationalist behavior makes investment unattractive; however, Argentina has attempted to gain the trust of foreign investors again by relinquishing control over market prices.¹⁸⁴ Some believe Argentina has finally begun to understand the

180. Ed Crooks, *Shell Pulls Out of \$9Bn refinery plan in China*, FINANCIAL TIMES, Dec. 4, 2009, available at <http://www.ft.com/intl/cms/s/0/2e360dc0-e111-11de-af7a-00144feab49a.html>; See also Ed Crooks, *Shell Warns of Shale Delays Outside US*, FINANCIAL TIMES, Apr. 23, 2013, available at <http://www.ft.com/intl/cms/s/0/53328f06-ac1d-11e2-a063-00144feabdc0.html#axzz2s6OKC7mJ>. Andrew Brown, head of international oil and gas production at Shell, has stated that "China was the most advanced of Shell's shale projects outside North America. The rule of thumb was that it took 30 wells to understand a new prospect . . . In China, Shell had drilled 23 and was planning 18 more this year." *Id.* This shows the additional effort needed for drilling in China and further questions whether it can mirror America's revolution. *Id.* Additionally, Shell has dealt with government blockades and halting operations, and is spending one billion dollars every year. Spegele & Scheck, *supra* note 70. Enduring these difficulties will soon not be worth the continued investment and effort from Shell.

181. Collin Eaton, *China's Largest Coal Company to Learn Shale in US Deal*, FUEL FIX, Jan. 3, 2014, available at <http://fuelfix.com/blog/2014/01/03/chinas-largest-coal-company-to-learn-shale-in-u-s-deal/>. "China Shenhua Energy Co., the world's second largest coal company, is planning to create a joint venture between a U.S. subsidiary and a private Pennsylvania natural gas producer to drill 25 natural gas wells in the Marcellus Shale" *Id.* See generally Jon Carter, *China Companies Look for Partnerships*, ENERGY AND CAPITAL, Oct. 29, 2013, available at <http://www.energyandcapital.com/articles/investing-in-chinese-shale-gas/3959>; See also Wu Jiao, *China, Russia, a Step Closer on Gas Supply*, CHINA DAILY, Sept. 6, 2013, available at http://www.chinadaily.com.cn/bizchina/2013-09/06/content_16948450.htm.

182. Chen Weidong, a senior industry analyst in close contact with the Ministry of Land and Resources, stated, h[t]he sector liberalisation looks unlikely to work in shale gas, as its investment is too high and returns are too low." Chen Aizhu, *China Back to Drawing Board as Shale Gas Fails to Flow*, REUTERS, Sept. 5, 2013, available at <http://www.reuters.com/article/2013/09/05/china-shale-idUSL4N0GY23420130905>.

183. The Energy Report, *Argentina Tries Its Hardest to Attract Foreign Oil and Gas Companies*, OIL PRICE, Aug. 6, 2013, available at <http://oilprice.com/Finance/investing-and-trading-reports/Argentina-Tries-its-Hardest-to-Attract-Foreign-Oil-and-Gas-Companies.html>.

184. *Id.*

necessity of foreign investors in shale from Decree 929,¹⁸⁵ but more concrete measures are yet to be seen.¹⁸⁶

The United States is still thriving in the shale revolution. The United States expects its 2013 oil imports to be the lowest since 1994.¹⁸⁷ Also, in just eleven months out of 2013, net energy imports have been cut in half from \$411 billion to \$217 billion.¹⁸⁸ Finally, the most evident example demonstrating the strength of the United States' shale revolution is that oil and gas resulting from domestic shale drilling is now being exported to allied countries like Japan.¹⁸⁹ The shale revolution has worldwide reach, with America at its center.

IX. CONCLUSION

Shale will undoubtedly be on the world's radar for decades to come; however, much like the reason why certain crops are grown in specific areas of the world and not others, shale is economical in certain parts of world and not others. There may be large shale formations in China and Argentina, larger than the United States' reserves, but the economic feasibility of exploiting that shale is not worth the political and legal risks investors must take. Once China and Argentina realize this (and Argentina

185. "[President] Kirchner signed Decree No. 929/2013, which creates incentives for oil and gas producers that bring to Argentina hard currency equivalent to \$1 billion in the first five years of a project. Beginning in the fifth year, the participating companies will be able to export 20 percent of their oil and gas production on a tax-free basis with no obligation to reimburse export proceeds to Argentina."

Karen Boman, *Argentina Oil, Gas Scheme 'Insufficient' to Attract Investment*, RIGZONE, July 18, 2013, available at http://www.rigzone.com/news/oil_gas/a/127842/Argentina_Oil_Gas_Scheme_Insufficient_to_Attract_Investment#sthash.qBGJ5sBa.dpuf.

186. *Id.* In an interview with the Energy Report, Bill Newman of Mackie Research stated, "Argentina's expropriation of Repsol's share in YPF in 2012 was a bit of a shock and it forced oil and gas companies to step back a bit to wait and see what the government's next move would be. But I think the government quickly realized that it couldn't fund growth internally and that it needs foreign investment to reserve its production declines . . . The new investment incentive brought in with Decree 929 somewhat confirms that the government understands that it needs foreign investment." Bill Newman, *As Argentina Backpedals, Will Oil and Gas Companies Step on the Gas?*, THE ENERGY REPORT (Aug. 6, 2013), available at <http://www.theenergyreport.com/pub/na/bill-newman-as-argentina-backpedals-will-oil-and-gas-companies-step-on-the-gas>.

187. John Kemp, *American's Energy Revolution Transforms International Relations*, REUTERS, Jan. 28, 2014, available at <http://www.reuters.com/article/2014/01/28/energy-diplomacy-idUSL5NOL22YK20140128?feedType=RSS&feedName=rbsEnergyNews>.

188. *Id.*

189. ConocoPhillips, along with other private investors, has turned a natural gas import terminal into an export facility. The Obama administration has "cleared the way for broader natural-gas exports" in light of this facility. Keith Johnson, *U.S. Approves Expanded Gas Exports*, WALL ST. J., May 18, 2013, available at <http://online.wsj.com/news/articles/SB10001424127887324767004578489130300876450>.

appears to be realizing this more quickly than China), more investors will put time and money into exploration projects. As it stands, China and Argentina must change their laws to either provide more incentives to investors, safer means of contracting and more concrete environmental regulations, or they must look elsewhere to obtain oil and gas, as they have been doing.

The point I argue here is not necessarily that China and Argentina should become mirror images of the United States. But based on my assessment of what laws are favorable to shale investors and what has allowed a shale revolution to occur in the United States, I conclude that China and Argentina must relax their laws and political environment in order to have a shale revolution of their own. China and Argentina are at a crossroads: without loosening authoritarian control over pricing and taking command of environmental regulation, they risk falling chronically behind in the race to energy independence. As it stands now, the United States has dominated that race.

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