HOW CAN GOVERNMENTS ACCELERATE INTERNATIONAL SHALE DEVELOPMENT?

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Synopsis: While American shale production has surged in recent years, international shale development has languished. The author describes the principal factors influencing the pace of international shale projects: (1) political risk; (2) absence of private mineral rights; (3) fiscal regimes; (4) services and infrastructure; (5) natural gas and oil markets; and (6) access to acreage. As the best shale in the United States is developed, or at least becomes more expensive, other nations will have the opportunity to compete for investment. In addition to luring developers with inexpensive acreage, nations wishing to accelerate their own shale development should consider energy policy reforms, such as tax incentives and private mineral rights.

I. INTRODUCTION

Shale formations are hardly unique to the United States. They span across every continent, offering their bounty to dozens of nations. The U.S. Energy Information Administration (EIA) estimates that shale petroleum resources outside the United States total as much as 287 billion barrels of oil and 6,634 trillion cubic feet of natural gas.[1] This equals more than 80% of global shale resources.[2] Figure 1 below illustrates the extent of these international shale deposits.

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1. U.S. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, TECHNICALLY RECOVERABLE SHALE OIL AND SHALE GAS RESOURCES: AN ASSESSMENT OF 137 SHALE FORMATIONS IN 41 COUNTRIES OUTSIDE THE UNITED STATES 3 (2013) [hereinafter U.S. EIA].

2. *Id. See also* Dallas Parker & John Furlow, *Is the U.S. Shale Revolution Replicable?*, HOUS. BUS. J. (Aug. 21, 2013).

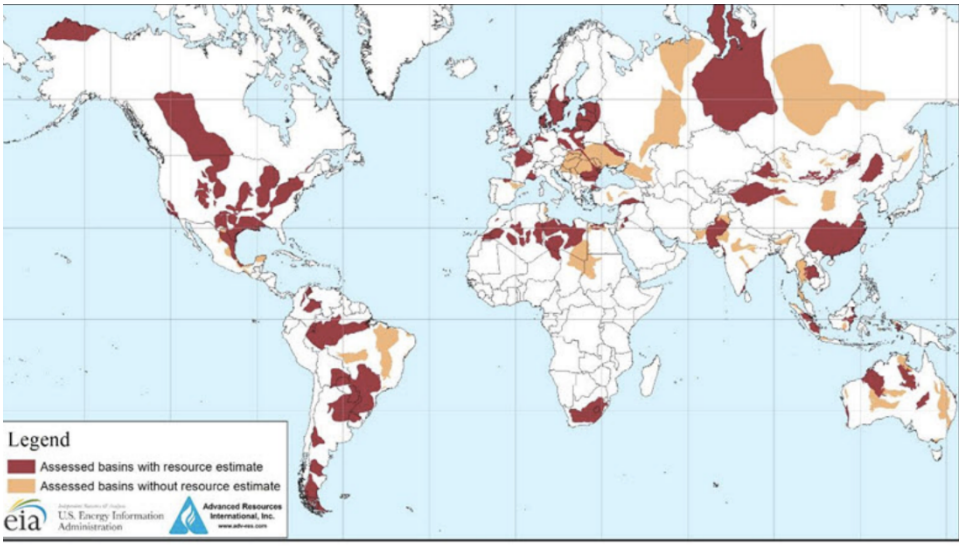

Figure 1: International Shale Plays[3]

Notwithstanding the productive potential of these formations, other nations have not kept pace with the United States. Over the last five years, American shale gas production has more than tripled, from about ten billion cubic feet per day (bcf/d) to more than thirty bcf/d, with tight oil registering similar gains—from a few hundred thousand barrels to more than three million barrels a day.[4] In contrast to the "thousands of shale wells in the US, there are only a handful producing commercial quantities of gas in . . . the rest of the world."[5]

A variety of factors explain this development disparity. The international regulatory and fiscal landscape generally has been adverse, with restrictions on hydraulic fracturing and tax regimes that are incompatible with the higher costs of shale. Political opposition has been magnified by the absence of private mineral rights, which leads landowners to organize "not in my backyard" protests. Many international locations also trail the United States in shale infrastructure, including pipelines, drilling rigs, hydraulic fracturing crews, and natural gas markets.[6]

3. U.S. EIA, *supra* note 1.

4. WOODMACKENZIE, UNCONVENTIONAL 3.0–A DISCERNIBLE NEW OUTLOOK (2014). From 2000 to 2009, American shale gas production grew from 1% to 20% of U.S. production, with current estimates as high as 40%. PAUL STEVENS, THE 'SHALE GAS REVOLUTION': HYPE AND REALITY, A CHATHAM HOUSE REPORT, at vi, 32-33 (2010); Mark Scott, *Scouring the World for Shale-Based Energy: Shale Investments Could Reshape Global Market*, N.Y. TIMES (June 17, 2014) ("With billions of dollars of investment from major players like ExxonMobil and smaller energy companies, shale gas now represents roughly 40 percent of America's total natural gas production, compared to less than 5 percent of China's overall gas production, according to the American energy data agency.").

5. Richard Anderson, *Shale Industry Faces Global Reality Check*, BBC NEWS (Apr. 6, 2014).

6. *See, e.g.*, *Oil Majors Wake Up to South Africa's Shale Potential*, ZAWYA (Oct. 8, 2013), https://www.zawya.com/story/S_Africa_basks_in_shale_glory-ZAWYA20131008092922/.

Other nations are beginning to recognize the need for energy policy reforms as a prerequisite to development. Governments can protect developers' investments from subsequent changes in law, such as a moratorium on hydraulic fracturing. Local opposition to shale can be mitigated by compensating landowners with a share of the production. Higher costs associated with lack of infrastructure can be offset with tax incentives, accelerated depreciation, and low cost acreage grants.

International shale will advance more quickly in those nations where policy reforms create a favorable economic—and lower risk—environment for shale development. Even if other governments are slow to incentivize shale plays, the fast pace of U.S. development will likely make the choicest domestic shale both scarcer and more expensive. As international profits gradually increase and domestic profits fall, the shale "bounty will in due course spread to other nations."[7]

II. POLITICAL RISK

The rates of return required for international projects are typically higher than those expected in the United States, and for good reason. Our industry's history is replete with examples of energy projects that have been expropriated or otherwise thrown into force majeure by conflict—often resulting in losses that were not readily recoverable through any legal process. International shale development carries with it the usual political risks of any given nation *plus* the new risk of opposition to hydraulic fracturing. Whereas the largest conventional petroleum fields are often offshore, shale developments may impact densely populated countryside. Affected residents may worry about the possibility of pollution and complain about wells and trucks. This leads to an additional layer of political risk.

How a particular country, and its political apparatus, will respond to shale development can be difficult to predict:

> Uncertainty in the legal and regulatory environment outside the U.S. is one of the top concerns cited by companies. Several warning flags are related to this. First, the cost, length of time and unpredictability associated with permitting exploration and production in a foreign country plays a significant role. Strict environmental laws, the risk of a ban on hydraulic fracturing, the risk of nationalization, labor market restrictions, import regulations and the lack of clearly defined intellectual property protection laws all factor in as well.[8]

Take France, for example. The EIA estimates that the Paris Basin shale contains reserves of about four trillion cubic meters of natural gas—enough to supply the nation for a century.[9] Several companies, including Total, Schuepbach, Toreador, and Hess, applied for and secured shale concessions from the French government.[10]

7. Mark P. Mills, *The Oil Price Swoon Won't Stop the Shale Boom*, WALL ST. J. (Oct. 24, 2014).

8. Parker & Furlow, *supra* note 2.

9. Henry Chu, *Pressure Builds Against France's Ban on Fracking*, L.A. TIMES (June 22, 2014).

10. *Toreador and Hess Paris Basin Shale Oil Partnership Receives First-Stage Governmental Approval*, EUROPÉTROLE (May 7, 2010), http://www.euro-petrole.com/toreador-and-hess-paris-basin-shale-oil-partnership-receives-first-stage-governmental-approval-n-i-4301; *France Cements Fracking Ban*, THE GUARDIAN (Oct. 11, 2013), http://www.theguardian.com/environment/2013/oct/11/france-fracking-ban-shale-gas.

Clean-burning natural gas seemed like a viable solution to France's reliance on fifty-eight aging nuclear reactors constructed in the 1960s, 1970s, and 1980s.[11] While the United States had extended many of its reactors' licenses to sixty years, Japan "grappling with the consequences of the Fukushima disaster, ha[d] proposed to limit the lifespan of its existing reactors to 40 years."[12] For France, the question was unresolved: "Can we go over 40 years? We have no answer on that yet."[13]

Everything in France changed with the introduction of a movie called *Gasland*, which blamed hydraulic fracturing for groundwater pollution in Pennsylvania.[14] In one scene, a Pennsylvania man even ignites the water flowing from his tap.[15] *Gasland* opened in France during early 2011.[16] Lobbying efforts by environmental groups soon followed, some of which may have been supported by Russia,[17] which sells about 60% per year of its gas production into the European market.[18]

Later that year, France passed a law that banned hydraulic fracturing.[19] Several concessions were cancelled, including those of Total and Schuepbach.[20] While Hess and Toreador were allowed to retain their concessions, their holdings were rendered practically worthless. What good is shale acreage if the trapped hydrocarbons can only be released using a banned technology? The stock market agreed, and Toreador's stock lost more than 80% of its value.[21]

Schuepbach fought the ban, appealing all the way to the highest court in France:

> Schuepbach argued in court in September that there isn't a study that establishes risks from fracking. The explorer also said the ban was unfair because the drilling technique may still be used in French geothermal energy projects. The court ruled that in imposing the ban, lawmakers were pursuing a legitimate goal in the general interest of protecting the environment and noted differences between geothermal and

11. Michel Rose & Marion Douet, *France Faces Twin Tasks of Ageing Nuclear Fleet, Staff*, REUTERS (Nov. 22, 2012), http://www.reuters.com/article/2012/11/22/us-france-nuclear-watchdog-idUSBRE8AL0T220121122.

12. *Id.*

13. *Id.*

14. GASLAND (HBO Documentaries 2010). *See also* Donald Gilliland, *'Gasland' Review: Documentary on Gas Drilling in Pennsylvania Isn't Perfect, but It's Worth Watching*, PENNLIVE (Jan. 20, 2015, 9:32 AM), http://blog.pennlive.com/midstate_impact/print.html?entry=/2010/06/gasland_review_documentary_on.html.

15. GASLAND, *supra* note 14.

16. *"Gasland" Film Screening and Discussion*, GENEVALUNCH, http://genevalunch.com/2011/11/30/gasland-film-screening-and-discussion/ (last visited Jan. 28, 2015).

17. Mariah Blake, *How Hillary Clinton's State Department Sold Fracking to the World*, MOTHER JONES (Sept. 10. 2014) ("US officials speculate that Russia also had a hand in fomenting protests there. 'The perception among diplomats in the region was that Russia was protecting its interests,' says Mark Gitenstein, the former U.S. ambassador to Romania. 'It didn't want shale gas for obvious reasons.'").

18. Insa Wrede, *Europe Has Little Reason to Fear Russian Gas Cut-Off*, DEUTSCHE WELLS (July 3, 2014), http://dw.de/p/1BLU2.

19. *France Outlaws 'Fracking' Shale for Natural Gas, Oil*, BLOOMBERG NEWS (July 1, 2011, 5:22 AM), http://www.bloomberg.com/news/articles/2011-07-01/france-vote-outlaws-fracking-shale-for-natural-gas-oil-extraction.

20. Laura Crisci, *French Law Banning Fracking Has Been Upheld* (Oct. 14, 2013), http://www.dailyenmoveme.com/en/regulation/french-law-banning-fracking-has-been-upheld.

21. Keith Schaefer, *Toreador's Next Move: The ZaZa Merger and Eagle Ford Play*, OIL & GAS INVESTMENTS BULLETIN (Dec. 14, 2011).

> shale gas exploration techniques. The court also rejected an argument that the ban went against property rights.[22]

Philippe Martin, Minister for Environment, Sustainable Growth and Energy, boasted, "[w]ith this decision the ban on hydraulic fracturing is absolute."[23]

France is not alone, and other countries have enacted bans, moratoria, and studies related to hydraulic fracturing. Examples include:

- *Bulgaria.* The nation banned hydraulic fracturing after protests against Chevron's planned shale exploration.[24]

- *South Africa.* "In response to public outcry concerning issues like water and other environmental effects, the South African Minister of Mineral Resources issued a moratorium on exploration licenses in February 2011. This moratorium was lifted in August 2012, however, making South Africa the first country ever to end a ban on fracking."[25] Opposition continues, though, with the Treasure Karoo Action Group renewing calls to reinstate the moratorium, and the Energy Minister advising "caution and [a] responsible approach that seeks to understand the risks to the environment."[26]

- *United Kingdom.* "The U.K. halted exploration, while scientists investigated links between drilling and earth tremors."[27] This moratorium was lifted after eighteen months.[28]

- *Lithuania.* "Chevron withdrew from [Lithuania's] shale gas production contest . . . after Lithuania changed the regulatory and taxation environment of shale gas production."[29]

- *Romania.* Romania instituted and then lifted a moratorium on hydraulic fracturing.[30]

22. *France Cements Fracking Ban*, *supra* note 10.

23. *Id.*

24. *Bulgaria Bans Shale Gas Drilling with "Fracking" Method*, BBC NEWS (Jan. 19, 2012).

25. STEVE HEDDEN, JONATHAN D. MOYER & JESSICA RETTIG, AFRICAN FUTURES PAPER, FRACKING FOR SHALE GAS IN SOUTH AFRICA: BLESSING OR CURSE? (2013).

26. Paul Burkhardt, *Fracking Opponents Renew Call for South African Shale-Gas Halt*, BLOOMBERG NEWS (July 22, 2014).

27. Ladka Bauerova & Tara Patel, *Europe's Shale Boom Lies in Sahara as Algeria Woos Exxon*, BLOOMBERG NEWS (Nov. 26, 2012).

28. Selina Williams, *U.K. Sets Tax Breaks to Encourage Shale-Gas Exploration*, WALL ST. J. (Mar. 20, 2013); Anderson, *supra* note 5.

29. *Lithuania Government Proposed 1 Pct Shale Tax Rate*, XINHUA (Sept. 30, 2014).

30. Irina Savu, *Romania Ends Moratorium on Shale Gas Exploration, Premier Says*, BLOOMBERG NEWS (Mar. 19, 2013).

- *Germany.* Germany has instituted a moratorium on hydraulic fracturing.[31]

Given the above, it is not surprising that companies have paused before rushing to advance international shale projects.

The United States government has sought to counter this trend by actively supporting international shale. Reasons for the policy include "part of a broader push to fight climate change, boost global energy supply, and undercut the power of adversaries such as Russia that use their energy resources as a cudgel."[32] For example, the U.S. State Department's Unconventional Gas Technical Engagement Program (UGTEP) seeks to "establish[] the right regulatory policy and fiscal structures" for shale gas development.[33] Its participants have included "Mexico, Colombia, Chile, Poland, Ukraine, Bulgaria, Romania, Lithuania, Jordan, Kazakhstan, Morocco, India, China, Indonesia, Vietnam, South Africa, [and] Botswana."[34]

One policy approach to assuaging developer fears would be adoption of laws that protect existing petroleum developers from adverse legal change. Such "stabilization" rights may provide a variety of remedies for subsequently enacted regulations. While nations may be unable to contract away their right to change law, "government[s] [can] covenant to take promptly all actions necessary to exempt the sponsor . . . from the application of such change in law."[35] They also can indemnify the developer for the economic consequences of regulatory change, such as by giving it the right to return the asset to the government at either cost or discounted economic value.[36] Such economic stability clauses are being discussed in Europe as a mechanism for bringing back reluctant shale developers.[37] Should a government fail to honor its stabilization guarantee, the developer should be afforded the right to have compensation determined by a neutral arbitrator.

III. PRIVATE MINERAL RIGHTS

Mineral rights in the United States are privately held, usually by the landowner. This is not the case elsewhere—"[i]n most, perhaps all, other countries

31. *Germany Moves Closer to Fracking Ban*, EURACTIV (July 31, 2014), http://www.euractiv.com/sections/energy/germany-moves-closer-fracking-ban-303808.

32. Blake, *supra* note 17.

33. *Unconventional Gas Technical Engagement Program (UGTEP)*, U.S. DEP'T OF STATE, http://m.state.gov/mc38721.htm (last visited Jan. 28, 2015).

34. *Id.*

35. William Musgrove, *Preserving the Economic Stability of an Energy Project* (Jan. 2013), http://www.kslaw.com/library/newsletters/EnergyNewsletter/2013/January/article2.html.

36. *Id.* For example, a model stabilization clause used by the author in prior agreements provides protections along the following lines: "Any Change in Law from and after the Signing Date that has the effect of adversely impacting the rights, obligations, and exemptions of [*developer*], shall require the Parties to enter into negotiations to re-establish the economic position of the [*developer*] that existed at the time of the Signing Date. If the Parties fail to agree on the compensation required to restore the [*developer's*] economic position, then the [*developer*] shall have the right to cause the [*nation*] to purchase all of the [*developer's*] interest in the Project for an amount in cash equal to the greater of (i) the sum of the total costs expended on the Project by the [*developer*] or (ii) the present value, discounted at a rate of ten percent, of the reserves associated with the Project in the absence of the Change in Law."

37. *Lithuania*, *supra* note 29 (suggesting a "multiparty agreement that these rules won't be changed for a long time allowing investments to pay off").

of the world, the underground resources belong to the crown or the government."[38] The American anomaly turns out to be an accident of history. Great Britain did not reserve any subsurface minerals for the crown in its original land grants, and this carried through to the colonies' grants to settlers.[39] A young George Washington actually took advantage of this regime as early as the 1760s, when he selected land around a burning oil and gas seep as compensation for public service.[40]

Once established, American mineral rights gradually spread across its new territories. Thomas Jefferson extended these rights to the lands acquired by the Louisiana Purchase.[41] While Texas, California, and New Mexico had to overcome a legacy of state-owned mineral rights from their predecessor governments, new laws and court rulings eventually adopted the American tradition as well.[42]

Private mineral rights appear to be an important ingredient for successful shale development. One reason is that shale projects have a greater impact on the surface of the land:

> Compared with conventional gas reserves, shale and tight gas are spread over much wider areas. For example, shale gas deposits in place are around 0.2 to 3.2 billion cubic metres (bcm) per km² of territory, compared with 2-5 bcm per km² for conventional gas. Thus shale and tight gas require many more wells to be drilled.[43]

In the Texas Barnett shale, for example, average wellhead density is twelve wells per square kilometer.[44] Landowners also perceive that shale development carries with it greater environmental risk, such as water contamination and earthquakes. As such, there is a greater need to compensate landowners and align their interests with shale development.

The importance of aligning ownership of mineral and surface rights was recently illustrated in Denton, Texas, a community in the Barnett shale. In November 2014, about 60% of its residents voted to enact a ban on fracking.[45] One interesting aspect of American mineral rights is that they can be sold independently of the surface, resulting in the landowner and mineral rights owners being different private persons. This is more likely to occur in urban areas, following "years of subdividing land and swapping land ownership."[46] Such was the case in Denton, where less than 30% of appraised mineral rights value was

38. Blake, *supra* note 17. Private mineral rights ownership elsewhere around the world is very limited. Examples in the literature arise from historical land grants within the British Commonwealth of Nations and include Trinidad and Tobago, Canada, and Australia. However, unlike the United States, other nations generally have sought to eliminate any vestiges of private minerals. *See, e.g.*, VICTORIA MINERAL RESOURCES SUSTAINABLE DEVELOPMENT ACT 1990 § 9; SOUTH AUSTRALIA MINING ACT 1971 § 16; TASMANIA MINERAL RESOURCES DEVELOPMENT ACT 1995 § 6(4); NEW SOUTH WALES COAL ACQUISITION ACT 1981.

39. *Mineral Rights History*, W. MINERAL CONSULTANTS, http://westernmineralconsultants.com/mineral-rights-history/ (last visited Jan. 28, 2015).

40. H. J. Gruy, *History of the Ownership of Mineral Rights*, SWIFT ENERGY (Aug. 11, 1999).

41. *Id.*

42. *Id.*

43. Stevens, *supra* note 4, at 10 (internal citations omitted).

44. *Id.* at 11.

45. Max B. Baker, *Denton Voters Approve State's First Ban on Hydraulic Fracturing*, STAR-TELEGRAM (Nov. 4, 2014).

46. Adam Briggle, *Acme, Frack Me: Wealth Distribution of Denton's "Hometown" Gas Wells*, DENTON DRILLING BLOG (Aug. 20, 2013, 8:18 PM), http://dentondrilling.blogspot.com/2013_08_01_archive.html.

locally owned.[47] For example, one well was owned by "a corporation in Midland . . . ; a Lutheran Church in Sioux Falls, South Dakota; Baylor University in Houston; a real estate developer in Corinth; and some individuals in Plano, Richardson, Dallas, and Arlington."[48] Even though Denton had 272 active wells within its city limits, the economic benefits were largely flowing elsewhere.[49]

As population density increases, so does the challenge of balancing shale's environmental impact. Denton residents complained about wells being "300 feet from a park" and "200 feet from a child's bedroom."[50] If the mineral rights were owned by these same residents, it is unlikely those locations would have been drilled in the first place. When ownership of minerals and land is aligned, there is an opportunity to negotiate sensible limits regarding where wells and related facilities will be located.

The rest of the world looks a lot like Denton. Landowners receive little or no compensation for the costs and risks of shale development, and if development proceeds, they must rely on distant regulators to protect their environments and livelihoods. "[O]utside the U.S., title to all oil, gas and mineral deposits is held exclusively by the 'sovereign.' Without mineral rights, surfaceholders do not have financial incentive to accept the risk and inconvenience of drilling."[51]

In densely populated Europe, "the state tends to own the minerals, and no-one is going to let an energy company rip up their land without a fight."[52] In South Africa, where there was a recent shale moratorium, commentators similarly observed that "landowners in the Karoo [shale basin] would not be able to profit off the volume of shale gas under their land."[53]

One of the easiest ways for governments to fast-track shale development may be to grant private landowners a stake in shale projects. Mexico's recent energy reforms included landowner rights: "'Surface rights is one of the most contentious political issues to be used by anti-reform elements in order to demonstrate how energy reforms do not benefit small-property owners, particularly small farmers in tight-oil formation areas in northeastern Mexico.'"[54] To address this concern, "[a]s part of the Energy Reform, clear mechanisms were established to negotiate surface access with land owners. There will be a royalty to be paid to landowners of 0.5%-3%."[55] Elsewhere, in Great Britain, "new measures [were] designed to bring the U.K. closer in line with the U.S., where the legal right of landowners to

47. Adam Briggle, *Fracking Fortunes Drain from Denton*, DENTON DRILLING BLOG (Aug. 19, 2013, 8:22 PM), http://dentondrilling.blogspot.com/2013_08_01_archive.html.

48. *Id.*

49. Baker, *supra* note 45.

50. *Id.*

51. Parker & Furlow, *supra* note 2 ("In the U.S., producers have benefited from high landowner support.").

52. Anderson, *supra* note 5.

53. HEDDEN, MOYER & RETTIG, *supra* note 25, at 6.

54. Chris Tomlinson, *Corporate Responsibility Paramount to Make Mexican Energy Reforms Work*, HOUS. CHRONICLE (Aug. 14, 2014), http://www.houstonchronicle.com/business/columnists/tomlinson/article/Corporate-responsibility-paramount-to-make-5688939.php#/0.

55. WOODMACKENZIE, MEXICO SHALE GAS UNCONVENTIONAL PLAY (2014).

earn royalties from shale-gas production has encouraged widespread investment."[56] Commentators have called for similar reforms in Argentina:

> What should Argentina do at this late but opportune date? Yeatts provides the answer—implement private ownership of the subsoil and allow market processes to take over from there. There are few strokes of the pen that can unleash as much spontaneous entrepreneurship, attract as much capital, and generate as much wealth as denationalizing the subsoil.[57]

The ability of nations to align better the interests of landowners and shale developers will be an important factor in achieving development levels similar to those in the United States.

IV. FISCAL REGIMES

Another important difference between American and international shale is the collective burden of taxes and royalties, which tend to be lower in the United States. Foreign fiscal regimes often are highly progressive, with the government taking the vast majority of petroleum produced.[58] Examples of progressive international systems include those that increase the government's share of petroleum, royalties, or taxes based on the rate of production, cumulative production over the project's life, net earnings exceeding total expenditures, or the project's rate of return.[59]

In contrast, the American fiscal regime is "flatter." Using Texas as an example, a shale developer will pay a one-time signature bonus per acre,[60] flat royalties of 15-25%, and a small severance tax (e.g., 4.6% for oil and 7.5% for natural gas, which may be reduced in cases of low production rates and prices).[61] The principal burden on the developer is the royalty rate, which is fixed and not progressive. This creates a strong incentive for companies to produce more petroleum from each well because those last barrels are going to be mostly profit.[62]

The practical effect of this structure is that American shale operators can achieve higher rates of return. Preeminent developer EOG Resources does not even consider shale plays with returns below 50%: "We really set the bar high and we are looking for [shale] plays that only would be able to generate, say, north of

56. Williams, *supra* note 28.

57. Robert Bradley, Jr., *'Theft of the Subsoil': Guillermo Yeatts on Latin/South America Mineral-Rights Reform* (Feb. 6, 2014), https://www.masterresource.org/energy-privatization/theft-subsoil-preface-yeatts/.

58. DANIEL JOHNSTON, INTERNATIONAL PETROLEUM FISCAL SYSTEMS AND PRODUCTION SHARING CONTRACTS 14 (1994).

59. SCOTT GAILLE, INTERNATIONAL ENERGY DEVELOPMENT 104-5 (2014).

60. In exchange for granting rights, other nations also may require an up-front cash payment or signature bonus.

61. *See generally Texas Severance Tax Incentives: Past and Present*, R.R. COMM'N OF TEX., http://www.rrc.state.tx.us/oil-gas/publications-and-notices/texas-severance-tax-incentives-past-and-present/ (last updated Jan. 27, 2015).

62. Even American company taxes, which have some progressivity, do not have much of an impact. For example, Texas levies a franchise tax of about 1% of gross receipts, and the U.S. federal government imposes graduated income taxes on corporations and individuals (petroleum projects may be held in LLCs, which are pass-through entities in which profits are taxed at the individual level). As a practical matter, though, taxable income is unlikely during the early, capital intensive years of a shale project, and American shale developers may be able to avoid income taxes altogether through loss carry-forwards. They also may be able to sell their entities, thereby converting future discounted income streams into capital gains, which are taxed at lower rates.

50% rates of return going forward."[63] The progressive nature of international fiscal systems tends to impede such returns.

Additionally, other nations levy indirect fiscal burdens on shale developers such as:

- *Carried working interest.* A state-owned oil company may be granted the right to participate in the development on a carried basis, often as high as 20%. For example, if a $10 million shale well is owned by the developer at 80% and by the government's oil company at 20%, the developer pays 100% of the well's costs even though it is only entitled to 80% of the well's net production (after taxes and royalties). Carried interests "complicate[] the investment environment, as the government would essentially have the right to nationalize major parts of projects without taking on the risks or compensating the owners."[64] In Argentina, "provinces have required a stake in concessions without investing in them, says Carlos Pierro, an energy analyst and former president of YPF, Argentina's state-run energy company. Such partnerships unnecessarily raise costs, he said."[65] Legislation in South Africa also would provide the government with a "'free carried interest,' in new gas and oil exploration and production plays. If the law is passed as introduced, the government would potentially have the ability to take as much as 50 per cent of each venture."[66]

- *Forced marriages.* Host governments may require partnerships with resident companies that are privately owned. Such combinations are referred to as "forced marriages." For example, in China,

  > [a]lthough no foreign investors were awarded blocks, directly or indirectly, in the first two rounds, the Chinese government has made the participation thresholds clear: participation by foreign investors must be through a sino-foreign equity joint venture in which a Chinese party holds a majority of the shares, with at least RMB300 million of registered capital, and the venture or the partners must have experience in oil or gas exploration.[67]

- *Local content.* The developer may be required to hire local workers, use local service companies, and/or make expenditures each year to assist local communities. Poland's "insistence that

63. EOG RESOURCES, INC., 2ND QUARTER 2014 EARNINGS CALL (Aug. 6, 2014).

64. HEDDEN, MOYER & RETTIG, *supra* note 25, at 7.

65. Taos Turner, *Argentina to Expand Oil & Gas Investment Incentives*, WALL ST. J. (June 10, 2014).

66. HEDDEN, MOYER & RETTIG, *supra* note 25, at 7.

67. EDWIN LEE, SHALE GAS IN CHINA: HOW FAR FROM DREAM TO REALITY?, CHADBOURNE & PARKE LLP (2013)

> A shale gas PSA between Shell and CNPC was approved by the Chinese government on March 27 this year for drilling in the Fushun-Yongchuan block in the Sichuan Basin. This is the first PSA approved for foreign involvement in the shale gas sector. Shell will contribute its technology and operating expertise in an effort to reduce the drilling cost per well from $12 million to $4 million. This block is viewed as the first commercial shale gas project in China.

Id. at 4.

foreign companies work with local partners did much to dampen enthusiasm" for shale development there.[68]

- *Annual rentals.* An annual fee per acre or square kilometer may be assessed, irrespective of whether any production is occurring.

Coupled with progressivity, such conditions weigh heavily on shale economics. As Robert Beck of Anadarko has explained, "'[m]ost of the fiscal terms that the other countries have in place are totally incompatible with unconventional development.'"[69]

Other nations are gradually confronting this reality. Examples of fiscal reforms include:

- *Argentina.* Recent legislation "would unify the royalties and taxes that provincial and city governments levy on producers. It would also lower the minimum investment levels required to send dividends abroad and qualify to export up to 20% of oil production tax-free."[70]

- *Russia.* The Russian government "package for 'tight oil' tax relief is a sliding scale of tax breaks for investors, which would grant a discount of 50 to 100 percent on mineral extraction tax depending on the permeability of the rock."[71] This reform "will make Russia one of the few countries to incentivize the production of energy resources from shale and other 'tight' rock."[72]

- *Lithuania.* The country reduced its tax rate for shale projects to 1%.[73]

- *Poland.* The Polish "government decided not to charge special taxes, specifically designed for the shale gas industry, before 2020."[74]

- *United Kingdom.* Changes in the tax code,

  [w]ould allow companies operating in the U.K.'s offshore oil and gas sector to continue to get immediate relief for shale-development costs at a 62% rate set against their production in the North Sea, while the field

68. Anderson, *supra* note 5.

69. Jeff Schlegel, Omar Samji, David Stringer & Meredith Rockhill, *Obstacles to Foreign Development of Shale Gas*, E&P (Nov. 1, 2013).

70. Turner, *supra* note 65 (A complaint was filed alleging that "Mrs. Kirchner broke Argentine law by making changes to oil and gas rules in a decree instead of through legislation."); *see also Argentina Offering Tax Breaks, Incentives to Develop Oil, Gas*, PLATTS (July 16, 2013).

71. *Russia Tax Breaks for Shale, Offshore Oil Seen on Jan. 1*, REUTERS (Mar. 18, 2013).

72. *Id.*

73. *Lithuania*, *supra* note 29.

74. Patryk Wasilewski, *Poland Proposes Tax Breaks for Shale Gas Industry: The Country is Trying to Reduce Its Reliance on Russia*, WALL ST. J. (Mar. 11, 2014).

allowance would reduce a company's tax rate on profits from shale-gas production to 30% from 62%, said Roman Webber, a partner at Deloitte.[75]

- *Algeria.* The government has "offered 'very attractive fiscal terms' to partners interested in shale exploration."[76]

- *Australia.* A recent study of Australia's fiscal regime evaluated a variety of reforms, recommending rapid depreciation (100% first year depreciation of costs) as a mechanism for offsetting the burden of royalties and the Petroleum Resources Rent Tax.[77]

- *China.* The nation adopted "[t]ax incentives to speed exploration and production of unconventional gas . . . [and] will subsidize production by offering 0.4 yuan (64 cents) a cubic meter for the fuel that's developed and consumed from 2012 to 2015."[78]

As the above indicates, fiscal terms are not set in stone. Oil ministers routinely have the authority to negotiate production sharing terms on a contract-by-contract basis. Even if tax and royalty rates are codified, laws can be amended. Better terms could include reduced rates for government production sharing, taxes, and royalties, and exemptions from government-carried interests or other forms of local content.

V. SERVICES AND INFRASTRUCTURE

Closely related to fiscal terms are the availability and cost of services and infrastructure. "The US [shale] experience was dependent upon the existence of a competitive and dynamic onshore service industry. Currently, there is no comparable onshore service industry in Europe and the scale of requirement is enormous."[79] Once a developer leaves the United States, it can easily see development costs double.[80]

Shale projects in other nations are impeded by the "[l]imited availability of experienced management, drilling crews, engineers and geologists. . . . Limited

75. Williams, *supra* note 28.

76. Bauerova & Patel, *supra* note 27.

77. Cameron England, *The Shale Gas Industry Needs Up Front Tax Breaks, University College London Says*, THE ADVERTISER (May 20, 2014).

78. Bauerova & Patel, *supra* note 27. Sarah M. Forbes, *The United States and China: Moving Toward Responsible Shale Gas Development* (Sept. 2013) (China has a track record of subsidizing segments of energy production. For example, coal-bed methane development in China "was supported by various tax incentives, including resource tax exemption, preferential corporate income tax, and value-added tax reimbursement, production subsidies, government-funded R&D.").

79. Stevens, *supra* note 4, at 16.

80. *See, e.g.*, ECF Int'l Shale Gas Forum, *Shale Gas: How much does a shale gas well cost? 'It depends'*, ENERGY CHINA FORUM (ECF) (Aug. 9, 2013), http://www.shalegaschinasummit.com/News_Infor.asp?tid=3469; *China's shale gas costs at least double those in US*, HELLENIC SHIPPING NEWS (Feb. 6, 2014), http://www.hellenicshippingnews.com/chinas-shale-gas-costs-at-least-double-those-in-us/.

availability of drilling rigs and other equipment also contributes."[81] As Anadarko's exploration chief explained, "you have to have infrastructure."[82]

American shale infrastructure and services investments have been considerable:

- There are almost 1,000 horizontal drilling rigs currently operating in the United States,[83] which enables "large-scale, multiwell development programs . . . essential to profitability,"[84] and the total North American rig count is about 2,000.[85]

- "North America currently represents more than half of the global oilfield services market by revenues, most comes from drilling and completion spending on the ~60,000 new wells drilled each year."[86]

- Drilling capex expenditures by forty North American companies are projected to be approximately $106 billion in 2015 and $111 billion in 2016.[87]

- "In the past five years, more than $300 billion has been spent in the U.S. midstream sector" constructing new pipelines,[88] and "[t]he rapid development of shale in the United States can also be attributed to the easy and low-cost access to the gas transport network."[89]

The rest of the world is playing catch-up:

- *Europe.* The total rig count in all of Europe is only 148 wells,[90] and "[p]utting it simply, the infrastructure in Europe does not currently exist to mount enough unconventional gas projects to make a difference."[91]

- *South Africa.* There are only two rigs operating in South Africa, and its shale fields are completely devoid of oil and gas

81. Parker & Furlow, *supra* note 2. "[L]ack of infrastructure and pipelines, . . . it is clear that the barriers to a shale revolution outside the US are considerable and numerous." Anderson, *supra* note 5.

82. *Anadarko Staying with Domestic Shale Gas for Now*, REUTERS (Feb. 2, 2010), http://es.reuters.com/article/idUKN0224991320100202.

83. Larry Nettles, *Introduction to the Fourth Annual Vinson & Elkins Hydraulic Fracturing Symposium*, at 10 (Oct. 15, 2014) (citing U.S. Energy Info. Admin., based on Baker-Hughes data).

84. Gregory DL Morris, *Shale Plays Present Global Opportunity*, AM. OIL & GAS REP. (Apr. 2012).

85. *North American Rig Count*, BAKER HUGHES, http://phx.corporate-ir.net/phoenix.zhtml?c=79687&p=irol-reportsother (last visited Jan. 28, 2015).

86. Creighton Smith, *Equity Financing of Capital Needs*, at 7 (Oct. 15, 2014) (citing Spears and Associates, Inc., OILFIELD MARKET REPORT 2005-2014).

87. *Id.* at 8 (citing Tudor, Pickering, Holt & Co. data).

88. *Id.* (citing SAN ANTONIO BUSINESS JOURNAL (May 16, 2014)).

89. Stevens, *supra* note 4, at 12; Forbes, *supra* note 78 (Over the last century, the "United States built a highly integrated natural gas pipeline infrastructure.").

90. *International Rig Count*, BAKER HUGHES, http://phx.corporate-ir.net/phoenix.zhtml?c=79687&p=irol-rigcountsintl (last visited Jan. 28, 2015).

91. Stevens, *supra* note 4, at 16.

infrastructure: "shale gas production in the Karoo will require heavy investments in . . . natural gas pipelines, roads and possibly water pipelines" due to the scarcity of water.[92]

- *China*. City water supplies were temporarily cut-off during hydraulic fracturing of a shale well in northern Shaanxi Province.[93] To address water shortages, companies may need to consider "[o]ptions for waterless hydraulic fracturing (such as carbon dioxide, nitrogen or liquefied petroleum gas)."[94]

- *Argentina*. There are 105 rigs operating in Argentina.[95] In 2011, Apache "completed the first horizontal multistage hydraulically fractured shale gas well in South America, and the company says it will continue to evaluate using horizontal drilling techniques on tight and unconventional resources in the pre-Cuyo, Los Molles and Vaca Muerta formations of the Neuquén Basin."[96] To continue its shale development, Argentina has introduced legislation that would "ease equipment import restrictions."[97]

The full-field development of international shale will require considerable infrastructure and services expenditures. Drilling rigs and hydraulic fracturing crews must be imported. Roads need to be built. Pipelines and terminals have to be constructed. All of this will take time and money, further burdening the economics of the first projects. Given the magnitude of the investment required by the initial shale developers, it is not just about bringing fiscal regimes into parity with those of the United States. They must be made more favorable to offset the higher costs of early facilities and services.

VI. GAS AND OIL MARKETS

The petroleum stream from a well typically includes natural gas, oil, and natural gas liquids (NGLs), and American shale economics are bolstered by the ability to sell all three streams of production.[98] The first shale projects in the United States took advantage of an attractive American gas market, with prices in the range of $12 per million British Thermal Units (mmbtu): "[t]he innovations that led to the US shale gas revolution were driven in part by high natural gas prices."[99]

92. HEDDEN, MOYER & RETTIG, *supra* note 25, at 7.

93. Forbes, *supra* note 78, at 8.

94. *Id.* at 10.

95. Joseph Triepke, *Middle East Countries Dominate Rig Per Square Mile Rankings*, OILPRO, http://oilpro.com/post/4934/middle-east-countries-dominate-rig-per-square-mile-rankings (last visited Jan. 28, 2015).

96. Morris, *supra* note 84.

97. Turner, *supra* note 65.

98. Schlegel, Samji, Stringer & Rockhill, *supra* note 69. *Anadarko staying with domestic shale gas for now*, REUTERS (Feb. 2, 2014, 4:15 PM), http://www.reuters.com/article/2010/02/02/anadarko-idUSN0224991320100202 ("[y]ou have to have a market to sell the gas into").

99. Forbes, *supra* note 78, at 11.

Many emerging shale plays appear to have reasonable access to natural gas markets, although government price controls may damper shale economics:

- *Europe.* "Higher European gas prices—around twice those in the US—will also help overcome" other impediments to European shale projects.[100]

- *Algeria*. The nation has pipeline access to Spain and Italy, but more pipeline capacity will be needed for shale projects.[101]

- *Mexico*. In addition to its own domestic gas market, shale fields in northern Mexico also could access the United States gas market.[102]

- *Argentina*. The problem in Argentina is that "gas prices are kept quite low by government subsidies."[103]

- *South Africa*. A major LNG project is currently underway in neighboring Mozambique.[104]

- *China*. Chinese natural gas prices are currently set by the government at artificially low prices, leading "[s]ome gas producers in China . . . [to] export[] gas even though the domestic gas demand cannot be met, in order to press policymakers for a domestic price increase."[105] The nation's "current cost-plus pricing model for natural gas is unlikely to support development of unconventional gas or incentivize strong risk-taking ventures. Pricing reforms may be the single most important step China can take towards facilitating shale gas development."[106] However, pilot programs are underway to allow for the introduction of market-based pricing: "Pilot reform schemes have been under way for more than a year in Guangdong and Guangxi provinces, where wellhead prices have been liberalized and essentially linked to oil product prices imported via Shanghai."[107]

In addition to local gas markets, shale developers also must consider global oil prices, which exhibited considerable volatility during 2014.[108] Even within the

100. James Green, *What Are the Impediments to the Development of The Shale Gas Industry in Europe and How Can These Be Overcome?*, K&L GATES LLP (Feb. 2012).

101. Ryan Ouwerkerk, *Opinion: Europe Needs Gas Supply Diversification Now*, BREAKING ENERGY (June 5, 2014).

102. *Sierrita Gas Pipeline Project*, KINDER MORGAN, http://www.kindermorgan.com/business/gas_pipelines/projects/sasabelateral/ (last visited Jan. 28, 2015).

103. Morris, *supra* note 84.

104. MOZAMBIQUE LNG, http://www.mzlng.com (last visited Jan. 28, 2015).

105. LEE, *supra* note 67, at 2.

106. Forbes, *supra* note 78, at 11.

107. *Id.* at 8.

108. *Sheikhs v Shale*, THE ECONOMIST (Dec. 6, 2014), http://www.economist.com/news/leaders/21635472-economics-oil-have-changed-some-businesses-will-go-bust-market-will-be.

United States, different shale formations incur varying costs of production. The break-even oil price for various American shale projects ranges from $40 to more than $100 a barrel.[109] Lower oil prices will weigh on shale project economics, slowing the pace of development globally.[110]

VII. ACCESS TO ACREAGE

One means to overcome higher costs is the ability of international governments to grant large swaths of shale acreage at very low cost—or even free. In contrast, American shale developers must cobble together hundreds of leases with individual landowners, who generally command an up-front bonus payment due at signing. At its simplest, assume that a three-year lease in Texas comes at a bonus cost of $1,000 an acre. If a developer needs to acquire 100,000 acres for its shale development, it would need to pay $100 million to secure its acreage. Governments can eliminate this bonus requirement and replace it with a minimum project spending commitment. The same funds are then available for development of infrastructure.

Compared with leasing from private mineral owners in the United States, the ability to acquire a large block of acreage from a government entails other advantages, such as:

- *Lower transaction costs*. The developer need not retain landmen or lease brokers to negotiate with many different owners to acquire its acreage.

- *Lower administration costs*. The developer has to manage only one contract: the one with the government. In contrast, an American shale developer is required to administer hundreds of separate leases.

- *Risk of acquiring enough acreage*. The single government contract will award it enough acreage for the entire development.

- *Risk of stranded acreage*. The government's acreage grant will be entirely contiguous, thereby eliminating concerns about leases being stranded because they are not large enough (or properly sized) for lateral wells.

- *Lease cost uncertainty*. Negotiating with one government eliminates uncertainty about acreage costs. During the process of acquiring many individual leases, lease prices often increase.

- *Larger block size*. International blocks tend to be larger than a project comprised of many domestic leases. This should give the developer the opportunity to drill appraisal wells in more disparate

109. Tom Randall, *Break-Even Points for U.S. Shale Oil*, BLOOMBERG NEWS (Oct. 17, 2014).

110. Stanley Reed, *Chevron to Abandon Shale Natural Gas Venture in Poland*, N.Y. TIMES (Jan. 30, 2015), http://www.nytimes.com/2015/01/31/business/international/chevron-to-abandon-shale-venture-in-poland-a-setback-to-fracking-europe.html?_r=1.

> sections of the shale formation, better enabling it to find the most productive well locations.

One example of how international governments can use large acreage grants to their advantage is BP's $16 billion Khazzan gas project in the Sultanate of Oman. BP's Block 61 concession in Oman spans 2,800 square kilometers, or almost 700,000 acres, providing it with access to an estimated 100 trillion cubic feet of tight natural gas.[111] Under the initial development plan, BP will produce 1 billion cubic feet of gas per day using a "500km pipeline network and horizontal drilling and hydraulic fracturing, the same technology used to unlock gas from shale formations in the US."[112]

Finally, nations should consider how shale acreage is awarded to prospective developers. Blocks may be awarded through a competitive auction or, alternatively, a direct negotiation in which the developer and the company negotiate an agreement on a non-competitive basis. Governments trying to incentivize shale development should be wary of using auctions, at least in shale's nascent days. This is because companies participating in auctions often incur costs purchasing technical data and analyzing acreage that someone else will win. Smaller companies, in particular, may be unable to bear such risk.

While oil ministers may dream about ExxonMobil and Chevron developing their shale fields, the reality is that smaller companies can play a critical role:

> [I]n a nationalized mineral rights system, rights to exploit oil and gas are typically auctioned to big oil companies in large blocks, effectively excluding smaller entrepreneurs from investment and potentially impeding the risk-taking, technological innovation, and rapid organic exploration and development that helped spur shale gas production in the US.[113]

Governments can encourage the participation of entrepreneurs by offering acreage on the basis of direct negotiation, eliminating up-front bonuses, and minimizing any prequalification criteria.

VIII. CONCLUSION

International shale development entails challenges beyond those encountered in American projects. These include less attractive fiscal terms, the absence of private mineral rights, higher services costs (due to the need to import technology and personnel), meager infrastructure, and less developed gas markets. Despite these headwinds, companies are slowly advancing international shale projects. Argentina, in particular, looks promising in the near-term, with ExxonMobil touting the results of its 2014 Vaca Muerta wells,[114] and "analysts see[ing] the oil-

111. April Yee, *American shale revolution techniques head to Arabian Gulf as BP wins Oman gas project approval*, THE NATIONAL (Dec. 16, 2013, 8:22 PM), http://www.thenational.ae/business/industry-insights/energy/american-shale-revolution-techniques-head-to-arabian-gulf-as-bp-wins-oman-gas-project-approval.

112. *Id.*

113. Jeff Schlegel, Omar Samji, David Stringer & Meredith Rockhill, *Obstacles to Foreign Development of Shale Gas*, E&P (Nov. 1, 2013).

114. Daniel Cancel & Pablo Gonzalez, *ExxonMobil Makes Second Argentine Shale Fine in Vaca Muerta*, BLOOMBERG NEWS (Dec. 18, 2014).

rich Neuquén Basin in Argentina as the most likely to be the first of the international shale plays to deliver commercial output."[115]

While other shale nations may trail Argentina, they have the capability to influence their own destinies. The right or wrong policies can cause the pace of shale development to quicken or languish. Governments can make a difference through creative licensing, such as by granting large tracts of shale acreage at nominal cost. Modest policy reforms—lower taxes, less regulation, stability of law, and private mineral rights—also can incentivize investment. As more governments adopt such approaches, global shale development should accelerate.

115. Morris, *supra* note 84.