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Natural Gas Fracking Addresses *All* of Our Major Problems
Richard J. Pierce, Jr.¹

Synopsis

Politicians and regulators all over the world are debating the merits and demerits of horizontal drilling and fracturing of shale formations to produce natural gas (fracking) and the many legal issues that are raised by fracking. Professor Pierce provides context for those debates by describing the economic, environmental, and geopolitical advantages of fracking.

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Introduction

It is challenging to find any reason for optimism today. The US economy continues to perform poorly as we struggle to try to dig out of the worst economic downturn in eighty years.² Global economic conditions are far worse.³ The combination of chaos in the Euro zone and a slowing of economic growth in China have the potential to produce a global recession so severe that it will drag the US into the economic doldrums even if US political leaders make all of the right domestic policy decisions.

¹ Lyle T. Alverson Professor of Law, George Washington University.

² Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2012 to 2022* (Jan. 2012).

³ World Bank, *Global Economic Prospects* (Jan. 2012).

The prospects for the environment are even worse. Some degree of anthropogenic climate change is now inevitable, and the risk of climate change of catastrophic proportions increases every year.⁴ The leaders of both US political parties are ignoring the problem;⁵ European nations have largely abandoned the extravagant and ineffective efforts to mitigate climate change that they initiated fifteen years ago;⁶ and, China's emissions of greenhouse gases increase dramatically every day.⁷

The geopolitical situation provides no reassuring source of optimism. The “Arab spring” seems to be far better at creating communal violence and anti-american islamist leaders throughout the middle east than at creating the progressive secular democracies that many western leaders expected.⁸ US efforts to persuade Iran to abandon its plan to become a nuclear power have not succeeded to date, as Iran uses its oil and gas reserves to discourage India from cooperating with the US-led trade sanctions⁹ and Russia uses its UN veto power to obstruct US efforts to implement an effective international sanction regime.¹⁰ Russia also refuses to cooperate with US and UN efforts to find a peaceful solution to the Syrian civil war that threatens to spread throughout the region.¹¹

One ray of hope has emerged from this sea of despair. New uses of two old technologies—horizontal drilling and hydraulic fracturing—have enabled the U.S. to

⁴ Intergovernmental Panel on Climate Change, Fourth Assessment Report: Climate Change 2007.

⁵ Bryan Walsh, Why Climate Change Has Become the Missing Issue in the Presidential Campaign, Time (Oct. 23, 2012).

⁶ See, e.g., Germany Cuts Subsidies to Floundering Solar Industry, The New American (Mar. 22, 2012).

⁷ European Commission, Long-Term trends in Global CO2 Emissions: 2011 Report.

⁸ Middle East Turmoil, Timeline, WSJ online (2012).

⁹ India's Growing Ties to Iranian Oil Could Bust U.S. Sanctions, Forbes (Mar. 15, 2012).

¹⁰ Ilya Arkhakov & Henry Meyer, Russia Says Iranian Nuclear Deadlock Risks Military Strike, Bloomberg (Sep. 28, 2012).

¹¹ Rick Gladstone, Friction at the U.N. as Russia and China Veto Another Resolution on Syria Sanctions, New York Times (July 19, 2012).

increase its natural gas reserves by 75% during the period 2004-2011.¹² Use of horizontal drilling and hydraulic fracturing to produce natural gas from shale formations has provoked debate among politicians all over the world. It has also raised scores of challenging legal issues that are being litigated in numerous agencies and courts. The public is divided on fracking. Some people view it as a practice that is so hazardous to public health and the environment that it should be banned. Thus, for instance, France and New York have imposed moratoria on fracking.¹³ Others view fracking as a potential source of economic, environmental and geopolitical gains so large that it should be encouraged.

I am in the second group, but my purpose in this article is just to describe the incredibly high stakes in the fracking debate by outlining the potential beneficial effects of fracking. In the six years since US gas producers began the practice of shale gas fracking, it has already had impressive effects. President Obama's 2012 State of the Union address provides a good starting point.¹⁴ The President claimed credit for presiding over the largest reduction in oil imports in modern history and for achieving the lowest level of dependence on oil imports in sixteen years. He attributed that remarkable performance partly to increased oil production from tight sands in the Dakotas but primarily to the massive increase in gas production that has resulted from fracking.

Fracking Will Improve the Performance of the US Economy

¹² Potential Gas Committee, Potential Supply of Natural Gas in the United States (Apr. 27, 2011).

¹³ Mary Esch, New York Fracking Moratorium Unlikely to Be Lifted As Regulators Reopen Rulemaking Process, Huff Post Green (Oct. 1, 2012); David Castelvecchi, France Becomes First Country to Ban Extraction of Natural Gas by Fracking, Scientific American Blogs (June 30, 2011) .

¹⁴ Whitehouse.gov. State of the Union Address (Jan. 25, 2012).

Fracking has increased US natural gas reserves by 75% over the period 2004-2011, and the Energy Information Administration (EIA) expects this trend to continue.¹⁵ It now predicts that the US will have enough gas to satisfy domestic demand for a century and that the US will soon have a surplus sufficient to begin exporting gas to Asia. Fracking has already allowed us to replace 10% of the coal we have traditionally used to generate electricity with cleaner burning natural gas, and EIA predicts that trend to continue for many years.¹⁶ The International Energy Agency predicts that the US will become the world's largest gas producer by 2017.¹⁷ As a result of fracking, gas costs less than one-third of the price of oil in the US.¹⁸ Fracking has already produced large numbers of new jobs and major increases in prosperity in Pennsylvania,¹⁹ and Ohio has the potential to add many thousands of fracking-related jobs in the near future.²⁰ New York is poised to participate in the economic boom created by fracking once it lifts its temporary embargo on fracking.²¹ In his State of the Union address, President Obama predicted that fracking will produce 600,000 new jobs nationwide.²²

The fracking boom will improve US economic conditions dramatically over the next decade. It will increase manufacturing activity by reducing significantly the cost of energy, and it will encourage major investments in chemical production facilities that use

¹⁵ Energy Information Administration (EIA), Annual Energy Outlook (2011).

¹⁶ Energy Information Administration, Electric Power Monthly (Oct, 2011).

¹⁷ International Energy Agency, Gas Medium Term Market Report (2012).

¹⁸ EIA, supra note 16.

¹⁹ Governor's Marcellus Shale Advisory Commission Report (July 22, 2011).

²⁰ Jack Kleinheinz & Russ Smith, Ohio's Natural Gas and Crude Oil Exploration and Production Industry and the Emerging Utica Gas Formation: Economic Impact Study (Sep. 2011).

²¹ Timothy Considine, Robert Watson & Nicholas Considine, The Economic Opportunities of Shale Energy Development (Manhattan Institute for Policy Research (June 2011).

²² Whitehouse.gov, State of the Union Address (Jan. 25, 2012).

natural gas as a feedstock.²³ It will also reduce transportation costs as heavy trucks, construction equipment, and trains are converted from expensive petroleum products to cheaper natural gas.²⁴ In addition, fracking will provide a general stimulus to the economy by reducing the costs consumers pay for natural gas, electricity, and products that are made with the use of natural gas and electricity, thereby increasing disposable income and spending by consumers.

Fracking Will Improve the US Environment

Replacing coal with gas in the US will reduce total emissions of green house gases attributable to electric generation by 45 per cent.²⁵ That is well-short of the 80 per cent reduction in global emissions that climate scientists believe to be needed to mitigate climate change, but it is a major step in the right direction. If we combine that step with the other steps that make sense in their effects on both the economy and the environment—a carbon tax²⁶, implementation of the UN's black carbon abatement initiative,²⁷ and real-time pricing of electricity²⁸—we will have a reasonable chance of meeting our climate goals. Replacing coal with gas will have other significant environmental benefits as well, e.g., elimination of the tens of thousands of premature deaths and hundred of thousands of illnesses in the U.S. each year that are caused by inhalation of pollutants emitted by coal-fired generating plants.²⁹ Moreover, we can

²³ Ben Casselman & Russell Gold, Cheap Natural Gas Gives New Hope to the Rust Belt, *Wall Street Journal* (Oct. 24, 2012).

²⁴ Floyd Norris, Natural Gas for Vehicles Could Use U.S. Support, *New York Times* (June 21, 2012).

²⁵ International Energy Agency, Greenhouse Gas R&D Program: CO2 Emissions Data Base (2009).

²⁶ See Richard Pierce, The Past, Present, and Future of Energy Regulation, 31 *Utah Env. L. Rev.* 291, 302 (2011).

²⁷ United Nations, *Integrated Assessment of Black Carbon and Tropospheric Ozone* (2011).

²⁸ Richard Pierce, A Primer on Demand Response and a Critique of FERC Order 745, *George Wash. J. Energy & Envtl L* 102 (Winter 2012).

²⁹ Michael Greenstone & Adam Looney, *A Strategy for America's Energy Future Illuminating Energy's Full Cost*, Brookings Institution (May 2011).

extend the benefits of the U.S. gas boom to the transportation sector by increasing the direct use of compressed natural gas in vehicles and/or by increasing the indirect use of natural gas by increasing the number of vehicles that are powered by gas-generated electricity. President Obama has indicated his support for both of those initiatives.³⁰

Fracking Will Improve the Global Economy

Gas is far more expensive in Europe and Asia than it is in North America.³¹ The increase in the gas supply attributable to fracking in the US has already changed the conditions in the global gas market in ways that have put downward pressure on gas prices in Europe and Asia. The effects of fracking in the US will increase as the US and Canada begin to export gas. Fracking in other countries has far more potential to reduce the price of gas in Europe and Asia.

The gas boom and its beneficial economic effects will be felt far beyond U.S. borders. The Energy Information Administration (EIA) has identified 48 shale gas formations in 32 countries that have the potential to yield new gas supplies comparable to those that have nearly doubled U.S. gas reserves in only six years.³² Large new basins are being discovered all of the time. Thus, for instance, on September 21, 2011, a small gas producer announced the discovery of a new basin in the UK that has the potential to satisfy all of the UK's gas demand for 64 years.³³ Horizontal drilling and hydraulic fracturing in basins outside the US can at least triple global gas supplies.³⁴ That, in turn,

³⁰ Whitehouse, gov, Remarks of the President on American-Made Energy (Jan. 26, 2012).

³¹ Energy Information Administration, International Energy Outlook 2011 (Sep. 9, 2011).

³² Energy Information Administration, World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States (Apr. 2011). See also International Energy Agency, Are We Entering a Golden Age of Gas? (2011).

³³ Guy Chazan, UK Gets Big Shale Find, Wall Street Journal (Sep. 22, 2011).

³⁴ Kenneth Medlock, Impact of Shale Gas Development on Global Gas Markets, Natural Gas & Electricity 22 (2011).

will reduce dramatically the price of gas in Asia and Europe, thereby improving the performance of the global economy through the same basic mechanisms that are already beginning to have major beneficial effects on the performance of the US economy.

Fracking Will Improve the Global Environment

As fracking increases the global supply of gas and reduces the price of gas in Europe and Asia, it will have the same kinds of dramatic beneficial effects on the global environment that it is already beginning to have on the US environment.³⁵ The International Energy Agency (IEA) predicts that gas will displace coal as the dominant source of energy in the world by 2030.³⁶ China is poised to be a particularly large beneficiary of the gas boom. EIA has identified several promising basins in China.³⁷ IEA predicts that China will consume more gas than the entire EU by 2030.³⁸ Since China is the largest source of greenhouse gas emissions and by far the largest source of increases in greenhouse gas emissions,³⁹ China's ability to replace coal with inexpensive gas as its primary electricity generating fuel has the potential to move the world a long distance toward the goal of effectively mitigating climate change. It will simultaneously yield major improvements in other aspects of air quality in Europe and Asia, since combustion of gas produces virtually none of the other pollutants that befoul the air and cause a high incidence of premature deaths and illnesses in many parts of the world.⁴⁰

Fracking Will Improve Geopolitical Conditions

³⁵ Id.. See also Susan Sakmar, *The Global Shale Gas Initiative: Will the United States Be the Model for Shale Gas Development Around the World?* 33 *Houston J. Int. L.* 369 (2011).

³⁶ IEA, note 32, *supra*.

³⁷ EIA, note 32, *supra*.

³⁸ IEA, note 32, *supra*.

³⁹ EIA *International Energy Statistics* (2011).

⁴⁰ Greenstone & Looney, *supra*. note 29.

The gas boom will also have significant beneficial effects on geopolitical conditions by, for instance, eliminating US dependence on oil and gas from insecure foreign sources like the middle east, reducing Russia's leverage over Europe attributable to Gazprom's dominance of the European gas market, reducing Iran's leverage over India attributable to India's heavy reliance on energy supplies from Iran, and eliminating completely the risk that Russian President Vladimir Putin will be successful in his efforts to create a natural gas version of the OPEC cartel.⁴¹

The Gas Boom Will Yield Benefits for at Least a Century

The remarkable increase in the U.S. natural gas supply that has occurred over the last five years and that has the potential to yield major global benefits for the next century has been attributable to new applications of old technologies. In the meantime, Japan, Korea, and the US have invested heavily in an effort to develop a new technology that would have beneficial effects on the U.S. and global gas markets for many more centuries. The three countries are in the process of devising means of extracting natural gas (methane) from methane hydrates. Methane hydrates are found in marine sediments around the world. As described by the United States Geological Survey: "The worldwide amounts of carbon bound in gas hydrates is conservatively estimated to total twice the amount of carbon to be found in all known fossil fuels on earth."⁴²

A US/Japan joint venture began successful production of methane hydrates from a test well in May 2012.⁴³ Energy Secretary Chu has expressed the view that gas

⁴¹ Coming Soon to a Terminal Near You: Shale Gas Will Make the World a Cleaner and Safer Place, *The Economist* 51 (Aug. 6, 2011); Kenneth Medlock, *Impact of Shale Development on Global Gas Markets, Natural Gas & Electricity* 22 (2011).

⁴² USGS Marine and Coastal Geology Program, *Gas (Methane) Hydrates—A New Frontier* (Aug. 3, 2011).

⁴³ Department of Energy, U.S. and Japan Complete Successful Field Trial of Methane Hydrate Production Technologies (May 2012).

production from methane hydrates is about where gas production from fracking was ten years ago. Japan expects to begin commercial-scale gas production from methane hydrates by 2018. Korea has embarked on a similar program.⁴⁴ If Japan, Korea, and the US are successful, gas production from methane hydrates will begin on a commercial scale long before we exhaust the dramatically expanded gas reserves that have become available as a result of horizontal drilling and hydraulic fracturing of shale formations. Gas from methane hydrates is capable of meeting both US and global demand for energy for many centuries.

Conclusion

I am well aware that there are important conditions that must be satisfied to realize my rosy scenario. The availability of the initial century of abundant, cheap, and environmentally benign natural gas is dependent on the ability and willingness of regulators and gas producers to take the steps needed to satisfy citizens and governments that horizontal drilling and hydraulic fracturing of shale formations can be accomplished with tolerably low environmental costs. With the help of excellent reports from the US Department of Energy and the International Energy Agency,⁴⁵ I am confident that we can satisfy those conditions. The additional centuries of the gas boom depend on the success of the Japanese, Korean, and US efforts to devise means of producing gas from methane hydrates at reasonable economic and environmental costs. Since those efforts require use of new technologies, it is impossible to be confident that they will be

⁴⁴ Sung-Rock Lee, 2nd Ulleung Basin Gas Hydrate Expedition: Findings and Implications, Department of Energy, Methane Hydrate R&D Program Newsletter, vol. 11 (2011).

⁴⁵ See International Energy Agency, Golden Rules for the Golden Age of Gas (May 2012); Department of Energy, Secretary of Energy Advisory Board, Shale Gas Subcommittee 90-Day Report (Aug. 28, 2011).

successful. The initial success of the Japan/US joint venture provides reason for optimism, however.