

Natural Gas Fracking Addresses All of Our Major Problems

By Richard J. Pierce, Jr.*

It is challenging to find any reason for optimism today. The U.S. economy continues to perform poorly as we struggle to try to dig out of the worst economic downturn in eighty years.¹ Global economic conditions are far worse.² 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 United States into the economic doldrums, even if U.S. political leaders make all of the right domestic policy decisions.³

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 U.S. 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"⁸ 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.⁹ U.S. efforts to persuade Iran to abandon its plan to become a nuclear power have not succeeded to date.¹⁰ Iran continues to use its oil and gas reserves to discourage India from cooperating with the U.S.-led trade sanctions¹¹ and Russia uses its United Nations ("UN") veto power to obstruct U.S. efforts to implement an effective international sanction regime.¹² Russia also refuses to cooperate with U.S. and UN efforts to find a peaceful solution to the Syrian civil war that threatens to spread throughout the region.¹³

One ray of hope has emerged from this sea of despair. New uses of two old technologies—horizontal drilling¹⁴ and hydraulic fracturing¹⁵ ("fracking")—have enabled the United States to more than double its natural gas reserves from 2004 to 2010.¹⁶ Use of horizontal drilling and hydraulic fracturing to produce natural gas from shale formations has provoked debate among politicians all over the world.¹⁷ It has also raised scores of challenging legal issues that are

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1. CONG. BUDGET OFFICE, THE BUDGET AND ECONOMIC OUTLOOK: FISCAL YEARS 2012 TO 2022 (2012).
2. See generally 4 WORLD BANK, GLOBAL ECONOMIC PROSPECTS: UNCERTAINTIES AND VULNERABILITIES (2012) (describing the reasons for concern about the future performance of the global economy).
3. *Id.* at 1, 3, 8.
4. INT'L PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 19–21 (Rajendra K. Pachauri et al. eds., 2007).
5. Bryan Walsh, *Why Climate Change Has Become the Missing Issue in the Presidential Campaign*, TIME (Oct. 23, 2012), <http://science.time.com/2012/10/23/why-climate-change-has-become-the-missing-issue-in-the-presidential-campaign/>.
6. See, e.g., James Heiser, *Germany Cuts Subsidies to Floundering Solar Industry*, THE NEW AM. (Mar. 22, 2012, 10:38 AM), <http://www.thenewamerican.com/tech/environment/item/7049-germany-cuts-subsidies-to-floundering-solar-industry> (Germany cuts subsidies to solar power because of the financial crisis in Europe).
7. EUROPEAN COMM'N, LONG-TERM TREND IN GLOBAL CO₂ EMISSIONS: 2011 REPORT 6 (Jos G.J. Olivier et al. eds., 2011).
8. Arab spring refers to the many movements to replace autocratic regimes with democratic regimes across the Middle East that began in Tunisia in 2010. Ved P. Nanda, *The Arab Spring, the Responsibility to Protect, and U.S. Foreign Policy—Some Preliminary Thoughts*, 41 DENV. J. INT'L L. & POL'Y 7 (2012).

9. *Middle East Turmoil*, Timeline, WALL ST. J. (Aug. 21, 2011, 7:09 PM), <http://online.wsj.com/article/SB10001424052748703842004576162884012981142.html#>.
10. *Iran's Nuclear Program*, N.Y. TIMES (Nov. 16, 2012), http://topics.nytimes.com/top/news/international/countriesandterritories/iran/nuclear_program/index.html.
11. Christopher Helman, *India's Growing Ties to Iranian Oil Could Bust U.S. Sanctions*, FORBES (Mar. 15, 2012, 1:09 PM), <http://www.forbes.com/sites/christopherhelman/2012/03/15/obama-plans-to-tap-spr-but-indias-growing-ties-to-iranian-oil-could-bust-u-s-sanctions/>.
12. Ilya Arkhapov & Henry Meyer, *Russia Says Iranian Nuclear Deadlock Risks Military Strike*, BLOOMBERG (Sept. 28, 2012, 11:07 AM), <http://www.bloomberg.com/news/2012-09-28/russia-says-iranian-nuclear-deadlock-risks-military-strike-1-.html>.
13. Rick Gladstone, *Friction at the U.N. as Russia and China Veto Another Resolution on Syria Sanctions*, N.Y. TIMES, July 19, 2012, at A8.
14. Horizontal drilling consists of drilling horizontally from the initial completion location of an oil and gas well. U.S. ENERGY INFO. ADMIN., U.S. DEPT OF ENERGY, DRILLING SIDWAYS—A REVIEW OF HORIZONTAL WELL TECHNOLOGY AND ITS DOMESTIC APPLICATION 1 (1993), available at <ftp://tonto.eia.doe.gov/petroleum/tr0565.pdf>.
15. Hydraulic fracturing refers to the use of water under pressure to force oil or gas out of shale or tight sands. See OFFICE OF FOSSIL ENERGY, U.S. DEPT OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER ES-4 (2009) [hereinafter MODERN SHALE GAS DEVELOPMENT], available at http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf.
16. *Potential Supply of Natural Gas in the United States: Advance Summary*, POTENTIALGAS.ORG, <http://potentialgas.org/publications> (last visited Mar. 14, 2013).
17. *Is Fracking a Good Idea?*, U.S. NEWS, <http://www.usnews.com/debate-club/is-fracking-a-good-idea> (last visited Feb. 21, 2013).

being litigated in numerous agencies and courts.¹⁸ 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.¹⁹ Others view fracking as a potential source of economic, environmental, and geopolitical gains so large that it should be encouraged.²⁰

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. Fracking has reduced U.S. dependence on insecure foreign sources of energy, reduced U.S. greenhouse gas emissions, and improved the performance of the U.S. economy. Over the next decade or so, it will have similar effects on the global environment and the global economy.

In the six years since U.S. 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.²¹ 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.²² 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.²³

I. Fracking Will Improve the Performance of the U.S. Economy

Fracking has increased U.S. natural gas reserves by seventy-five percent over the period of 2004 to 2011,²⁴ and the U.S. Energy Information Administration ("EIA") expects this trend to continue.²⁵ It now predicts the United States will have enough gas to satisfy domestic demand for a century and that the United States will soon have a surplus

sufficient to begin exporting gas to Asia.²⁶ Fracking has already allowed us to replace ten percent 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.²⁷ The International Energy Agency ("IEA") predicts that the United States will become the world's largest natural gas producer by 2017.²⁸ As a result of fracking, natural gas costs less than one-third of the price of oil in the United States.²⁹ Pennsylvania has already added large numbers of new jobs and has seen major increases in prosperity as a result of fracking,³⁰ and Ohio has the potential to add many thousands of fracking-related jobs in the near future.³¹ New York is poised to participate in the economic boom created by fracking once it lifts its temporary embargo on fracking.³² In his State of the Union address, President Obama predicted that fracking will produce 600,000 new jobs nationwide by the end of the decade.³³

The fracking boom will improve U.S. economic conditions dramatically over the next decade. It will increase manufacturing activity by significantly reducing the cost of energy, and it will encourage major investments in chemical production facilities that use natural gas as a feedstock.³⁴ It will also reduce transportation costs as heavy trucks, construction equipment, and trains are converted from expensive petroleum products to cheaper natural gas.³⁵ 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.³⁶

18. See, e.g., *Berish v. Sw. Energy Prod. Co.*, 763 F. Supp. 2d 702, 705–06 (M.D. Penn. 2011) (permitting discovery for subjecting fracking to strict liability).

19. Mary Esch, *New York Fracking Moratorium Unlikely to Be Lifted as Regulators Reopen Rule-making Process*, HUFFINGTONPOST (Oct. 10, 2012, 10:12AM), http://www.huffingtonpost.com/2012/10/01/new-york-fracking-moratorium_n_1928884.html; David Castelvecchi, *France Becomes First Country to Ban Extraction of Natural Gas by Fracking*, SCIENTIFIC AM. (June 30, 2011), <http://blogs.scientificamerican.com/observations/2011/06/30/france-becomes-first-country-to-ban-extraction-of-natural-gas-by-fracking/>.

20. *Is Fracking a Good Idea?*, *supra* note 17.

21. Barack Obama, President of the United States, *Remarks by the President in State of the Union Address*, THE WHITE HOUSE (Jan. 24, 2012, 9:10 PM), transcript available at <http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address>.

22. See *id.*

23. See *id.*

24. *Potential Supply of Natural Gas in the United States: Advance Summary*, *supra* note 16.

25. U.S. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, DOE/EIA-0383, ANNUAL ENERGY OUTLOOK 37 (2011).

26. Jane Nakano, *Next Steps for U.S. Natural Gas Exports*, CTR. FOR STRATEGIC & INT'L STUDIES (Dec. 17, 2012), <http://csis.org/publication/next-steps-us-natural-gas-exports>.

27. U.S. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, DOE/EIA-0226, ELECTRIC POWER MONTHLY: OCTOBER 2011, at 167 (2011).

28. INT'L ENERGY AGENCY, GAS MEDIUM-TERM MARKET REPORT 2012: MARKET TRENDS AND PROJECTIONS TO 2017, at 14 (2012).

29. U.S. ENERGY INFO. ADMIN., ELECTRIC POWER MONTHLY, *supra* note 27, at 79–80.

30. GOVERNOR'S MARCELLUS SHALE ADVISORY COMM'N, REPORT 7 (2011), available at http://files.dep.state.pa.us/publicparticipation/marcellusshaleadvisory-commission/marcellusshaleadvisoryportalfiles/msac_final_report.pdf.

31. JACK KLEINHEINZ ET AL., OHIO'S NATURAL GAS AND CRUDE OIL EXPLORATION AND PRODUCTION INDUSTRY AND THE EMERGING UTICA GAS FORMATION: ECONOMIC IMPACT STUDY 3 (2011).

32. Timothy Considine et al., *The Economic Opportunities of Shale Energy Development*, 9 ENERGY POL'Y. & ENVTL. REP. 1, 18–24 (2011), available at http://www.manhattan-institute.org/html/eper_09.htm.

33. *Remarks by the President in State of the Union Address*, *supra* note 21.

34. Ben Casselman & Russell Gold, *Cheap Natural Gas Gives New Hope to the Rust Belt*, WALL ST. J., Oct. 24, 2012, at A1.

35. Floyd Norris, *Natural Gas for Vehicles Could Use U.S. Support*, N.Y. TIMES, June 21, 2012, at B1.

36. SEC'Y OF ENERGY ADVISORY BD., U.S. DEP'T OF ENERGY, SHALE GAS PRODUCTION SUBCOMMITTEE NINETY-DAY REPORT 5 (2011), available at http://www.shalegas.energy.gov/resources/081811_90_day_report_final.pdf.

II. Fracking Will Improve the U.S. Environment

Complete replacement of coal with natural gas in the United States will reduce total emissions of greenhouse gases attributable to electric generation by forty-five percent.³⁷ That is well short of the eighty percent reduction in industrialized nations' emissions that climate scientists believe is needed to mitigate climate change,³⁸ 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 tax,³⁹ implementation of the UN's black carbon abatement initiative,⁴⁰ and real-time pricing of electricity⁴¹—we will have a reasonable chance of meeting our climate change mitigation 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 hundreds of thousands of illnesses in the United States each year that are caused by inhalation of pollutants emitted by coal-fired generating plants.⁴² Moreover, we can 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. Substituting natural gas for gasoline either directly or indirectly in the form of electricity generated through use of natural gas simultaneously reduces the cost of transportation and reduces emissions of pollutants. President Obama has indicated his support for both of those initiatives.⁴³

III. Fracking Will Improve the Global Economy

Natural gas is far more expensive in Europe and Asia than it is in North America.⁴⁴ The increase in the natural gas supply attributable to fracking in the United States has already changed the conditions in the global natural gas market in

37. Mark Herlong, *Considerations for an 80% Reduction in Carbon Dioxide Emissions*, THE MARSHALL INSTIT. POL'Y OUTLOOK (The George C. Marshall Instit., Washington, D.C.), Jan. 1, 2008, at 2–3, available at <http://www.marshall.org/pdf/materials/572.pdf>.

38. SUSAN JOY HASSOL, PRESIDENTIAL CLIMATE ACTION PROJECT, QUESTIONS AND ANSWERS: EMISSIONS REDUCTIONS NEEDED TO STABILIZE CLIMATE 4 (2011), available at <http://climatecommunication.org/wp-content/uploads/2011/08/presidentialaction.pdf>.

39. See Richard Pierce, *The Past, Present, and Future of Energy Regulation*, 31 UTAH ENVTL. L. REV. 291, 302 (2011).

40. UNITED NATIONS ENV'T PROGRAMME & WORLD METEOROLOGICAL ORG., INTEGRATED ASSESSMENT OF BLACK CARBON AND TROPOSPHERIC OZONE 247 (2011).

41. Severin Borenstein, *The Long-Run Efficiency of Real-Time Electricity Pricing* 1 (Ctr. for the Study of Energy Markets, Working Paper No. 133, 2005).

42. MICHAEL GREENSTONE & ADAM LOONEY, THE HAMILTON PROJECT, A STRATEGY FOR AMERICA'S ENERGY FUTURE: ILLUMINATING ENERGY'S FULL COSTS 6 (2011).

43. Barack Obama, President of the United States, *Remarks of the President on American-Made Energy* (Jan. 26, 2012, 10:11 PM), transcript available at <http://www.whitehouse.gov/the-press-office/2012/01/26/remarks-president-american-made-energy>.

44. See U.S. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, DOE/EIA-0484, INTERNATIONAL ENERGY OUTLOOK 2011, at 36 (2011) [hereinafter INTERNATIONAL ENERGY OUTLOOK 2011].

ways that have put downward pressure on natural gas prices in Europe and Asia.⁴⁵ The effects of fracking in the United States will increase as the United States and Canada begin to export natural gas.⁴⁶ Natural gas from the United States and Canada will put downward pressure on the price of natural gas from other countries. Fracking in other countries has far more potential to reduce the price of natural gas in Europe and Asia, as fracking increases the domestic supply of natural gas in many countries.⁴⁷

The natural gas boom and its beneficial economic effects will be felt far beyond U.S. borders. The EIA has identified forty-eight shale gas formations in thirty-two 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.⁴⁸ 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 United Kingdom that has the potential to satisfy all of its gas demand for sixty-four years.⁴⁹ Horizontal drilling and hydraulic fracturing in basins outside the United States can at least triple global gas supplies.⁵⁰ That, in turn, will reduce dramatically the price of gas in Asia and Europe,⁵¹ 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 U.S. economy.

IV. Fracking Will Improve the Global Environment

As fracking increases the global supply of natural gas and reduces the price of natural 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 U.S. environment.⁵² The IEA predicts that natural gas will displace coal as the dominant source of electricity in the world by 2035.⁵³ China is poised to be a particularly large beneficiary of the natural gas boom. EIA has identified several promising basins in China.⁵⁴ IEA predicts that China will consume more natural gas by 2035 than the entire European Union does currently.⁵⁵ Because China is the largest source of greenhouse gas emissions and by far

45. *Id.*

46. See INT'L ENERGY AGENCY, GOLDEN RULES FOR THE GOLDEN AGE OF NATURAL GAS: WORLD ENERGY OUTLOOK SPECIAL REPORT ON UNCONVENTIONAL GAS 11 (2012).

47. See *id.* at 11.

48. U.S. ENERGY INFO. ADMIN., WORLD SHALE GAS RESOURCES: AN INITIAL ASSESSMENT OF 14 REGIONS OUTSIDE THE UNITED STATES 2 (2011) [hereinafter WORLD SHALE GAS RESOURCES]; see also INT'L ENERGY AGENCY, ARE WE ENTERING A GOLDEN AGE OF GAS? 52 (2011).

49. Guy Chazan, *U.K. Gets Big Shale Find*, WALL ST. J., Sept. 22, 2011, at B3.

50. Kenneth B. Medlock III, *Impact of Shale Gas Development on Global Gas Markets*, NAT. GAS & ELECTRICITY 25 (James A. Baker III Instit. for Pub. Pol'y 2011).

51. *Id.* at 28.

52. *Id.* at 22, 26, 28. See also Susan 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, 371, 380–95 (2011).

53. WORLD SHALE GAS RESOURCES, *supra* note 48, at 10, 79.

54. *Id.* at 115–16.

55. *Id.* at 77–78.

the largest source of increases in greenhouse gas emissions,⁵⁶ China's ability to replace coal with inexpensive natural 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 because 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.⁵⁷

V. Fracking Will Improve Geopolitical Conditions

The gas boom will also have significant beneficial effects on geopolitical conditions by eliminating U.S. dependence on oil and gas from insecure foreign sources like the Middle East. As President Obama has acknowledged, fracking has already reduced U.S. reliance on imported oil to its lowest level in sixteen years and will make the United States completely energy independent within the next fifteen years. Fracking also reduces Russia's leverage over Europe attributable to Gazprom's dominance of the European gas market, reduces Iran's leverage over India attributable to India's heavy reliance on energy supplies from Iran, and eliminates completely the risk that Russian President Vladimir Putin will be successful in his efforts to create a natural gas version of the OPEC cartel.⁵⁸

VI. 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 United States 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.⁵⁹ The three countries are in the process of devising means to extract methane gas from methane hydrates.⁶⁰ Methane hydrates are found in marine sediments around the world.⁶¹ As described by the U.S. 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.”⁶²

A U.S./Japan joint venture began successful production of methane hydrates from a test well in May 2012.⁶³ Energy Secretary Steven Chu has expressed the view that gas production from methane hydrates is about where gas production from fracking was ten years ago.⁶⁴ Japan expects to begin commercial-scale gas production from methane hydrates by 2018.⁶⁵ Korea has embarked on a similar program.⁶⁶ If Japan, Korea, and the United States 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 U.S. and global demand for energy for many centuries.

VII. Conclusion

I am well aware that important conditions 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 U.S. Department of Energy and the IEA,⁶⁷ 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 U.S. efforts to devise means of producing gas from methane hydrates at reasonable economic and environmental costs. Because those efforts require use of new technologies, it is impossible to be confident that they will be successful. The initial success of the Japan/U.S. joint venture, however, provides reason for optimism.

56. INTERNATIONAL ENERGY OUTLOOK 2011, *supra* note 44, at 140–41, 143; *International Energy Statistics*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8> (last visited Feb. 21, 2013).

57. GREENSTONE & LOONEY, *supra* note 42 at 6.

58. *See Coming Soon to a Terminal Near You: Shale Gas Will Make the World a Cleaner and Safer Place*, THE ECONOMIST, Aug. 6, 2011, at 54–56; Medlock III, *supra* note 50, at 23–26.

59. *See* Dan Joling, *Alaska's Methane Hydrate Resources Sparks Debate Over Energy and Climate Change*, HUFFINGTON POST (Nov. 11, 2012), http://www.huffingtonpost.com/2012/11/11/methane-hydrate-alaska-north-slope-climate-change_n_2113828.html.

60. *See id.*

61. *Gas (Methane) Hydrates—A New Frontier*, U.S. GEOLOGICAL SURVEY, <http://marine.usgs.gov/fact-sheets/gas-hydrates/title.html> (last updated Jan. 9, 2013, 7:37 PM).

62. *See id.*

63. *U.S. and Japan Complete Successful Field Trial of Methane Hydrate Production Technologies*, U.S. DEP'T OF ENERGY (May 2, 2012), <http://energy.gov/articles/us-and-japan-complete-successful-field-trial-methane-hydrate-production-technologies>.

64. *Id.*

65. Jeffrey Hays, *Alternative Energy in Japan: Biomass, Seabed Methane Hydrate and Garbage Incinerators*, FACTS & DETAILS, <http://factsanddetails.com/japan.php?itemid=8448&catid=23&subcatid=152> (last updated Oct. 2012).

66. Sung-Rock Lee, *2nd Ulleung Basin Gas Hydrate Expedition (UBGH2): Findings and Implications*, 11 FIRE IN THE ICE 6, 6 (2011).

67. *See generally* INT'L ENERGY AGENCY, GOLDEN RULES FOR THE GOLDEN AGE OF NATURAL GAS, *supra* note 46 (describing best practices for regulating fracking); SEC'Y OF ENERGY ADVISORY BD., *supra* note 36.