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The Future of Oil and Gas Law

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INTRODUCTION

In the first phase of this symposium fifteen years ago, I addressed a pure legal problem. I spoke about "Defining the Royalty Obligation."[1] In this session, I have a broader focus—the future of oil and gas jurisprudence.

My thesis is simple: Oil and gas jurisprudence has a bright future. We live in a hydrocarbons world, and our economic system is not going to change dramatically overnight; we will continue to live in a world powered and heated by hydrocarbons for at least the next twenty years. In fact, world demand for oil and gas is likely to increase substantially. Consequently, there will be a place for oil and gas law and oil and gas lawyers—who are among the people that make it possible for us to produce hydrocarbons—for at least that time.

Let me illustrate with some data and some projections.[2] From the turn of the twenty-first century until mid-2008, the world watched as oil prices first inched upwards and then surged. The high energy costs that energized us until a year and a half ago (and that appear poised to return when the world economy rebounds) were a result of the convergence of several factors. Some were short to mid-term, such as limited worldwide excess oil production capacity. In 2007, there was only two million barrels excess production capacity, most of it in Saudi Arabia,[3]

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1. *See* John S. Lowe, George W. Hutchison Professor of Energy Law, SMU Dedman School of Law, Address at the Washburn University School of Law, Symposium: The Future of Oil & Gas Jurisprudence (Mar. 18-19, 1994); *see also* John S. Lowe, *Defining the Royalty Obligation*, 49 SMU L. REV. 223 (1996).

2. The U.S. Energy Information Administration (EIA) is the source of most of the data in this paper. Though a part of the U.S. Department of Energy, the EIA has a good reputation for both even-handedness and competence. *See* http://www.eia.doe.gov/. Other excellent sources include the International Energy Administration, the Organization of Petroleum Exporting Countries, and many international oil companies such as British Petroleum's Annual Statistical Review, *available at* http://www.bp.com/productlanding.do?categoryId=6929&contentId=7044622, ExxonMobil's Energy Outlook, *available at* http://www.exxonmobil.com/Corporate/energy.aspx, and Shell's data on the New Energy Future, *available at* http://www.shell.com/home/content/responsible_energy/nef/. But all data collection is subject to human and systemic failure, and projections change from time to time. In fact, since this presentation, the EIA has issued new projections that are different in detail, though consistent with, the projections upon which this analysis is based. *See* http://www.eia.doe.gov/oiaf/aeo/index.html.

3. *See* Tamsin Carlisle, *Saudi Aramco Gears Up for Record Oil Production*, THE NATIONAL, July 28, 2009, *available at* http://www.thenational.ae/apps/pbcs.dll/article?AID=/20090728/

in a production system that supplied a daily world oil demand of about eighty six million barrels.[4] Lack of excess capacity meant that interruptions in supply, whether caused by natural disasters such as hurricane Katrina or man-made such as the war in Iraq, would cause prices to soar.[5] Political uncertainty was also a factor. The potential for interruptions in supply from political upheaval in Iran, Nigeria, Venezuela, or Eastern Europe encouraged hoarding and speculation, which further fueled price increases.[6] Finally, constrained refinery capacity in the United States and Europe created economic bottlenecks that periodically drove gasoline prices artificially high. This country has built no new refineries for more than thirty years, and most of its refining capacity is along the hurricane-vulnerable Gulf Coast.[7] Europe has built no new refineries for twenty years.[8]

But, there has been a fourth and long-term problem—surging demand for energy of all sorts, but particularly for oil. From 2000 to 2007, world oil demand increased by 9.4 million barrels per day.[9] Consider some statistics and some projections.[10] Following is a depiction of energy-consumption history and projections over the next twenty years.[11]

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4. *See* U.S. ENERGY INFORMATION ADMINISTRATION, RECENT MONTHLY AND ANNUAL OECD COUNTRIES AND WORLD PETROLEUM (OIL) DEMAND, 1997-PRESENT (2010), *available at* http://www.eia.doe.gov/ipm/demand.html.

5. As of September 2009, a prominent Saudi claimed that Saudi Arabia held 4.5 million barrels of oil per day in spare capacity—90% of world excess production capacity. Prince Turki al-Faisal, *Don't Be Crude*, FOREIGN POLICY, Sept./Oct. 2009, 102, at 103. Five million barrels of excess capacity will greatly diminish the risk of price spikes, but it may "burn off" quickly if the world recession is short.

6. Political uncertainty in the United States may also contribute to price increases for energy by encouraging speculation. The 2008 U.S. presidential campaign, with its debates over what U.S. energy policy should be—emission regulations, drilling in the Arctic, the Eastern Outer Continental Shelf, Yellowstone, as well as other issues—also encouraged speculation among investors.

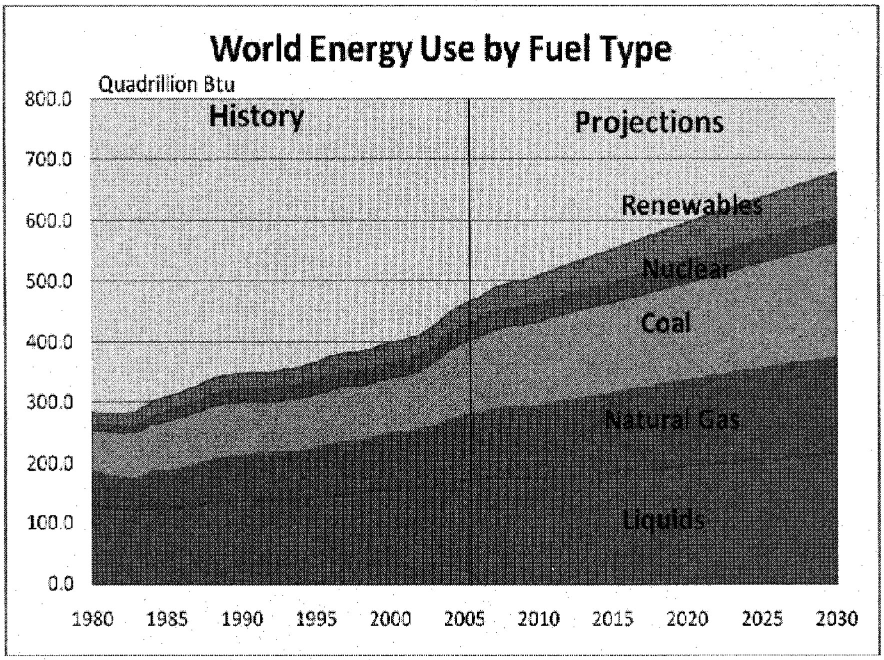
7. Peak Oil News, Oil Refinery Capacity Bottleneck, http://www.peak-oil-news.info/oil-refinery-capacity-bottleneck/ (last visited Feb. 22, 2010).

8. *Id.* As of June 2008, U.S. refining capacity was 17,610,000 barrels a day. U.S. Energy Information Administration, U. S. Operable Crude Oil Distillation Capacity, http://tonto.eia.doe.gov/dnav/pet/hist/mocleus2m.htm (last visited Feb. 22, 2010). The U.S. consumption was 19,500,000 barrels a day. U.S. Central Intelligence Agency, Country Comparison: Oil-consumption, https://www.cia.gov/library/publications/theworldfactbook/rankorder/2174rank.html?countryName=United States&countryCode=us&regionCode=na&rank=1#us (last visited Feb. 22, 2010).

9. Daniel Yergin, *It's Still the One*, FOREIGN POLICY, Sept./Oct. 2009, 89, at 92.

10. *See* U.S. ENERGY INFORMATION ADMINISTRATION, INTERNATIONAL ENERGY OUTLOOK 2009 (2009), *available at* http://www.eia.doe.gov/oiaf/ieo/pdf/0484(2009).pdf.

11. *See id.* at 1 (slight alterations to graph).



Worldwide energy consumption in 2006 was approximately 472 quadrillion British Thermal Units (Btus) a year, up from 398 quadrillion Btus in 2000.[12] The U.S. Energy Information Administration (EIA) predicts that energy demand will increase worldwide by about 44%, to about 678 quadrillion Btus a year, by 2030.[13] The increase in demand for energy and the EIA's projections are based on population growth and economic growth, especially in Asia—led by China and India.[14] While energy demand will inch up in the developed nations of the world, it will bound upwards in the developing nations.

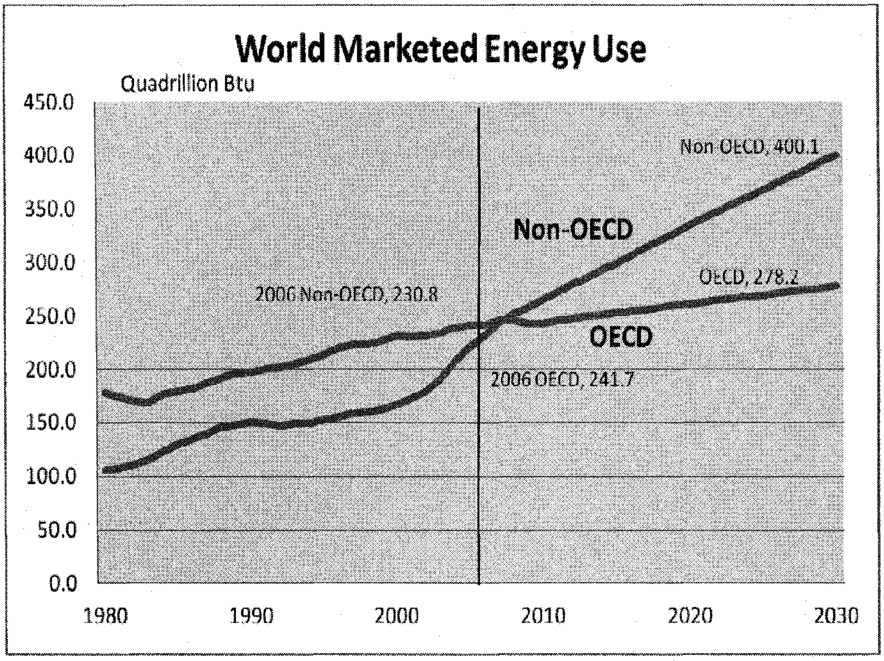
The expected growth in energy demand will not be spread uniformly around the world, as the following graph illustrates.[15]

12. *Id.* at 7. "Btu" refers to British Thermal Unit and is a unit of energy equal to the amount of heat required to raise one pound of water one degree Fahrenheit at one atmosphere pressure, equivalent to 251.997 calories. *See* WEBSTER'S NEW UNIVERSAL UNABRIDGED DICTIONARY 263 (1996). A quadrillion Btus is approximately equal to the amount of energy in forty-five million tons of coal, or one trillion cubic feet of natural gas, or 170 million barrels of crude oil. Maxwell, How Large is a Quadrillion BTU?, http://wilcoxen.maxwell.insightworks.com/pages/137.html (last visited Feb. 22, 2010). Other sources are more optimistic. ExxonMobil's "Outlook for Energy," estimates that world demand will increase just 35%. EXXONMOBIL, THE OUTLOOK FOR ENERGY: VIEW TO 2030, at 3 (2008), *available at* http://www.exxonmobil.com/corporate/files/news_pub_2008_energyoutlook.pdf.

13. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 10, at 1.

14. *See id.* at 5.

15. *Id.* at 8 (slight alterations to graph).



Energy consumption in the Organisation for Economic Co-operation and Development (OECD) nations—the major industrialized nations of the world[16]—has increased at a relatively modest rate over the last twenty-five years and will likely increase less than 20% by 2030, largely as a result of population growth.[17] Energy consumption in non-OECD nations, however, will probably increase by nearly 70% during the same period, both as a result of population growth and expanding economies.[18] For example, China's economy is expected to grow 7.8% this year, notwithstanding a global recession that will likely cause the global economy to shrink by 2.5%.[19] India's economy grew 6.1% from April to June 2009, compared to the same quarter in 2008.[20]

Even by 2030, however, more than two-thirds of world energy will come from hydrocarbons—oil, gas, and coal.[21] That will represent a sig-

16. The Organisation for Economic Cooperation and Development is a group of thirty industrialized nations that seek to develop coherent economic policies. *See* Organisation for Economic Co-operation and Development, About OECD, http://www.oecd.org (last visited Feb. 22, 2010). Its member nations have approximately 18% of the world's population. *See* Organisation for Economic Cooperation and Development, Members and Partners, http://www.oecd.org/pages/0,3417,en_36734052_36761800_1_1_1_1_1,00.html (last visited Feb. 22, 2010).

17. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 10, at 1.

18. *Id.*

19. *UN Group Says China GDP Will Jump 7.8%*, SHANGHAI DAILY, Sept. 8, 2009, *available at* http://www.shanghaidaily.com/sp/article/2009/200909/20090908/article_413138.htm.

20. Mukesh Jagjota & Neelabh Chaturvedi, *India's GDP Grew 6.1% in Latest Quarter,* WALL ST. J., Sept. 1, 2009, *avaialable at* http://online.wsj.com/article/SB125169693308971767.html.

21. See U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 4, at 122-23.

nificant move away from fossil fuels, which currently account for about 85% of energy consumed.[22] Nuclear power and renewable energy together will grow in importance, from a total of about 59.2 quadrillion Btus in 2003 to about 97.1 quadrillion Btus in 2030.[23] But, the bulk of world energy twenty years from now still will come from hydrocarbons: from oil, gas, and coal. The world economy runs on hydrocarbons and likely will continue to do so for many years. Despite the fact that we are (finally) moving to diminish our reliance on fossil fuels, the transition will not take place overnight. For the foreseeable future, we will live in a hydrocarbons world.

Now let us bring this a step closer to the United States. This is a big country in area, in population, and in energy demand! The United States, with about 4.5% of the world's population, consumes approximately 21.2% of total world energy consumption[24] and produces about 24% of world gross domestic product (GDP),[25] as well as about 20% of world carbon dioxide emissions.[26] The U.S. per-capita energy consumption is also disproportionately large. In 2006, per-capita consumption in the United States was an estimated 334.6 million Btus, compared to 79 million Btus in Argentina, 51.2 million in Brazil, 56.2 million in China, and just 1.9 million in Malawi.[27] Even many highly-industrialized nations consume far less energy per capita than the United States: Japan's per-capita consumption in 2006 was 178.7 million Btus, Switzerland's was 170.7 million Btus, and the United Kingdom's was 161.7 million Btus.[28]

And we get our energy from the same sources in about the same proportions as the rest of the world. The United States relies on hydro-

22. *See id.*

23. U.S. ENERGY INFORMATION ADMINISTRATION, INTERNATIONAL ENERGY OUTLOOK 2006, at 85 (2006), *available at* http://www.eia.doe.gov/oiaf/ieo/pdf/ieoreftab_2.pdf. Renewable energy will likely grow much faster than nuclear energy. *See id.*

24. U.S. Energy Information Administration, United States Energy Profile, http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=US (stating the U.S. consumes 99.856 quadrillion Btus compared to the world consumption of 472 quadrillion Btus) (last visited Feb. 22, 2010).

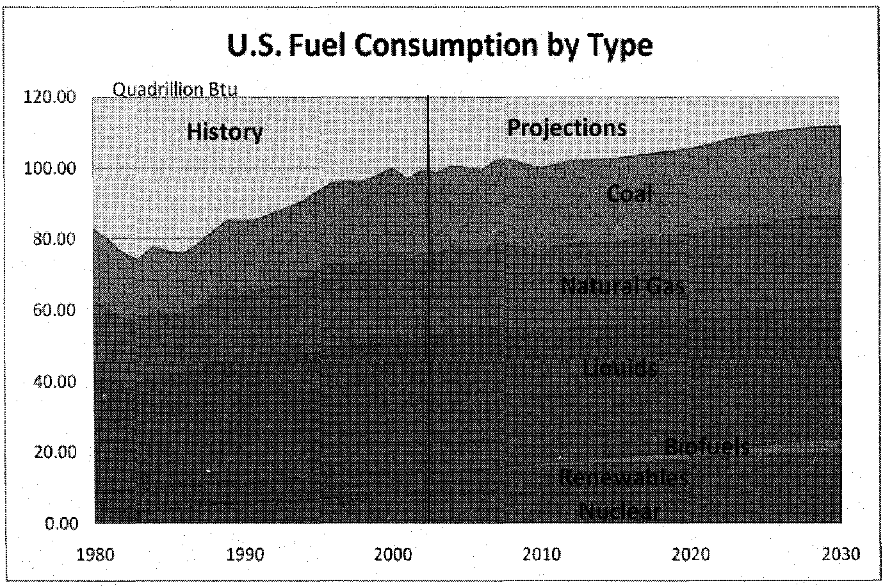
25. The United States accounts for 23% to 24% of the world's overall Gross Domestic Product. *See* WORLD BANK, WORLD DEVELOPMENT INDICATORS DATABASE: GROSS DOMESTIC PRODUCT 2008 (2009), http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf; U.S. Central Intelligence Agency, The World Factbook, https://www.cia.gov/library/publications/the-world-factbook/fields/2195.html (last visited Feb. 22, 2010).

26. U.S. ENERGY INFORMATION ADMINISTRATION, EMISSIONS OF GREENHOUSE GASES IN THE UNITED STATES 2008, at 8 (2009), *available at* ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057308.pdf.

27. U.S. ENERGY INFORMATION ADMINISTRATION, INTERNATIONAL ENERGY ANNUAL 2006 (2008), *available at* www.eia.doe.gov/pub/international/iealf/tableelc.xls. Per-capita consumption is largely a matter of economic activity and geography. So some nations use much more than the United States. In 2006, for example, Canada's per capita energy consumption was 427.2 million Btus, the United Arab Emirates was 577.6, and Qatar's was 1,023.3. *Id.*

28. *Id.*

carbons, as the following graph shows.[29] In 2008, approximately 37.1% of the energy consumed in the United States came from oil, 23.8% from natural gas, 22.5% from coal, and smaller percentages from renewable energy resources and nuclear power generation.[30]



But most importantly for purposes of this essay, the graph shows that hydrocarbons—coal, oil, and natural gas—will continue to meet the largest share of total primary energy consumption in the United States, although their share likely will decline from 85% in 2007 to 79% in 2030. The U.S. economy, like the world economy, is hydrocarbons-based and will continue to rely on hydrocarbons for the foreseeable future. These facts alone guarantee the relevance of the jurisprudence that governs exploration for, and the development and marketing of, our domestic resources.

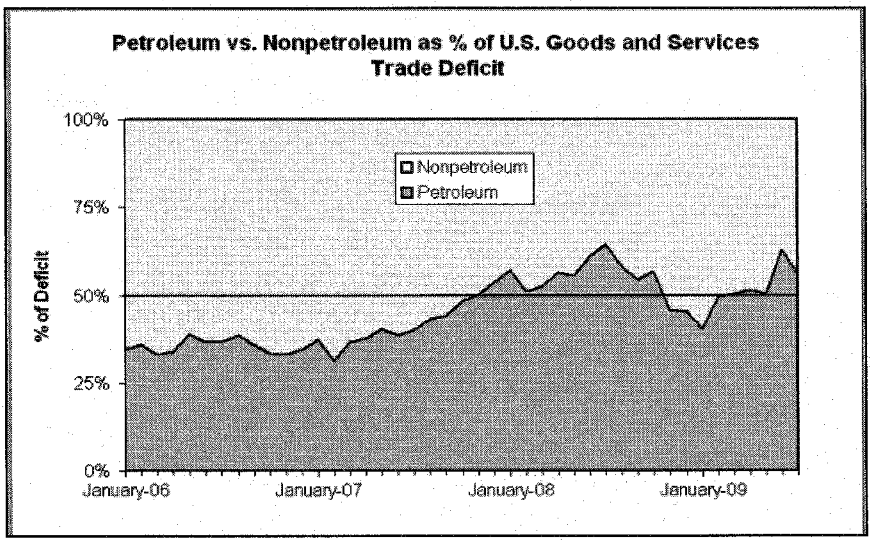
Moreover, the role of oil and gas lawyers likely will increase in importance because the United States cannot meet its own energy needs and will continue to have to trade to get a substantial part of the energy that it needs. Every oil and gas attorney knows that this country is a huge energy importer. At the present time, we use approximately twenty million barrels of crude oil per day, but we produce only about eight million barrels.[31] The remainder, more than twelve million barrels

29. *See* U.S. ENERGY INFORMATION ADMINISTRATION, ANNUAL ENERGY OUTLOOK 2009 at 62 (2009), *available at* http://www.eia.doe.gov/oiaf/archive/aeo09/pdf/0383(2009).pdf (slight alterations to graph).

30. *See id.*

31. U.S. Central Intelligence Agency, The World Factbook, https://www.cia.gov/library/publica

per day, we import. We also import about 16% of the natural gas we use, most of it from Canada, but 1-3% in the form of liquefied natural gas.[32] Only in coal are we self-sufficient.[33] The cost to this country is huge. If oil prices are $70 per barrel, twelve million barrels of oil adds nearly $850 million *per day* to our trade deficit. When oil prices peaked



in 2008, the cost to the United States for its oil imports was more than $1.5 billion per day, a total of $50 billion for the month of July 2008,[34] well more than 60% of the U.S. trade deficit as shown in the graph above. In June of 2009, petroleum imports reached 63.7% of the total U.S. trade deficit, even with substantially lower oil prices.[35]

Further, we pay a price in terms of energy security. The U.S. reliance on oil imports exposes us to the threat of disruptive price shocks. The problem is not just the high cost of oil imports, but that we depend upon oil imports that we cannot control. Nearly half of the U.S. oil imports in 2008 (46%) came from Organization of Petroleum Exporting Countries (OPEC) nations and nearly a fifth (18%) from Persian Gulf sources.[36] A significant interruption in supply caused by war, natural

tions/the-world-factbook/geos/us.html (last visited Feb. 22, 2010). The CIA Factbook estimates that the United States produced 8.514 million barrels of oil per day in 2008, while consuming 19.5 million barrels. *Id.*

32. U.S. Energy Information Administration, Energy in Brief—What Everyone Should Know About Energy, http://tonto.eia.doe.gov/energy_in_brief/liquefied_natural_gas_lng.cfm (last visited Feb. 22, 2010).

33. *See* U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 29, at 82-84.

34. *See* U.S. Census Bureau, Foreign Trade Statistics, http://www.census.gov/foreign-trade/statistics/graphs/PetroleumImports.html (last visited Feb. 22, 2010).

35. *Id.*

36. U.S. Energy Information Administration, Petroleum Imports by Country of Origin, 1960-2008, http://www.eia.doe.gov/emeu/aer/txt/ptb0504.html (last visited Feb. 22, 2010).

disaster, or mere political or economic disagreement could easily cause a sharp oil price spike, triggering a recession or spiraling inflation, or both, as happened twice in the 1970s.[37]

Because of technological advances, the energy-import picture will likely become marginally better over the next twenty years. Technology permits us to produce goods and live well with less energy use; this country uses energy twice as efficiently today as it did in the 1970s.[38] U.S. energy consumption in terms of Btus consumed per constant dollar of economic output has shrunk from 18,000 Btus to 8,900 Btus since 1970.[39] Technology also enables us to produce a higher percentage of our reserves than most of us had ever expected would be true.[40] Finally, technology makes it possible to develop unconventional oil and gas resources that we had only dreamed about using. Shale gas is an example. The United States had expected to become a large importer of natural gas by the end of the first decade of the twenty-first century, but shale-gas development now accounts for nearly 50% of U.S. gas supply and has caused U.S. estimated gas reserves to increase by 35% just from 2006 to 2008.[41]

The EIA projects that technology will permit the United States to turn around the steady decline in oil and gas production that we have suffered for more than thirty years. The agency projects that production of crude oil in the United States will increase a whopping 44% over 2007 levels by 2030.[42] In conjunction with conservation, which will curb somewhat the growth in consumption, increased domestic production of crude oil should narrow the gap between domestic oil production and consumption from 60% to about 40%. The following graph tells the story of the impact of advances in the technology of oil and gas explora-

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37. Estimates of the reduction in U.S. Gross National Product levels caused by the Arab Oil Embargo ranged from 3% to 5% per year. Estimates of the reduction in U.S. Gross National Product levels caused by the Iranian Crisis of 1979 ranged from 3% to 8% per year. Wilfrid L. Kohl, *Oil and U.S. National Security*, *in* AFTER THE OIL PRICE COLLAPSE 156-57 (1991).

38. Yergin, *supra* note 9, at 95.

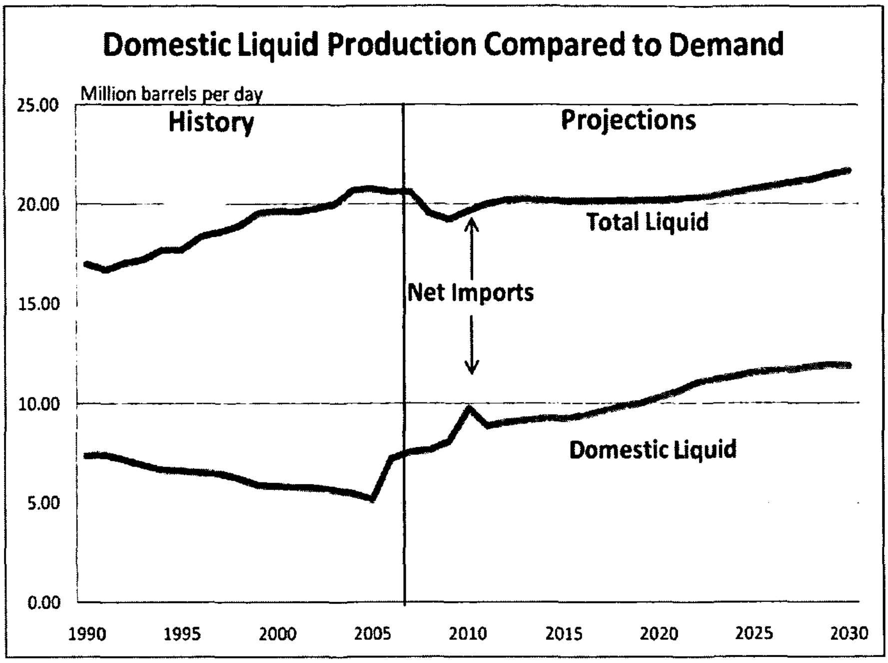
39. American Council for an Energy-Efficient Economy, *The "Invisible" U.S. Energy Efficiency Boom*, May 15, 2008, http://www.aceee.org/press/e083pr.htm.

40. The technological advances are welcome. As I have noted above, this country consumes nearly a quarter of the world's oil production while only having 2.4% of the world's oil reserves and relies heavily on imports to meet its demands. BP AMOCO, STATISTICAL REVIEW OF WORLD ENERGY 8, 13 (2008), *available at* http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2008/STAGING/local_assets/downloads/pdf/statistical_review_of_world_energy_full_review_2008.pdf.

41. U.S. DEP'T OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 7-11 (2009), *available at* http://www.netl.doe.gov/technologies/oil-gas/publications/EP reports/Shale_Gas_Primer_2009.pdf.

42. U.S. ENERGY INFORMATION ADMINISTRATION, AN UPDATED ANNUAL ENERGY OUTLOOK 2009 REFERENCE CASE REFLECTING PROVISIONS OF THE AMERICAN RECOVERY AND REINVESTMENT ACT AND RECENT CHANGES IN THE ECONOMIC OUTLOOK, Table A1, 16 (2009), *available at* http://www.eia.doe.gov/oiaf/servicerpt/stimulus/pdf/sroiaf(2009)03.pdf.

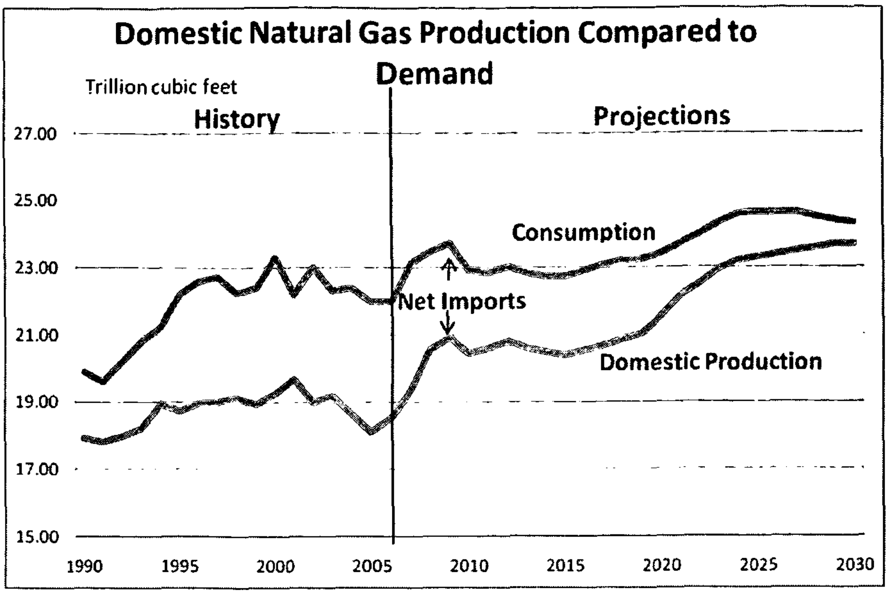
tion and production.[43]



The picture for natural gas is even more dramatic, as the following graph illustrates.[44]

43. *See* U.S. ENERGY INFORMATION ADMINISTRATION, ANNUAL ENERGY OULOOK 2010: REFERENCE CASE 9, *available at* http://www.eia.doe.gov/neic/speeches/newell121409.pdf (slight alterations to graph).

44. *See id.* at 15 (slight alterations to graph).



The technology that permits exploitation of unconventional gas resources like shale gas should permit us to narrow the import gap for natural gas from 16% of our usage to just 3% by 2030, according to the EIA.[45] In part, that reflects increased natural gas production, which the EIA projects will increase nearly 24% by 2030,[46] and, in part, smaller increases in demand for natural gas, which the EIA projects will stay basically flat from 2007 to 2030.[47]

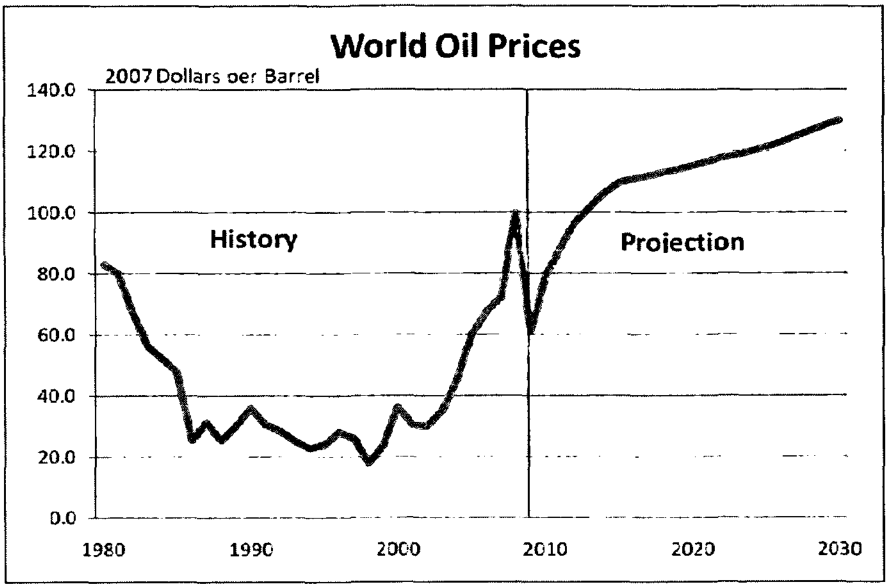
Still the cost of our energy imports, particularly for oil, will be huge because increased world demand will likely drive up the price. The EIA estimates that the price of imported oil will nearly double from 2007 to 2030—from $63.83 in 2007 to $124.36 in 2030 (in 2007 dollars)—as the following graph shows.[48]

45. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 42, at 16.

46. ID. (stating the increase in natural gas production is estimated to increase from 19.84 quadrillion Btus in 2007 to 23.67 quadrillion Btus in 2030).

47. *Id.* (stating the projected increase is from 21.86 quadrillion Btus in 2007 to just 22.02 in 2030).

48. *See* U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 10, at 2; *see also* U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 42, at 16. This is the EIA's "reference case," its most likely scenario. In "nominal" 2030 dollars, the "low price" estimate for 2030 was $73 per barrel. The high price estimate was $289 per barrel. The reference case was $189. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 10, at 23-24.



And high energy prices invariably mean that energy lawyers are in high demand and that energy issues are frequently presented to the courts.

In sum, what the data and the projections signify is that we live in a hydrocarbons world and we likely will continue to do so for the next twenty to forty years. Although the transition to more environmentally friendly sources of energy may have begun, oil and gas law is not yet a dying subject. There will continue to be a need for oil and gas and coal and for lawyers who understand the principles of property, contract, regulatory, and tax law that apply to private mineral rights and transactions that involve them.