

Subcommittee on Energy and Power of the House Energy and Commerce Committee

Testimony submitted for Hearings on “America’s Energy Security and Innovation”

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It is an honor to appear before the Subcommittee on Energy and Power of the House Energy and Commerce Committee, and I do want to express my appreciation for the opportunity to participate in this important hearing.

The United States is in the midst of the “unconventional revolution in oil and gas” that, it becomes increasingly apparent, goes beyond energy itself. Today, the industry supports 1.7m jobs – a considerable accomplishment given the relative newness of the technology. That number could rise to 3 million by 2020. In 2012, this revolution added \$62 billion to federal and state government revenues, a number that we project could rise to about \$113 billion by 2020.² It is helping to stimulate a manufacturing renaissance in the United States, improving the competitive position of the United States in the global economy, and beginning to affect global geopolitics. This revolution has also engendered two debates -- about the environmental impact of shale gas development and about the role of U.S. energy exports. All this sets the framework for the Subcommittee’s hearings.

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² IHS, *America’s New Energy Future: the Unconventional Oil and Gas Revolution and the United States Economy*, vol. 1 *National Economic Contributions* (October 2012) and vol. 2, *State Economic Contributions* (December 2012).

Owing to the scale and impact of shale gas and tight oil, it is appropriate to describe their development as the most important energy innovation so far of the 21st century. That is said with recognition of the major technological advances in wind and solar since 2000; but, as is described in *The Quest*, those advances are part of the “rebirth of renewables”. As actual innovations, solar and wind emerged in the 1970s and 1980s.³

The unconventional revolution has unfolded pretty fast. This Committee has held many important hearings on energy over the decades. Yet it is striking to think back to the hearings of even just half a decade ago, during the turmoil of 2008, when it was widely assumed that a permanent era of energy shortage was at hand.

How different things look today. Shale gas has risen from two percent of domestic production a decade ago to 37 percent of supply, and prices have dropped dramatically. U.S. oil output, instead of continuing its long decline, has increased dramatically – by about 38 percent since 2008.⁴ Just the increase since 2008 is equivalent to the entire output of Nigeria, the seventh-largest producing country in OPEC.

People talk about the potential geopolitical impact of the shale gas and tight oil. That impact is already here. It is sobering to consider that, without this increase in oil output based on the same technologies as shale gas, the sanctions on Iranian oil exports might well have failed.

Where did the unconventional revolution come from?

This development is a story of entrepreneurship and innovation. Although hydraulic fracturing dates back to the late 1940s, it took from the early 1980s to the end of the 1990s, in the face of much skepticism and disappointment, to establish that natural gas could be economically extracted from shale rock using

³ Daniel Yergin, *The Quest: Energy, Security, and the Making of the Modern World* (New York: Penguin Books, 2012), updated edition, chapters 27, 29-30.

⁴ Energy Information Administration

that technology. By 2003, it was successfully yoked with another technology, horizontal drilling, to provide proof of concept.⁵

Still, the dominant conviction for the next few years was that the United States was going to become increasingly short of natural gas and would become a large importer of liquefied natural gas (LNG). Only in 2008 was it observed that U.S. natural gas production was going up, instead of down. Many more companies entered into shale gas development, and the pace of effort intensified. Since then, output has grown rapidly, indeed well beyond the capacity of the current market to absorb it. It was not until the autumn of 2009 that the shale revolution became apparent to the policy community. And it was only around 2010 that producers began to shift from focusing on gas production to producing oil and liquids-rich natural gas using the same techniques.

What is the economic impact of the unconventional oil and gas revolution?

While various states had begun to home in on the economic development aspects of shale gas and tight oil, it was only in about 2011 that its significance for the national economy started to come into focus. So far, this unconventional revolution is supporting 1.7 million jobs – direct, indirect, and induced. It is notable that, owing to the long supply chains, the job impacts are being felt across the United States, including in states with no shale gas or tight oil activity. For instance, New York State, with a ban presently in effect on shale gas development, nevertheless has benefitted with 44,000 jobs. Illinois, debating how to go forward, already registers 39,000 jobs.⁶

The total revenues flowing to governments from unconventional amounted to \$62 billion last year. Companies are now committing or planning investments that in total appear to go into the hundreds of billions of dollars. A large number of chemical companies, for instance, have announced plans to build or expand facilities in North America – with capital expenditures totaling close to

⁵ Yergin, *The Quest*, chapter 16, “The Natural Gas Revolution”.

⁶ IHS, *America’s New Energy Future*, vol. 2, *State Economic Contributions*, p. 14

\$100 billion.⁷ Will all be built? Time will tell. But what is striking is that, half a decade ago, these companies would have scoffed if they had been told that they would be investing back into the United States. The investments are coming both from U.S. based companies, which are “on-shoring” in response to lower energy costs, and from foreign companies. Many other kinds of manufacturing firms are also investing and expanding based upon this growing business.

The unconventional revolution was one of the major topics at the World Economic Forum two weeks ago in Switzerland. European business leaders and some European policymakers are realizing that United States’ new energy situation greatly improves its competitive position vis a vis a Europe that desperately needs new jobs. When I was in China for the Chinese publication of *The Quest*, I repeatedly encountered discussions about how shale gas could change the global competitive playing field to the advantage of the United States.

How to assess the environmental aspects?

The most notable impact is in terms of CO₂ emissions. U.S. carbon dioxide emissions from energy consumption are down 13 percent since 2007.⁸ The economic downturn is part of the story. But the most significant part is the result of natural gas supplanting coal in electric generation at a rapid rate.

Hydraulic fracturing has been used since the late 1940s, as already indicated. However, it has only been recently applied at this scale and with this degree of intensity in regions that are more densely populated and that are not accustomed to oil and gas development. Understandably, the environmental impacts need to be carefully assessed and monitored, and the public needs to be confident about these impacts.

In March, 2011, President Obama spoke about how “recent innovations have given us the opportunity to tap” large reserves of natural gas –

⁷ IHS, *Energy and the New Global Industrial Landscape: a Tectonic Shift?* (January 2013), p. 2

⁸ EIA, *Monthly Energy Review*, January 2013, Table 12.1

“perhaps a century’s worth of reserves.” But he added that the public needs to be assured that it is being produced safely.⁹ As a consequence, a subcommittee to the Secretary of Energy’s Advisory Board was established to examine the environmental questions. I served on that committee under Chairman John Deutch of MIT.¹⁰ Our work identified three major environmental issues – water, local air pollution, and community impact. Each, the subcommittee concluded, needs to be managed with great attention and can be managed through best practices in operations and regulation, continuing technological innovation, and community engagement.¹¹ We see continuing effort going into these endeavors – with, for instance, recycling of water and new approaches to waste water treatment.

One observation that came out of that study is what seems to be a mismatch between perceptions of regulation and actual regulation. Drilling is a highly-regulated activity, but it is mostly regulated at the state level. We identified the need to continue to support, with what amounts to very small funding, the activities of STRONGER – State Review of Oil and Natural Gas Environmental Regulations – a collaborative benchmarking and standard-setting organization that evaluates and promotes continuing improvement of regulatory activities among the states.¹²

⁹ “Remarks by the President on America’s Energy Security,” March 30, 2011, <http://www.whitehouse.gov/the-press-office/2011/03/30/remarks-president-americas-energy-security>

¹⁰ Other members of the Subcommittee included Professor Stephen Holditch, chairman of the department of petroleum engineering at Texas A&M University; Fred Krupp, president of the Environmental Defense Fund; Kathleen McGinty, chairman of the Council on Environmental Quality in the Clinton Administration and former Secretary of the Pennsylvania Department of Environmental Protection; and Susan Tierney, former assistant secretary of energy in the Clinton Administration and former Secretary of Environmental Affairs and the Chair of the Water Resources Board for the State of Massachusetts and managing principal of the Analysis Group.

¹¹ Secretary of Energy Advisory Board, *Shale Gas Subcommittee 90-Day Report*, August 18, 2011.

¹² For STRONGER, <http://www.strongerinc.org/>

What does the unconventional revolution mean for US imports and exports of oil and gas?

U.S. imports and exports of energy have been a major issue for almost seventy years in the United States. Until the end of the last decade, it seemed that the main question about oil imports was how fast they would increase as a share of total consumption; and, for gas, how large the exports would become. This unconventional revolution has turned around the direction of imports. . U.S.net imports of oil have declined from a peak of 60 percent in 2005 to about 40 percent today. That is the consequence of surging tight oil production, and reduced demand, owing to both greater efficiency and the weak economy. Moreover, the flow of imports has changed. Canada now supplies about 27percent of total U.S. imports.

Net imports of crude will continue to decline. But the United States will continue to remain a net importer for some time. Our import levels are still higher than they were at the time of the first oil crisis, in the 1970s. However, we will see the Western Hemisphere, and North America in particular, moving towards greater self sufficiency. At the same time, the very large, technically-advanced refining complex on the Gulf Coast -- along with the shifting domestic product demand -- will put the United States in the position to continue to expand exports of refined products.

What, of course, gets most attention now is the potential for liquefied natural gas (LNG) exports. This needs to be looked at in terms of overall U.S. supply and global competition. Our view is that, owing to the very large resource base, the market in the U.S. is demand-constrained, rather than supply-constrained. Larger markets – whether they be in electric power, industrial consumption, transportation, or exports -- are required to maintain the investment flow into the development of the resources.

Many LNG projects for the United States have been announced. These would be expensive facilities to build -- \$10 billion or more. Only a handful, in our view, are likely to end up being financed and built. The reason is both cost and the scale of global competition. Currently, 95 million tons of new annual capacity

around the world are either under construction or have been committed, which is equivalent to fully a third of existing capacity. Capacity in the U.S. that might be coming into a market late in this decade or early in the next will have to compete with new supply from existing exporters, such as Australia, and the new sources, such as off-shore East Africa and the Eastern Mediterranean. Moreover, western Canada is likely to become a major exporter of LNG to the main markets in Asia. This competition will create a global market offset on how many projects are actually built.

While markets and economics will eventually determine the realistic scale of U.S. exports, one also has to take into account wider considerations in assessing policy regarding future LNG exports. For decades, the United States has made the free flow of energy supplies one of the cornerstones of foreign policy. It is a principle we have urged on many other nations. How can the United States, on one hand, say to a close ally like Japan, suffering energy shortages from Fukushima, please reduce your oil imports from Iran, and yet turn around and, on the other, say new natural gas exports to Japan are prohibited?

What is the geopolitical impact of the unconventional energy revolution in the United States?

This question has moved to the front of international discussion. Last Friday, at the venerable Munich Security Conference, a forum for leading defense and security officials from around the world, this was one of the main topics of discussion. This kind of question was never on that agenda before.

One immediate impact has already been cited. Tighter sanctions on Iran have succeeded in taking half of Iran's oil exports out of the market, even as global demand for oil continues to expand. The increase in Saudi output was part of the formula. But also of great importance has been the growth in U.S. supply – at a rate higher than generally anticipated.

Certainly expanded domestic supply will add to resilience to shocks and add to the security cushion. Moreover, prudent expansion of U.S. energy exports will

add an additional dimension to U.S. influence in the world. However, there will remain only one global oil market, and a major disruption anywhere would affect the entire market. The question as to how the unconventional revolution will affect U.S. involvement in the Middle East is moving to the fore. Current net U.S. imports from the Persian Gulf are equivalent to eight percent of total consumption, as it is. Even if that number goes down, the nature of U.S. interests in the region go well beyond direct oil imports to the importance of the region for the global economy and global security.

Conclusion

Altogether, the unconventional oil and gas revolution has already had major impact in multiple dimensions. Its significance will continue to grow as it continues to unfold. These hearings provide a very timely opportunity for assessing that impact and significance in its many dimensions, and I am pleased to respond to the committee's questions.
