



**A NEW ENERGY OPTION:
North America's New Natural Gas Resources
And Their Potential Impact On
Energy and Climate Security**

Working Paper

By

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“The biggest energy innovation of the decade is natural gas—more specifically what is called ‘unconventional’ natural gas. Some call it a revolution....To have the resource base suddenly expand by this much is a game changer.”

Daniel Yergin and Robert Ineson, “America’s Natural Gas Revolution,”
Wall Street Journal November 3, 2009

* * *

“Natural gas will play a key role whatever the policy landscape.... Constraints on the rate at which low-carbon technologies can be deployed, and the low carbon content of gas relative to coal and oil mean that gas demand will continue to expand.”

World Energy Outlook
International Energy Agency, Paris (2009)

* * *

“[Natural gas] can play an important role in helping us decarbonize our energy systems.... [D]uring our present era, when natural gas can be substituted for coal, that’s an important step forward.”

Nobel Laureate and former Vice President, Al Gore
George Washington University, Washington, D.C.
November 5, 2009

A NEW ENERGY OPTION: North America's New Natural Gas Resources And Their Potential Impact On Energy and Climate Security

By Gregory C. Staple, Esq. and Joel L. Swerdlow, Ph.D.*

I. Introduction

“[T]he future is . . . always ‘guerilla country’ in which the unsuspected . . . derails the massive and seemingly invincible trends of today.”

Peter Drucker, *The Age of Discontinuity* (1968)

This paper provides a general introduction to the unprecedented increase in North America's natural gas supplies that new technologies have made possible—supplies that exceed 100 years at current consumption levels.¹ The Paris-based International Energy Agency (IEA) recently called this a “revolution” that will have a global impact.²

This very large, low-carbon energy resource could provide the United States and other countries with significant new options for reducing greenhouse gas (GHG) emissions. Natural gas can generate electricity with less than half the CO₂ emissions of coal; transportation vehicles powered by natural gas release about twenty-five percent less global warming pollution than gasoline powered ones.

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The recent surge in gas production has surprised many experts. Few energy or climate specialists had expected to be focusing on natural gas now; decades ago, knowledgeable people had dismissed natural gas as an exhausted and increasingly irrelevant adjunct to petroleum.

Despite the promise of abundant supplies, whether natural gas will play a central role in mitigating climate change presents some tough decisions and difficult tradeoffs. It will require, among other things, that we escape from what British poet William Blake called “mind-forg’d manacles,”³ which lead some to believe that all resource extraction will irrevocably harm the environment or that fossil fuels are *ipso facto* undesirable. An unthinking deference to either view, no matter how noble or well-intentioned, can all-too-easily be used to defend a high-carbon *status quo*.

In order for natural gas to serve as a vehicle for effective climate action, new and supportive governmental policies will also be required. Putting a price on unwanted CO₂ emissions is important. However, as discussed below, simply adopting a cap-and-trade program will not necessarily result in lower levels of GHGs that are based on lower-carbon fuel such as natural gas. In the U.S., at least, climate change legislation must provide a clear economic incentive for major consumers to increase their use of natural gas in the power and transportation sectors based on its comparative advantage as a clean fuel.

Natural gas offers the U.S. an historic opportunity to reduce GHG emissions and other harmful air pollutants. Ignoring and thus losing that opportunity would not only harm the U.S.—it also would have wide and adverse ramifications for other countries. As the IEA notes in its 2009 *World Energy Outlook*, North America’s increasing natural gas production is likely to

affect the climate and energy security options for Europe, Asia and the rest of the world for some time to come.⁴

In general terms, a robust U.S. and Canadian supply provides local users with alternative energy options. It frees large volumes of liquefied natural gas (LNG) for import by other regions, altering the global fuel mix and, hence, the carbon footprint in those regions. The potential for the U.S. to shed imports rather than to attract them is so novel that, as recently as 2008, a prestigious Council on Foreign Relations task force on “Confronting Climate Change” recommended that the U.S. increase its investment in LNG terminals—facilities that now may no longer be needed.⁵

Reduced North American competition for price-sensitive natural gas imports can also enhance regional security by, for example, reducing the leverage of major gas suppliers located in the Middle East and Russia. Similarly, to the extent that users can substitute natural gas for oil, new natural gas supplies may also limit the power of some petroleum exporters. In order to understand the magnitude of this potential, it is worth noting that just since 2005, the United States has added domestic onshore natural gas production that exceeds annually the total energy content of all U.S. oil imports from Saudi Arabia.

The unconventional natural gas fields that have fueled the recent U.S. production boom—chiefly, production from deeply-buried and organic-rich shale rocks—have their geologic equivalent in many other countries. Shale deposits, often formed more than 300 million years ago during the Devonian period, constitute the largest single mass of sedimentary rocks on Earth. Major deposits are known to exist in China, India, Australia, and Eastern Europe—and that is without extensive or systematic exploration. While the scope of natural gas in these

regions is still poorly defined, the exploration and production know-how generated in North America is likely to prove invaluable in furnishing that definition and developing these resources.

The greater the experience that the U.S. and Canada gain in moving down the cost curve with these “unconventional” resources, the more likely it is that natural gas can be extracted in an economical fashion elsewhere, and that measurable climate benefits will follow. This thinking, and the potential for technology transfers, is underscored by the historic U.S.-China cooperation pact on shale gas development that was announced during President Obama’s November 2009 visit to Beijing.⁶

Even though the U.S. natural gas industry has demonstrated that supplies from unconventional sources can reverse the historic decline in output from conventional gas reservoirs, our survey of North America’s natural gas production suggests that several ongoing regulatory debates will influence the level and timing of future supplies. These debates include the terms on which shale gas producers can use and recycle the large volumes of water required for resource extraction; the protocols for managing chemicals now associated with shale gas extraction; and regulation of the air emissions related to natural gas compression equipment needed to harvest, store and transport gas to market. In recent months, these debates have received prominent news coverage in some parts of the country⁷—news that sometimes threatens to drown out the overall benefits of relying upon natural gas vis-à-vis coal or oil. We shall return to those concerns later on.

The rest of this paper has three main parts. In the next Section, Part II, we provide an overview of the upsurge in North America’s natural gas production and the major technological,

business and legal drivers of this resource boom. We then look briefly at some of the technical and environmental issues that may affect the timing and scope of resource production in the years ahead.

Part III looks at how the new natural gas resource base may affect U.S. climate change legislation. In recent months, the shale gas boom has attracted high-level attention in Washington, D.C., triggering the U.S. Department of Energy to reappraise the country's resources. To date, however, natural gas has not figured prominently in the U.S. debate over potential mitigation options for global warming.

This could change in 2010. Several U.S. Senators, for example, now support adding to any climate bill specific incentives for fuel switching, such as the "bridge fuel credit" program developed by the ACSF.⁸ We explain how this fuel credit would work and the public policy rationale behind it.

Part IV of this paper discusses the international ramifications of the North American natural gas boom, concentrating on its global energy security and climate policy implications. We also briefly survey the likely extent of unconventional gas resources in other regions of the world.

Our conclusion is straightforward: Natural gas gives us a new option. It is not perfect, but, on balance, it appears to offer a ready—and largely proven—path for greater climate and energy security. With half of the carbon intensity of coal on primary combustion, and significantly less than that when higher combustion efficiencies are factored in, natural gas provides a newly-abundant low carbon energy option at scale. And it has far less economic and technological risk than most other low carbon options.

Peter Tertzakian, the chief energy economist at ARC Financial Corporation, said it well in his new book *The End of Energy Obesity*:

If the objective is to reduce CO₂ emissions quickly, the most compelling large-scale substitution is replacing coal-fired power plants with natural gas units By carefully pairing and optimizing the use of natural gas with renewables—like solar, wind or biomass power—we can reconfigure our electricity generating system.⁹

Tertzakian also points out that centralized electricity generation is only “the large end of the scale.” Vehicle transportation lies at the other, no less important, “small, decentralized end of the scale.” Thus, in the longer term, the ability of natural gas to decarbonize our economies will also turn on whether it can win a significant share of the world’s transportation market. It is all a matter, says Tertzakian, of “how determined the citizens of a nation or region are in wanting to change their energy diet to become more lean, secure and flexible.”¹⁰



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¹ Our assessment of the natural gas resource in the U.S. and elsewhere, and the new policy options that these resources provide, is preliminary. The full extent of this resource base is still being assessed by various parties, including the Massachusetts Institute of Technology (MIT). In 2008, ACSF commissioned MIT to undertake a comprehensive review of the future role of natural gas in the U.S. economy (and, to lesser extent, worldwide). This review will be completed by June 2010 and will complement the MIT's earlier reports *On The Future of Nuclear Power* (2007) and *The Future of Coal* (2007).

² International Energy Agency, 2009 *World Energy Outlook* 403 (2009).

³ William Blake, "London," *Songs of Experience* (1794).

⁴ 2009 *World Energy Outlook*, *supra*, n.2 at p. 67.

⁵ Council on Foreign Relations, *Confronting Climate Change: A Strategy for U.S. Foreign Policy* 41 (Independent Task Force Report No. 61 2008).

⁶ The White House, Office of the Press Secretary, Fact Sheet: U.S.-China Shale Gas Resource Initiative (Nov. 17, 2009), *available at*: http://www.energy.gov/news2009/documents2009/US-China_Fact_Sheet_Shale_Gas.pdf

⁷ *E.g.*, Jad Mouawa and Clifford Krauss, "Gas Company Won't Drill in New York Watershed," *New York Times*, Oct. 27, 2009, *available at*: <http://www.nytimes.com/>

⁸ Letter from Senators Michael Bennett *et al.*, to Sen. Barbara Boxer, Chair, Senate Committee on Environment and Public Works (Sept. 23, 2009), *available at*: <http://www.cleanskies.org/pdf/senate-letter-natural-gas-boxer-092309.pdf>

⁹ Peter Tertzakian with Keith Hollihan, *The End of Energy Obesity* 224-25 (John Wiley B. Sons, Inc. 2009).

¹⁰ *Id.* at 225, 226.

About the American Clean Skies Foundation

In its third year of operation, ACSF is at the forefront of energy and climate matters. The Foundation has two main activities. It owns and operates Clean Skies TV, a leading Internet- based energy and environmental news network. Programming is available on demand, 24/7 at www.cleanskies.com. In addition, the Foundation has an active energy policy and research program in partnership with other NGOs.

For more information, please visit our website:
<http://www.cleanskies.org>



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