February 2012
GPPi Policy Paper No. 14

Supported by the
European Commission

The Impact of Shale Gas on European Energy Security

Andreas Goldthau · Wade Hoxtell

BROOKINGS

GPPi
global public policy institute

Imprint

Global Public Policy Institute (GPPi)

Reinhardtstr. 15
10117 Berlin

Phone: +49 • 30 • 275 959 75-0
Fax: +49 • 30 • 275 959 75-905

gppi@gppi.net • www.gppi.net

Authors: Andreas Goldthau, Wade Hoxtell

Published: Berlin, February 2012

About the Authors

Dr. Andreas Goldthau is the head of the department of public policy and associate professor at Central European University, an American graduate school based in Budapest, Hungary. His current academic interests focus on energy security and on global governance issues related to oil and gas. Prior to joining Central European University, Andreas worked as a transatlantic postdoc fellow in international relations and security with the Paul Nitze School of Advanced International Studies at Johns Hopkins University, the RAND Corporation and the German Institute for International and Security Affairs. He was also a research fellow with the Institute for East European Studies at the Freie University in Berlin and a Fulbright senior scholar with the Elliott School of International Affairs at George Washington University. He has further worked as a Robert Bosch visiting lecturer at the Tyumen State University in Russia. Andreas holds a joint graduate degree in political science from the Institut d'Etudes Politiques de Paris and Freie University Berlin, a state certificate in Russian language from Lomonossow University in Moscow, and a PhD from Freie University Berlin.

Wade Hoxtell is a project manager with the Global Public Policy Institute (GPPi) in Berlin. His research interests include global energy governance, climate change, public-private partnerships and corporate social responsibility. He also works as a consultant to a number of United Nations agencies, including the UN Global Compact Office, UNICEF and the ILO, on partnerships and sustainability issues. Before joining the Global Public Policy Institute in May 2006, he was a project assistant with the Aspen Institute Berlin. From 2003-2004 he worked as a legislative aide in the Wisconsin State Senate. He holds an MA in European Studies from Jagiellonian University in Krakow, Poland and undergraduate degrees in international relations, German, European studies and global cultures from the University of Wisconsin-Madison.

Acknowledgements

The research for this study was generously funded by a grant from the European Commission. This study also draws on the results of a research project (Goldthau 2012) carried out in the context of the Political Economy of Energy in Europe and Russia (PEEER) network.

Finally, the authors would like to thank the participants at the ninth Transatlantic Energy Governance Dialogue session entitled Shale Gas: A Game Change for European Energy Security? The session took place on 12-13 May 2011 at Central European University in Budapest, Hungary.

Table of Contents

1 Introduction

Gas markets are in flux. In most of the OECD world, gas demand has faltered the past years, a result of the ongoing financial and economic crisis. At the same time, soaring unconventional (shale) gas production, mainly in the US, coupled with increasing global capacity in liquefied natural gas (LNG) has altered the supply side.[1] As a consequence, compared to the situation only five years ago, natural gas markets have literally been turned upside-down.

These developments have major repercussions for Eurasian gas markets and possibly also for European energy security. Russia, still the dominant supplier in Eurasia, has lost market shares in Europe. A European sellers' market has shifted towards a buyers' market again, reflecting additional supplies landing on the European market, notably in the form of LNG. The latter, in turn, has started to impact prevalent contractual arrangements in European gas markets and the common oil price peg.

While economic activity will eventually recover, it is unconventional gas developments that will keep on affecting energy markets in the medium- to long-term. Natural gas markets and Eurasian energy relations will certainly not look as they did before shale entered the gas scene – regardless of whether the US success story can be replicated in Europe. The shale gas revolution is therefore a dynamic but uncertain process that impacts a range of energy actors and institutional arrangements, while at the same time transforming regulatory environments and market structures. Regardless of whether Eu-rope decides to produce shale gas itself, how this plays out will have a considerable effect of European energy security.

As a consequence, this study argues, a number of risks have emerged that require policy solutions, including investment uncertainty, cartelization of gas markets and price vola-tility. These rather unaddressed "side effects" could turn the tide against shale production and its already hyped role as the transition fuel to a low carbon future.

This policy paper proceeds as follows. In section 2, we briefly highlight developments in unconventional gas and the implications on gas market structures. In section 3, we present some key challenges to European energy security as a result of these developments. Finally, in section 4, we present policy conclusions.

1 In this paper the terms "shale gas" and "unconventional gas" are used interchangeably, in line with public policy discourse on the topic. For a scientific overview between the various forms of unconventional gas, see MIT. 2010. The Future of Natural Gas: An Interdisciplinary MIT Study. Cambridge, Mass.: MIT.

2 The Emergence of Shale Gas and its Implications on European Gas Markets

Three key trends are fundamentally altering European gas markets. First, the emergence of shale gas in the US has triggered a quiet but important "revolution" (Yergin and Inieson 2009) – not only for North American markets but also beyond. Enabled by technological innovation, namely horizontal drilling and fracking rock formations, unconventional gas supplies have become exploitable at economical costs and fundamentally altered natural gas production and reserves in North America. Current estimates vary between two trillion and 2.5 trillion cubic feet cubic feet (TCF) of recoverable gas (EIA 2011; MIT 2010) in the US, the equivalent to some 100 years of consumption at 2010 levels. Unconventional gas at present now accounts for around 60 percent of marketed gas in the US (IEA 2011), turning the unconventional into the new conventional.

Second, this supply-sided trend has coincided with a global economic recession, triggered by the financial crisis, and is leading to reduced gas consumption in not only most of the OECD world but also elsewhere. Gas demand in Europe alone fell by 5.6 percent in 2009 compared with 2008 (Honoré 2011; International Energy Agency 2010). Even in China and other emerging Asian economies, consumption went down temporarily before quickly picking up again.

Third, additional LNG supplies started to enter markets. Some gas producer countries, notably Qatar, have made large investments into developing LNG capacities in anticipa-tion of increasing American gas-import needs to replace coal, and to compensate for fal-tering domestic gas production levels. These new volumes have come onstream as US shale gas production has soared and global demand faltered. As the US market could no longer absorb additional volumes of comparably more expensive LNG imports, cargos searched for markets elsewhere: primarily Europe. A downward spiral was set into motion. The European market, having seen a slump in demand and oversupplied already by piped gas from the East, became the destination of choice of redirected LNG cargos (In-ternational Energy Agency 2009). As a consequence, prices on Continental European spot markets, notably NetConnect Germany (NCG) and the UK National Balancing Point (NBP), fell sharply. Europe tilted towards a buyers' market again.

These three coinciding trends have triggered two major effects. First, major European utilities – such as Germany's E.ON Ruhrgas, Turkey's Botas, Italy's Eni, France's GDF Suez, Austria's EconGas and Finland's Gasum – have found themselves bound in long-term take-off contracts (LTCs) with Russian or Norwegian suppliers that have pegged the gas price to oil products. They therefore have had every incentive to push for a change in contractual arrangements, acknowledg-

ing the new price environment. They have started to seek to move away from the oil price peg, and replace the latter with an orientation towards lower spot prices. Second, producers dependent on Western European consumers, notably Gazprom, have started to face a problem as well. Instead of serving a gas-hungry European market as the main and often exclusive supplier, they have rather seen competition from LNG imports, reducing market shares. Adding to decreasing sales volumes that have reduced revenues, Gazprom has faced an additional fiscal backslash: Instead of profiting from rising gas prices (a result of resurging oil prices), the Russian monopolist has had to grant discounts amounting to an estimated 2 billion USD in 2010 alone (RIA Novosti 2010) so as to not alienate major European importers it crucially relies on.

There is indication, however, that the gas glut might disappear sooner than expected (IEA 2011). Potential factors include slower LNG development in Qatar and a de facto moratorium on nuclear energy after Fukushima in some European countries, topped by a nuclear phase-out in Germany, the largest European gas market. Yet, the trend towards more market-based models in natural gas trade seems irreversible (Stern and Rogers 2011). The new realities of the Eurasian gas market are beginning to reflect growing gas-to-gas competition, challenging incumbent models and leading to already visible changes in contractual arrangements (Konoplyanik 2011).

3 New Hope, New Risks: Challenges to European Energy Security

In light of a changing energy landscape in European gas, observers have been quick to point to geopolitical implications, notably a greater diversity of sources of gas supplies and, as a result, a weakening Russian "grip on Europe" (Baker Institute 2009; Kuhn and Umbach 2011; Pagnamenta 2009). Others have stressed that more liquid and competitive gas markets would imply better prices and more energy security for consumers. However, while the changing structure of international gas markets may lead to more competition and new opportunities, it also entails new risks. These separate but very much intertwining risks include increased price fluctuations stemming from more volatile spot markets, emerging possibilities to at least partially cartelize globalizing gas markets and incentive problems for investment in new supplies in key producer countries.

Price volatility

The decade-old pattern of long-term take-or-pay agreements, with a gas price pegged to a basket of crude-oil based substitutes, is appearing to give way to a new, as yet undeter-mined model. One of the emerging key questions will center on how changes to the his-torically developed and well-balanced allocation of risks entailed in gas projects between producers and importers will be managed. Historically, given the high capital intensity and the long lead times of the gas business, take-off agreements emerged as a means to account for two equally pressing sources of risks – volume and price. In essence, these agreements left the volume risk with the importer as the latter agreed to buy up a certain volume of gas over a certain period of time without having certainty about market demand in the future. The price risk, by contrast, was left with the producer, as the latter was not able to influence the very oil price developments to which gas was pegged. The peg, however, enabled the importer to cope with the volume risk, as the gas price for the end user was competitive vis-à-vis key competitor fuels and thus allowed the development of a sizeable consumer market, able to eventually take the contracted volumes.

Now, contractual models reflecting this traditional allocation of risk are being put into question. Due to additional LNG intake and depressed demand, the continental European market is rapidly becoming more liquid, strengthening spot markets, fostering gas-to-gas competition and providing for arbitrage margins for traders and companies. In addition, there are growing voices who say that oil is no longer the competitor fuel to natural gas, as it had been in the early stages of the developing European gas markets. The oil price peg is therefore becoming in-

creasingly questioned from this end as well. New contracts will either gradually integrate pricing arrangements oriented towards spot markets, or they can even put an end to the LTC model altogether. With this, the explicit historical allocation of risks entailed in natural gas projects is coming to an end. What is more, the oil price peg and its smoothening effect on gas price hikes will probably be a thing of the past once spot-market based pricing mechanisms start dominating the pricing formula. As evidence from the British gas market reveals, prices have become more volatile due to the cyclical nature of the market (Asche et al. 2007).

Cartelization of gas markets

Breaking up the existing contractual structure, particularly the oil price peg, and leaving prices to the market means that volumes and hence prices may become subject to possible manipulation. Prevalent take-off agreements imply that any tinkering on the supply side does not translate into price hikes. This makes any attempt to cartelize the Eurasian gas market a rather pointless exercise. While neither long-term contracts nor the oil price peg will disappear over night, the non-take-off bound part of the gas market is set to grow further. With this, the market share open to cartelization expands as well. Particularly in times of a buyers' market, producers face great incentives to push for coordination on volumes and prices. Attempts to pool market power in an emerging Gas Exporting Countries Forum (GECF) may therefore eventually bear fruit in a more liquid and global-gas market. The GECF links the world's three largest reserve-holders (Russia, Iran and Qatar) while uniting some 85 percent of current global LNG production capacity (BP 2011). Russia's recent attempts to move the Forum to a more formalized organizational structure may be seen as steps towards this direction (Stern 2010; Stern and Rogers 2011)

As GECF members provide Europe with over 60 percent of its gas supply, any coordi-nated efforts to manipulate the gas price upwards would have considerable implications for European energy security. This particularly holds in light of European efforts to transition to a lower carbon economy, in which increased natural gas consumption would play a role as well as fill the gap in electricity production, potentially resulting from the moratoria and, in the case of Germany, the phase out of nuclear power.

Investment uncertainty

While the new energy landscape in European gas may bring new opportunities for spot-based business models (or paper gas), the decade-long model of risk allocation between the two traditional parties – gas producing companies and major utilities on the consumer end – is fading. And so is their prevalent traditional business model. The changing market dynamics highlighted above will enable consumers, particularly end users in industry, to buy on spot. While in principal

a positive development overall, this implies less planning security for consumed volumes in gas. This affects traditional exporters (in Russia, Norway or the Caspian) and importers (notably European utilities). Importers no longer have long-term planning security in the end user market, which may make them less inclined to commit to contracting large volumes over a time period spanning decades, as they did in traditional contractual agreements – a process that has already started. For producers, in turn, increased gas-to-gas competition may come with uncertainty on long-term demand and cost margins. Russian or Norwegian producers predominantly operate in the conventional gas sector. Unlike companies in the shale gas business, they cannot shut down wells once demand or prices drop below competitive levels. Volumes produced cannot therefore be adjusted flexibly to developments in consumption, but need to be stored (which is expensive) or redirected (which often is not feasible due to lacking infrastructure).

This may have effects on the suppliers' readiness to invest in new, technologically de-manding and capital intensive upstream projects, adding to or replacing maturing fields. Given the fact that upstream projects are very costly and have lead times of several years, producers may simply abstain from investing in new projects, which would have dire consequences for European energy security if prospects of generic unconventional gas do not live up to expectations. Russia's decision to postpone development of the giant Arctic Shtokman field, once a top priority in Gazprom's E&P projects, already shows a growing risk-averse attitude in a changing market environment (Wall Street Journal 2010). Qatar's recent slowdown in rolling out additional LNG may reflect similar concerns (Reuters 2010). Moreover, as time horizons in the gas market may shorten, both among producers and consumers, but particularly among traders who are an increasingly important group of gas market actors, these developments may be severely at odds with required planning security in the gas market, which ideally runs in decades rather than years.

Taken together, price volatility, the potential cartelization of gas markets and investment uncertainty may, at best, come with additional uncertainty. At worst, they may entail considerable risks with regard to security of supply, smooth price developments and market balance.

4 Policy Conclusions

While environmental issues – including concerns about the impact of shale gas production techniques on groundwater and methane leakage – may be a show stopper for European production of shale gas, Europe will nevertheless feel the effects of greater global exploitation of shale reserves. Thus, the shale gas revolution and its effects on interna-tional gas markets create policy implications for the European Union, especially regarding efforts to mitigate the risks detailed above.

First, these changing market dynamics, particularly the elimination of the oil peg, may lead to growing tensions between contractual parties; altering contracts through negotiation or litigation will not be easy (Stern and Rogers 2011). This transitional period may require moderation. Mechanisms should be established to ensure that the restructuring of contracts is conducted in a way that is equitable to both producers and importers.

Second, while greater market liquidity due to LNG can increase arbitrage, balance Russia as a predominant supplier, and ultimately cut the peaks off of any supply shocks, greater liquidity is not a cure-all for European energy security concerns. Policies need to be put in place to support the emergence of an integrated European gas market, ready and able to absorb additional gas supplies, also enabling gas volume swaps across national borders. At the same time, the transit to new market structures needs to be accompanied by policies designed to accommodate newly emerging contractual models in a system still dominated by long-term contracts.

Endnotes

Asche, Frank, Petter Osmundsen, Marius Sikveland, and Ragnar Tveteras. 2007. Volatility and Risk Sharing in European Gas Markets. Paper read at International Association for Energy Economics, 10-13 June, at Florence.

Baker Institute. 2009. Russia and the Caspian States in the Global Energy Balance. *Baker Institute Policy Report* 39.

BP. 2011. *Statistical Yearbook of World Energy*. London: BP.

EIA. 2011. *Annual Energy Outlook*. Washington, DC: US Department of Energy.

European Commission. 2010. EU energy and transport in figures. Brussels: European Commission.

Goldthau, Andreas. 2012. Emerging governance challenges for Eurasian gas markets after the shale gas revolution. In *Dynamics of Energy Governance in Europe and Russia*, edited by C. Kuzemko, A. Belyi, A. Goldthau and M. Keating. Basingstoke: Palgrave Macmillan.

Honoré, Anouk. 2011. Economic recession and natural gas demand in Europe: what happened in 2008-2010?: Oxford Institute for Energy Studies.

IEA. 2011. World Energy Outlook 2011 special report: Are we entering a golden age of gas? Paris: International Energy Agency.

International Energy Agency. 2009. Natural gas markets review. Paris: IEA.

International Energy Agency. 2010. Natural Gas Information. Paris: International Energy Agency.

Konoplyanik, Andrey. 2011. Gazprom's concessions in oil-indexed long-term contracts reflect "forced adaptation" to new realities. *Gas Matters,* April.

Kuhn, Maximilian, and Frank Umbach. 2011. Shale Gas: A "Game Changer" For European Energy Security. *GWPF*, 11 May.

MIT. 2010. The Future of Natural Gas: An Interdisciplinary MIT Study. Cambridge, Mass.: MIT.

Pagnamenta, Robin. 2009. World gas glut will weaken "Russian grip on Europe". *The Times*, 11 November.

Reuters. 2010. All Qatar LNG trains restarted, bearish for prices, 14 July.

RIA Novosti. 2010. E.On Ruhrgas presses Gazprom for discounts again. 20 August.

Stern, Jonathan. 2010. Continental European Long-Term Gas Contracts: Is a Transition Away From Oil Product-Linked Pricing Inevitable and Imminent? *Oil, Gas & Energy Law Intelligence* , June.

Stern, Jonathan, and Howard Rogers. 2011. The Transition to Hub-Based Gas Pricing in Continental Europe. Oxford Institute for Energy Studies.

Wall Street Journal. 2010. Gazprom Delays Start of Shtokman Gas Field. 05 February.

Yergin, Daniel, and Robert Inieson. 2009. America's natural gas revolution. *Wall Street Journal,* 02 November.

About this Paper

This paper is the result of a two-year research and dialogue program titled "Common Goals – Different Approaches? Strengthening Transatlantic Cooperation on Global Energy Issues," conducted by the Global Public Policy Institute (GPPi) and the Brookings Institution. The program was supported by a generous grant from the European Commission, with additional support from the Draeger Foundation and Central European University. For more information on the program, please visit www.globalenergygovernance.net.

The Global Public Policy Institute

GPPi is an independent think tank based in Berlin. Our mission is to develop innovative strategies for effective and accountable governance and to achieve lasting impact at the interface of the public sector, business and civil society through research, consulting and debate. For more about GPPi, please visit www.gppi.net.

The GPPi Approach

- GPPi is an independent and non-profit institute. GPPi receives project funding from foundations as well as from project partners and clients from the public and private sectors. The institute reinvests profits from consulting activities into its research work.

- GPPi builds bridges between research and practice. The institute's international team combines research and public policy expertise with management consulting skills. GPPi fosters the exchange of knowledge and experience between researchers and practitioners.

- GPPi promotes policy entrepreneurship. Its work strengthens strategic communities around pressing policy challenges by bringing together the public sector, civil society and business.

The Brookings Institution

The Brookings Institution is an independent, nonpartisan organization devoted to research, analysis, education, and publication focused on public policy issues in the areas of economics, foreign policy, and governance. The goal of Brookings activities is to improve the performance of American institutions and the quality of public policy by using social science to analyze emerging issues and to offer practical approaches to those issues in language aimed at the general public. For more on the Brookings Institution, please visit www.brookings.edu.

The European Commission

The European Commission supports the joint GPPi/Brookings "Common Goals – Different Approaches? Strengthening Transatlantic Cooperation on Global Energy Issues" project as well as the "Transatlantic Energy Governance Dialogues" conference series through a generous "EU-U.S. Policy Research and Debate" grant. More information on the European Commission can be found at http://ec.europa.eu/index_en.htm.

The Draeger Foundation

The Draeger Foundation, founded in 1974, is a non-profit institution committed to the promotion of science and research, especially in the field of national and international economic and social order. By encouraging the intensive exchange of experience and ideas regarding issues which are of importance for our future, the Draeger Foundation endeavors—within the bounds of its capabilities—to make a contribution toward improved international relations. More information can be found at www.draegerstiftung.de.

Central European University (CEU)

Located in one of Europe's most elegant capital cities, Budapest, accredited in both the U.S. and Europe, CEU offers a uniquely international atmosphere of academic excellence, critical reflection, and social engagement. CEU students come from over 100 countries of five continents, our faculty – from 30 countries. CEU stresses both academic excellence and public policy relevance of its teaching and research. We focus on key issues of the 21st century ranging from climate change to democratic governance and from international security to deeper understanding of history and philosophy. To learn more about CEU, please visit www.ceu.hu.

Global Public Policy Institute (GPPi)

Reinhardtstr. 15
10117 Berlin

Phone: +49 • 30 • 275 959 75-0
Fax: +49 • 30 • 275 959 75-905

gppi@gppi.net • www.gppi.net