

Perspectives on the Future of Unconventional Gas in Europe – Insights from the ZEW Energy Market Barometer

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The “shale gas boom” in the United States (U.S.) has triggered discussions about the extraction of unconventional gas¹ resources in the European Union (EU). Advocates of extraction believe that import dependencies would decrease, even energy independence seems possible. Furthermore, natural gas prices are believed to decline substantially.

Looking at market fundamentals, however, these beliefs are likely exaggerated. Comparing the U.S. and Europe there are significant differences in estimates of technically recoverable resources of unconventional gas.^{2,3} The European Commission’s Joint Research Centre (EU JRC) provides mean estimates of 39.9 trillion cubic meters (tcm) for the U.S., yet only 11.7 tcm for Europe.⁴ Thus, fewer resources in Europe make the quest for energy independence harder.

Moreover, it remains questionable whether the extraction of unconventional gas resources in Europe will be economically feasible. The EU JRC, in line with other studies, estimates extraction costs of 5-12 US.-dollar per million British thermal units (\$/MMBtu).⁵ In that respect, extraction seems fairly profitable given current market prices of about 10 \$/MMBtu for front year futures.^{6,7} Yet, these cost estimates, based on aggregating individual cost factors bottom-up, typically focus on engineering costs and ignore various kinds of (transaction) costs. For example, the costs for acquiring the land access from local land owners and obtaining the drilling rights from the public authorities are often not explicitly accounted for. Compared to the U.S., plot sizes of farm land are often significantly smaller in Europe such that firms would have to negotiate with multiple land-owners and state authorities before even building the first drilling rig. Furthermore, as local communities are often hostile to unconventional gas extraction, this may lead to civil protest and long mediation processes adding more transaction costs to the bill.

Given the uncertainty about technically recoverable resources and extractions costs we suggest an alternative way of revealing the profitability of shale gas extraction in the EU. We asked energy market experts from the ZEW Energy Market Barometer^{8,9} from which price level onwards they would expect a significant increase in the extraction of unconventional gas resources in the EU. Experts have different notions about the size and relevance of specific cost factors. By asking about the Break-even price level for unconventional gas we aimed for experts to provide their best estimate for the overall cost of significant unconventional gas extraction in the EU.¹⁰ The distribution of estimates by the experts gives us information about the range, as well as median estimates of overall extraction costs.

In addition to the expected Break-even price of unconventional gas extraction in the EU, we also asked for the expected market price of natural gas, the future development of total extraction volumes, and the expected regulatory actions regarding unconventional gas extraction. This allows us to draw a more detailed picture of the perspectives on

and for the European gas market in light of recent developments in the shale gas industry. In the following we present and discuss the findings of our survey.

Median Break-even Price between 40 and 50 €/MWh (14.8-18.5 \$/MMBtu)

The median estimate for the Break-even price of unconventional gas in the EU is between 40 Euro per megawatt hour (€/MWh) (~ 14.8 \$/MMBtu) and 50 €/MWh (~18.5 \$/MMBtu). 19 percent of the

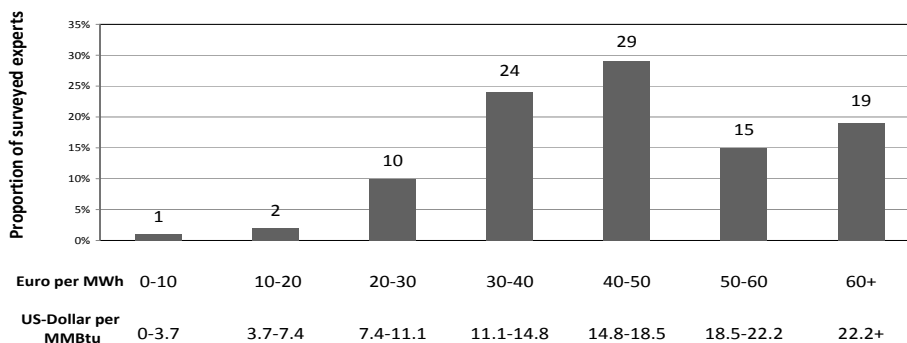


Figure 1: Break-even Price of Unconventional Gas in the EU

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respondents even expect that a wholesale price of natural gas above 60 €/MWh (~22.2 \$/MMBtu) is necessary to substantially increase the extraction of unconventional gas in the EU (see figure 1).

These Break-even price expectation are substantially above current wholesale market prices in the UK, Netherlands and Germany, which are about 27 €/MWh (\$10 \$/MMBtu).¹¹ Thus, European natural gas prices would need to increase sig-

nificantly for unconventional gas extraction to become profitable. Will they? 66 percent of the experts think that the price for natural gas will increase in the next five years. In addition, 50 percent of the experts predict a constant supply of unconventional gas for the next five years. Hence, it seems unlikely that the expected price increase is sufficient to foster a broad extraction of unconventional gas in the EU in the coming years. However, 76 percent reckon with an increase of extraction volumes of unconventional gas in the next ten years.

Increase in Overall Gas Supply and Stable Import Dependency

What impact will an increase of unconventional gas extraction in the long term have on the overall supply of natural gas in the EU? Half of the respondents predict a decrease in conventional gas supply in the next ten years. An equal amount anticipates that the overall extraction volume of conventional and unconventional gas in the EU increases. Hence, the experts expect that the decrease of conventional gas extraction in the EU is overcompensated by the increase in unconventional gas extraction in the next ten years. Contrary to this, 36 percent expect a constant overall extraction volume of conventional and unconventional gas.

Regarding the demand side the majority of respondents expect an increase in demand for natural gas in the EU in five years (71 percent) as well as in ten years (64 percent). The crucial question regarding energy independency is whether this demand will be served by domestic or foreign supply? About half of the respondents think that the security of supply will not change in response to the extraction of unconventional gas deposits. This indicates that the demand structure will also not change significantly. Demand will likely be served by sources inside as well as outside the EU as today.

After all, Russia, Azerbaijan, Turkmenistan, and Qatar explored recently conventional gas fields with high capacity and low extraction costs. Also the capacities for the transportation of gas from Eastern Europe and the Middle East are already increasing and will do so further with the construction and operation of new pipelines as well as liquefied natural gas (LNG) ports.

Expectations about the Legal Framework

Although the development of unconventional gas in Europe is currently not very dynamic, questions regarding the legal framework are broadly discussed. Furthermore, the International Energy Agency (IEA) recently published a report stating that a regulatory framework is necessary to take the special risks of fracking technologies into account.¹² According to the IEA report a regulatory framework would increase extraction costs only slightly. Yet, no regulation at all could increase resistance to fracking technologies and thus hinder their diffusion. Accordingly, we asked our experts, which additional regulation they would expect in Germany and the EU.

Ninety two percent of the experts presume that there will be mandatory environmental impact assessments (EnvIA) in Germany. Also 82 percent expect further regulation regarding water legislation and 61 percent with respect to mining legislation. Moreover, 72 percent of the respondents expect additional standards in public participation processes. Thus, the majority foresees more regulation in these areas in Germany. On a European level there is more uncertainty about regulatory developments. Nevertheless, 58 percent of the experts expect mandatory EnvIAs. Forty nine percent expect additional water legislation.

How do these expected developments in the regulatory framework affect extraction costs? Respondents who foresee one or more changes of the regulatory framework on the

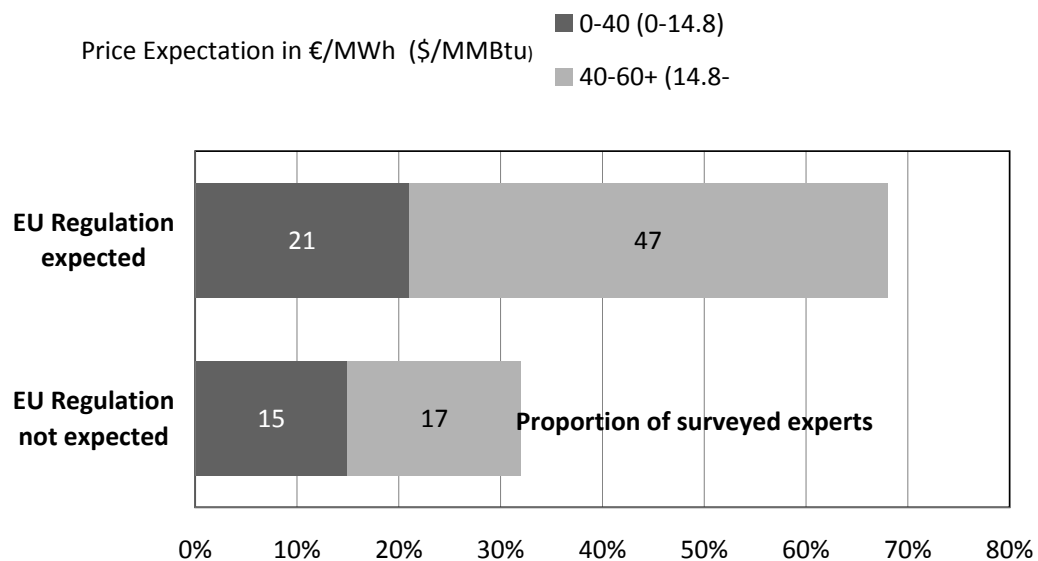


Figure 2: Price Expectation Given Expected Regulation

EU level also predict a higher Break-even price of unconventional gas (see figure 2). However, a simple linear regression model explains just about five percent of the variation in Break-even prices by expected regulation. Thus, the skepticism on the large scale profitability of unconventional gas in Europe is apparently not driven as much by the legislative framework as one might expect.

Conclusion

Our survey does not support hopes for decreasing import dependency of fossil fuels or lower natural gas prices in Europe. The respondents predict clearly higher extraction costs for unconventional natural gas resources compared to today's wholesale prices. At most, the extraction of unconventional gas will increase to a significant level in ten years. Yet, this extraction will merely balance the decrease in the conventional gas supply and the increase in demand. Higher import shares and absolute levels of imports remain a likely scenario. Thus, there is no indication for energy independency, but with a diverse portfolio of gas suppliers, the EU should be able to ensure a secure supply. Regarding the regulatory and legislative framework in the EU many experts anticipate further developments regarding environmental impact assessments and water legislation.

Footnotes

¹ We refer with unconventional gas to shale gas, tight gas, and coal bed methane.

² Rogner, H.H., "An assessment of world hydrocarbon resources." Annual review of Energy and the Environment 22 (1999): 217-262.

³ Medlock, Kenneth B. Jaffe, Amy M. and Hartley, Peter R., "Shale gas and US national security", The James A. Baker III Institute Energy Forum of Rice University (2011), Houston, Texas.

⁴ Pearson, Ivan, Zeniewski, Peter, Gracceva, Francesco, Zastera, Pavel, McGlade, Christophe, Sorell, Steve, Speirs, Jamie and Thonhauser, Georg, "Unconventional gas: Potential energy market impacts in the European Union" European Commission Joint Research Centre, Institute for Energy and Transport (2012), Petten, Netherlands

⁵ Pearson, Ivan, et al., *ibid.*

⁶ European Energy Exchange (EEX), "Natural gas", retrieved from the World Wide Web on 26 Feb. 2013: <http://www.eex.com/en/>

⁷ ICE Futures Europe (ICE), "Daily Volumes for ICE UK Natural Gas Futures (Monthly)" (futures up to six years ahead), retrieved from the World Wide Web on 27 Feb. 2013: www.theice.com

⁸ The Centre for European Economic Research (ZEW) hosts a panel of energy markets experts, who are surveyed biannually for the ZEW Energy Market Barometer [ZEW Energiemarktbarometer]. The ZEW Energy Market Barometer is an industry-specific indicator of economic sentiment regarding energy supply, energy trade, and energy service industries in Germany. It comprises the expectations of about 200 experts concerning short- and long-term developments in the national and international energy markets. The majority of the panelists work for the energy supply industry or in energy trading. Furthermore, experts stem from academia and energy consultancies. A

small part of the participants work for energy related associations, administrations or institutions. Given that the ZEW Energy Market Barometer addresses German energy market experts, results may relate particularly to the German situation. The panel was established in 2003.

⁹ The complete series of the Energy Market Barometer can be retrieved from: <http://www.zew.de/de/publikationen/energiemarktbarometer.php>. This article is based on the latest Energy Market Barometer from January/February 2013, which is only available in German.

¹⁰ We equalize Break-Even prices with overall costs based on the assumption of perfect competition and zero long-run profits. This assumption can be justified looking at the US shale gas industry, which is very competitive.

¹¹ EEX, *ibid.* ICE, *ibid.*

¹² IEA, "Golden rules for a golden age of gas", (2012), Paris, France.

Dave Williams Honored

In my role as the Vice President for Conferences, I have been working closely with our Executive Director, David Williams, in the planning of IAEE meetings. It has always been a very pleasant and enriching experience to work with him. His dedication, professionalism and his outstanding positive energy have always impressed me. His commitment and passion to the advancement of IAEE meetings has been overwhelming. His hard work is acknowledged by the whole Professional Conference Management Association(PCMA) now. It is no surprise to me that the PCMA has honored David Williams with its "Global Executive of the Year" award. This well-deserved award makes him a proven leader in the industry worldwide. Dave, we are proud of you !

Gürkan Kumbaroglu