

extractive industries: blessing or curse?

A slow costly road to nowhere: shale gas development in Europe

The myth of ‘cheap and abundant’ energy from shale gas is rooted in the American boom, based on artificially low prices driven by speculation and industry overestimates. The European situation presents a tougher picture, with difficult geological conditions, higher population density, and a lack of drilling expertise and infrastructure. Shale gas in Europe will follow a rocky path potentially leading to even higher gas prices—locking public subsidies into fossil fuel use at the expense of renewable energy.



Well pad in Poland. © FoEE



Well pad in France. © FoEE



Pipelines in France. © Ineke Scholte

Introduction

Shale gas proponents heralded the shale gas boom in the United States (US) as an unqualified success story, worthy of repeat in Europe – where it would bring significantly lower gas prices and increased competitiveness of European industries.

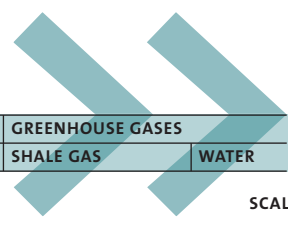
However, proponents ignore the differing geological, geographical and hydrological conditions in Europe, and the lack of drilling infrastructure and know-how, which make a replication of the US experience in Europe impossible. The US route, one reliant on artificially low prices driven by speculation and industry overestimates, if repeated in Europe would be hindered by significantly higher costs, and a pace of development unlikely to impact upon gas prices. There is strong evidence that shale gas plays a negligible role in the competitiveness of national economies and could only thrive in Europe through massive public subsidies which would put it in direct competition with renewable energy sources. This report raises serious questions about the economic case for shale gas by drawing on key industry sources, economic experts and business consultants.

Geology and water supply

Shale gas development is entirely dependent on favourable geological conditions,¹ which are less prevalent in Europe than in the US, calling the feasibility of shale gas development into question. Compared to North America, European gas basins are considered to be smaller, tectonically more complex and more compartmentalized, with deposits deeper, at higher temperatures and more pressurised.¹ For example, shale gas deposits in Poland appear to be 1.5 times deeper than in the US, which would increase drilling costs by a factor of three, according to Schlumberger, an oilfields service company.² More powerful pumps and drilling rigs are required to deal with greater depths and temperatures, driving up costs, and requiring the development of new equipment and know-how which cannot simply be transferred from the US.³

In Hungary and Poland test drillings have been so disappointing that several large shale gas operators have already decided to stop explorations entirely:

- In Hungary ExxonMobil stopped test drillings in 2010 after results did not indicate the existence of substantive reserves.⁴ A joint venture between partly state-owned MOL and Falcon Oil & Gas was terminated, because drilling results were “below expectations”⁵
- In Poland, Exxon Mobil stopped all its operations because “no demonstrated sustained commercial hydrocarbon flow rates” were observed.⁶ Talisman Energy and Marathon Oil recently followed the same path after “unsuccessful attempts to find commercial levels of hydrocarbons”²⁰ while other companies, including Poland’s PGNiG and US giant ConocoPhillips have decided to abandon some regions because of difficult geological conditions.^{7, 25} Some shareholders in companies like state controlled PGNIG have complained that the government seems to have placed “political desire ahead of business knowledge.”²³



	EXTRACTION	HYDRAULIC FRACTURING	GREENHOUSE GASES
CLIMATE CHANGE		EMISSIONS	SHAPE GAS
			WATER

SCALE

Finding sufficient water supply for shale gas drilling and extraction is also a challenge – approximately 17 million litres of water are needed per well.⁵ Fresh water availability is very low in those European countries in which the prospects for shale gas are greatest: Germany, Poland and the Czech Republic have the lowest renewable water resources per capita in Europe. According to KPMG, the shortage in water supply and the location of shale gas basins lead to water prices up to 10 times higher than in the US, contributing further to the costs of extracting shale gas in Europe.⁵ Without technological innovation it is unlikely that shale gas operators will be able to deal with limited water resources as prescribed by current regulation.¹

Population density and land access

Land-intensive shale gas drillings – since 2005, up to 32,000 new wells have been drilled each year in the US²⁶ – pose serious environmental and health risks in Europe due to its higher population density. Most shale gas deposits are spread across primarily industrial and relatively urbanised areas in Europe¹ making large scale development very difficult and costly. This is echoed by Shell’s CEO Peter Voser who cited “high population density” as a major obstacle to shale gas development in Europe.⁸

Compared to the US, the ownership in mineral rights is different: while land owners in the US automatically receive royalties from subsurface mining, ownership is retained by the state in Europe. European land owners have therefore little incentive to allow drilling on their land, which has the potential to spoil water sources and reduce its value for agriculture or tourism significantly.¹ Land ownership is also a lot more fragmented in Europe, particularly in Poland, foreshadowing lengthy and costly negotiations between shale gas operators and land owners.⁸

POPULATION

Infrastructure and know-how

While the infrastructure and know-how in hydraulic fracturing has been developed in the US since the 1980s, there is no comparable service sector, equipment availability or knowledge base in Europe.⁹ Most significant is the lack of adequate drilling rigs in Europe. The business consultants of KPMG and Pöyry notably stress that while the US boasts about 2,500 rigs, there were only 72 active rigs in Europe in 2012⁴, with a tiny fraction of them being suitable for the complicated hydraulic fracturing processes required for shale gas extraction.⁵ The KPMG study also points out that the current pipeline infrastructure would need to be significantly expanded, requiring substantial investments.⁵

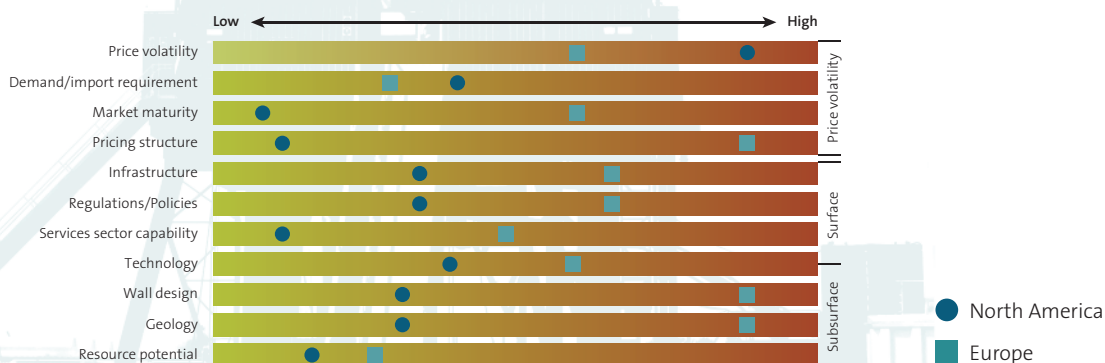
There would also be a significant bottleneck in skilled labour, with an acute shortage of qualified personnel in Europe who can operate rigs, perform highly complex drilling operations and streamline the efficiency of the operations, which, according to a study by the Oxford Institute for Energy Studies, will be crucial to minimise the already very high costs for European shale gas.¹

INFRASTRUCTURE

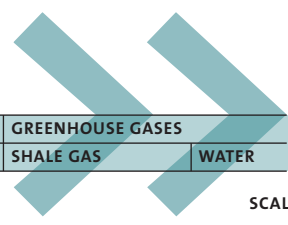
Price impact of shale gas

All the factors mentioned above, geology, water scarcity, population density and lack of infrastructure, equipment and qualified personnel, will not only significantly increase the costs for possible shale gas exploitation in Europe, as illustrated in Figure 1, but also make it very unlikely to lower costs in the long term, as shale gas operators in the US were able to.¹

figure 1 Risk factors identified in unconventional gas extraction (Schlumberger 2010)



PRICE IMPACT



	EXTRACTION	HYDRAULIC FRACTURING	GREENHOUSE GASES
CLIMATE CHANGE		EMISSIONS	SHALE GAS
			WATER

SCALE

Attempts by Wood MacKenzie¹⁴, Bloomberg New Energy Finance¹⁰ or Pöyry⁴ to predict the impact of shale gas exploitation on gas prices are based on very optimistic assumptions and exclude the costs of building the necessary infrastructure. Yet they still conclude unanimously that European shale gas will become available at current gas prices at best and is not likely to be competitive with cheaper imports, which also means that European shale gas would not lower gas prices in the next decade.^{1,4,10} The prestigious German economic research institute ZEW recently reached even starker conclusions. It consulted more than 200 gas and industrial experts who predict that shale gas will only become economically viable if the gas price reaches 15.6 \$/mcf to 19.5 \$/mcf – whilst the current gas price is at 10.5\$/mcf.¹¹

Experts agree, however, that even modest amounts of shale gas will not be produced unless supported from public subsidies. It is clear “that additional incentives, in particular tax incentives such as tax credits, tax reductions, uplifts or accelerated depreciation, will be required for unconventional gas to be developed over the next decade.”¹ Announcements by the UK Finance Minister George Osborne that generous tax breaks for shale gas companies would soon be introduced²¹ and by Polish Prime Minister Donald Tusk that Poland would invest more than 12 billion euro in the shale gas sector by 2016²² confirm this analysis. This puts shale gas in direct competition for public funding with renewable energy sources like wind and solar energy¹³ and raises the threat of locking in emission-intensive natural gas infrastructure.¹²

Shale gas prices and estimates in the UK

- Price estimates for shale gas in the UK depend entirely on the quality of the gas fields, which has not been determined yet. Calculations by Wood MacKenzie show that only gas fields as productive as the highest performing in the US would make shale gas exploitation profitable in the UK. If the fields are low performing, the breakeven price would be double of the current European market price.¹⁴
- Regardless of the well quality, Bloomberg New Energy Finance predicts that shale gas exploitation in the UK is “unlikely to result in low natural gas prices”¹⁰ The Grantham Institute concludes similarly that “it is unlikely that gas consumers would see much, if any, benefit in terms of reduced gas and electricity bills.”¹²
- Drilling costs for the exploratory drillings in the UK were five times higher than for the average US well.¹¹ Experts expect them to remain at least two to three times as high as in the US.^{10,14}
- Calculations show that even large public subsidies would not make shale gas drillings profitable unless the gas fields are of the highest quality.¹⁴
- In a recent report, the Grantham Institute estimated that “current estimates of technically recoverable resources of shale gas would be equivalent to between 2 and 14 years of domestic gas consumption, assuming that it would be possible to extract all the gas. In practice the amount of gas that could be effectively produced (i.e. the proven reserves) is likely to be much less.”¹²

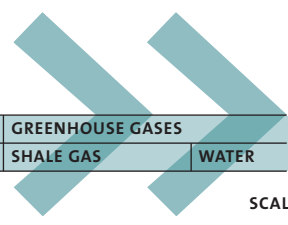
PRICE IMPACT

Speed of development

The speed with which shale gas resources could be developed in Europe is very slow. This is an important factor as conventional gas reserves are drying up and gas companies are trying to offset them with unconventional supplies. However, all analysts agree that Europe won't see an explosion in shale gas exploitation as the US has witnessed, where shale gas production rose by a factor of 20 in just 12 years.^{12,15}

BP's chief economist said that it will “take years to actually generate and unlock shale production in Europe” so that “the EU's production of shale gas might reach only 2.4bn cubic feet per day (bcfd) by 2030 - compared with about 20bcfd in the US currently”¹⁶ Bloomberg predicts for the UK that shale gas “is unlikely to arrive quickly enough in sufficient volume to drive UK prices below international levels.”¹⁰ Similarly, the consultants from Pöyry only see a “low probability” that unconventional gas could entirely offset declining conventional reserves in Europe in 2020.⁴ In its 2012 World Energy Outlook, the International Energy Agency confirms this assessment and estimates that in 2030 the European shale gas production would only amount to 2-3% of the European gas demand.²⁴

DEVELOPMENT



	EXTRACTION	HYDRAULIC FRACTURING	GREENHOUSE GASES
CLIMATE CHANGE		EMISSIONS	SHALE GAS
			WATER

SCALE

No benefits for consumers or industry

As shown above, all possible indicators show that shale gas in Europe, if economically feasible at all, would be extremely costly and develop very slowly. It is not expected that European shale gas could have a tangible effect on retail gas prices for households and businesses.¹² Even in the US, where spot prices fell by 70%, this has only translated into a 10% gas price reduction for households.¹⁷ And the positive impact on economic growth, as proclaimed by the oil and gas lobby group American Petroleum Institute,¹⁸ seems to be much lower in reality: the entire industry has only contributed to 0.6% of economic growth since 2009.¹⁷

This also explains the findings of a study which shows that the shale gas boom has not made American industries more competitive. The study by the German bank KfW tracks the competitiveness of the German and US industrial sector in the last ten years, exactly the time when the shale gas boom took off, and finds no noteworthy competitive advantage for US manufacturing sector from lower energy prices. The authors explain this by the negligible contribution of energy prices on overall costs (2%) in manufacturing.¹⁹ It is argued that even in the long term, fracking does not give the US economy a competitive advantage. On the contrary, the KfW study concludes that low energy prices reduce incentives for energy efficiency in the industrial sector, endangering its competitiveness in the long term.¹⁹

BENEFITS

Conclusion

As has been shown, shale gas in Europe, if economically feasible at all, would arrive slowly, at much higher prices than in the US and only be viable if supported by massive subsidies from European governments. These subsidies would support a technology that contaminates water supplies, endangers people's health and contributes to dangerous climate change. Friends of the Earth Europe calls on European governments to support the transition to renewable energy sources and to increase energy efficiency instead of promoting expensive, unsustainable fossil fuels. This would not only benefit people and the environment, but also enhance the competitiveness of European businesses.

CONCLUSION

Sources:

- 1 <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf>
- 2 <http://www.bloomberg.com/news/2011-11-29/shale-gas-drilling-cost-in-poland-triple-u-s-schlumberger-says.htm>
- 3 <http://www.naturalgaseurope.com/poland-shale-gas-industry-fails-to-take-off>
- 4 http://www.poyry.co.uk/sites/www.poyry.uk/files/The_Impact_of_Unconventional_Gas_on_Europe.pdf
- 5 <http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/shale-gas/Pages/Shale-gas-development-inevitable.aspx>
- 6 <http://www.ft.com/intl/cms/s/0/5e883fdc-b94c-11e1-b4d6-00144feabdc0.html#axzz2RN4ISWry>
- 7 <http://www.naturalgaseurope.com/poland-shale-gas-industry-fails-to-take-off;http://www.naturalgaseurope.com/pgnig-fx-energy-abandon-mieczewo-discovery>
- 8 <http://www.businessweek.com/news/2012-01-12/shell-ceo-says-the-potential-for-shale-gas-in-europe-is-limited.html>
- 9 http://www.energywatchgroup.org/fileadmin/global/pdf/EWG-update2013_long_18_03_2013.pdf
- 10 <http://about.bnef.com/press-releases/uk-shale-gas-no-get-out-of-jail-free-card/>
- 11 <http://ftp.zew.de/pub/zew-docs/zn/schwerpunkte/energiemarkt/Energiemarkt0213.pdf>
- 12 <http://www2.lse.ac.uk/GranthamInstitute/publications/Policy/docs/PB-uk-dash-for-smart-gas.pdf>
- 13 <http://www.reuters.com/article/2013/03/31/us-bosch-solar-shalegas-idUSBRE92U03520130331>
- 14 Wood Mackenzie (2012), UK Shale Gas – fiscal incentives unlikely to be enough, Upstream Insight. The full report is not available online, a summary can be found here: <http://www.woodmacresearch.com/cgi-bin/wmprod/portal/corp/corpPressDetail.jsp?oid=10989661>
- 15 <http://www.nature.com/nature/journal/v494/n7437/full/494307a.html>
- 16 <http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/9806638/Shale-gas-is-not-a-game-changer-for-the-UK-says-BP.html#>
- 17 <http://www.washingtonpost.com/blogs/wonkblog/wp/2013/04/23/the-oil-and-gas-boom-has-had-a-surprisingly-small-impact-on-the-u-s-economy/>
- 18 http://www.api.org/~media/Files/Policy/Jobs/Economic_Impacts_ONG_2011.pdf
- 19 https://www.kfw.de/Download-Center/Konzernthemen/Research/Research-englisch/Fokus-PDF-Dateien/Fracking_you-snooze-you-lose_en.pdf
- 20 <http://www.reuters.com/article/2013/05/08/poland-shale-idUSL6NODP2WH20130508>
- 21 <http://www.reuters.com/article/2013/03/20/us-britain-budget-shale-idUSBRE92J0UY20130320>
- 22 <http://www.reuters.com/article/2012/10/12/poland-tusk-shale-idUSW8E8KR02220121012>
- 23 <http://www.bbc.co.uk/news/business-22459629>
- 24 <http://www.worldenergyoutlook.org/>
- 25 <http://www.upstreamonline.com/live/article1266983.ece>
- 26 <http://shalebubble.org/drill-baby-drill/>

SOURCES

Friends of the Earth Europe gratefully acknowledges financial assistance from the Isvara Foundation and DG Environment. The contents of this document are the sole responsibility of Friends of the Earth Europe and cannot be regarded as reflecting the position of the funder mentioned above. The funder cannot be held responsible for any use which may be made of the information this document contains.

Published by Friends of the Earth Europe in May 2013. **authors:** Fabian Flues, Antoine Simon **editors:** Samuel Fleet, Paul de Clerck, Connal Hughes

INFO

