



UKERC Response to the Energy and Climate Change Committee's Call for evidence on the Impact of Shale Gas on Energy Markets

Part 1

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UKERC Response

This document sets out part one of a two part response of the UK Energy Research Centre (UKERC) to the Energy and Climate Change Committee's call for evidence on the Impact of Shale Gas on Energy Markets.

The overall submission of both parts is under the control of Professor Michael Bradshaw from the University of Leicester. Part two includes contributions from multiple experts.

Professor Bradshaw is leading a research project on *The Geopolitical Economy of Global Gas Security and Governance: Implications of the UK*, which is being funded by UKERC. This submission is based on that project.

Summary

This submission focuses on the potential impact of shale gas production on the global gas industry. Firstly, it suggests that the rapid development of shale gas production in the United States (US) has had a significant impact as it has resulted in the loss of a major market for LNG exporters. Events in Japan post-Fukushima are also an important factor in explaining the current situation. Secondly, the very low price for gas in the US, as a result of shale gas production, is putting pressure on gas price formation, both in Europe in relation to long-term oil-indexed pipeline imports and in the Asia-Pacific region in relation to long-term oil-indexed LNG imports. However, the high-price of oil is also a key factor in the current debate over the future pricing of natural gas. To conclude, the potential for significant shale gas production is an important factor in the current uncertainty over the future of the global gas industry, but it is not the only factor at play and any assessment of shale gas must be made in the wider context of multiple uncertainties.

1. What have been the effects of shale gas on the LNG industry?

1.1 The impact of shale gas on the LNG industry needs to be seen in the wider context of the potential transformation of the global gas industry. The first, and most direct, consequence of the rapid expansion of shale gas production in the US has been the loss of the US as a major market for LNG imports. Previously it was expected that the US

would have to import significant amounts of LNG and about 150 bcms of re-gasification capacity was constructed. Today the US uses less than 10 per cent of that capacity and there are plans to re-construct some of the re-gasification terminals as LNG export terminals. This is the case with the Cheniere Energy project at Sabine Pass in Louisiana. Now the issue under discussion is the extent that the US should be an exporter of LNG. A combination of this loss of market and the fall in gas demand as a consequence of the global financial crisis in 2008 onwards resulted in a surplus of LNG on the market. Much of this surplus LNG found its way to European markets and the UK was a beneficiary of this 'gas glut.' However, this period of plenty was short-lived as the Great East Japan Earthquake in March 2011 and the disaster at the Fukushima nuclear power station resulted in the shutdown of Japan's nuclear fleet. By July 2012 there were no nuclear power stations operating in Japan, now two plants are back in operation, but the future is uncertain. Japan has turned to increased fossil fuel use and LNG now provides 48% of Japan's power generation. As a result LNG demand in Japan increased by 20% in 2010-11. Qatar supplied 50% of this incremental demand. This is significant because a combination of increased European LNG imports, growing Asian demand and additional Japanese demand have consumed the earlier 'gas glut,' resulting in a tight market until 2015-16 when new production comes on line. In fact, by 2020 we will likely be in a situation of over-supply in the global LNG market and shale gas exports from North America will be potentially be part of that scenario.

1.2 The second impact of shale gas in the US is that it is contributing to the destabilisation of the gas price formation model in both European and Asian markets. As implied by the next question, gas is not a globalized market. Rather, in simple terms, there are four major regional pricing systems, and within these, price structures that are specific to national markets and even individual supply chains (for a detailed analysis see Stern 2012). In the US the Henry Hub price is based on gas-to-gas competition. This is also the case in the UK with the Net Balancing Point (NBP) as the benchmark price. Continental Europe is a combination of long-term prices indexed to the oil price, which currently predominate, and a growing amount of spot trading on emerging gas hubs. Prices of LNG supplies to Asia are also based on long-term oil indexed prices, with a growing amount of LNG spot trading. As a result of shale gas production in the US pushing down the Henry Hub prices, in combination with high oil prices, there is now growing pressure on the logic of oil price indexation. This pressure is being felt in Europe as companies seek to renegotiate the terms of their long-term contracts with suppliers such as Gazprom to reflect the lower prices available on spot markets.

Gazprom's pricing and contract behavior is now the subject of investigation by the European Commission. In Japan the cumulative consequence of having to source additional LNG in a tight market has made the cost of electricity an important political issue (Hosoe 2012). The Japanese Government now wants to revisit the expensive terms by which it has previously guaranteed security of gas supply. Part of the solution for Japan is to source future LNG from North America at a lower price (Ando 2012).

1.3 Shale gas is a key part of a complex set of processes that are destabilising the current pricing mechanism within the LNG supply chain. The problem is that LNG is a capital intensive business that requires a long-term commitment between supplier and buyer and at present the industry has no viable alternative to oil indexation. In a UK context this is relevant as it is becoming increasingly reliant on imports of LNG and is also playing a role as a western bridgehead for LNG entering the European Continental market via the interconnectors. Short-term, UK consumers may suffer from companies having to source high-cost LNG in a tight market, but post 2020—thanks to the development of new LNG projects based on conventional gas—there could be a plentiful market for LNG in the Atlantic basin. Of course, if US shale gas turns out to be a short-lived boom and the US has to start importing substantial amounts of LNG this would deny a cheaper source of exports for both Atlantic and Pacific basins and also a source of competition for LNG deliveries. Finally, there is considerable debate in the US about the wisdom of exporting LNG (see Ebinger et al. 2012 and Medlock 2012b), however, should it not become a substantial net exporter there are plenty of other projects in Australia, Canada, East Africa and Russia, for example, that will provide new supplies. The question is then at what cost to the consumer?

2. Could shale gas lead to the emergence of a single, global gas market?

2.1 The current global gas supply system is based on a series of regional markets and we have a largely self-contained North American market dominated by pipeline gas. At present, the direct impact of shale gas production is confined to this market. We have a European market that is supplied by domestic production, in combination with pipeline gas supplies from Norway, North Africa and Russia, with a growing amount of LNG. Finally, we have an Asia-Pacific market that is dominated by LNG supplies, the major consumers being Japan, South Korea and China. There is also now pipeline gas

supplying China from Central Asia, which is to be supplemented by supplies from Myanmar and potentially Russia. Mapped onto these markets we have a global LNG supply system that is currently divided into the Atlantic Basin and the Pacific Basin. It is the LNG trading system that provides flexibility as pipeline supplies are physically fixed. The expansion of Qatari LNG has provided a substantial amount of gas that can supply either basin, thus there are signs of greater integration. As noted above, the recent gas glut allowed European buyers to purchase cheaper LNG from Qatar. However, as a consequence of Fukushima and growing demand in Asia, buyers in the APR have sourced a growing amount of LNG from outside of the Pacific basin—in 2011 Japan received 67% of its LNG from within the APR and in 2010 the figure was 75—this situation is likely to remain until at least 2016 (Hosoe 2012, 49). After 2016 new production from Australia and Papua New Guinea will rebalance the situation. Longer term LNG supplies from Canada, the US, East Africa and Russia will provide even more supply. This could result in over-supply in the Pacific basin, which would make more Middle Eastern and African LNG (and possibly US LNG) available to European buyers.

2.2 What impact might shale gas production have on this situation? The modeling exercise conducted by Gracceva and Zeniewski (2012) assumes that most shale gas production will be consumed within producing states, which seems reasonable. Even in the US future LNG exports are likely to be modest against total domestic production and it is uncertain what impact they will have on the global LNG market. Certainly, in Europe and in China shale gas production will be consumed domestically. Thus, shale gas is unlikely to impact significantly on the supply side of the LNG system; however, it may serve to dampen down demand for LNG imports in new shale gas producing countries. Gracceva and Zeniewski (2012, 196) conclude: ‘...if high reserves and low production costs stimulate considerable [shale] gas production in all regions, this may dilute the importance of LNG by challenging the profitability of long distance interregional trade.’ This suggests that substantial shale gas will dampen the ‘globalising’ tendencies that have been seen in the LNG system. Gracceva and Zeniewski (2012, 219) make clear that shale gas in Europe will only serve to stabilize Europe’s gas import dependence at around 60%.

2.3 The important point here is that the potential impact of shale gas is part of a wider set of issues that are driving the transformation of the global gas industry. There is currently a high degree of uncertainty about the future in terms of the pricing and contracting of natural gas, but there is also an abundance of reserves of conventional

gas, let alone the prospects for unconventional gas. Given the differences between the North American, European and Asian gas markets it is unlikely that we will see a truly global market for gas anytime soon. The possibility of substantial shale gas production is critical in challenging the current pricing and contracting system, but in reality it has served to destabilise a system that was increasingly unsustainable. At present, one could argue that it is the consequences of high oil prices and oil-price indexation that are fuelling demands by gas consumers in both Europe and Asia to change the system, not the belief that a shale gas revolution is around the corner.

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