Energy & Climate Change Committee – Impact of Shale Gas on Energy Markets

Written evidence from the **Energy Intensive Users group**, 1st October 2012

1. Executive Summary

1.1 The Energy Intensive Users Group (EIUG) represents energy intensive industries such as steel, chemicals, paper, cement, lime, glass, ceramics and aluminium producers that that depend on continued access to secure, internationally competitive energy supplies to remain in business.

1.2 Some energy intensive industries (e.g. fertilisers and petrochemicals) require competitively priced sources of natural gas and other hydrocarbons as feedstocks. Others (e.g. certain ceramics processes) have no practical or economically viable alternative to the use of gas in high temperature kilns.

1.3 The UK has benefitted for many years from its indigenous supplies of natural gas, supplied through a competitive market, which has tended to provide consumers with competitively priced energy supplies. UK import dependency has recently increased as conventional production has declined, with ever greater volumes of gas being sourced from Norway, other continental markets and further afield via LNG. These higher priced sources have driven up the price of gas in the UK wholesale market up to and in some instances above the price of continental European oil-indexed industrial supplies, which are uncompetitive globally (see chart 1. in Appendix).

1.4 EIUG believes government deserves credit for recognising that natural gas will remain a vital part of the UK energy mix into the 2020s for both power generation and heat, ahead of the wider development of new nuclear and renewables. There will also be a longer term need for gas in power generation as a relatively low carbon backup for intermittent renewables, and possibly also for baseload generation if carbon capture and storage technology is satisfactorily developed over the coming decades.

1.5 In sharp contrast to the UK experience of rising gas prices, shale gas development in the United States has seen energy and feedstock prices fall, stimulating rapid growth in the manufacture of petrochemicals, and LNG import facilities being unused and being converted for export use. Fortuitously, similar to the UK experience in the 1990s, low US gas prices relative to coal has encouraged investment in gas fired power generation at the expense of older coal plant, resulting in a significant fall in CO_2 emissions.

1.6 Recent surveys from shale gas producers and respected independent bodies such as the British Geological Survey have confirmed that the UK has considerable physical reserves of shale gas. It is also possible that UK shale deposits could contain higher weight hydrocarbons – essential feedstocks for the petrochemicals industry.

1.7 UK shale reserves therefore have the potential to provide UK consumers with a secure, indigenous source of energy and hydrocarbon feedstocks, partly replacing the declining output from conventional offshore reserves. The commercial viability of these reserves is not yet proven, but even if conservative estimates are borne out in practice (the Oxford Institute for Energy Studies predicts European shale gas may be twice as expensive to produce as in the USA) the effect would be to put downward pressure on UK gas prices. Furthermore, rather than depending on subsidy (like most renewables) shale could provide a valuable source of income to the UK economy.

1.8 Energy intensive and petrochemicals sectors require certainty that energy and feedstocks will be secure and competitively priced in the medium term in order to secure future investment. Without such certainty, it is likely that these sectors will decline, reducing manufacturing capacity. If shale develops positively, however, prospects for manufacturing to build and grow on the current significant UK supply infrastructure are good.

1.9 The UK has a proven track record of technological development in oil and gas production and manufacturing. Recent reports show that shale gas is no riskier than current fuel extraction technologies and, subject to appropriate environmental regulation, can be managed safely and responsibly.

1.10 It is vital therefore for both economic and environmental reasons that the UK supports and encourages the responsible development of shale gas.

2. The importance of natural gas and hydrocarbon feedstocks

2.1 For many years natural gas has been a key part of the UK's primary fuel mix. Large indigenous offshore reserves have provided the UK with a competitive source of energy for the power generation.

2.2 The so called 'dash for gas' caused a transformation of the power generation industry with the widespread displacement of coal, resulting in a significant fall in UK carbon emissions.

2.3 UK government policy is to further decarbonise the UK economy, and it is accepted that much of this will have to be achieved through the decarbonisation of the power generation sector.

2.4 Government has recognised through its call for evidence on Gas Generation Strategy that natural gas will continue to have a vital role to play in power generation, both as a back-up for interruptible renewables and ahead of the deployment of a new generation of nuclear stations, at least for the medium term.

2.5 Since gas is to remain a critical 'bridging fuel', it is essential that UK gas prices remain internationally competitive (gas prices will remain a key influence determining wholesale electricity prices), and critically so for the energy intensive sector.

2.6 In addition to natural gas, UK offshore resources provide other hydrocarbons that are important for other industrial sectors, such as petrochemicals and fertilisers, which may also be present in shale deposits. Also, the raw materials required for the production of ceramic construction materials are often located close to, or part of, the same geological formations as shale gas, thus allowing opportunities for localised consumption of local shale gas reserves.

3. UK and the US – Contrasting Recent History of Natural Gas

3.1 Following the discovery of natural gas in the North Sea, the UK for many years enjoyed the benefits of plentiful gas supplies and gas prices which were relatively competitive internationally. The construction of the UK to Belgium interconnector also enabled large volumes of gas to be sold and exported to the wider European market.

3.2 UK indigenous production has declined quite rapidly during the mid-2000s as field depletion exceeded new discoveries. As a result, the UK has moved to becoming a net gas importer. This has resulted in prices being higher, on average, as the wholesale market has become increasingly exposed to external global influences.

3.3 The UK is now increasingly dependent upon imports of Liquefied Natural Gas (LNG) in particular. While there is as yet not a truly global market for LNG (as there is in oil) it is clear that the availability and price of LNG is affected by global supply and demand balance and other risk factors. For example, following the global financial collapse of 2008, LNG availability kept UK prices relatively low and competitive, whereas post-Fukushima increased demand for LNG has caused a significant tightening of the Asian LNG market in particular, and hence price increases worldwide.

3.4 The recent tightening of the LNG supply/demand balance has seen UK prices rising significantly, to well above those in the US (see chart 1. In Appendix)

3.5 Natural gas prices have now risen above the equivalent cost of coal for the generation of power, causing power generators to increase power generation from coal and reduce generation from gas stations. With coal stations emitting more carbon dioxide per unit of power generated, this has resulted in UK emissions increasing (we estimate that UK CO_2 power sector emissions may have increased by around 25 million tonnes in 2011 alone).

3.6 Increasing wholesale gas prices have had a direct impact on the UK power market and are a major cause of recent increases in wholesale electricity prices. With the UK generation mix being more dependent on gas than most other European markets, this has resulted in UK wholesale power prices rising to highly uncompetitive levels. When climate policy is also taken into account, the competitive position of electricity intensive energy users in the UK is even worse. (See chart 2. In Appendix).

3.7 The situation is nearly the complete reverse of that in the US. In the late 2000s, a number of import terminals were built in the US in expectation that it would need to import large quantities of LNG to meet demand.

3.8 At the same time, advances were made in the recovery of shale gas. Development was so rapid that by the time terminals were constructed, US shale gas production had grown enough that imports were simply not required and the new terminals remained very largely unused.

3.9 The growth of shale pushed US gas prices very significantly downward to lower prices than many had predicted were for viable shale economics to work. The contrast is now stark, with the US enjoying natural gas prices which are around 30% of the levels we see in the UK. (see chart 1. In Appendix).

3.10 In addition to the extraction of natural gas (methane), significant quantities of larger hydrocarbon molecules (ethane and propane) are being also extracted in the US.

4. Impact of shale in the US

4.1 The growth of shale gas in the US has had some profound impacts. As previously noted US natural gas prices have fallen dramatically and are now around the lowest in the world – certainly the lowest of the transparent liquidly traded markets.

4.2 Rather than being a net importer, the US is now expected to be a net gas exporter, with a number of major liquefaction projects announced (in part using terminals that were initially constructed to import gas). Thus, rather than exporting money to buy gas, the US economy will benefit from a large new revenue stream.

4.3 Lower US gas prices have resulted in a lowering of electricity prices, giving a massive competitive advantage to the US electro-intensive industries (see chart 2. in Appendix).

4.4 Natural gas is now more competitive than coal for power generation in the US, so gas has been displacing coal in the power generation sector. As a result, the US has seen a significant reduction in CO_2 emissions.

4.5 The increased availability and competitive cost of chemical feedstocks has seen a large number of new investments announced in ethane crackers. For example, on 1st June 2012 ICIS Heren reported that: '*US-based ExxonMobil Chemical's announcement of a new 1.5m tonne/year cracker in Texas by 2016 brings the tally of new US ethylene capacity announcements to 33% of existing capacity'.*

4.6 There are numerous other reports of the positive impact shale is having on the US manufacturing sector, which is now clearly growing. Further examples from the steel sector include Timken's $200m investment at its Faircrest plant, BlueScope's announcement it is considering adding a 1m tonne pa iron production plant at its Ohio facility, and from the chemical sector Methanex Corp. moving its methanol plant from Chile to L.A.

5. Shale Gas Potential in the UK

5.1 There is significant speculation about the potential of shale gas in the UK, although some observers appear to have concluded (prematurely, in our view) that shale is unlikely to be a 'game changer' for the UK energy market.

5.2 We do not share this negative view. We believe that shale gas in the UK has the potential to be transformational in delivering secure, internationally competitive energy and feedstock supplies that are vital for energy intensive and petrochemicals sectors.

5.3 It is apparent, albeit on limited surveys, that the UK has significant and world class shale deposits. The Bowland shale, for example, is reported to be five times the thickness of the Marcellus shale in the US.

5.4 Technically, there are reports from respected bodies that shale extraction can be achieved with no greater risk than current extractive technologies. Indeed, we consider that the UK has well established arrangements in a wide variety of industries for responsibly managing environmental and other risks. The US has demonstrated the technology which should be readily transferable. Indeed, shale gas extraction has been undertaken in Germany for many years without public fuss or technical issues.

5.5 Further, the UK has a very strong track record. The development of a massive oil and gas production and transmission infrastructure was achieved in a relatively short period in arguably a much more challenging environment. There is no reason to suggest that given the right climate that this could not be replicated for shale gas production.

5.6 The UK should be looking to achieve ‘first mover’ advantage. With an established gas and petrochemicals infrastructure already in place we only require a competitive source of supply to replace dwindling indigenous offshore reserves to sustain our remaining energy intensive and petrochemicals sectors.

5.7 The benefits to industry are only part of the story, with many wider spin-off benefits which would enhance the prospects of manufacturing and the wider UK economy.

5.8 EIUG therefore strongly supports the responsible development of UK shale gas, and consider it vital to the long term success of energy intensive manufacturing in the UK.

5.9 We encourage government to support the development of shale gas. Paradoxically, unlike renewables and new nuclear, this support will not be financial but will need to be in areas such as licensing and planning. Indeed, UK plc will reap massive financial benefit from a successful shale gas industry.

Responses to Questions

We have the following comments in response to specific questions posed by the Committee:

What are the estimates for the amount of shale gas in place in the UK, Europe, and the rest of the world, and what proportion is recoverable?

EIUG does not have expertise in this area and only has access to information that has already been made publically available.

Test drilling is required to establish reliable data on shale quality, so information on UK reserves is still evolving. Views are therefore changing rapidly, but generally new information has tended to result in ever more optimistic forecasts.

The proportion of recoverable of reserves is also uncertain. However, assuming that just 10% of reserves are recoverable, Bowland Shale appears to have the capacity to produce 30% of the volume of gas that has been extracted from UK conventional fields since 1970. In light of this, we do not think it is an exaggeration to say that shale gas potential is akin to rediscovering the North Sea.

Globally, new information is published on a near daily basis indicating that massive shale deposits lie across the planet. China, for example, has the largest reserves and with a gas market of similar size to the UK, reserves to demand ratios are equivalent to around 250 years of supply.

Germany also has significant reserves, and with shale extraction having been undertaken for many years, we anticipate that shale development will see further growth.

Why are the estimates for shale gas so changeable?

We are not experts on this question, but note that exploration to date has been relatively limited. As exploration continues, it has already become apparent that shale deposits are large, generally in excess of expectations, and globally diverse.

It is also clear that other countries are likely to pursue shale development (as the US has done) and we see it as essential that the UK, with a strong track record on gas production and an existing good infrastructure, seizes early mover advantage.

What are the prospects for offshore shale gas in the UK Continental Shelf?

We have no particular view on the relative merits of off-shore versus on-shore shale production. In either case we think it essential that Government supports the development of the industry, in particular through the granting of exploration and development licences.

Should the UK consider setting up a wealth fund with the tax revenue from shale gas?

We have no position on the merits of establishing a wealth fund. However, it is apparent that the UK economy (and hence Treasury receipts) will benefit significantly if we continue to produce and potentially export indigenous gas rather than import supplies from other parts of the globe at higher and uncompetitive prices.

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

As already discussed, the US will become a gas exporter of natural gas. Others will surely follow. It is better that the UK is an early mover.

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

Shale has the potential to improve the prospects of a global gas market developing. However, if we do not embrace indigenous shale then we will remain a large importer and price taker, exposed to the attendant geo-political risk.

What are the effects on investment in lower-carbon energy technologies?

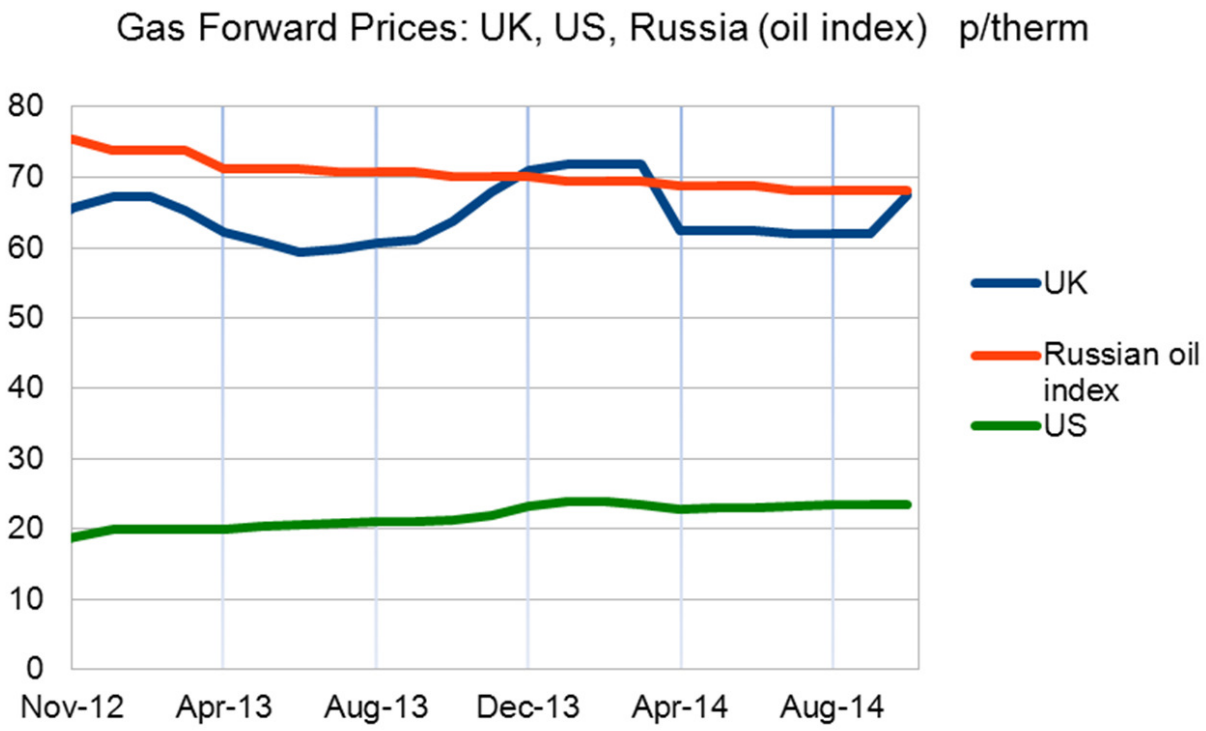
EIUG believes shale gas technology is positive news in terms of the UK's long term transition to a low carbon economy, and in terms of global emissions as gas is increasingly substituted for coal in power generation elsewhere. Gas is recognised as an essential bridging fuel that is relatively low in terms of its carbon emissions and is therefore an attractive option for backup generation that is required during the regular and prolonged periods of low output to which UK wind generation is unavoidably prone. Gas is also likely to remain an essential, relatively low carbon fuel for industry, particularly in heat-intensive sectors (certain ceramic processes, for example) where alternative lower carbon fuels are either unavailable or current electrical alternatives (if any) are remain neither practical nor economic.

What is the potential impact on climate change objectives of greater use of shale gas?

Shale has the ability to yield abundant quantities of gas, an economic primary fuel with around half the carbon intensity of coal. Its plentiful availability is therefore good news in terms of its impact on carbon emissions – especially in heavily coal dependent, rapidly developing countries like China and India which account for an increasing proportion of global emissions. There is also a possibility of using gas as a substitute for current, higher carbon liquid transport fuels, with similar benefits in terms of global application and emissions reduction.

Appendix

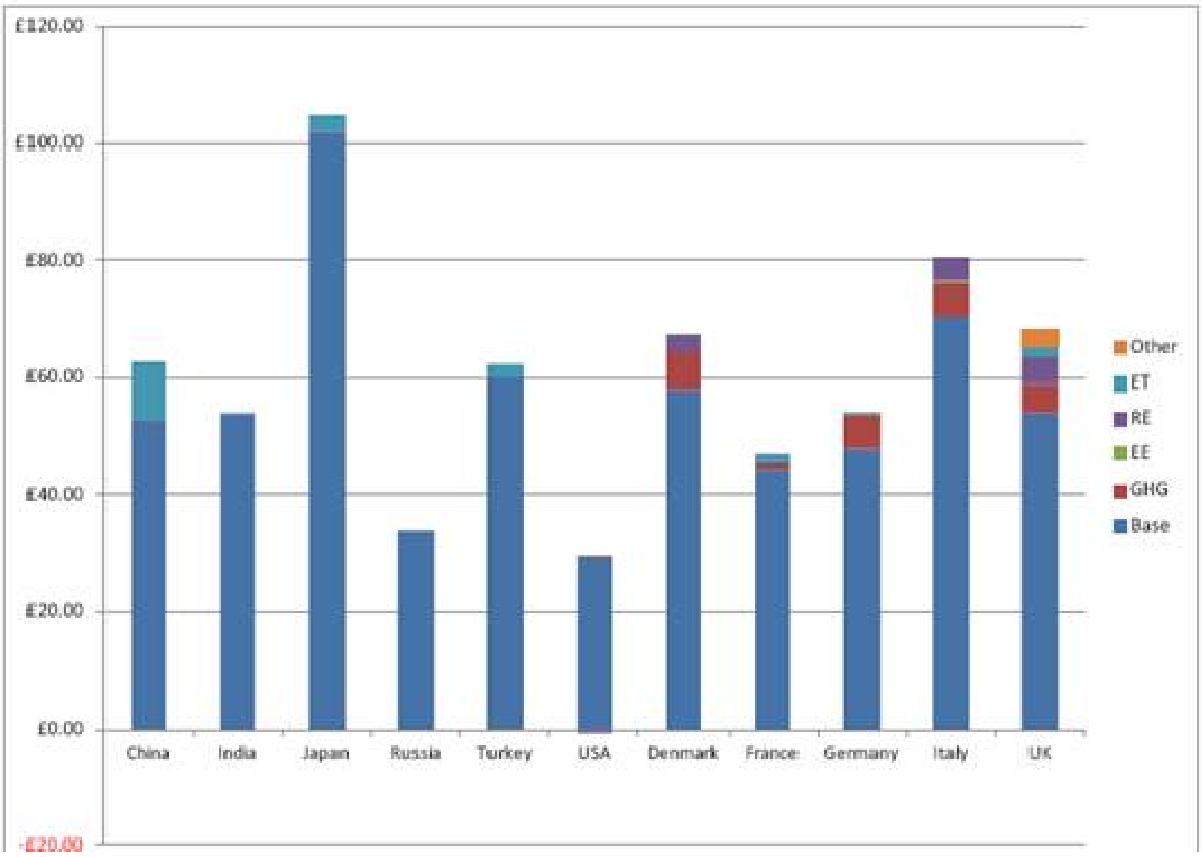
1. International comparisons – wholesale gas prices



Source: UK Energy Purchasing Specialists Ltd, September 2012

2. International comparisons – electricity prices to energy intensive users

Figure 1-1b: Base electricity price and indicative incremental impacts in 2011 on electricity price of energy and climate change policies (£/MWh, 2010 prices) – Sensitivity using market forecasts of EUA prices



Source: BIS, 'An International Comparison of Energy & Climate Change Policies impacting Energy Intensive Industries in Selected Countries', 11th July 2012