

A call for evidence on the role of gas in the electricity market

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This call for evidence sets out the importance of gas generation in the future UK electricity mix including how it will help maintain security of electricity supply and deliver our transition to a low carbon economy. It provides a set of questions which the Government hopes to discuss with industry and other interested parties in advance of publishing a strategy for gas generation. DECC will work with the Treasury and other stakeholders to produce the strategy by autumn 2012.

1. The role of gas in the energy mix

- 1.1 Gas has a vital role to play in the UK energy mix. We currently use more gas than any other primary fuel¹. Gas provides a significant proportion of electricity generation (around 34% in 2011) and sets the electricity price for most of the year, as generation from gas power stations is used to cover peaking electricity demand. Gas also provides almost 75% of energy consumption for heating, and is an important source of industrial heat.
- 1.2 Gas plays a critical role in providing a reliable and flexible electricity system that meets demand. Currently, gas generation plants are quick to build, have relatively low capital costs and are flexible. They can respond efficiently to changes in electricity demand and play a key role in keeping the power system balanced.
- 1.3 However, we face many challenges in the electricity sector over the coming decades. We need to ensure the electricity system supports the transition to a low carbon economy in the most secure and affordable way. In recognition of the significant financial challenge of decarbonisation and replacing ageing infrastructure, we need to ensure that the market puts in place a diverse range of technologies; including the investment needed for gas generation and a more diverse range of gas supply sources. We would like this call for evidence, and this autumn's gas generation strategy, to help us meet these challenges.
- 1.4 Over the next two decades, gas will continue to play a key role in our energy mix alongside other lower carbon electricity sources. We will need new gas generation

¹ Provisionally, Gas was 39% of primary energy use in 2011, vs 34% for oil. Of the amount of gas consumed in 2011, 58% of gas demand was used to provide heating and 34% was used to generate electricity. The remainder was either lost, used by the energy industry (e.g. in the production and distribution of gas), or used for non-energy purposes (Energy Trends - 2012)

capacity to ensure security of supply, as coal² and nuclear³ power stations close, and to balance the electricity system as more low carbon technology become available. Coal, for example, currently provides a significant amount of generation; in 2011 it provisionally accounted for around 30% of electricity generated⁴, and can account for a greater proportion in the winter months.

- 1.5 Natural gas is also likely to continue to play a leading role in supplying cost-effective heating well into the 2020s, although growth in on-site renewable heating and in heat networks will reduce the role of gas for heating over time. This is set out in our recent Heat Strategy⁵.
- 1.6 Beyond 2030 the share of different electricity sources in our electricity mix is inevitably less certain. However, we expect gas will have an important role in load-balancing with renewable and nuclear generation, and to meet peak demand. Dependent upon the pace of development and deployment of other generation technologies and the rate at which their costs reduce, gas generation may continue to play a crucial role in the provision of baseload capacity in the coming decades, also acting as an effective policy 'hedge'. It could play a significant ongoing role in a decarbonised electricity system with Carbon Capture & Storage (CCS). That is one of the reasons why we are committed to enabling cost-competitive CCS deployment, including through our £1bn capital fund, potentially supplemented with operational support through long term contracts, for an outcome focused programme of projects which is open to gas proposals as well as coal. By 2050, we may still need unabated gas for back-up and to meet some peak demand⁶.

2. Decarbonising the power sector

- 2.1 The Government is committed (through the Climate Change Act 2008) to meeting the legally binding target to cut greenhouse gas emissions by 2050 by at least 80%, compared to 1990 levels and the obligation under the Renewable Energy Directive for at least 15% of our energy to come from renewable sources by 2020. This is why the UK is choosing to largely decarbonise the electricity sector with low carbon technologies such as renewables, new nuclear and CCS. To do this, the coming years will see a continuation of previous trends; more switching from coal to gas-powered generation, the development of new nuclear power and CCS, and renewable electricity rising to around 30% of electricity generation by 2020. Similar to other countries, the UK will

² Around 12 GW of fossil fuel plant have opted out of the Large Combustion Plant Directive, including around 8 GW of coal, and are therefore due to close by the end of 2015 at the latest. The Industrial Emissions Directive could also lead to further closures by the end of 2023.

³ Nuclear power stations have published lifetimes which reflect an expected closure date. Operators may apply to the Office of Nuclear Regulation and the Nuclear Decommissioning Authority for life extensions. Although life extensions are possible, they are not guaranteed.

⁴ Energy Trends, DECC, March 2012

⁵ The Future of Heating; A strategic framework for low carbon heat in the UK, March 2012. Available at http://www.decc.gov.uk/en/content/cms/meeting_energy/heat_strategy/heat_strategy.aspx

⁶ The Carbon Plan: Delivering our low carbon future, DECC, 2011

move to a more diverse range of energy sources to increase electricity security and reduce exposure to volatile fossil fuel prices, as well as to cut emissions.

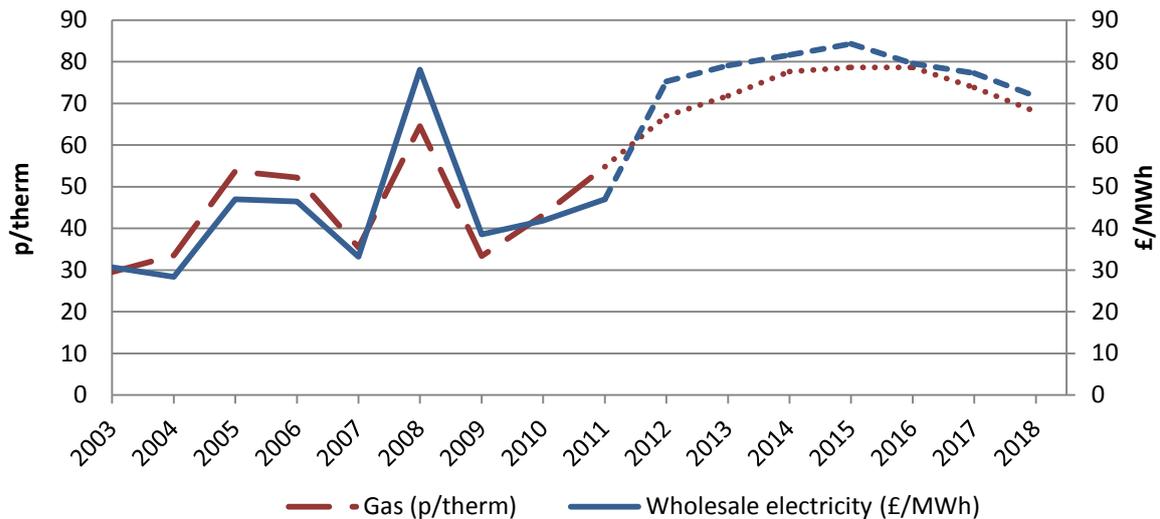
2.2 We need to ensure that we retain flexibility in delivering our security, decarbonisation and affordability goals. This is because there is considerable uncertainty over which technologies will emerge as the most economically efficient and appropriate to deliver the necessary carbon reductions and energy security over the coming decades. Through the Electricity Market Reform (EMR) and supporting policies, the Government's aim is to provide a framework for competition between all low carbon technologies; renewables, nuclear power and CCS, to drive innovation and cost reduction, and to hedge against the delivery and cost risks of technology. This means ensuring security of supply where gas generation is likely to continue to play a significant role in decarbonising the electricity sector, including through its use in industrial and commercial-scale Combined Heat and Power plants⁷. However, we recognise that the potential role for gas generation in the future, as baseload, peak demand or balancing capacity has a level of uncertainty, because this depends on the pace and cost of deployment of technologies. The Government wants to ensure we take a flexible approach to delivering a secure, affordable decarbonised electricity sector and is therefore interested in views on the role of gas generation through to 2020 and beyond.

3. Investing in gas-fired power stations

3.1 In the UK we are expecting more than 3 GW of new Combined Cycle Gas Turbine (CCGT) capacity to come online in 2012. In addition, a significant volume of new CCGT capacity is in the planning pipeline; more than 15 GW of capacity has been consented and a further 1 GW is under consideration. Despite the considerable sum of capacity in the pipeline, there is still uncertainty over if and when it will be built.

3.2 Investment in new gas generation is driven by the expected future profitability of these plants, which is in turn determined by the expected revenues and costs of the plants over the course of their economic lives. Revenues are largely driven by wholesale electricity prices, while costs are largely driven by the fixed costs associated with building and maintaining the plants, and the variable costs associated with the cost of fuel and the cost of carbon. Chart 1 below shows historic and projected electricity and gas prices.

⁷ Around 7% of our electricity currently comes from gas-fired CHP.

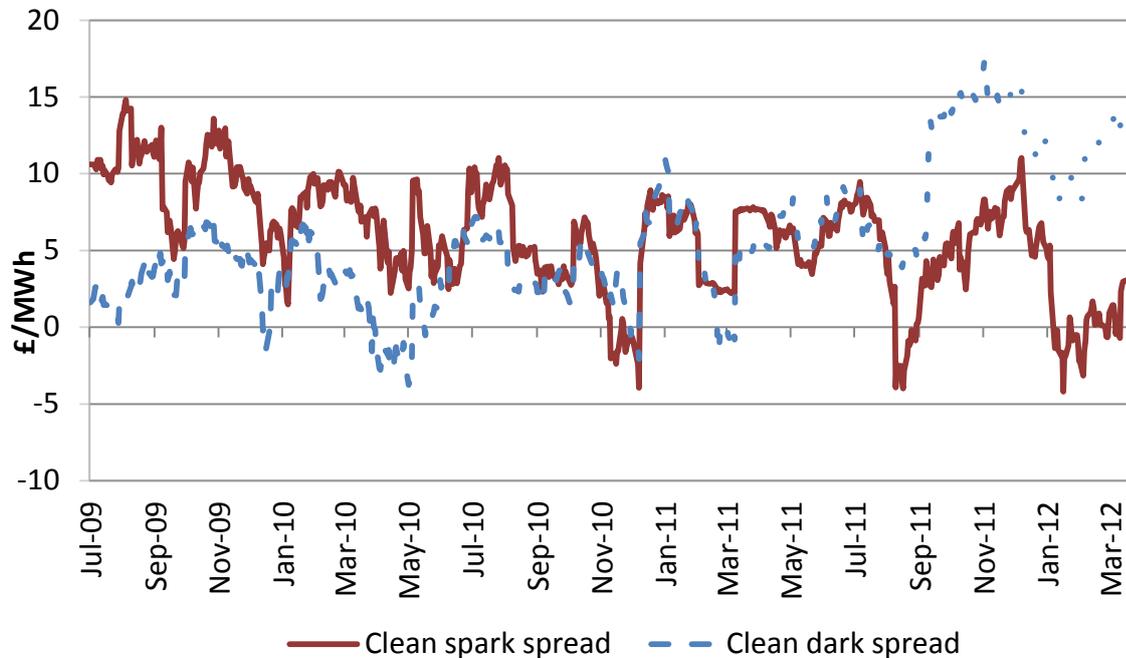
Chart 1: Historic and projected electricity and gas prices

Source: Annual averages. 2010 prices. Historical gas prices: Bloomberg. Historical electricity prices: London Energy Broker's Association. Gas and electricity projections (central): DECC 2011

3.3 The wholesale gas price and the wholesale electricity price broadly move together, as for much of the year gas-fired generation is the marginal plant and therefore sets the wholesale electricity price. A key measure of the profitability of a gas plant is the so-called 'clean spark spread'⁸. The current clean spark spread is low, as a result of low electricity prices and high gas prices relative to its closest competitor, coal. Low electricity prices are driven by excess amounts of generation capacity. As can be seen from chart 2, clean spark spreads have been falling, while clean dark spreads, which measure the profitability of coal, have remained relatively high due to the relatively low cost of coal and the current low cost of carbon.

⁸ The 'clean spark spread' represents the difference between the baseload wholesale electricity price and combined gas and carbon costs, for a reference (49% efficient) gas generator. The 'clean dark spread' shows the corresponding measure for a reference coal generator.

Chart 2: Clean Dark and Spark Spreads July 2009 - April 2012

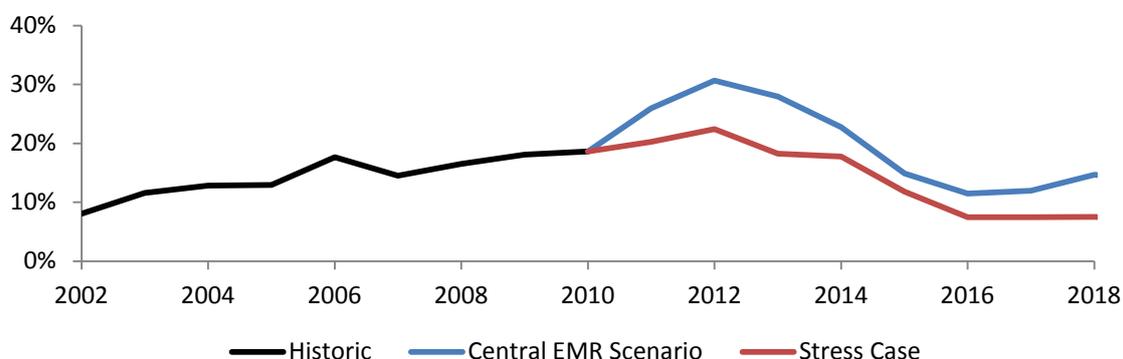


Source: DECC calculations based on Bloomberg and London Energy Brokers'

3.4 While these short term indicators suggest that gas generation is not currently profitable and may explain why some consented plants have not yet been built, there are strong reasons to believe that this will not be the case indefinitely. As chart 1 shows, DECC's current projections suggest that wholesale electricity prices will increase. A key reason for this expected increase is that we anticipate current excess capacity margins will decline later in the decade as a result of the retirement of existing coal and nuclear plants. Decisions to retire coal plants will be influenced by a number of factors such as the carbon price and underlying commodity prices. Chart 3 shows DECC's current expectations of future de-rated capacity margins as represented in the Technical Update to the EMR White Paper⁹. Tighter margins should lead to an increase in the baseload wholesale price, which should improve the investment case.

⁹ <http://www.decc.gov.uk/assets/decc/11/policy-legislation/emr/2210-emr-white-paper-full-version.pdf>

Chart 3: Historic and future de-rated capacity margins under a central scenario and under a stress case¹⁰



3.5 In the longer term we expect the amount of nuclear and wind generation to increase, which has a lower marginal cost¹¹ than gas-fired generation. This means that as the amount of this type of generation increases, gas-fired generation will dispatch less. For an investor, this creates uncertainty as flexible plants will be increasingly reliant on volatile, unpredictable prices to secure the revenues needed to justify investment.

3.6 For CCGTs the pattern of dispatch will potentially change too. Nuclear generation and some renewables technologies run almost constantly throughout the year, whereas other renewable technologies such as wind and solar are more dependent on the weather. This means that CCGTs, as well as other types of flexible generation and storage, could have a very important role to play in the future generation mix as the electricity market is decarbonised, and that role will depend on the pace and extent of deployment of other generation technologies.

3.7 It could be concluded that while the immediate outlook for gas plants on the system is difficult given current spark spreads, the medium term outlook is more favourable when we consider the market fundamentals and as the role for gas generation becomes clearer, but we would be interested in views.

4. Supplying gas to power stations

4.1 The UK has one of the largest gas markets in Europe, and the most competitive, liquid and transparent. This makes it an attractive destination for overseas gas producers, and has encouraged competition between gas suppliers. In turn, the market has delivered significant investment in a diverse range of gas supply sources; domestic production, import pipelines from Norway and the Continent, Liquefied Natural Gas (LNG) from the

¹⁰ Source: <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/energy-markets/3884-planning-electric-future-technical-update.pdf> (p.25)

¹¹ Marginal cost refers to fuel costs, carbon costs and variable operational and maintenance costs.

global market and storage. Import capacity alone could supply over 150% of the UK's annual gas demand.

4.2 Spare import capacity from pipelines and LNG terminals are important sources of flexibility, which in conjunction with storage, enable the market to balance supply and demand. In addition, GB's liquid spot market quickly reacts to changes in the supply and demand conditions and allows the market to allocate gas efficiently to those who value it most. In this way, demand-side response, such as voluntary fuel-switching in the power sector, can also be a valuable market balancing tool. This diversity and flexibility provides a high level of supply security and has contributed to relatively low wholesale prices compared to other European countries.

4.3 With the continuing importance of gas within our energy mix and declining domestic production from the North Sea, maintaining a flexible and diverse supply base will be essential to ensure we do not become overly reliant on particular sources or routes, and to help manage the risks of supply and price shocks. Our existing supplies by pipeline from the European Economic Area (Norway and the EU) and LNG (global markets) have played a key role in ensuring reliability of our gas supplies, and we expect this role to increase. Recent independent assessments (for example the Poyry reports for DECC¹²) suggest the global outlook for gas supply is good. The International Energy Agency (IEA) has described the global gas resource base as 'vast and widely dispersed geographically', with remaining recoverable reserves of conventional gas equivalent to 130 years of current consumption. Large scale global development of unconventional gas such as shale gas would further improve this outlook. The IEA has estimated that unconventional gas could add a further 125 years worth of current consumption. However, the extent to which unconventional gas production will develop outside the US is highly uncertain. The US boom in unconventional production was supported by favourable geology and resource ownership laws, low population density, good supply chains/networks and favourable regulatory environments. These factors may not be present to the same extent elsewhere. In addition, global gas demand is estimated to rise dramatically, by 55% by 2035 according to IEA.

4.4 Nevertheless, given the continuing importance of gas within our energy mix the Government is not complacent and has legislated to give Ofgem new powers to sharpen incentives on gas suppliers in order to maintain adequate gas supplies. The Government has also asked Ofgem to produce a report on the risks to gas supplies and the merits or otherwise of further measures to address those risks.

4.5 As domestic production declines, a range of infrastructure is likely to be required: new import infrastructure such as import pipelines, gas reception facilities and LNG import facilities to replace declining domestic production; and increased gas storage capacity,

¹² GB Gas Security of Supply and Options for improvement, Poyry 2010. See http://www.decc.gov.uk/en/content/cms/meeting_energy/markets/gas_markets/gas_markets.aspx

to provide close-to-market 'swing supply' to help meet peak demand. It will also be important to ensure our infrastructure is appropriate to meet peak demand. Particularly important, in the context of the potential role for gas in providing flexible capacity, will be the development of fast-cycling storage facilities. Currently four such facilities are under construction, which together will almost double current storage deliverability, while six others have the majority of their planning consents in place.

4.6 There is also likely to be a need for reinforcement of the transmission grid to help manage changing patterns of flows into and around the transmission system, in particular to meet any new gas-fired power stations and the variability in supply of plants providing back-up capacity. Investments in the National Transmission System are subject to price controls regulated by Ofgem. Network Operators are in the process of agreeing Business Plans with Ofgem for the next price control period which will run from 2013-2021.

5. Tackling barriers to gas generation investment

5.1 It is vital that any obstacles to investment in gas generation infrastructure are removed or reduced where possible and appropriate to do so, so as to enable the delivery of gas-fuelled generating capacity at the lowest cost to consumers.

5.2 The aim of EMR is to meet the significant long-term challenge of decarbonisation and to deliver our carbon reduction targets, while maintaining secure and affordable electricity supplies. EMR consists of a carbon price floor, the introduction of new long term contracts for low carbon electricity generation (contracts for difference), a capacity mechanism to ensure secure electricity supply and an Emissions Performance Standard (EPS).

5.3 A capacity mechanism, which is a market intervention intended to ensure adequate and reliable capacity, is particularly relevant to gas generation and the Government has now committed to legislate to introduce a Capacity Market. The Government is taking this step in response to the changing nature of the GB electricity market, because in the future there will be an increased proportion of low carbon plants with very low running costs on the system. A Capacity Market can provide greater revenue certainty by providing fixed payments for capacity, which in turn may reduce the cost of capital. This increased certainty will enable investments to be made with greater confidence and means that a Capacity Market can play a key role in incentivising new gas generation, as part of a diverse mix of capacity and to ensure security of supply. We intend to publish further information on EMR shortly.

5.4 In addition, the future role of gas generation to balance the electricity system will be considered in the Electricity Systems Paper which the Government intends to publish this summer. This paper will set out initial views on any actions the Government deems necessary to ensure that the electricity system can continue to balance supply and

demand over the longer term in a way that minimises cost and makes most efficient use of assets.

5.5 The Government also confirmed in the EMR White Paper that it would introduce an EPS applicable to new fossil-fuel power stations and targeted to helping deliver the Government's commitment to preventing the most carbon-intensive power stations from being built. It confirmed that the level would be set as an annual limit equivalent to 450g/kWh at baseload, a level below the emissions intensity of coal, but above that of modern gas plants. However, in order to ensure that there is sufficient certainty for investors in gas generation under the EPS, it has been confirmed that the Government intends the level to be set out in primary legislation and maintained for power stations consented under the 450g/kWh-based level until 2045.

5.6 The Government is aware of other sources of regulatory uncertainty which have a bearing on the financial decisions of investors and is therefore interested in views on tackling barriers to gas generation investment.

6. Engagement & Questions

6.1 The Government is keen to generate an open discussion with interested parties about the role of gas in the UK's electricity sector. Below we set out a list of questions for discussion on which the Government would like to engage with stakeholders. Written responses should be sent to gasgeneration@decc.gsi.gov.uk or Gas Generation Call for Evidence, Area 4E, 3 Whitehall Place, London SW1A 2AW (telephone 030 0068 6796). The closing date for responses is 28 June 2012.

- a) What are the main strengths and weaknesses of gas generation in helping deliver a secure, affordable route to decarbonisation through to 2020 and then by 2050?
- b) What role can gas fired generation play in the future and what level of gas generation capacity is desirable?
- c) What are the key factors driving the economics of investing in new gas-fired power generation and how are these factors likely to change?
- d) What barriers do investors face in building new gas generation plants in the UK? What are the key regulatory uncertainties that may prevent debt and equity investors making a final investment decision in gas generation and supply infrastructure?
- e) Are there any other policy issues that need to be addressed beyond the Government's proposals for the capacity mechanism and the EPS?
- f) Given a continuing role for gas and the potential for increased volatility in gas demand, to what extent is gas supply and related infrastructure a barrier to investment in gas fired generation? What impact will unconventional gas have on the case for investing in gas generation and the supporting infrastructure?

Confidentiality and data protection

Information provided in response to this call for evidence, including personal information, may be subject to publication or disclosure in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004). If you want information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

The Department will process your personal data in accordance with the DPA and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

If you have any comments or complaints about the call for evidence process, please email consultation.coordinator@decc.gsi.gov.uk.

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