Gas Generation Call for Evidence
Department of Energy & Climate Change
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28 June 2012

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

EDF Energy is one of the UK's largest energy companies with activities throughout the energy chain. Our interests include nuclear, coal and gas-fired electricity generation, renewables, and energy supply to end users. We have over five million electricity and gas customer accounts in the UK, including residential and business users.

EDF Energy is committed to delivering affordable, secure, and diverse low carbon supplies based on a diverse energy mix, including nuclear and renewables. We believe that gas fired generation will play an important role in this mix as part of the trajectory towards a decarbonised power sector in the 2030s. It will play a key role in providing the reliable and flexible generation required to balance the increasing amount of intermittent renewable generation envisaged for the electricity system.

It is for this reason that we have invested £860m in a new 1.3GW combined-cycle gas turbine (CCGT) plant at West Burton in Nottinghamshire. The construction of the CCGT is part of our strategy of investment in the UK energy infrastructure, and once commissioned, it will generate enough electricity for approximately 1.5m homes.

However, EDF Energy believes that further investment in gas plant, beyond the minimum that is required to bridge the gap to the transition to low carbon technologies, will not be the right answer for the UK's climate change objectives. Such investment increases the risk that the UK's long term emissions reduction targets will not be met. This is because the carbon emissions from these new assets will either be 'locked in' or, alternatively, it increases the risk of stranding assets. We believe it will also be important to consider the carbon footprint of long distance gas transportation systems, including Liquefied Natural Gas (LNG) and pipelines. This could be significant in some cases, as the UK starts increasingly to move away from UK Continental Shelf (UKCS) supply to a greater reliance on imported gas.

We believe that the largest opportunity for gas in the longer term exists when it is fitted with carbon capture and storage (CCS), which could allow gas to take a larger share of the market if other low carbon options do not come forward, or if they prove to be more expensive.

EDF Energy does not believe that investors currently face any substantial "barriers" to building new gas generation plants. Market conditions simply do not currently favour investment in new CCGTs, and this is demonstrated by low short-term clean spark

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spreads over the near term trading horizon. However, we would expect the spreads to improve in the medium to long-term, responding to closures of around 40% of existing generation capacity expected by 2025.

It is likely that investors are also aware that the Government's commitment to move to a low carbon economy will mean that fossil fuel plant such as CCGTs will in the future operate at lower load factors than historically has been the case. This is likely to lead to increased revenue uncertainty. The Government has correctly recognised that this uncertainty could lead to under-investment and lower levels of reliable capacity.

EDF Energy therefore welcomes the Government's proposal to introduce a capacity market to help address security of supply concerns. A well designed capacity market will deliver a higher reliability standard in a sustainable and cost effective way. It is vital that the capacity market is designed to provide adequate capacity to ensure security of supply. This will require fairly reimbursing all reliable capacity that has been successful in the auction to compensate for the loss of the scarcity premium in the energy price resulting from the introduction of the capacity mechanism. In order to reduce investor uncertainty, it is crucial that the Government keeps to its timeline of providing more detail on its design preference for the capacity mechanism by the end of the year.

We also note that there would appear to be clear interactions between the development of the capacity market and the operation of the gas system. The design of any capacity mechanism should therefore recognise the interaction between the two and aim to ensure that there are no unintended consequences. It is vital that National Grid, as the electricity and gas system operator and proposed administrator of the capacity market, is empowered to consider these interactions in a holistic manner. We believe that, as further details of the detailed frameworks relating to Electricity Market Reform (EMR) are published, this will give investors a clearer idea of the role of gas in the energy mix in the future.

We would like to emphasise the fact that coal fired generation, as well as gas, also has a key role to play in providing capacity until the early 2020s. It is therefore important that the Government considers in the design process the interaction between the development of the capacity market and the implementation of the Industrial Emissions Directive (IED).

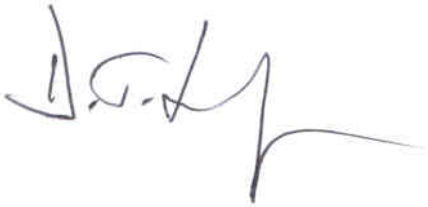
EDF Energy is aware of the current impact of unconventional gas, such as shale gas, on prices and supplies in the USA in terms of depressing local market prices. However, we expect that the shale gas impact in Europe will be smaller than in the USA because of lower production potential and several other factors that are likely to lead to higher costs. Instead, we believe that Europe is likely to be caught between downward pressures through LNG cargoes diverted away from the USA (and the development of LNG supply from Qatar and Australia), and upward pressure from growing demand for gas from Asia. Although the volume of gas available worldwide may be higher, it is important to note that, once the cost of transportation to Europe is taken into account, this may only curb the extent of price rises in the longer-term rather

than drive prices down from current levels. We believe that the UK will still mainly be reliant on imports, and that prices will be driven by the price of the marginal supply (e.g. imports from Russia or competition with Asian demand for LNG), and unconventional gas will not dramatically alter the need for investing in gas generation and supporting infrastructure.

Our detailed responses are set out in the attachment to this letter. Should you wish to discuss any of the issues raised in our response or have any queries, please contact Ravi Baga on 020 77522143, or myself.

I confirm that this letter and its attachment may be published on DECC's website.

Yours sincerely,



Denis Linford
Corporate Policy and Regulation Director

Attachment

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

EDF Energy's response to your questions

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?

EDF Energy believes that gas fired generation has a number of strengths and that it will play a reduced, but nevertheless important role, in a diverse energy mix as part of the trajectory towards a decarbonised power sector in the 2030s.

Gas fired generation is a proven technology, is well understood by developers and has an established and secure global supply chain. It has the advantage of a fast build time of around 2.5 years[1]. Development consents exist for approximately 15GW of new combined cycle gas turbines (CCGTs) which could be taken forward at relatively short notice if the need for this capacity materialises. However, as we will discuss in our response to Question b), we believe that the best way for the UK to ensure maximum delivery of low carbon generation is to remove, as far as is possible, the need for new CCGT plant beyond that which is already planned.

Gas fired generation also benefits from a well developed wholesale gas market in the UK, supported by adequate import infrastructure and short-term gas storage facilities. We believe that gas fired generation can play a role in providing the reliable and flexible generation required to meet peak demand. It will also help balance, in the short to medium term, the increasing amounts of intermittent renewable generation envisaged for the electricity system, as other balancing technologies such as electricity storage may continue to develop.

While gas generation has lower CO_2 emissions (circa 40%) than old coal fired generation, it is important to note that gas generation, without carbon capture and storage, is still a significant source of carbon emissions in its own right. We believe it will also be important to consider the carbon footprint of long distance gas transportation systems, including Liquefied Natural Gas (LNG) and pipelines. This could be significant in some cases, as the UK starts to move increasingly away from UK Continental Shelf (UKCS) supply to a greater reliance on imported gas. As we will discuss in our response to Question b), another potential weakness from importing more gas is that it exposes the UK to greater price volatility and long-term price uncertainty as global demand continues to increase.

[1] Mott McDonald, UK Electricity Generation Costs Update, June 2010

We note that prices in long-term gas contracts have historically been indexed to the price of oil, which in turn is largely driven by geopolitics and international events. In fact, the UK's energy security of supply is increasingly dependant on global oil and gas wholesale markets and on other producers of primary fuels. Using gas as an example of both a primary fuel used for domestic heating and a secondary fuel for electricity generation, world production has been increasingly concentrated outside the OECD countries. These countries are often viewed as politically more volatile and hence susceptible to greater fears of supply disruption.

Focusing on the European Union as a region, we find a high degree of reliance on imported gas from the Eastern European transit countries and on production from Eurasia. This is forecast by the International Energy Agency[2] to increase. Imports from North Africa are also set to rival those from Russia in terms of volumes imported into Europe. We have also seen the rapid political realignment of these gas exporting countries and so a greater reliance on imported gas opens the UK to very different forms of risk.

It is important to make the point that not all events are the same in terms of their impact on wholesale market prices or on the UK's economy. In a financial market, where traders do not expect to take delivery of the commodity, prices can often reflect sentiment or trading positions and not a fundamental threat to supply. As we increasingly diversify our sources of gas, we may expose ourselves to a wider range of political risks but may also be able to hedge physical supply risks by sourcing gas supplies through existing relationships with other producing countries.

b) What role can gas fired generation play in the future and what level of gas generation capacity is desirable?

Around the start of the next decade, the UK is facing a shortfall in its generation capacity as a result of, in particular, coal plant closures and constraints on running linked to age and environmental measures such as the Industrial Emissions Directive (IED). It is vital that this gap is filled by low carbon technologies for the UK to meet its climate change commitments. EDF Energy recognises that, while some new gas build may be needed to meet any potential supply shortfall, it is clear that a second 'dash for gas' (following the trend of the 1990s) will significantly reduce the scale of decarbonisation of the power sector that could be achieved by the 2030s. Such fuel-switching will be insufficient on its own to enable the UK to meet its climate change targets. It will also increase the UK's overall exposure to gas supply shocks and price risk. This would be particularly acute given the impact gas supply costs have on the overall cost of a CCGT (approximately 70% at current gas prices of around 60p/therm).

Gas plays a significant role in our energy mix today, with 46% of electricity generation[3] and 81% of home heating[4] fuelled by this source. However, we support DECC's

[2] IEA World Energy Outlook 2011, p94

[3] DECC, Chapter 5 of the Digest of UK Energy Statistics (DUKES) for 2011

ambitions to move away from fossil fuel heating. EDF Energy has long supported early action on renewable heat, as we believe that this is a sector which can make a significant and cost effective contribution to the UK meeting its 2020 renewable energy target, especially through the use of heat pumps.

The forecast decline in UKCS gas reserves will mean importing more gas. Hence the UK faces a greater exposure to international gas markets, both in terms of physical delivery and price. While we have recently witnessed a global oversupply of gas and lacklustre demand (which has curbed the recent increases in gas prices), the lack of sufficient indigenous resources creates a net risk for the UK economy. In addition to the risks presented by potentially volatile fossil fuel prices, the UK should also recognise the potential risks that could arise from carbon price shocks if it fails to decarbonise sufficiently its energy supplies.

EDF Energy believes that further investment in gas plant, beyond the minimum that is required to bridge the gap to the transition to low carbon technologies, will not be the right answer for the UK's climate change objectives. Such investment increases the risk that the UK's long term emissions reduction targets will not be met. This is because the carbon emissions from these new assets will either be 'locked in' or, alternatively, it increases the risk of stranding assets. The Committee on Climate Change (CCC) has stated that delivering the 2050 target is likely to require the power sector to be almost, if not completely, decarbonised by 2030, suggesting a carbon intensity of around 50gCO_2/kWh by this date. We agree with the CCC's analysis that concludes that investing in gas-fired plant rather than low carbon technologies "will result in a deviation from the path towards meeting long-term targets"[5].

However, EDF Energy recognises that there will still be an important role for new gas plant in the short to medium term to help ensure the UK's energy security of supply. As stated in our response to Question a), gas as a fuel will play a key role in providing the reliable and flexible generation required to balance the increasing amounts of intermittent renewables envisaged for the electricity system. However, some of this gas could be used more effectively in existing gas stations that have been mothballed rather than in newly built plant. We believe that an optimal mix of gas fired plant would include a mixture of CCGTs and less efficient but more flexible and lower cost open-cycle gas turbines (OCGTs). We note later in our response the importance of getting clarity on the capacity mechanism proposed in Electricity Market Reform (EMR). This will help ensure industry can make well informed decisions that ensure consumers do not have to pay more than is necessary to deliver future energy needs.

It is important that suitable grandfathering provisions for the Emissions Performance Standard (EPS) are in place for new plant, to reduce investor uncertainty by addressing stranded asset risk. We therefore welcome confirmation from the UK Government in

[4] DECC, The Future of Heating: A strategic framework for low carbon heat in the UK, March 2012

[5] Committee on Climate Change, Meeting Carbon Budgets – the need for a step change Progress report to Parliament, p24, October 2009.

the Energy White Paper that the operation of the EPS will not be retrospective, and that plant which is consented before the EPS comes into legislation will not be subject to the mechanism.

We note that the CCC, in its Renewable Energy Review[6], had an illustrative generation scenario in 2030 in which power sector decarbonisation could be achieved with a 40% share of renewables, 40% nuclear, 15% fossil fuel with carbon capture and storage (CCS), and up to 10% from unabated gas. In line with this, we believe that the largest opportunity for gas in the longer term exists when it is fitted with CCS. This could potentially allow gas to take a larger share of the market if other options do not come forward or if they prove to be more expensive.

The latest estimates for the levelised cost of electricity[7] suggest that gas CCS appears to be favoured over coal CCS (reflecting the lower capex and carbon intensity of gas) and this will be an important consideration as more intermittent wind comes on the system. We therefore welcome the inclusion of gas in the Government's CCS Commercialisation Programme, which will hopefully accelerate commercial deployment of the technology in the 2020s.

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?

As stated in our response to Question a), we note that approximately 15GW of CCGT projects have received Section 36 planning consent but have not yet been taken forward for investment decisions. Companies have invested a significant amount of time and money to secure these consents. We believe this is a rational response from developers to establish credible options that provide a significant level of contingency to ensure future electricity demand can be met.

The key factors in driving investment in new gas-fired power generation will be the developers' view of the clean spark spread and projections of future electricity demand and supply imbalances.

Short-term clean spark spreads are currently trading at very low margins as a result of weak power demand (due to the recession), healthy supply volumes, and lower coal prices. This suggests that the market does not believe there is a need for new gas fired capacity over the near term trading horizon. For example, on 27 June 2012, the front-season clean spark spread was just £0.36/MWh. This is far too low to justify new build baseload CCGTs (and also currently compares unfavourably with the equivalent clean dark spread for coal of £17.30/MWh). This looks set to continue for the foreseeable near term future as indicated by National Grid's summer outlook, which states that supply margins will be comfortable through the summer. We note that there does not appear to be any significant change to this trend for the summer 2013 trading horizon.

[6] Committee on Climate Change, Renewable Energy Review, May 2011

[7] Mott McDonald, Potential cost reductions in CCS in the power sector - Discussion Paper, May 2012

In the medium to long term, we would expect the market signals for new gas fired capacity to improve as existing generation capacity closes. However, as discussed in the next section, revenue uncertainty, because of increasing penetration of intermittent wind generation, may make investment in gas generation unattractive in the absence of a capacity mechanism.

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?

EDF Energy does not believe that investors face any substantial "barriers" in building new gas generation plants. For example, the Overarching National Policy Statement (NPS) for Energy (EN-1), together with the NPS for Fossil Fuel Electricity Generating Infrastructure (EN-2), clearly sets out the primary basis for decisions by the Planning Inspectorate on applications it receives for nationally significant fossil fuel electricity generating stations (e.g. air emissions, noise and vibration effects). As stated in our response to Question c), we note that approximately 15GW of new CCGTs already have Section 36 development consent but are currently not scheduled for construction. This would imply that there are reasons outside the planning process responsible for this situation.

Investors are also aware that the Government's commitment to move to a low carbon economy will mean that fossil fuel plant such as CCGTs will in the future operate at lower load factors than historically has been the case. This is likely to lead to increased revenue uncertainty. The Government has correctly recognised that this uncertainty could lead to under-investment and low levels of reliable capacity. We believe there is a significant risk that the present energy only market may not provide a sufficient signal for investment in reliable generation capacity or the provision of demand side response, particularly as more intermittent plant is added to the system.

EDF Energy therefore welcomes the Government's proposal to introduce a capacity market to help address security of supply concerns. A well designed capacity market will deliver a higher reliability standard in a sustainable and cost effective way. We believe that it is important that physical security of supply is achieved through actual physically backed capacity (that can be verified by the System Operator), as opposed to reliability markets with no physical backing (i.e. pure financial options). We also believe that penalties for failure to provide capacity should be related to the size of capacity payments rather than being related to energy market prices. This approach will avoid the risk of imposing a double penalty through energy cash out and capacity penalties on capacity providers, which will contribute to minimising the overall cost of capacity procurement. It will also avoid the creation of potentially damaging distortions to energy market trading that may damage energy market liquidity.

Although the high-level framework set out in the draft Energy Bill provides the broad parameters for the capacity market, we believe that investors are likely to be awaiting further details on the detailed designed of the mechanism before committing to further investment in gas-fired generation. This is particularly true given that DECC is currently considering the relative treatment of new and existing plant and will not make a decision on this before the end of the year. It is an important principle that all capacity which contributes to maintaining physical security of supply should receive recognition of the value of the capacity it provides in the capacity mechanism.

Investors also currently face uncertainty on the likely timing of the first capacity auction, which DECC states will be decided by Ministers on the basis of the security of supply outlook. Although we believe that the UK is unlikely to face a capacity shortage until the early 2020s, we believe that there is merit in the early introduction of the capacity market. If there is adequate capacity, then early auctions would demonstrate this by revealing a low value for capacity. These early auctions would provide much needed clarity on the process, instil confidence in the way in which the capacity mechanism will operate and may help to avoid early closure of existing capacity.

We believe that as further details of the detailed frameworks relating to EMR are published (e.g. the volume of generation to be contracted by contracts for difference) then this will give investors a clearer idea of the role of gas in the energy mix in the future.

We also note that there would appear to be clear interactions between the development of the capacity market and the operation of the gas system. In particular the value of capacity at times of scarcity could provide the market signals to incentivise short term / fast-cycle gas storage capacity. The operation of CCGTs is dependant on the clean spark spread and not on the absolute values of electricity and gas. As such a CCGT will continue to generate if the spark spread is sufficient. This link is significant especially when it is considered that CCGTs offer the largest potential for demand side response on the gas system. Equally the striking of electricity capacity contracts in particular geographic regions, such as the South West, may help to avoid investment in the electricity transmission system but could trigger investment in the gas system to support this generation and this link should allow the market to optimise the investment needed. The design of any capacity mechanism should therefore recognise the interaction between the gas and electricity systems and aim to ensure that there are no unintended consequences.

A further example is that it is necessary to protect local gas distribution networks from a shortage of gas because safe restoration of supplies to customers could take many months. This means that in extreme circumstances it may be necessary to switch off CCGTs to protect the gas system even if this results in temporary loss of electricity supplies to some customers. The design of the capacity mechanism and the penalty regime should take this into account.

e) Are there any other policy issues that need to be addressed beyond the Government's proposals for the capacity mechanism and the EPS?

EDF Energy believes that the major policy issues have been addressed, and that further measures are unnecessary. The priority should be to make the Government's proposed EMR measures work. Given the concerns raised in our response to Question d), it is vital that the Government keeps to its timeline of providing more detail on its design preference for the capacity mechanism by the end of the year.

We would also like to emphasise the fact that coal fired generation, as well as gas, has a key role to play in providing capacity until the early 2020s. It is therefore important that in the design process the Government considers the interaction between the development of the capacity market and the implementation of the IED. The continued operation of coal plant beyond 1 January 2016 will require either major investment in Selective Catalytic Reduction (SCR) or similar technology to meet tighter IED emission limits, or the acceptance of limited life and running hours under derogation. By the end of 2013, coal plant operators must make a binding decision on their selected IED compliance route (to "opt in" or "opt out"). As operators are preparing financial decisions on SCR investments now, it is important that they have clarity soon over the detail of the capacity mechanism. This is because any revenue from the mechanism may be critical in determining whether such plant remains open or not. We believe this reinforces the need to introduce the capacity market as soon as practicably possible, as it will help reduce the risk associated with investment decisions in all forms of generation.

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?

EDF Energy believes that the UK regulatory regime has, in the past, encouraged sufficient and significant investment in gas supply and related infrastructure to meet UK demand. This is demonstrated by the growth in LNG terminals over the last decade as well as the growing investment in gas storage and interconnectors. Such investment will be important going forward as the UK becomes more dependant on imported gas supplies from a diverse range of sources. However, there is a risk from the reliance on imports. As DECC and Ofgem acknowledge, "while sufficient capacity is a requirement for promoting security of supply, it is also essential that there is sufficient availability of gas (i.e. gas molecules flowing)"[8]. It is therefore important not to hinder the functioning of the competitive gas market or to limit the amount of gas being brought into the UK. In fact, any impediments, both physical and contractual, should be removed where possible.

[8] DECC/Ofgem, Statutory Security of Supply Report, November 2011

We also note that CCGTs are unique in the generation sector in that they are reliant on regulated transmission owners providing the infrastructure for their fuel supply requirements (i.e. their gas connection) as well as on the ability to make their electricity available to the market (i.e. their electricity connection). The introduction of the Connect and Manage regime as part of the Transmission Access Review has removed the constraint that was previously present on gaining access to the electricity system. However, CCGTs are also dependant on the ability of National Grid Gas (NGG) to deliver their gas connection and capacity in order to be able to generate.

The new process that the Planning inspectorate follows, through the nationally significant infrastructure project regime, has potentially increased NGG's timetable for delivering additional capacity when significant additional investment is required to support this. This could potentially limit the ability of NGG to connect new gas generation capacity. For example, we note that Ofgem has recently consulted on NGG's revenue requirements to support five potential CCGTs and two potential storage projects in the South East. If all of these projects were to go ahead, Ofgem's consultations indicate that NGG would require an additional £1.5bn of investment to support these projects. Our analysis suggests that most of these projects already have Section 36 development consent, and so the ability to deliver gas connections and capacity may represent a constraint in this area.

EDF Energy is aware of the current impact of unconventional gas, such as shale gas, on prices and supplies in the USA in terms of depressing market prices. However, we believe that caution has to be exercised in assuming a similar "shale gas revolution" in the UK and the rest of Europe. This is due to a number of factors including important differences in geology, population density and higher water costs. The commercial viability of extraction is variable across countries because it is dependant on specific local issues, including access to land, environmental constraints, technological knowledge and expertise, cost of production, access to market and fiscal terms.

We therefore agree with DECC, that if shale gas is to be part of the UK's energy mix, then we need to have a good understanding of its potential impacts (including a number of environmental concerns) and what can be done to mitigate them.

However, prima facie, we expect that the shale gas impact in Europe will be smaller than in the USA due to the uncertainties over resource and production potential. For example, a recent report from Pöyry[9] estimates, in its Balanced Scenario, that in volume terms, by 2030, only five per cent of NW European gas demand will be met from unconventional sources. This suggests that the impact of unconventional gas on UK and European gas prices will continue to be indirect. We believe that Europe is likely to be caught between downward pressures through LNG cargoes diverted away from the USA (and the development of LNG supply from Qatar and Australia), and upward pressure from growing demand for gas from Asia. However, although the volume of gas available worldwide may be higher, it is important to note that, once the

[9] Pöyry Management Consulting, The Impact of Unconventional Gas on Europe, June 2011

cost of transportation to Europe is taken into account, this may only curb the extent of price rises in the longer-term rather than drive prices down from current levels.

It is our view that the UK and other European markets will still mainly be reliant on imports, and that prices will be driven by the price of the marginal supply (e.g. imports from Russia or competition with Asian demand for LNG), and unconventional gas will not dramatically alter the need for investing in gas generation and supporting infrastructure.

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