July 2012

Carbon Capture and Storage Association
Response to

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

Introduction

The Carbon Capture and Storage Association welcomes this opportunity to respond to the call for evidence on the role of gas in the electricity market

The CCSA brings together a wide range of specialist companies across the spectrum of CCS technology, as well as a variety of support services to the energy sector. The Association exists to represent the interests of its members in promoting the business of CCS and to assist policy developments in the UK and the EU towards a long term regulatory framework for CCS, as a means of abating carbon dioxide emissions.

We welcome the Government's intention to develop a Gas Generation Strategy later this year, to ensure the UK can deliver sufficient secure, low-carbon and affordable energy to meet increasing demand.

Whilst we have some comments regarding the importance of gas generation in the UK's electricity mix, the majority of our comments are focussed on CCS – and the important role that gas-CCS can play in a decarbonised UK electricity sector.

Summary

- The CCSA welcomes the development of a Strategy to ensure the UK has sufficient fossil-fuel electricity generation capacity to meet demand going forward.
- As coal and gas will continue to supply a significant proportion of UK electricity for the foreseeable future, we believe there is need for the UK to set out a Strategy for all fossil fuels (both coal and gas) to ensure a diverse energy mix going forward.
- Following the recent Government announcement that the 450g CO_2/kWh EPS will be maintained for consented plants until 2045. we are concerned that unless a very strong framework/incentives exists for these power stations to fit CCS, this could potentially send a very detrimental signal to the CCS industry, and could result in the real danger that the UK will not meet its 2050 climate change target or the decarbonisation of the power sector in the 2030s.
- We believe that the UK will likely need an amount of unabated gas-fired power in the 2020s to balance the system. However, it is vital that this gas-fired power can be decarbonised through CCS and we therefore believe that the Gas Strategy must set out a strong framework for incentivising CCS on gas in the medium and long-term. We recommend a much stronger link is made between the Gas Strategy and Government's CCS policy – including key elements from the Government's CCS Roadmap published in April this year, consideration of the issues that need to be resolved in the EMR to enable CCS to be appropriately incentivised, and a review of the current CCR guidance, to ensure CCR-consented gas-fired power stations can retrofit CCS when economically feasible.

Specific Comments

1. Over the next few decades, the UK will require a significant amount of new electricity generation capacity – to cope with increasing demand, as well as the closure of around 35GW[1] of existing capacity (mostly coal and nuclear) in the mid 2020s. At the same time, the UK is committed to a climate change target of reducing greenhouse gas emissions by 80% by 2050, as well as an aim to decarbonise the electricity sector by the 2030s[2]. To cope with the inflexibility of nuclear, and the intermittency of some renewable technologies, a large proportion of this new electricity generation capacity will have to be met by fossil fuels (with CCS). We therefore welcome the development of a Strategy to ensure early planning and construction of this vital fossil fuel generation capacity.

2. The CCSA takes a neutral approach to the development of different fossil fuels. We believe that both coal and gas (with CCS) will be needed in the UK energy mix going forward. Indeed, in 2010 coal supplied 28% of UK electricity (a significant increased share over the past 3 years due to its place in the merit order), whilst the supply from gas reached 47%[3]. However, the share of natural gas in the mix fell to just 27% in Q1 this year compared to a range of 40%-55% over the past four years. The recent low EU carbon prices have made coal more attractive and have seen a significant gas-to-coal shift in recent months. Official DECC figures show that the amount of electricity produced from coal in the UK rose by more than one-fifth in Q1 2012 compared with a year earlier[4], representing a six-year high for coal. Current forecasts suggest that both coal and gas will continue to supply a significant proportion of UK electricity for the foreseeable future[5]. UK policy has in the past emphasised the importance of retaining a diverse energy mix (with coal and gas) to avoid over-reliance on any one particular fuel or technology, with its associated energy security challenges. However, coal does not feature strongly in current UK policy, with greater emphasis placed on the need for new gas generation capacity (as witnessed in this Call for Evidence) – although we note that a significant volume of coal plants are currently running due to low coal and emission prices driven by the current economic climate, as well sweating assets ahead of the impending Carbon Floor Price and Emission Performance Standard in the UK Electricity Market Reform (EMR) package, and the impacts of the EU Large Combustion Plant Directive. We believe there is need for the UK to set out a Strategy for all fossil fuels (both coal and gas) to ensure a diverse energy mix going forward. A key element of any Strategy going forward must be the need for CCS on both coal and gas in order to meet climate change targets and decarbonise the electricity sector – indeed, of the companies that have bid into the current CCS Commercialisation Programme, only one includes a gas-CCS proposal, the remaining are coal-CCS proposals.

3. There are several factors contributing to the fact that, while there may be gas-fired capacity permitted or in the permitting process, it is unlikely that construction will take place in the short term. These factors include:

    - Low spark spreads and more attractive dark spreads
    - Low levels of demand for gas and power due to the economic downturn
    - A significant amount of mothballed gas-fired capacity
    - A promise of Capacity Payments (through the EMR) but a lack of clarity as to the detail of these payments, what kind of capacity might attract Capacity Payments and whether these payments will be available broadly or only as a last resort

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[1] *Meeting the Energy Challenge, A White Paper on Energy*, DTI, HM Government, May 2007

[2] The Climate Change Committee has proposed that to meet UK climate change targets, the electricity sector must be largely decarbonised by 2030 – a target date accepted by both industry and NGOs.

[3] *Digest of UK Energy Statistics 2011*, DECC 2011

[4] http://www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx#

[5] http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx#2011-projections

- Uncertainty regarding load factors and increasingly irregular running regimes for gas-fired power stations going forward

4. The UK introduction of EMR sets a benchmark in terms of a comprehensive package to support the development of all low-carbon electricity generating technologies under one overarching framework. However, until the details of EMR have been fully developed, developers of all low-carbon technologies face uncertainty regarding future projections of costs and revenue, affecting the ability to take Final Investment Decision on a project – this includes developers of gas-fired generation. To give some certainty to developers of gas-fired generation, Secretary of State Ed Davey announced on 17th March that the proposal to introduce an Emissions Performance Standard (EPS) would be maintained for plant consented under the 450g CO_2/kWh-based limit until 2045[6]. This is now enshrined in the draft Energy Bill published on 22nd May[7]. Whilst we understand the need for Government to provide confidence to investors to ensure sufficient generation capacity, we are concerned that unless a very strong framework/incentives exists for power stations consented under the 450g CO_2/kWh-based limit to fit CCS (particularly through a predictable and sustainable long-term carbon price coupled with appropriately designed CfD contracts for CCS), this could potentially send a very detrimental signal to the CCS industry – that consideration of CCS on gas is not necessary until 2045. This could deter developers of even early gas-CCS projects, therefore placing the burden on the coal industry to kick-start the CCS industry. In addition, although the UK will likely need an amount of unabated gas-fired power during the 2020s, unless these power stations are incentivised to fit CCS (during the 2020s and 2030s), there is a real danger that the UK will not meet its 2050 climate change target or the decarbonisation of the power sector in the 2030s.

5. As gas (and coal) will continue to play an important role in the UK electricity mix going forward, it is vital that a Strategy on gas is sufficiently linked to the UK's overall 2050 target of reducing emissions by 80%. To ensure that gas is able to play a role in meeting this target, we strongly believe that the Gas Strategy must set out a strong framework for incentivising CCS on gas in the medium and long-term, sending a clear signal to the CCS industry to enable confidence in gas-CCS investment. Although the Call for Evidence document does refer to CCS in several places, there is no clear and strong link between the need for a gas generation strategy and the forward pathway/policy for CCS (as set out in the CCS Roadmap from April this year). We note that the Government's policy on CCS seems to be progressing in isolation from a number of policy areas and we strongly urge the Government to consider cohesive policy development across all areas of energy, electricity, fossil fuels and CCS. In particular, there are several elements to the Government's CCS policy, which we believe should be considered & included in the Gas Strategy:

   - The CCSA strongly welcomed the publication of the Government's CCS Roadmap on the 3rd April this year, and we believe that many elements of this Roadmap should be included in the Gas Strategy. The CCSA published *A Strategy for CCS in the UK and Beyond* in September 2011, setting out the industry vision for CCS in the UK to 2030. A key element of this Strategy is the industry ambition to see 20-30GW of CCS fossil fuel power plants in operation by 2030[8], and we were pleased to see that this ambition was recognised in the CCS Roadmap. We recommend that this ambition should be featured in the Gas Strategy – reflecting expectations that a proportion of this 20-30GW must be gas-CCS.
   - A key element to the cost-effective development of CCS is the need to plan for and incentivise right-sized transport and storage infrastructure. The CCSA has made clear its views regarding the need to develop CCS infrastructure and clustering that is able to support CCS projects beyond the current Commercialisation programme, both in the power sector and industrial sectors. We are pleased that the Commercialisation Programme now includes both consideration of 'right-sized' infrastructure development, as well as the inclusion of industrial CCS proposals, where these contribute the development of CCS

[6] http://www.decc.gov.uk/en/content/cms/news/pn12_025/pn12_025.aspx
[7] http://www.decc.gov.uk/en/content/cms/legislation/energybill2012/energybill2012.aspx
[8] *A Strategy for CCS in the UK and Beyond*, CCSA, September 2011

clusters. We recommend that the Gas Strategy should include the need for effective planning of CCS infrastructure, to enable gas-fired power stations to cost-effectively fit CCS.

- To encourage gas-fired power stations to fit CCS, the Government must ensure both incentives and regulation are sufficiently strong. In terms of incentives, the EU ETS is the overarching driver for all low-carbon technologies. For CCS to be incentivised through the EU ETS, a strong carbon price (€60-90 per tonne CO_2 for early CCS projects[9]) must be in place. However, at present the EU ETS price is insufficiently high or reliable, and the UK has therefore decided to introduce a Carbon Price Floor (CPF) in the EMR – starting at £15/tonne CO_2 in 2013, rising to £30/tonne CO_2 in 2020 and £70/tonne CO_2 in 2030[10]. We believe it is vital that, as well as continuing to push for a stronger and more effective EU ETS, the UK maintains a strong CPF to 2030 and beyond – this will go a long way towards incentivising CCS on gas-fired power stations during the 2020s (new build and retrofit).
- The key incentive in the EMR for all low-carbon technologies is the Feed-in-Tariff Contract-for-Differences (FiT CfD). Discussions are already taking place regarding the appropriate design of the FiT CfD for CCS, and again, it will be vital that the FiT CfD is designed in a way to incentivise CCS on gas (as well as coal) – both new build and retrofit, for the early CCS projects as well as longer-term CCS commercialisation. The CCSA continues to work on a number of key issues relating to CCS in the EMR, which must be resolved to enable confidence in CCS investments, and we recommend that these issues should be considered within the Gas Strategy. The following is a list of some of these high-level issues – the full position is included in our responses to the ECC Committee call for evidence for pre-legislative scrutiny into the draft Energy Bill[11]:
    - It is vital that the EMR sends strong, clear signals to CCS project developers (both coal and gas), investors and the supply chain on the EMR support that will be made available to CCS. This is necessary to ensure that the projects not selected under the current Commercialisation Programme are kept alive and taken forward for development at a later stage. We believe that the investment signal from the EMR for CCS project developers is currently extremely weak, providing no detail on how CCS projects that are not supported by the Commercialisation Programme might be able to receive support. In particular, the EMR 2013 Delivery Plan will contain the Government's objectives for EMR in the period 2014-2018 and this Delivery Plan must therefore include details on the Government's CCS objectives for the UK electricity market in this period – this signal must provide a degree of confidence similar to that provided to other low-carbon technologies in the EMR.
    - To be able to meet the 2050 climate change target and with the expected increase of intermittent renewables and baseload nuclear plans on the system, there will be an increasingly important role for flexible low-carbon electricity generation. Currently, fossil-fuel power stations with CCS are the only option for providing this low-carbon flexibility. We believe further thought should be given to how such flexible plant can be incentivised under EMR – particular as the large volumes of intermittent, inflexible and low marginal cost capacity added to the system will create significant market risk for such flexible plant generating uncertainty over a plants load factors and revenues. Although the CCSA believes that CfD contracts for the early CCS projects should be based on a baseload model, we believe more thought is required regarding the possibility of operating a CCS plant under a flexible CfD contract at a point in the future (and the necessary predictable triggers that will alter the CfD contract), when fossil-fuel plants with CCS will likely be required to operate with some flexibility to balance the system.

[9] *Carbon Capture and Storage: Assessing the Economics*, McKinsey & Company, September 2008
[10] *Planning our electric future: a White Paper for secure, affordable and low-carbon electricity*, DECC, July 2011
[11] http://www.ccsassociation.org/index.php/download_file/view/429/359/ & http://www.ccsassociation.org/index.php/download_file/view/430/359/

- Although we note that the Government is currently not minded to include those plants that received CfD payments in the Capacity Market, we believe that much of the rationale for creating a Capacity Market applies to the need for fossil-fuel CCS plant (particularly the need for a fixed payment to reward available capacity ready to dispatch when necessary). We therefore believe that at a minimum it is important that CCS plants have the flexibility to opt a proportion of its capacity for CfD support with the remaining capacity supported under a Capacity Market.
- As CCS projects have a long operative life (multiple decades), we believe that that the current proposal for a 10 year CfD contract for the first projects is completely inappropriate and too short for CCS projects. We believe this the length of CfD contracts should match the operating timescales of CCS projects, perhaps 20 – 25 years. In addition, with the decision to grandfather EPS at the 450g CO_2/kWh limit until 2045, unabated gas plant have essentially been given 30 years of operational certainty, which is at serious odds with the 10-year commercial lifespan given to coal or gas-CCS plants in the proposed CfD contract.

- Whilst the UK has come a long way in the development of appropriate regulations for CCS, there are still a number of issues to be resolved. In particular, these include further consideration of financial security and liabilities for storage developers, issues related to the transfer of petroleum to CCS licences and a large number of activities pertaining to the development of marine regulation. In terms of high-level regulatory policy, the Government has a policy for new-coal fired power stations, which states that these "*must have CCS on at least 300 MW net of the proposed generating capacity*"[12] (this is now enshrined in the EPS of 450g CO_2/kWh). In addition, the Government has a policy on Carbon Capture Readiness, "*all commercial scale (at or over 300 MW) combustion power stations (including gas, coal, oil or biomass) have to be constructed Carbon Capture Ready (CCR)*"[13]. With the decision to grandfather the current EPS level of 450g CO_2/kWh for power stations until 2045, it will be more than ever necessary to ensure that the CCR requirements for a consented gas-fired power station, are truly meaningful. Although the EU CCS Directive does include minimal requirements for CCR (and we note that UK CCR requirements do exceed these to some extent), there is a significant difference between 'minimal' and 'meaningful' CCR requirements. We recommend that the Government consider a review of the 2009 CCR guidance, and that this should be undertaken with industry involvement. In particular, we would emphasise the following issues for consideration:
    - The ability to retrofit CCS to a plant consented as CCR is an economic issue based to a large extent on the market's expectation of future CO_2 prices. The inclusion of stronger market based incentives (such as a predictable and sustainable long-term carbon price coupled with appropriately designed CfD contracts for CCS) will encourage developers to retrofit CCS on CCR consented power stations, making CCR an important regulatory and planning tool, which will provide an important signal to investors in power plants operating under the incentives framework of an effective carbon price and appropriately designed CfD contracts.
    - The location of a CCR consented gas-fired power station will be the key determining factor in its ability to commercially retrofit CCS at a later date. Although we note that the UK CCR guidance requires consideration of "*the economic feasibility within the combustion station's lifetime of the full CCS chain, covering retrofitting, transport and storage*"[14], this economic feasibility will be heavily influenced by the location of the power station, and therefore this becomes a circular argument where the power station is consented in a location unsuited to an economically potential feasible transport and storage solution. It

[12] Overarching National Policy Statement for Energy (EN-1), DECC, July 2011
[13] Overarching National Policy Statement for Energy (EN-1), DECC, July 2011
[14] Overarching National Policy Statement for Energy (EN-1), DECC, July 2011

will therefore be even more important to ensure that when a developer submits their required report to DECC every two years on the technical feasibility of CCS retrofit, the transport route and storage option remain economically viable.

- We note that in the years since the UK CCR guidance was produced, many developments in understanding of CO_2 storage have taken place. The current CCR guidance merely requires identification of a suitable storage location (from a published list set out in the annex). At the very least, the process of identification, qualification, access to storage, and obtaining permits, rights and approvals falls short of being realistic.

6. We note that CCGTs can also run on decarbonised hydrogen as a fuel source. As the CCS pre-combustion capture option generates hydrogen, there is therefore a significant opportunity to reduce emissions from CCGTs through this capture option – either by locating a capture plant (& transport solution) on site, or by locating an industrial gasifier offsite, which would capture the CO_2 from coal or gas, and then simply pipe decarbonised hydrogen to the remote CCGT. We recommend that this opportunity should be highlighted in the Gas Strategy.

The view expressed in this paper cannot be taken to represent the views of all members of the CCSA. However, they do reflect a general consensus within the Association.