DECC Call for Evidence on the Role of Gas in the Electricity Market

Response by E.ON

Summary

- The role of gas-fired generation in the UK electricity market is likely to change significantly as the electricity system decarbonises.
- Gas generation will play a vital role in securing a low carbon electricity system by providing flexible back-up to intermittent renewable generation, particularly from wind. As a result, its volume of generation and therefore energy market income will become more contingent on wind conditions and will be more unpredictable than today.
- In addition, the route to a low-carbon electricity system and future levels of generation from intermittent renewable and other sources of low carbon generation are uncertain, particularly as these depend on Government support. This adds to volume and income uncertainties but on longer timescales.
- These uncertainties make investment in gas generation challenging. We therefore welcome Government's intention to introduce a market-wide capacity mechanism to incentivise new investment and continued operation of existing gas generation assets alongside other providers of capacity.
- However, announcement of the intention to introduce a capacity mechanism itself causes uncertainty and is likely to see most investment in new gas plant deferred until the detailed design and timing of the mechanism are clear.
- Government should therefore focus on completing the design of the mechanism as soon as possible. Timescales should not slip beyond those announced with the draft Energy Bill in May. There are three key areas to address:
    - Early certainty of the security of supply standard and the date of the first auction.
    - Certainty of the market design including penalty mechanisms and precise details of capacity contracts.
    - Fair and equitable treatment of existing assets compared to new assets.
- In addition to the capacity mechanism, we have identified a number of other barriers to investment in gas generation, the most significant of which are:
    - *Transparency of ancillary services:* transparency should be increased to ensure investment signals are clear.
    - *Development consent process:* this should be reviewed to reduce timescales, costs and risks at the pre-application stage.
- Whilst we believe the gas market in Great Britain is currently well supplied and resilient and are not convinced that additional intervention is needed now, investment in gas storage can take 6-10 years to complete. DECC will therefore need to keep the position under review against expected future demand for gas over these longer timescales. This ultimately requires a political assessment of whether the cost of intervention to customers is justified by the additional security benefits of gas storage or other measures. Any assessment of future gas security of supply must account for expected changes in the electricity generation mix as Electricity Market Reform proposals develop.

Q1. 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?

1. Gas generation should play a key role in addressing the security of electricity supply pressures the UK faces this decade:
   - It is a mature technology that can be built relatively quickly and has lower investment costs than alternative sources of generation which can provide firm power, given CCS requirements on coal and the cost and limited scope for biomass (although the current planning system may restrict how rapidly new gas projects can be developed in response to anticipated demand (see answer to question 4)).
   - It has lower CO_2 emissions than the current average UK grid intensity so will contribute to emissions reductions in the short to medium term.

2. In the longer term CO_2 emissions from unabated gas generation on a large scale are not consistent with the UK's decarbonisation goals so its role is likely to change as the system decarbonises. The role of gas generation with carbon capture and storage will depend on commercial demonstration of the technology, its relative cost compared to other low carbon options, and the effectiveness of relevant Government incentives.

3. However, given its flexible and responsive nature, unabated gas generation operating at lower load factors can play a crucial role in supporting a future low carbon system which is characterised by significant intermittent renewable generation.

4. The role gas generation could play in future will also depend on the availability and flexible supply of gas (see response to question 6).

5. Flexible gas generation reduces the cost of decarbonising the UK energy system by providing back-up to intermittent renewables at relatively low cost. Whilst we support the development of other technologies that can offer this support (such as electricity storage), gas generation and associated infrastructure (such as gas storage) are proven technologies. The UK cannot invest significant sums of money in renewables without having certainty that future security of supply requirements can be met.

6. Gas generation does result in some price exposure for UK consumers to global fuel markets, particularly as production from the UK continental shelf declines. The global gas market is currently very uncertain; upward pressure on prices from increased demand in Asia is countered by downward pressure from the potential impact of unconventional sources of gas, particularly in the USA. Much of the impact depends on the ability of regional gas markets to connect and form a truly global market (for example through increasing LNG import/export capacity). Given this level of uncertainty, it is difficult to predict whether gas prices are likely to increase or decrease in real terms in future. Therefore, exposure to global gas markets does present a risk to the UK in terms of price, but no exposure could also present a risk if price were to fall and UK competitiveness suffered as a result.

Q2. What role can gas fired generation play in the future and what level of gas generation capacity is desirable?

7. The role of gas fired electricity generation in future will be determined by the relative competitiveness of other forms of generation, including the effectiveness of incentives provided to build new low carbon generation (currently the Renewables Obligation, to be replaced by the EMR CfD regime).

8. Gas fired generation will sit below most low carbon generation in the merit order given its higher marginal cost. Therefore, gas power plants will only run when low carbon generation capacity is insufficient to meet demand, or to provide ancillary services. This means that the role gas generation will play in future will be heavily influenced by the costs of and levels of support for low carbon technology.

9. It is therefore likely that unabated gas generation will play a supportive role in a future electricity system, providing back-up to intermittent low carbon forms of generation. This role is crucial in a low carbon system with significant renewable generation but is likely to be more unpredictable than today.

10. This introduces significant new risks for gas generation investors and market signals alone are unlikely to be sufficient to incentivise investment in time to maintain security of supply. In our response to question 4 we discuss how Government can address this.

11. The development of CCS technology will have a significant influence over the role of gas in future. With CCS, gas could have an increased role in a future low carbon system, alongside other forms of low carbon generation, although its higher marginal costs are still likely to restrict annual load factors.

Q3. What are the key factors driving the economics of investing in new gas-fired power generation and how are these factors likely to change?

12. When investing in new gas-fired power generation there are a number of decisions any investor must consider, which will include:

    - What to build (technology, capacity, efficiency)
    - Where to build (influenced by locational charging such as TNUOS)
    - When to build (influenced by development time and expected reward or market uncertainty)
    - Who builds (investor as sole developer or consortium)
    - How to fund a development
    - How are you going to build and connect to the grid
    - How/where will you source gas
    - Any potential heat load for CHP

    These decisions will be influenced by many factors, including:

- Fixed costs such as development/investment costs (such as gas turbine costs, costs of raw materials, labour and the cost of capital)
- Variable or marginal costs (such as gas/carbon prices, operations and maintenance costs, grid connection, rates, balancing costs and tax)
- Variable or marginal revenue (such as power price and spreads, income from any capacity mechanism and ancillary services)
- Development and other consents and authorisations
- Potential future environmental compliance costs
- Other regulatory processes (for example, the requirement under the Energy Efficiency Directive to perform a cost-benefit analysis for potential for CHP at new generation sites)

13. Changes in the factors that drive investment can occur as a result of market forces or political or regulatory intervention. Where change results from market forces, this can often be anticipated and managed by investors, particularly in the case of gas-fired generation where its fuel costs and power market revenue tend to be aligned. The risk and potential impact of changes resulting from political or regulatory intervention can be more difficult to anticipate and can therefore present significant barriers to investment. This is particularly the case where changes have retrospective effects on investments already committed, although we recognise that DECC generally seeks to avoid this outcome. However, recent instances of abrupt changes in incentives under mechanisms covered by the Treasury levy-control framework have raised the level of perceived risk in this area.

14. We do recognise that intervention may be necessary in certain circumstances, for example, in the case of a capacity mechanism in the UK which is intended to increase certainty of income for providers of capacity, or, in the case of the EU ETS, where intervention at EU level to support and increase certainty of the long term EU price for carbon is necessary. Any intervention must be introduced in a manner that minimises uncertainty and minimises impacts on the functioning of energy markets.

15. In addition to usual market or regulatory uncertainties there are a number of specific areas where change is likely:

    - *Price of gas*
      This will be influenced by global and European gas markets and levels of demand from Asian economies in particular, along with potential impacts of unconventional sources of gas and the ability of countries with excess domestic supply such as the USA developing export infrastructure.
    - *Price of carbon*
      This will be influenced by ongoing economic difficulties in the EU (including any potential recovery), political changes (for example, 2030 ETS targets and any adjustment to the Phase 3 cap) and international climate change negotiations.
    - *Capacity income and power price*

In addition to income from the capacity mechanism itself, its introduction is likely to impact many other revenue streams including power price, balancing costs and ancillary services.

- *Balancing costs*
  Ofgem's significant code review of both the gas and electricity cash-out arrangements could result in significant changes to balancing costs.
- *Equipment and development costs*
  Prices of raw materials, factory availability, ancillary equipment and labour will change as the global demand for power stations changes.
- *Transmission Network use of System Charges (TNUoS)*
  The improved Investment Cost Related Pricing (ICRP) proposals from Ofgem will reduce locational signals provided through TNUoS costs, which will have an impact on decisions on where to build new power stations. These proposals are likely to increase network costs and therefore increase costs to consumers.

Q4. 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?

16. We have identified six key areas, three of which related to the proposed capacity mechanism, where we believe Government has an opportunity to address or influence current barriers to investment. These are relevant for both debt and equity investors.

    <u>Capacity Mechanism: certainty over the electricity security of supply standard</u>

17. With the introduction of a capacity mechanism, Government will be able to influence the level of generation capacity in the UK and bring forward necessary investment that would otherwise not come forward. This intervention is important but the level of security of supply being targeted will in future be set administratively rather than by market signals. This introduces uncertainty for investors.

18. To provide as much clarity as possible, the security of supply standard, or at least the process for defining it (such as the proposed reliability standard), should be defined as far as possible in primary legislation, so that investors will have confidence in the long-term durability of the capacity market and the signals it will provide. At present the design of the capacity market is almost entirely left to secondary legislation, which is more easily subject to change.

19. Similarly, the effect of Treasury financial controls on the ability of the System Operator to award contracts needs to be entirely predictable.

20. We note the proposal in Annex C of the Electricity Market Reform update published in May 2012 which allows Ministers to take a final decision on the amount of volume to contract for after a capacity auction has been run. We accept that a degree of discretion by Ministers is in consumers' best interests but this discretion must be based on a clear and robust (and ideally transparent) methodology. We would be concerned if investors were to incur significant costs

developing capacity options which were then rejected by Ministers for political, rather than economic reasons.

Capacity mechanism: its design and the price for capacity

21. In addition to uncertainty of the security of supply standard to be targeted by Government, investors currently face significant uncertainty of the precise design of the capacity mechanism and the potential reward for capacity in future.

22. A gas generation asset is a long-term investment so needs some visibility of likely income over its economic life. In addition to income from the capacity market itself, visibility of income from other sources such as the wholesale market is also important. These income sources will themselves be influenced by the design of the capacity mechanism.

23. The capacity mechanism framework should be designed to give as much certainty as possible to investors and existing asset owners as soon as possible. This will allow investment decisions (which could include investing in existing assets or building new plant) to be made in time to meet the UK's security of supply needs. Design of the mechanism and certainty of the timing of any early capacity auction should not slip beyond the timescales announced by Government with the draft Energy Bill.

Capacity mechanism: fair treatment of existing assets

24. Potential investors in new gas plant in the UK are likely to include investors who already own assets. The fair treatment of these existing assets is therefore critical, not just for the potential investors who own them but also new investors who will be conscious of how their new asset may be treated in future.

25. Any distinction between new and existing assets, particularly in the proposed capacity mechanism, must be made on fair and practical grounds. The mechanism should be designed to deliver security of supply at least cost, not to achieve other policy goals such as encouraging new entry or environmental goals which should be incentivised by mechanisms designed with those goals in mind. A distinction should not be made on the basis of an existing asset's sunk costs which would jeopardise the potential for new investment (as new investors may expect equally unfair treatment for their plant in future).

26. Owners of existing assets will have assumed fair treatment in a functional energy market when making investment decisions. It should be recognised that decisions on these investments (e.g. major overhauls and new capital parts) are taken on a multi-year time horizon. If further uncertainty is introduced by a shorter capacity market contract duration (e.g. less than 3 years), owners of existing plant are less likely to invest as capacity market revenues will be more uncertain. Investment decisions in existing plant must not be undermined by the capacity mechanism.

Transparency of ancillary services market

27. A robust market for ancillary services is crucial in order to incentivise investment in the required plant characteristics and to allow the System Operator to contract for services necessary for the running of the electricity system, which are not incentivised by other markets or mechanisms, but without interfering with those other mechanisms.

28. A capacity mechanism should focus on the need for resource adequacy. Any attempt to incorporate incentives for flexibility within the mechanism will complicate it significantly and is likely to distort existing market signals.

29. The current market for ancillary services is relatively opaque, and clear investment signals are difficult to interpret. The need for ancillary services is likely to rise given the UK's decarbonisation aims which will result in more intermittent generation in potentially more remote locations. Therefore increased transparency of the ancillary services market and its investment signals is vital.

Emissions Performance Standard (EPS)

30. The proposed EPS, to be set at 450gCO2/kWh, will not currently have an impact on new gas-fired generation which, even unabated, emits less than this level.

31. However, the introduction of the EPS, and the potential for it to be reviewed and revised every three years does introduce additional risks.

32. Whilst Government's proposal to grandfather the EPS to 2045 for new plant at consent limits this, we continue to believe the EPS presents additional risks to new investors for limited (if any) environmental benefit.

33. As described in paragraph 8, the amount of electricity physically generated by gas fired power stations will be determined by the costs and levels of support for low carbon generation. Provided sufficient low carbon generation comes forward to meet the UK's decarbonisation goals, fossil-fuel generation output will be restricted economically through the wholesale market and its position in the merit order. Similarly, a robust EU ETS with a long-term emissions cap will restrict the output of higher carbon plant. An EPS is therefore unnecessary.

34. With the proposal to review the EPS every three years, investors at early stages of development (pre-planning) are unlikely to have certainty of the level of EPS that would apply to their plant, although we recognise that any change will need to be reflected in primary legislation. However it seems unlikely that, if a review concluded that a tighter EPS were needed, the Government would not identify a suitable legislative vehicle to implement it. It will therefore be important to ensure that the basis on which these reviews are conducted is well understood so they can reach a view on likely outcomes which may affect projects they have in development.

35. Should an EPS at some point require CCS to be fitted to gas plants operating at higher load factors, investors will have the option of restricting load on an annual basis or fitting CCS. The latter would be incentivised by either a high carbon price delivered by the EU ETS (we do not

regard the UK Carbon Price Floor as a reliable incentive) or by an appropriately designed CfD for CCS plant. If the Government wants to incentivise CCS on gas plant, it will need to clarify the nature of support offered by the CfD regime.

The Development Consent Process

36. In our view timescales for obtaining development consent for new gas-fired plant have become more extended since introduction of the regime under the Planning Act 2008. While the timing of a decision from the Planning Inspectorate, once a development consent application is submitted, should now be more predictable, the nature of the pre-application process has meant that overall timescales have become significantly longer. We estimate that, for a CCGT, the period from initiation of the project to securing development consent will now take on average around 4½ years, compared to just over 2½ under the Section 36 consent regime. The period from development consent to commissioning is, however, somewhat shorter under the new regime. Overall timescales for a CCGT from project initiation to commissioning are now estimated to be around 7¾ years compared to under 6½ years previously. This is not the outcome that developers were anticipating when the Planning Act was originally conceived.

37. The principal reasons for this additional delay are the requirements of the pre-application process, the related obligation to submit detailed design specification in the application to the Planning Inspectorate, and the extent to which the Planning Inspectorate can accept design changes after an application has been submitted is also an issue. There are a number of areas where developers would welcome improvements:-

    - the requirements on developers need to be proportionate to the nature of the project. The requirements for consultation on a CCGT situated in an industrial park do not, for example, need to be as extensive as those for a new nuclear power plant;

    - the requirements on developers during the pre-application phase need to be more clearly spelt out so that developers do not over-compensate to ensure compliance. There also needs to be clearer guidance on when developers have met their requirements. This will help avoid a process where unnecessarily onerous precedents are set;

    - the Planning Inspectorate should be able to consider changes in design once a development consent has been submitted without a need for the developer to start consultations again, where the potential changes have been covered by the pre-application consultation process and the environmental impact assessment. The Planning Inspectorate should also be able to consider alternative options, again where these have been covered by the pre-application consultation process and the environmental impact assessment, for example where a statutory consultee has proposed an alternative, and the developer would like the Planning Inspectorate to decide on the best approach;

    - the application for development consent also needs to be sufficiently broad to be able to take account of different approaches which may be proposed during the tendering process which will follow the granting of development consent. It is not credible for developers to seek tenders before the development consent application is made

because, firstly, plant suppliers do not take seriously projects which have not received development consent and, secondly, the developer needs to understand the nature of the development consent and conditions attached to it before initiating the tender process.

38. In addition to uncertainty over their own applications, investors also face risks from the planning processes of related developments over which they have limited control. This would include, for example, National Grid's process for any necessary overhead lines to connect the plant.

39. While we welcome and are contributing to Government's current light touch review of planning policy (the CLG Consultation on Proposed Changes to the Suite of Guidance Documents for the Major Infrastructure Planning Regime), we believe that the full review of the Planning Act, currently scheduled for 2014, should be brought forward to effect improvements.

Q5. Are there any other policy issues that need to be addressed beyond the Government's proposals for the capacity mechanism and the EPS?

40. As outlined in response to the previous question, the development consent process and transparency of the ancillary services market are areas where specific policy issues need to be addressed in addition to the capacity mechanism and Emissions Performance Standard (EPS).

Q6. 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?

Infrastructure

41. Gas supply and related infrastructure are a vital component of any gas generation strategy. Any form of electricity generation can only ever be as reliable as the fuel that supplies it. Inadequate gas supply and related infrastructure certainly have the potential to be a major barrier to investment as investors will not develop power stations that cannot be supplied with fuel.

42. In recent years, there has been significant investment in diverse physical assets to increase gas import capability and flexibility of gas supplies to Great Britain, although much of this investment was sanctioned in the early part of the last decade when price volatility gave stronger investment signals.

43. We agree with DECC's assessment that the Great Britain gas market is currently well supplied and resilient and this has been demonstrated over recent cold winters. The UK gas market has delivered significant large infrastructure investments over the last few years and the market has dealt well with recent periods of market tightness.

44. Whilst we are not convinced that additional intervention is needed now, investment in gas storage can take 6-10 years to complete so DECC will need to keep the position under review against expected future demand for gas over these longer timescales. This ultimately requires a

political assessment of whether the cost of intervention to customers is justified by the additional security benefits of gas storage or other measures.

45. As the volume of wind generation increases, demand for gas, particularly on a daily basis, will become significantly more variable as gas plant has to change output to adjust for increasing amounts of intermittent wind generation on the system. Managing peaks of very high demand could become an issue in future as the availability of fuel switching for power generation (from gas to coal and oil) will be reduced as existing coal and oil plant closes. Assessments of gas security of supply must account for expected changes in the electricity generation mix and the resulting demand for gas supply flexibility as EMR develops.

46. In the meantime there are practical things the Government can do to incentivise gas storage. For example, Government could improve the tax regime as it affects gas storage investment. The gas storage industry is currently in dispute with HMRC over whether investment in gas storage caverns qualifies for plant and machinery allowances. In our view they do qualify as plant.

47. E.ON's gas storage business is investing in UK gas infrastructure with the Holford project which began commercial operations in Q4 2011 and the Whitehill project which is in development, although incentives for investment in further gas storage are limited at present.

48. In an electricity market that decarbonises with intervention which is predictable and which preserves wholesale electricity market signals, incentives for investment in gas infrastructure will be clearer and the gas market will be more capable of meeting requirements.

49. In particular, the capacity mechanism must be designed in a way that preserves wholesale market signals where possible. If intervention interferes with the operation of the wholesale electricity market, for example by introducing capacity penalties based on electricity delivered, this is likely to alter the requirements for gas infrastructure unnecessarily and in a short timeframe which the gas market may be unable to deliver. For example, given the lead times for development of gas storage projects, market signals need to be transparent and visible early enough to bring this investment forward.

50. Failure of the gas market to deliver investment in infrastructure could result in higher gas prices as the UK has to attract imports from the global market.

<u>Unconventional gas</u>

51. We do not expect unconventional gas to have a significant impact on investment in gas generation in the short term. However, in the longer term, significant development of unconventional gas reserves could increase the supply of gas and exert downward pressure on prices, which is an effect likely to be shared globally as level of investment in LNG export and import infrastructure rises. This could make investment in gas generation more attractive if investors believe they could benefit from these lower prices. However, if gas generation becomes a more marginal technology in a future electricity system, the extent that gas

generators would benefit may be limited (as lower gas prices lead to lower power prices and the spread or margin remains the same).

52. As outlined in paragraph 6, the impact of unconventional gas is still very uncertain. Whilst gas prices in the US have fallen significantly, and the global gas market has seen a reduction in demand for LNG imports to the US, the impact on global gas prices has been limited while export infrastructure in the US is still being developed. Once this infrastructure is developed, we may see downward pressure on prices, although, as the market becomes more global, this effect may be balanced by increased demand from Asia.

53. Development of unconventional sources of gas outside the US will also have an impact on gas prices. Resources elsewhere in Europe may have the most significant impact on UK prices given our existing levels of interconnection. However, as is the case in the USA, if new unconventional sources of gas in Europe give rise to excess supply and lower gas prices, this may then lead to investment in export infrastructure to capture higher prices in other markets.

54. Development of unconventional sources of gas in China is also a relevant factor. According to Energy Information Administration (EIA), China has the largest shale gas reserves in the world. If China were able to develop these resources on a significant scale, this would result in reduced imports. New liquefaction facility projects mainly in Australia currently targeting the Chinese and other Asian gas markets would then have to find new sources of demand. This could lead to excess LNG on the global market and price reductions. However progress in China has been slow so far due to the lack of technology knowhow, underdeveloped infrastructure and water supply issues.

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