Wingas Storage Project

Need Case Final Draft

Confidential

Mr John Baldwin
Managing Director

Email: john.baldwin@cngservices.co.uk
Tel: 0121 707 8581
Mobile: 07831 241217

Wingas Storage Project

Need Case Final Draft

Contents

JOHN BALDWIN

NEED PROOF OF EVIDENCE

QUALIFICATIONS AND EXPERIENCE

1. My name is John Baldwin. I am an energy consultant with CNG Services Limited. I have a Master of Arts degree in Engineering Science from Oxford University. I am a Chartered Engineer and a member of the Institution of Mechanical Engineers, the Institute of Gas Engineers and Managers, and the Energy Institute.

2. I joined British Gas as a Graduate Engineer in 1983 from Oxford University and worked within various design, operational and maintenance roles on the National Transmission System (NTS). In 1990, I joined the commercial department of British Gas Exploration and Production where I worked in oil and gas sales and on the CATS project. In 1994, as Armada Project Commercial Manager, I concluded arrangements for the £500 million Armada Project including negotiation of gas and oil sales and joint venture agreements.

3. I returned to Transco as Transmission Commercial Manager in 1994 with commercial responsibility for NTS, power stations and the Interconnectors. I was responsible for the team that put in place all commercial arrangements under the Network Code for new gas storage developments and supplies to gas fired power stations. My team also negotiated the arrangements whereby the Interconnector UK terminal was sited on Transco land at Bacton.

4. In January 1996, I assumed responsibility for the Network Planning Department and secured BG Executive approval for £300 million of NTS expansion projects for 1998 that were associated with the UK-Continent Interconnector, some major new UK gas fields and a number of combined cycle gas turbine power plants. During the MMC enquiry in 1996/7, I was responsible for the Transco Investment submission (£4 billion over five years) and the 'Develop the Network' (growth) opex.

5. From 1998 – 2003 I was Managing Director of Lattice Energy Services (LES), building a business focused on providing utility infrastructure services including connections, conversions to gas and CHP. Following the merger in 2002 of Lattice Group and National Grid, I left National Grid to work as a Gas Consultant and develop a design and project management business.

6. Since 2002 I have worked as a Gas Consultant on a number of projects. My recent experience includes:

    a. UK Project Director for Excelerate Energy Teesside GasPort Project (2006-7)

b. Support to Ofgem on the National Grid Gas Transmission Price Control (2006-7) including being Project Manager of the Future Transmission Price Control review which included a detailed review of National Grid's supply/demand methodology.

c. Support for Ofgem in relation to National Grid's LNG Storage business (2006)

d. Support to Ofgem in relation to Milford Haven NTS pipeline reinforcement projects (2007)

e. Feasibility Studies for power generation projects using gas grid pressure (Scotia Gas Networks, Northern Gas Networks and Wales and West Utilities) (2008)

f. Feasibility Studies for biomethane projects for United Utilities, EON and others (2008 and 2009)

g. Support to Ofgem Project Discovery which reviewed UK Supply-Demand in 2016 (2009)

h. Support to Moorland Energy which is developing a new onshore UK gas field at Ryedale (potentially the largest onshore gas field discovered for 20 years)

7. When President of the SBGI (Society of British Gas Industries) in 2005-7 I was instrumental in establishing the Gas Storage Operators Group within the SBGI.

8. I started supporting the Wingas/Saltfleetby project in March 2008 and was asked to prepare a proof of evidence on the Need Case for the project in June 2009

SCOPE OF EVIDENCE

9. In this proof of evidence I cover a range of issues relating to the need for additional underground gas storage capacity in the UK, in general, and the role of the proposed Saltfleetby facility, in particular.

10. Amongst other issues, I will consider national energy policy, the changing role of gas in the energy mix, the gas supply / demand balance, energy security, gas market efficiency and alternatives. In doing so I will draw on a wide range of published material, including data and forecasts provided by the Department for Climate Change (DECC) and National Grid. I will draw heavily on the National Grid forecasts as they are independent from gas suppliers and have access to confidential data that is not available to other market participants. As such their forecasts are reputable and authoritative.

11. I note that amongst the 'matters' identified by the Secretary of State as likely to be relevant to his consideration of the application was:

    "the extent to which the proposed storage is consistent with the objectives of HMGs policy on energy is set out in the Energy White Paper entitled "Our energy future – creating a low carbon economy" (Cm 5761 February 2003), the Energy Review Report 2006 entitled "The Energy Challenge" (Cm 6887 July 2006), the Energy White paper entitles "Meeting the Energy Challenge" (Cm 7124 May 2007), Ministerial Written Statement entitled "Energy Statement of Need for Additional gas Supply Infrastructure" dated 16 May 2006 and Minerals Policy Statement 1; Planning and Minerals published November 2006"

12. Whilst Paul Foster is giving evidence on policy generally, I will identify those strands of national energy policy which are particularly relevant to my evidence.

13. I have noted paragraph 4 of the Statement of Case by Lincolnshire County Council which says "The County Council does not dispute the need for underground gas storage, the suitability of the Saltfleetby gas field for this purpose and the suitability of the Saltfleetby A and B sites for injection and recovery of the gas"

14. My proof of evidence is structured as follows:
    a. Need for and benefits of gas storage;
    b. National energy policy;
    c. The changing role of gas in the UK energy mix;
    d. Gas supply / demand balance;
    e. Energy security;
    f. Gas market efficiency;
    g. Urgency of the need for gas storage capacity;
    h. Alternatives; and
    i. Conclusions.

NEED FOR AND BENEFITS OF GAS STORAGE

Introduction

15. The UK economy faces a major challenge as indigenous gas supplies decline and there is increasing dependence on imported gas. According to J Havard and R French of the DTI, by the end of the current decade, the UK will have an import dependency of around 30%, and by 2020 it could rise to 80% (Paper to The Geological Society 2009). Without additional storage to store gas in the summer there will be both higher gas prices for UK consumers and increased risk that supply disruptions in winter will lead to gas shortages.

16. At the same time, the UK Government is strongly promoting the development of renewable energy, with particular focus on offshore wind. Given the intermittent nature of wind (which only blows around 30% of the time), flexible gas fired power generation will be required to produce electricity when there is no wind. The use of gas storage facilities offers an ability to maintain gas in store that is not required at times of high wind. When the wind drops, the gas can be withdrawn from store. I will explain that the Saltfleetby facility is in a good location to provide this flexibility.

17. To maintain supplies to UK consumers at reasonable prices and to provide flexibility for wind generation, it is critical that new gas storage is developed in the UK. I will explain that the rate of decline of indigenous UK gas production means that there is now some urgency in respect to this requirement.

Issues

18. In relation to the need for and benefits of gas storage capacity, a number of issues arise. In this section of my proof I will briefly introduce those issues and in subsequent sections I will develop them in more detail.

National energy policy

19. The need for increased gas supply infrastructure, and a regulatory environment to allow such infrastructure to be delivered to the market in a timely fashion, was set out by the Government in the Energy White Paper of 2003 (DTI 2005a): Our Energy Future — creating a low carbon economy. This identified four challenges, one of which was securing the reliability of energy supplies. This remains integral to an energy policy that meets the needs and expectations of all energy consumers. It was considered as part of the DTI's Energy Review (DTI 2006a) and in the 2007 Energy White Paper which said *"Hence, as highlighted by respondents, to manage future gas security of supply risks better, Government will take action to (amongst other things) increase gas storage and import infrastructure by facilitating the construction of gas*

supply infrastructure both onshore and offshore, through reforms to the planning and licensing regime". (Page 255, paragraph 8.11)

20. In addition, in the Energy Act 2008, the UK Government adopted a legally binding target to replace 15% of the fossil fuels used in 2020 with renewable energy. The Government Renewable Energy Strategy (July 2009) aims to reduce fossil fuel demand and support the development of renewable energy such as offshore wind. Combined cycle gas turbine (CCGT) power generation is seen as critical in ensuring electricity supply is maintained when there is no wind. CCGTs can provide flexible electricity but also require flexible gas supplies which can best be provided by local gas storage. The role of gas storage in the changing UK energy mix is my next issue below.

21. It is also clear that a shortage of UK gas storage increases the 'cold weather and disruption' risk to gas suppliers which leads to higher gas prices. There is also increased risk of disruptions to gas and electricity supplies, with adverse consequences for both UK industry and UK consumers. I will explain these issues later.

<u>The changing role of gas in the UK energy mix</u>

22. As a result of the Government's Renewable Energy Strategy, gas is seen as the critical fuel for making electricity at times when there is no wind generation. Whilst gas fired power generation is well established, the interaction with wind is forecast to be an important new factor after 2015. This interaction leads to the requirement for National Grid's NTS to provide additional flexibility to link gas fired power stations with gas storage facilities in particular. In addition, over the next 10 years the majority of UK coal fired generation plants will close down due to emissions legislation and the majority of nuclear power stations will also close down. Over this period, the natural gas share of total energy demand is forecast to rise.

23. Hence, in addition to gas being the primary fuel for heating domestic customers in the UK, gas will also become the main fuel for ensuring electricity supplies to these same customers. With major decline in UKCS gas production, gas storage in the UK is vital in ensuring gas is available to provide heat and electricity to UK consumers in the period 2013 – 2020 and beyond. I will explain this in more detail, drawing on National Grid and DECC forecasts.

24. I will also explain that, by comparison with other major gas consuming countries in the EU, the UK has very low storage levels as a percentage of imports. This will rise as import reliance increases but I will show that even if all the potential storage projects are developed, the UK storage level will still be below those of France and Germany.

<u>Gas supply / demand balance</u>

25. The demand for gas for heating rises as the temperature falls. For electricity, there is not so much seasonal variation. Combining these two main uses for gas means that winter demand is around 2.5 times higher than summer demand.

26. When considering the supply / demand balance for gas it is important to understand how the NTS is operated by National Grid and the obligations that gas shippers have. Each day, approximately the same amount of gas must enter the NTS (National Transmission System) as leaves it. There are relatively small differences between daily supply and daily demand; this is known as linepack and is the inventory of gas in the NTS. Some flexibility to change in demand is provided by this linepack but this is limited to around 5% of a typical day's demand. Gas shippers are responsible for the supply and demand balance of their own customers and suffer adverse financial consequences if, for example, their customers take more gas out of the NTS in a day than they input into the NTS.

27. The gas shippers ensure their daily supply and demand balance in a number of ways. They can deliver more gas into the NTS from UK gas fields, from pipelines importing gas from abroad and from LNG imports. In addition, they can inject gas into the NTS from gas held in store and can interrupt supplies to some of their customers. The volume of interruption and capacity is reducing due to reforms which create universal firm capacity by 2012. The key role of gas storage is to allow suppliers to buy gas at a relatively low summer price (when demand is low) and provide this gas to their customers in winter when demand is higher. I will explain how a shortage of gas storage leads to higher gas prices to consumers.

28. In addition there are also significant within-day variations in gas demand as a result of changing weather forecasts. Gas suppliers have to maintain the supply-demand balance for their customers each day or suffer adverse financial consequences. They use gas storage as an important means of maintaining their supply-demand balance.

29. Whilst gas suppliers suffer financial consequences if their demand exceeds their supplies, the gas grid itself would 'fail to danger' if demand exceeded supply. This could cause a loss of gas pressure (eg caused by insufficient gas), which would allow air to be drawn into the low pressure gas grid which would carry a risk of explosion. The recommissioning of the gas grid in this scenario could take months and hence it is a priority to avoid this.

30. There is another issue that impacts supply and demand in that gas (unlike electricity) travels along the NTS to final consumers at a relatively slow rate (around 30 mph); this increases the difficulty of balancing gas supply and demand at the point of consumption, and therefore adds a geographical element to the balancing problem. It is very useful for the operation of the NTS that gas storage should exist close to major demand centres. The location of Saltfleetby within 60 miles of around

40% of UK CCGTs is highly attractive and a unique characteristic of Saltfleetby. I will explain this later.

Energy security

31. There is a political consensus in the UK that there is an urgent need for additional gas storage as a result of the decline in UK gas production and increase in reliance on gas for heating and electricity. There have been examples of disruption in gas supplies to Europe in the last few years including disputes between Russia and Ukraine and violence in Nigeria which is a major source of LNG.

32. Close-to-market storage infrastructure is more important to the UK now than it was when we were self-sufficient in gas as a result of significant indigenous supplies. UK gas production from the North Sea previously reduced our need for gas storage, as compared to some of our European neighbours who lack indigenous supplies. Now, to replace the capability of the southern North Sea gas fields and the Morecambe Fields in Morecambe Bay, which have traditionally provided increased gas supply to meet winter gas demand, we need more storage than we have required in the past. I will explain that there is now a degree of urgency to building more storage as a result of a 40% decline in UKCS production in the period 2000 - 2010.

33. In summary, I will explain that we need timely and appropriately sited gas storage to be developed and there are limited locations for such infrastructure. The Wingas Saltfleetby project is in a good location, close to existing NTS pipelines and gas fired CCGTs. Crucially, it is also being developed by companies with the financial strength to make the investment which the UK economy needs.

Gas market efficiency

34. An efficient gas market requires a number of things:
    a. Sufficient reliable gas transmission capacity to move supplies to customers;
    b. Sources of gas that can be relied upon at times of high demand or disruption of major supplies; and
    c. Competition between producers of gas to sell their gas; and between gas suppliers to sell gas to consumers.

35. Gas storage is required to provide support in relation to gas transmission capacity and also to provide near to market gas to gas suppliers. As indigenous gas supplies decline, there is a decline in sources of gas demand that can be relied upon at times of high demand and it is necessary to deliver supplies over much greater distances. Gas storage is required to ensure that gas is available at times of high demand and/or supply disruption.

36. I will show that a shortage of gas storage reduces the opportunities for gas suppliers to buy lower priced summer gas and as a consequence

leads to higher prices for consumers and reduced competition at times of high gas demand.

Urgency of the need for gas storage capacity

37. I will explain that there is a political consensus in the UK that additional gas storage must be developed as UKCS production and reserves decline. National Grid's 2008 Ten Year Statement illustrates the dramatic reduction in UKCS production in the period 2003 to 2013. In the space of 10 years, UKCS production is likely to fall by around 70 BCM/annum. During this time, partially as a result of planning difficulties, there is likely to only be 1.1 BCM of new gas storage built. From being a gas exporter in 2003, UK will be importing around 60 BCM/annum from 2013.

38. The combination of decline in UKCS production together with growth in demand means that new gas storage is important and urgent. The Saltfleetby contribution of 0.7 BCM space and 9.5 MCMD is important and material in the context of the UK gas market and it is important that it is completed as quickly as reasonably practical.

Alternatives

39. To consider the alternatives I believe it is helpful to consider the two distinct roles that Saltfleetby will provide:

Gas provision in winter

40. With UKCS flows declining, there are three main alternatives to the storage of gas in depleted on-shore gas fields such as proposed at Saltfleetby:
    a. Other gas storage;
    b. Reduction in winter gas demand; and
    c. Additional winter gas imports by pipeline or LNG.

Within-day flexibility

41. In addition, in respect to the within-day flexibility provided by onshore gas storage there are a number of alternatives:
    a. Investment in other gas storage facilities;
    b. Investment in additional onshore pipeline capacity with surplus linepack; and
    c. Reduction in wind generation with more base-load gas fired generation.

42. I will explain that the Wingas Saltfleetby project is in a good location to fulfil needs of physical gas demands and market performance in both seasonal and short term roles.

NATIONAL ENERGY POLICY

Introduction

43. There are a number of specific references that have been made in national energy policy on the role of gas storage in the UK in improving energy security and market efficiency. Gas storage also plays a role in supporting the development of renewable energy sources, and in particular wind power, as I will discuss later. The need for more gas storage is urgent and this is recognised in national policy including the Statement of Need issued by the Energy Minister to Parliament on 16 May 2006.

44. In April 2006, the Department for Trade and Industry (DTI) Joint Energy's Security of Supply Working Group (JESS) highlighted an increased need for new gas supply along with investment in infrastructure projects to meet annual demand as well as seasonal and daily fluctuations in demand. It considered that gas import dependency within the UK will rise to about 80% by 2014 – 2015. Presented in this report was a list of known and potential projects that will be necessary to meet demand peaks in the event of severe weather in the winters of 2006 – 2007 and 2007 – 2008. The use of the Saltfleetby gas field for gas storage was listed as a planned project. The JESS work led directly certain amount of urgency to develop more gas storage.

Ministerial Written Statement - Secretary of State for Trade and Industry - Energy Statement of Need for Additional Gas Supply Infrastructure - 16th May 2006

45. The Statement said that investment was being made to improve UK gas infrastructure "the projects have the potential to make a real difference to our gas supply infrastructure; by 2010, our storage capacity could more than double and our import infrastructure is planned to more than triple". (Page 1, paragraph 5).

    As it turns out, by 2010 there will only have been an increase of UK gas storage capacity of around 20%, reflecting the difficulties associated with developing new gas storage projects.

    There have been other statements by Government Ministers that reinforce these points. I provide here some short extracts from national policy statements, together with my comments on their significance to this inquiry. All the relevant publications are listed in the document reference section.

UK energy policy on the role of gas storage

46. A number of statements are made in the 2006 Statement of Need regarding the need for storage infrastructure and its role in ensuring security of supply. One summarising reference is made which is relevant to this inquiry. It is on page 3 of the main summary.

"In summary, we need timely and appropriately sited gas supply infrastructure to be delivered by the market, because:

- *Great Britain is becoming increasingly dependent on gas imports, and requires new gas supply infrastructure to help ensure security of supply;*
- *new projects enable extra supply and storage options if they proceed without avoidable delays;*
- *there are limited locations currently suitable for much needed gas storage projects;*
- *onshore storage is needed to enable slow-moving gas to be available close to market when consumers require it;*
- *new energy infrastructure projects provide national benefits, shared by all localities."*

47. This represents a clear case for gas storage in relation to security of supply and proximity to market. The additional focus on the 2020 renewable energy target and the need for CCGTs to provide flexible back-up to wind generation represents a new development since 2006.

48. J.Havard and R.French of the Energy Markets Unit of DECC produced a paper that was included in the Geological Society, London, Special Publications 2009; v. 313; p. 13-15 doi:10.1144/SP313.2. In this paper they explain in some detail the importance of storage to the UK energy market. On page 13 they state.

"Therefore close-to-market storage infrastructure is substantially more important to us now than it was when we had significant indigenous supplies. Our gas production from the North Sea previously reduced our need for gas storage, as compared to some of our European neighbours who lack indigenous supplies. Now, to replace the capability of the southern North Sea gas fields and the Morecambe Field in Morecambe Bay, which have traditionally provided increased gas supply to meet seasonal peaks in demand (e.g. in winter), we need more storage than we have required in the past."

49. On page 14 they comment on the fact that storage facilities can only be located in very specific geographical locations, but can provide national benefits.

"Due to geological limitations, applications from developers to construct such facilities may be more common in some parts of Great Britain than others. Although such facilities may not always appear to convey a local benefit, they do provide crucial national benefits, in which all localities share. In particular, they add to the reliability of national energy supply, from which every user of the system benefits."

Energy White Papers

50. The need for increased gas supply infrastructure, and a regulatory environment to allow such infrastructure to be delivered to the market in

a timely fashion, was set out by the Government in the Energy White Paper of 2003 (DTI 2005a): Our Energy Future — creating a low carbon economy. This identified four challenges, one of which was securing the reliability of energy supplies. This remains integral to an energy policy that meets the needs and expectations of all energy consumers. It was considered as part of the DTI's Energy Review (DTI 2006a) and in the 2007 Energy White Paper which said *"Hence, as highlighted by respondents, to manage future gas security of supply risks better, Government will take action to (amongst other things) increase gas storage and import infrastructure by facilitating the construction of gas supply infrastructure both onshore and offshore, through reforms to the planning and licensing regime"*. This demonstrates that the Government is concerned in relation to the development of new gas storage, a theme that will be developed later in my evidence.

Department of Energy and Climate Change – The Importance of gas storage to the UK – The DECC Perspective

51. The last Energy White Paper to make specific reference to the role of gas storage in national energy policy was published in May 2007. These references to gas storage in summary relate to the following material points for the inquiry:

    "increase gas storage and import infrastructure by facilitating the construction of gas supply infrastructure both onshore and offshore, through reforms to the planning and licensing regime" (Page 120 – para 4.54 – third bullet)

    and

    "Delays to new infrastructure projects can also affect the demand/supply balance for gas, which although not necessarily leading to shortages, can contribute to higher energy prices" (Page 255 – para 8.11 – fourth sentence)

52. In addition, in the Energy Act 2008, the UK Government adopted a legally binding target to replace 15% of the fossil fuels used in 2020 with renewable energy. The Government Renewable Energy Strategy (July 2009) aims to reduce fossil fuel demand and support the development of renewable energy such as offshore wind. CCGT power generation is seen as critical in ensuring electricity supply is maintained when there is no wind. CCGTs can provide flexible electricity but also require flexible gas supplies which can best be provided by local gas storage. The attractiveness of the Saltfleetby location for the provision of flexibility is explored later in this statement.

53 The latest Energy White Paper published in July 2009 made some general references to gas storage, although the focus of this paper was renewable sources of energy. These in summary are:

"The UK's gas import capacity has increased more than five-fold over the last decade as a result of private sector investment, and more capacity is under construction. The Government introduced the 2008 Planning Act to reform planning consents procedures, and this will enable the timely development of onshore gas storage projects, and the 2008 Energy Act paves the way for a consents regime for offshore proposals, such as storage and unloading facilities. The new tax relief for cushion gas (required to provide pressure within gas storage facilities) will provide a further incentive to invest in storage capacity." (The UK Low Carbon Transition Plan - Page 106 – last paragraph)

Department of Energy and Climate Change – Energy Markets Outlook

54. The Energy Markets Report published in December 2008 has a number of references to the importance of gas storage in ensuring continued security of gas supply in the UK. I have reproduced a number of these below.

"There is expected to be increasing diversity of the potential sources of gas supply to the UK, though there are widely differing views on the future sources of gas. For the medium and longer term, further investment in additional import and storage capacity is likely to be required. In particular, the need is recognised for additional gas storage in the UK over the coming years as UKCS supplies continue to decline and the UK becomes increasingly dependent on imports. Maximising the diversity of sources of supply and additional investment in import capacity are important in the medium term if the UK is to be able to maintain the position of being able to meet demand in the event of interruption to another supply route." (Page 9 – para 2.9)

"Higher levels of import dependence bring new risks. These are not necessarily any greater than the risks to indigenous supplies (which may arise, for example, due to technical difficulties, adverse weather conditions or problems with industrial relations) and they cannot be avoided altogether. They therefore need to be managed. Options for doing this, all of which are under way, include:

- *Facilitating and encouraging investment in gas storage and import infrastructure to maximise the diversity of options available for gas supply;*
- *……."* (Page 54 – para 5.1.2)

"The Government is encouraging new investment in gas storage and import infrastructure through reform of the planning and consents regulatory framework to ensure that it is clear and consistent and reflects the national need for new infrastructure." (Page 59 – para 5.3.2)

Report on Energy Security by Malcolm Wicks, the Prime Minister's Special Representative on International Energy (August 2009)

55. In his report, he makes a number of points in relation to gas storage including:

- *UK levels of gas storage are much less than those in a number of other EU member states. In the past, indigenous production has meant that this was not problematic. (Page 121, paragraph 6.52).*
- *Discussions with a number of market players during the review showed agreement that we will need substantially higher amounts of storage in future. A lack of adequate storage compromises our ability to respond quickly to emergencies by rapidly introducing additional gas to the market. More than two-thirds of existing storage is in the Rough facility. It could leave us vulnerable if, as in 2006, access to Rough was disrupted (in that case, by an accidental fire). (Page 121, paragraph 6.53)*
- *A number of players in the gas market have plans for more commercial storage. There has been only limited development of new gas storage projects in recent years, and the amount built has consistently failed to meet earlier projections, but the Government has recently made welcome moves to streamline the planning process and on the tax treatment of 'cushion' gas in Budget 2009. (Page 121, paragraph 6.54)*

56. The Prime Minister welcomed the report and said*: "We are already taking a number of responsible far-sighted steps to put the UK on a secure, low carbon, affordable energy footing in the long-term and I am grateful for the work undertaken by Malcolm Wicks. The ability to maximise domestic energy reserves and establish homegrown energy sources is vital alongside the UK's ability to pull on every lever internationally in support of energy security". (Source www.malcolmwicks.org.uk/energy – 2nd from last paragraph)*

Ofgem

57. In March 2009, Ofgem launched Project Discovery to review what they see as key challenges for the UK energy market including:

    - *GB has demanding new carbon targets - reductions of 80 per cent by 2050 and an urgent need to plug the generation gap as coal and oil plant comes off the system to meet 2015 European emissions limits.*

    - *Britain's exposure to global gas markets is increasing. Dependence on imports could be as high as 80% by 2020. There are also nearer term risks from this increased dependence on volatile international gas markets, as we saw last winter in the Russia/Ukraine crisis.*

    - *GB is experiencing a worldwide financial crisis which threatens investment and highlights the risk that existing market arrangements may not be sufficient to protect consumers' interests.*

    - *The amount of investment needed to hit environmental targets leaves no room for delay in medium term expenditure: some £50 billion is needed by 2020 to meet environmental targets; 33GW of renewable generation from 3GW today.*

- *On the supply side, there are concerns regarding whether investment in additional capacity and infrastructure in Russia and elsewhere will be sufficient and timely enough to meet the increasing demand for imports to the EU.*

58. As part of Project Discovery, on 9th October 2009, published a comprehensive review of UK energy supplies in their Energy Market Scenarios document. The following extracts are from Page 8, paragraph 1.14

- *"Gas import dependency will increase dramatically, especially where environmental measures only achieve partial success, exposing the country to a greater range of potential supply shocks."*

- *"The greatest risk to security of supply appears to be maintaining gas supplies through a severe Winter."*

- *Uncertainty relating to the impact of environmental policy makes forecasting future gas demand much more challenging for potential investors than might have been the case historically. This may delay investment in gas infrastructure that might be required should environment measures not fully deliver*

- *"Gas import dependency could be exacerbated by growth in gas-fired power generation to replace lost nuclear and coal fired capacity in some scenarios."*

- *"A rapid expansion of renewables would lessen the risk of gas import dependency, but would require thermal plant to operate more flexibility to manage variability in Wind output, which may require further investment; and, a more flexible demand side may be required in the future to better manage any shocks in gas or electricity supplies."*

Ofgem are picking up the themes that have been developing in the UK gas market in the past decade and are all addressed by the Saltfleetby development – increased dependence on imports, risk to security of supplies due to a severe winter, financing uncerainties and the wind-gas CCGT interaction. The Ofgem report supports the need to develop Saltfleetby both in terms of size and urgency..

<u>Themes in UK Energy Policy</u>

59. The Wickes Report is just the latest in a series of reports, presentations, papers, White Papers that goes back to 2003. The key theme is that UK does have to develop new gas storage and with every year that goes by the urgency increases. What is clear by the lack of new gas storage developments since UKCS flows started to decline in 2000 is that it is very difficult to deliver new gas storage projects in the UK. The fact that the Saltfleetby Project has financial backing from two

of the world's biggest energy companies is of critical importance; the project can be delivered by 2013 based on its current plan. Any delay to the project would lead to an increase in risk to energy security and potentially higher energy prices to UK consumers. This is a theme I will come back to later.

60. In addition to the energy security and market efficiency arguments described above, the other main theme in current UK Energy Policy is that there should be growth in renewable electricity generation from offshore wind which means that an increase in flexible gas fired power generation is required. I will explain later how Saltfleetby is ideally located to provide this flexibility – paragraph 185-188.

61. The third theme is that reform of planning is required in order to allow delivery of strategically important projects like Saltfleetby. The 2008 Planning Act was introduced to ensure timely investment in onshore gas storage to maintain security of supply and to reduce the risk of high gas prices. It is recognised that new energy infrastructure may have a local impact but it provides national benefits. I will show later the other gas storage projects that have had planning permission refused or have been unable to raise finance to go forward; this leads to an increasing urgency for the development of new storage facilities of which Saltfleetby is a key part.

Conclusions

62. There are clear statements from the UK Government, National Grid and Ofgem that they are supportive of the development of new storage facilities to provide increased security of gas supply. This is essential given the increasing reliance on imported gas from around the world. This is backed up by the fact that they have introduced the 2008 Planning Act to ensure timely investment in new onshore gas storage. An additional benefit of additional gas storage is that the risk of high gas prices is reduced and, if the storage is located close to power generation demand like Saltfleetby, it provides the flexibility .needed for gas fired power generation.

THE CHANGING ROLE OF GAS IN THE UK ENERGY MIX

Introduction

63. An efficient gas market requires a number of things:
    a. Sufficient reliable gas transmission capacity to move supplies to customers;
    b. Sources of gas commodity that can be relied upon at times of high demand or disruption of major supplies; and
    c. Competition between producers of gas to sell their gas and between gas suppliers to sell gas to consumers.

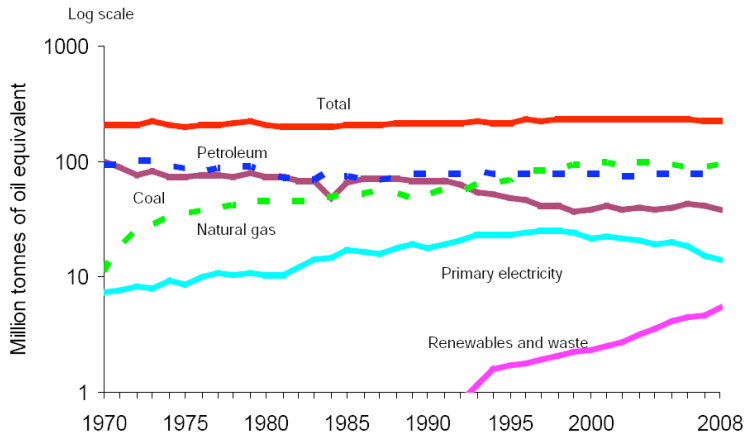
64. Gas storage is required to provide support in relation to gas transmission capacity and also to provide near to market gas for gas suppliers. As indigenous gas supplies decline, there is a decline in sources of gas demand that can be relied upon at times of high demand. Gas storage is required to ensure that gas commodity is available at time of high demand and/or supply disruption.

65. In addition, a new role for gas arises as a result of the forecast growth in intermittent wind generation being promoted by the UK Government in relation to the UK's 2020 targets for renewable energy. This is for CCGTs to switch on and off as wind generation output rises and falls. This leads directly for a need for gas to come in and out of store and this is something I will explain later – paragraphs 85-86.

UK energy mix over time

66. Gas as a primary fuel has been a major contributor to meeting the needs of UK energy demand for many years and is expected to continue to be a primary energy source for the foreseeable future, even following the building of new nuclear power stations and renewable energy sources. The historical picture is shown by the following graph which is taken from the 2009 Digest of UK Energy Statistics (DUKES) – Long Term Trends – Chart 1.1.1

Chart 1.1.1: Inland consumption of primary fuels and equivalents for energy use 1970 to 2008



67. It is clear from this diagram that gas has the highest market share of all the different primary energy sources, despite a recent small downturn in demand. The percentage each fuel supplies on an energy supplied basis is as follows, taken from table 1.1.1 of 2009 DUKES – Long Term Trends
    - Natural Gas 41%
    - Petroleum 33%
    - Coal 17%
    - Nuclear 5%
    - Renewables and waste 2%

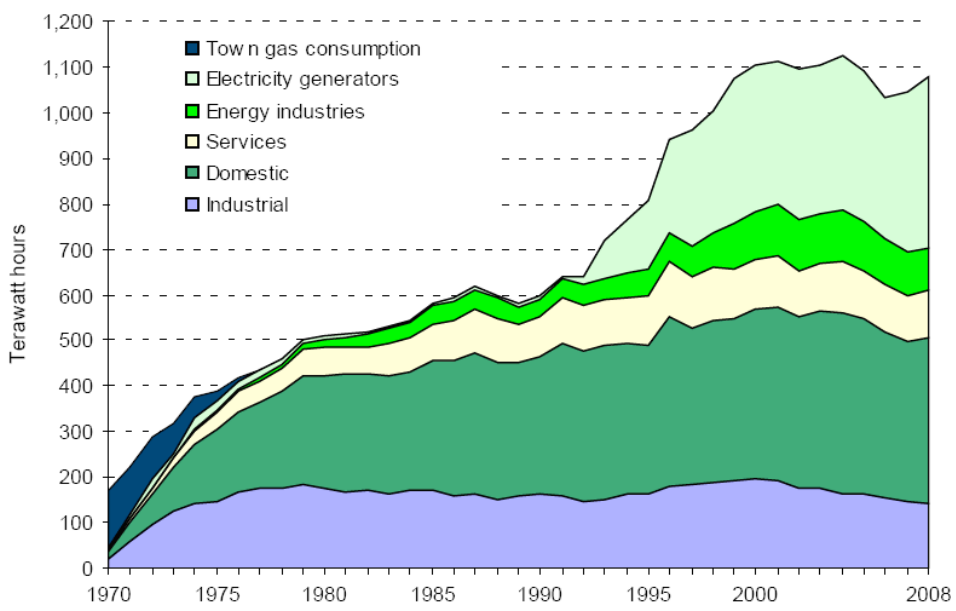
68. The Ofgem Project Discovery report states *"Retirements of older nuclear plants and closures of coal and oil plants by the end of 2015 under European environmental legislation could pose a threat to security of supply. Increasing gas import dependency could be exacerbated by growth in gas fired power generation. Significant changes in the way which we generate and consume power may be needed to manage the variability associated with increasing reliance on wind power." (Page 1, paragraph 3)*

69. What is also noticeable from the above table in the increasing role of renewable energy within the overall energy mix. The relationship of gas storage, wind, CCGTs and Saltfleetby is an important one. I shall explain later that Saltfleetby is in a good location to help provide this flexibility – paragraphs 185-188.

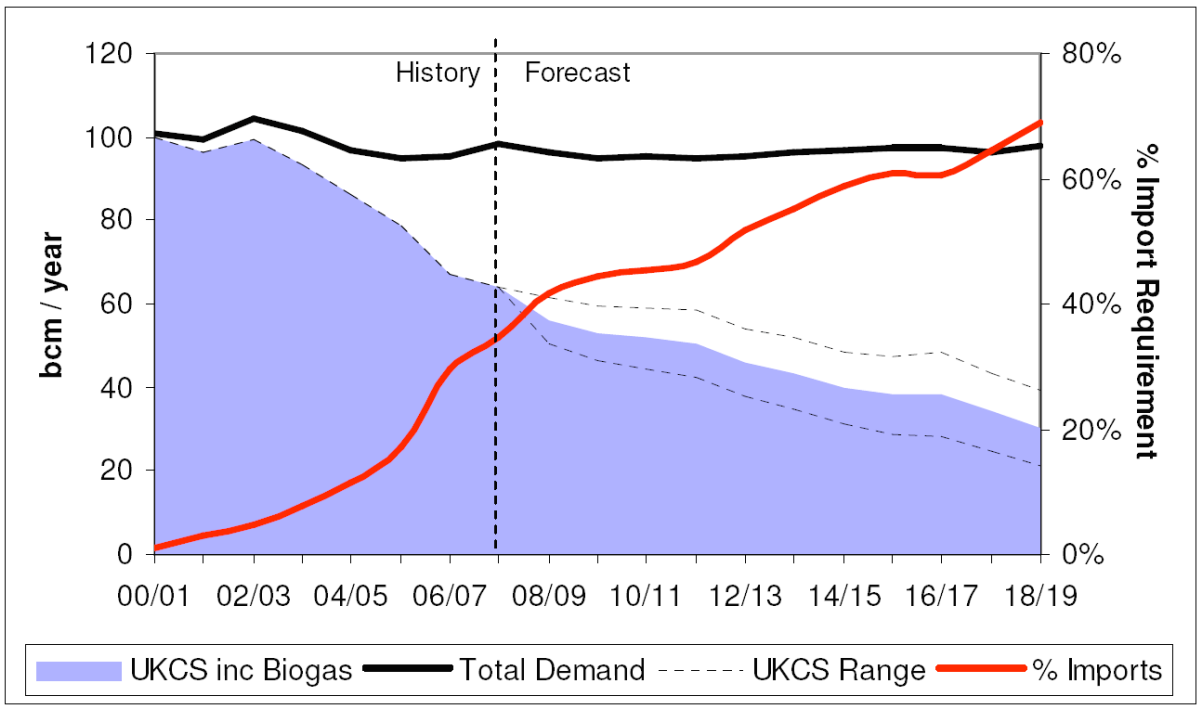
Changes in UK gas production and demand over time

70. The following graph was taken from 2009 DUKES – Long Term Trends Chart 4.1.1 and demonstrates the substantial growth in gas consumption and how the end use of gas has changed dramatically in recent years as consumption for electricity generation has grown. Most other sectors have seen modest growth or level demand in recent years.

Chart 4.1.1: Consumption of town gas and natural gas 1970 to 2008



71. Gas demand in the UK has been primarily met by indigenous gas production from the United Kingdom Continental Shelf (UKCS) but in recent years the UKCS production has been declining and imports have been rising to meet demand. The historic and forecast UKCS production is shown on the following graph which has been taken from page 17 of the National Grid publication – Transporting Britain's Energy 2009: Development of Energy Scenarios published in July 2009.



72. This shows clearly that by 2018 the UK will be reliant on imports for around 70% of its gas. It also illustrates that even if gas demand were to fall significantly, imports would make up a large proportion of gas supply to the UK market. The National Grid forecasts are independent from any commercial interest and are able to utilise confidential data that is not available to other parties. These forecasts provide the detailed numbers that help to put into context the DECC and Ofgem concerns described earlier which underpin the urgent need for new gas storage including Saltfleetby.

Existing and future UK gas storage

73. In the following tables I set out the latest information from National Grid in relation to gas storage. The information is broken down into a number of categories which include the potential storage projects, some held up by planning, others by lack of finance. I will provide a commentary in relation to each category.

Existing UK gas storage

Storage Project	**Operator**	**Location**	**Space (BCM)**	**Operational**
LNG Storage	National Grid LNG Storage	Various	0.3	1971-1983
Hornsea	SSE Hornsea	Yorkshire	0.3	1979
Rough	Centrica Storage	S.North Sea	3.3	1985
Hatfield Moor	Scottish Power	Yorkshire	0.1	2000-2001
Holehouse Farm	Energy Merchants Gas Storage	Cheshire	0.04	2001-2002
Humbly Grove	Star Energy	Hampshire	0.3	2005-2006
Total			4.34	

74. The important factor from this table is that in the 24 years since the completion of the offshore Rough gas storage facility by the then British Gas (mostly built prior to privatisation), there has only been an additional 0.44 BCM of storage capacity (the last 3 projects above), representing an increase of around 11%. During this time, UKCS gas production rose from 36 BCM in 1983 to 108 BCM in 2000, falling back to around 67 BCM in 2009.

Under development storage projects

Storage Project	**Developer**	**Location**	**Space (BCM)**	**Gas Year**
Aldbrough	SSE/Statoil	East Yorkshire	0.4	2008-2009
Holford	E.ON	Cheshire	0.2	2011-2012
Caythorpe	Centrica	East Yorkshire	0.2	2011-2012

Stublach	Storengy UK Limited	Cheshire	0.4	2013-2014
Total			1.1	

75. This table indicates that the projects being built represent an increase of around 25%. During the same period, to 2013-14, it is forecast that UKCS production will decline by around 20 BCM. The 1.1 BCM of new storage is therefore only around 5% of the decline in UKCS production.

Storage projects with planning consents, final investment approval not made

Storage Project	**Developer**	**Location**	**Space (BCM)**	**Planning Granted**
Aldbrough II	SSE/Statoil	East Yorkshire	0.4	May 07
Portland	Portland Gas Ltd	Dorset	1.0	July 07
Whitehill Farm	E.ON	Yorkshire	0.4	October 07
Gateway	Stag Energy	Offshore Barrow	1.5	November 08
Holehouse Farm	EDFT Storage	Cheshire	0.3	March 09
Bains	Centrica Storage	Offshore Barrow	0.6	June 09
Total			4.2	

76. Of these projects, 2.1 BCM relate to offshore projects which are expensive to finance and may not go ahead even though the planning hurdle has been cleared. Other projects with planning permission have been impacted by the credit crunch and are having difficulties raising finance.

Storage projects yet to receive planning consents

Storage Project	**Developer**	**Location**	**Space (BCM)**	**Date Applied**
King Street	NPL	Cheshire	0.2	October 07
Saltfleetby	Wingas	Lincolnshire	0.7	October 08
Fleetwood	Canatxx	Lancashire	1.0	February 09
Total			1.9	

77. All these projects have had planning permission rejected and are in the appeal or resubmission process. The Fleetwood project had planning rejected at its inquiry and is now in a new planning process. The Saltfleetby project is attractive in that it can move from this category to the 'under construction' category because of its ownership and financing.

Storage projects yet to submit planning consents

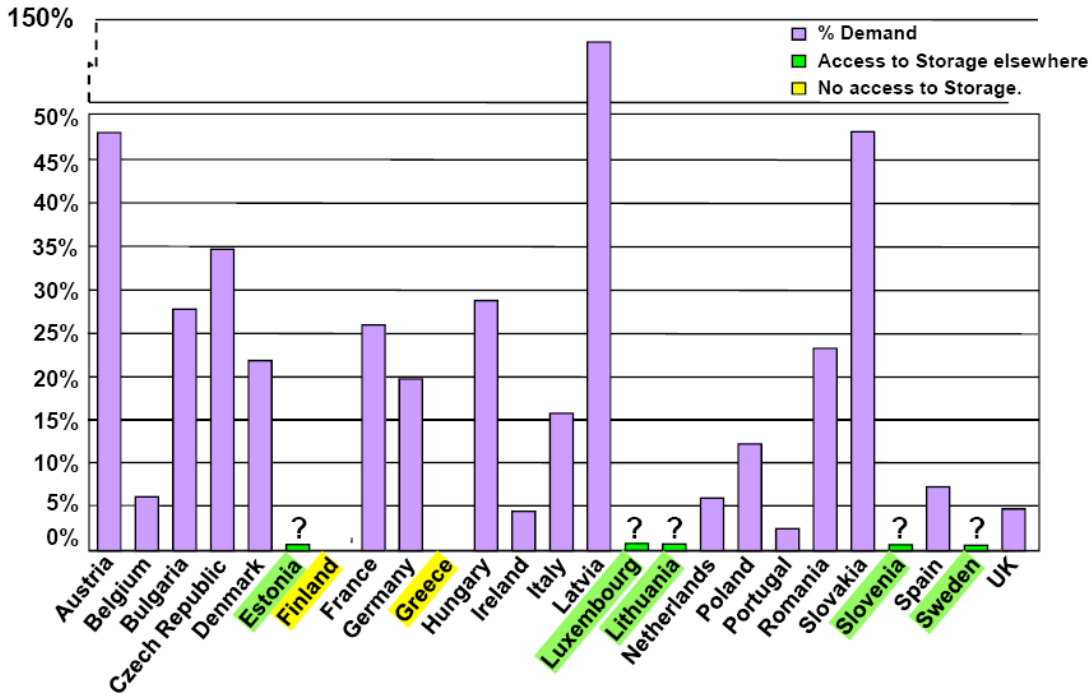
Storage Project	**Developer**	**Location**	**Space (BCM)**
Albury I	Star Energy	Surrey	0.2
Albury II	Star Energy	Surrey	0.4

Hewett	ENI	Offshore Barrow	4.0
Baird	Centrica	Offshore Barrow	1.7
Hatfield West	Scottish Power	Yorkshire	0.1
Gateway II	Stag Energy	Offshore Barrow	1.5
Total			7.9

78. Of potential projects, more than 90% is located offshore (7.2 BCM out of 7.9 BCM). What this indicates is that there is a limited number of potential storage sites that are onshore and companies are starting to look offshore. Potential onshore sites that are close to the gas grid are in short supply, with Saltfleetby the largest potential depleted field development. It is by no means certain that any of the offshore projects will go ahead because of the difficulty and cost of developing such offshore projects.

<u>Comparison with gas storage capacity elsewhere</u>

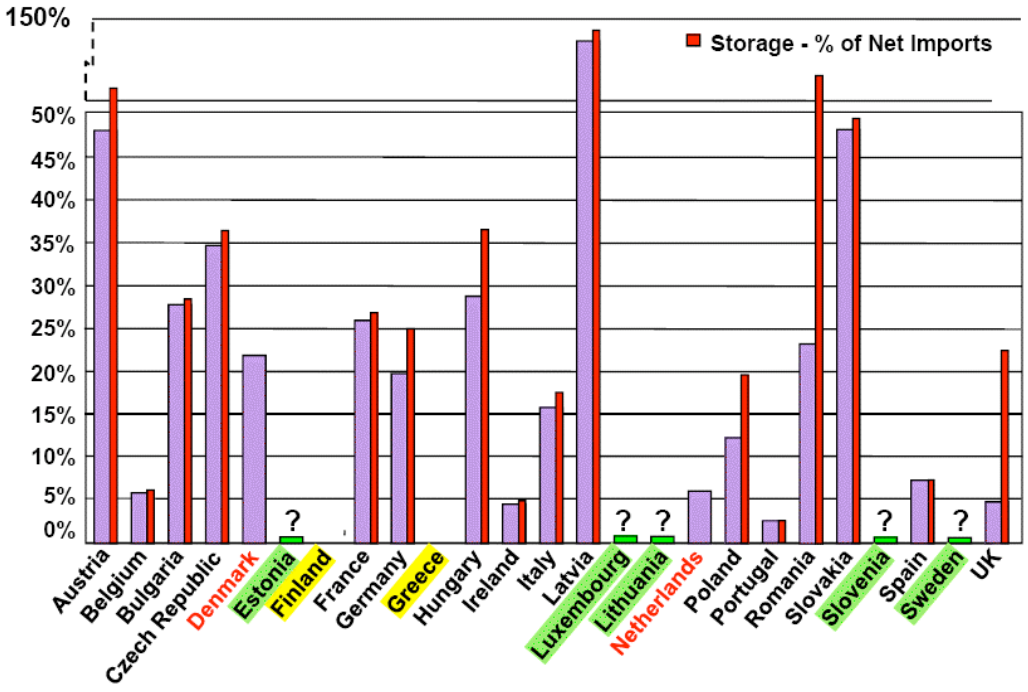
79. A comprehensive analysis of the different storage levels in each EU Member State has been carried out by the Department of Energy & Climate Change (DECC) and this was presented at a recent conference on the 29th June 2009 by Gill Campbell Assistant Director, European and Energy Policy Directorate at DECC. The graph below shows how different countries have approached their storage requirements though the methodology adopted by each country was not published by DECC.



80. The UK is at the bottom of this league of major gas consuming countries, a position that reflects the fact that until 2004 the UK was

broadly self-sufficient in gas and the delays there have been in building new storage in the UK.

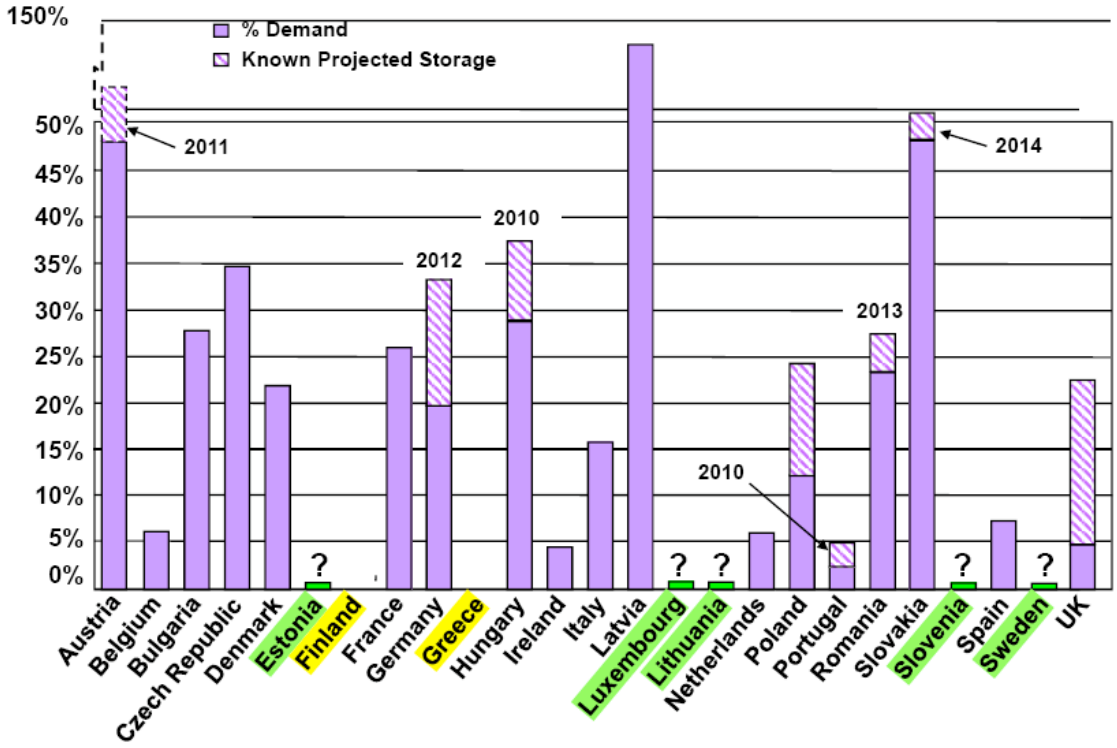
81. The graph below (also from the Gill Campbell presentation) shows the percentage of annual demand satisfied by storage (in same colour as above) but also shows the amount of storage as a percentage of imports. This shows clearly that most countries that import gas have storage levels that meet a substantial proportion of those imports.



82. The UK currently has a significantly better coverage of import levels than of total demand levels as a consequence of the relatively low levels of imports into the UK due to residual UK Continental shelf production. In the medium term however, to 2015, UKCS production is forecast to fall by around 25 BCM per annum during which period gas demand for power generation is forecast to increase by around 25%. Taken together these factors will reduce the UK percentage to around half of that for France. Crucially, however, France does not rely on gas for power generation but has nuclear generation with back-up from hydro-electricity and other fuels. This illustrates the urgency of the need for facilities like Saltfleetby, a theme I will develop later.

83. Even taking into account UKCS reserves and production, the UK is still well below the levels of countries that have gas demand levels comparable to the UK (Germany and France). Other high demand countries are Italy and the Netherlands. Italy has lower coverage of imports and the Netherlands has no gas imports. If we look at the storage capacity as a percentage of winter demand a similar picture arises (UK 9%, Germany 32% and France 35%).

84. The next graph (also from the Gil Campbell presentation) shows the position if all known new storage projects had been completed. As I explained earlier, I think it is very unlikely that all such projects will come forward, but the exercise is useful in understanding the scale of the problem facing the UK. This assumption would place the UK in a better position compared to the current situation and in line with the largest consumers and developing economies.



85. This begs the question "will this be sufficient gas storage for UK?". There is no absolute level of gas storage that there should be as a proportion of gas demand. However, there are a number of factors that help to inform gas suppliers, consumers, regulators and Governments as to what percentage of demand is appropriate, including:

- Penetration of gas in the residential market – the higher this level, the more winter gas demand (around six times the summer level for residential customers), the higher the storage required. More than 80% of UK homes are connected to the gas grid, one of the highest levels of penetration in the World.
- Penetration of gas in the power generation market – UK is forecast to generate more than 60% of electricity from gas by 2020 which is much higher than Germany (24%) and France (7%) for example.
- Robustness of gas importation infrastructure and supply chain – whilst UK has the physical capacity to bring in gas, our economy is vulnerable because gas suppliers do not contract to make such imports in the event of a cold winter or major supply disruption. So, whilst we may have physical infrastructure available to import gas in a cold January, we may not be able to buy enough gas to import.

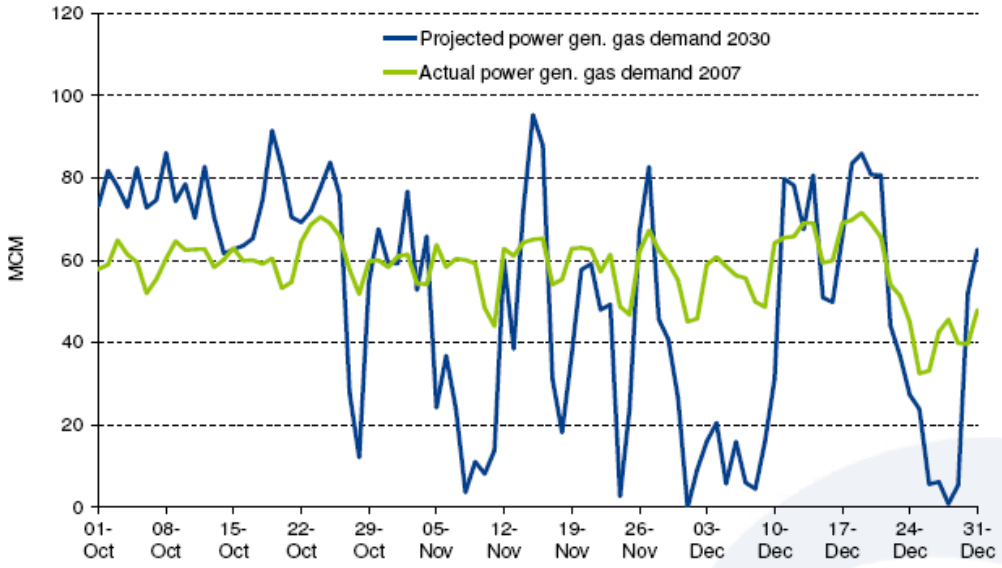
86. These factors would indicate that the UK should have a higher percentage of gas storage as a percentage of demand than many other similar economies. Even if all the possible projects are developed (including the offshore ones) the UK will not be served as well as the fundamentals indicate is appropriate. So, we need all the potential storage and more. The ability for Saltfleetby to be operating by 2013 is important as the urgency is real.

<u>The role of gas storage as a complement to renewable energy production</u>

87. In the Energy Act 2008, the UK Government adopted a legally binding target to replace 15% of the fossil fuels used in 2020 with renewable energy. The Government Renewable Energy Strategy (July 2009) aims to reduce fossil fuel demand and support the development of renewable energy such as offshore wind.

88. In order to meet this 15% combined cycle gas turbine (CCGT) power generation is seen as critical in ensuring electricity supply is maintained when there is no wind. CCGTs can provide flexible electricity but require flexible gas which can best be provided by local gas storage.

89. Energy consultancy 'Poyry' has completed a study for a group of energy companies including National Grid and Centrica. The study looked at the question "how could the impact of intermittent generation, required to meet targets for renewables and decarbonisation of generation, affect the wholesale energy markets in GB and Ireland?'. Poyry presented their results at the National Grid TBE 2009 event in July 2009 including the following graph:



90. This graph indicates that when the wind is blowing the majority of gas CCGTs will be shutdown, when the wind drops they will need to operate. This represents a dramatic change compared to today when

gas CCGTs only require a limited amount of flexibility. I will show that the location of Saltfleetby is ideal for providing flexibility for power generation.

Conclusions

91. As a result of the Government's Renewable Energy Strategy gas is seen as the critical fuel for making electricity at times when there is no wind generation. Whilst gas fired power generation is well established, the interaction with wind is forecast to be an important new factor after 2015. This interaction leads to the requirement for National Grid's NTS to provide additional flexibility to link gas fired power stations with gas storage facilities in particular. In addition, over the next 10 years the majority of UK coal fired generation will close down due to emissions legislation and the majority of nuclear power stations will also close down. Over this period, the natural gas share of total energy demand is forecast to rise.

92. Hence, in addition to gas as the primary fuel for heating domestic customers in the UK, gas will be the main fuel for ensuring electricity supplies to these same customers. With major decline in UKCS gas production, gas storage in the UK is vital in ensuring both gas is available to provide heat and electricity to UK consumers in the period 2013 – 2020 and beyond.

GAS SUPPLY/DEMAND BALANCE

Introduction

93. As part of the introduction to this section I have taken the following extract from page 13 of the paper from the Department of Energy and Climate Change – The Importance of gas storage to the UK – The DECC Perspective referred to in section 4b.

"A central feature in creating a reliable gas market is balancing physical supply and demand. There are a number of reasons for this:

- *there is a very strong seasonal element in gas demand (largely arising from household demand for central heating purposes in winter) — the 'swing factor', i.e. the ratio of winter peak daily gas demand to annual average daily demand, is over 30%;*
- *there is also a strong within-day element in gas demand: gas demand is not 'flat' over each period of 24 hours, but, especially in winter, tends to peak in the evening and to fall in the very early morning;*
- *gas 'fails to danger' (i.e. in the event of a supply failure there is a risk of air entering the gas supply pipes thereby creating a highly explosive and dangerous situation); because of this it is highly important to maintain continuity of supply to (especially) the household market;*
- *and yet gas (unlike electricity) travels along the supply system to final consumers relatively slowly; this increases the difficulty of balancing gas supply and demand at the point of consumption, and therefore adds a geographical element to the balancing problem.*

We have three kinds of tool for providing the flexibility to balance the physical gas market:

On the supply side

- *by varying (increasing or decreasing) supplies of gas into the market;*
- *by drawing on close-to-market gas storage facilities;*

On the demand side

- *through demand management; in practice, by relying on the commercial arrangements between gas market players and gas consumers to reduce gas demand at times of tight supply. There is some demand-side flexibility, but the much higher winter demand compared to summer demand means there is inevitably an important role for the supply side in balancing the market in the winter, and thereby preventing a supply failure that could result in interruptions to users or even air entering the gas supply system, creating a potentially dangerous situation."*

94. There are a number of uncertainties in the current economic climate with regard to the ability of the UK gas market to achieve a

supply/demand balance. Growth in gas demand and the development of supplies are both affected. However the future of the economy will be dependent on sufficient energy supplies being available from all possible sources to meet demand. National Grid are seen within the industry as a reliable wholly independent source of supply and demand forecasts and therefore the information in the following sections is sourced from National Grid documents. National Grid has published a detailed report on their supply and demand forecasts as part of their TBE 2009 Consultation Process entitled "Transporting Britain's Energy 2009 – Development of Energy Scenarios" published in July 2009. They have also developed a range of scenarios to accompany these forecasts to illustrate the uncertainty that there is in both supply and demand.

Annual gas supply/demand balance

95. To develop an annual gas supply/demand balance it is necessary to first forecast annual gas demand and then to match that demand with the forecast gas supplies that could be used to support that demand.

Demand

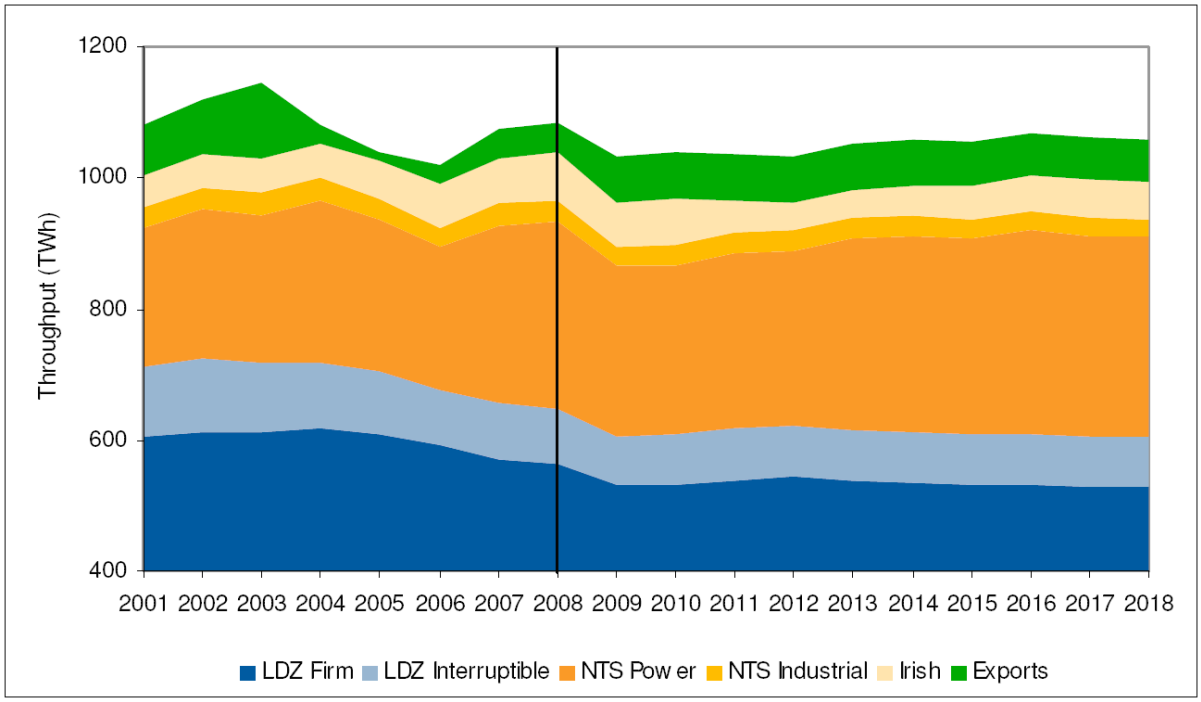
96. As a consequence of high energy prices and a rapid decline in the UK economy, energy demand for both gas and electricity has fallen significantly. For the 2008/9 financial year, weather corrected gas demand in the Distribution Network (DN)[1] market areas fell by 5%, the fourth consecutive year of decline.

97. Though energy prices have fallen from their exceptional highs in 2008, NG's longer term forecasts for most forms of energy and therefore end user prices remain relatively high. This combined with increased energy efficiency measures, higher carbon prices and government initiatives, results in DN gas demand forecasts that are essentially flat and NG's forecasts for gas demand in the power generation sector are for modest increases as new CCGT plant replaces some coal and ageing nuclear plant. Through to 2018/19 they forecast 13.6 GW of new CCGT plant to be connected to the NTS, of which 7.5 GW is under construction.

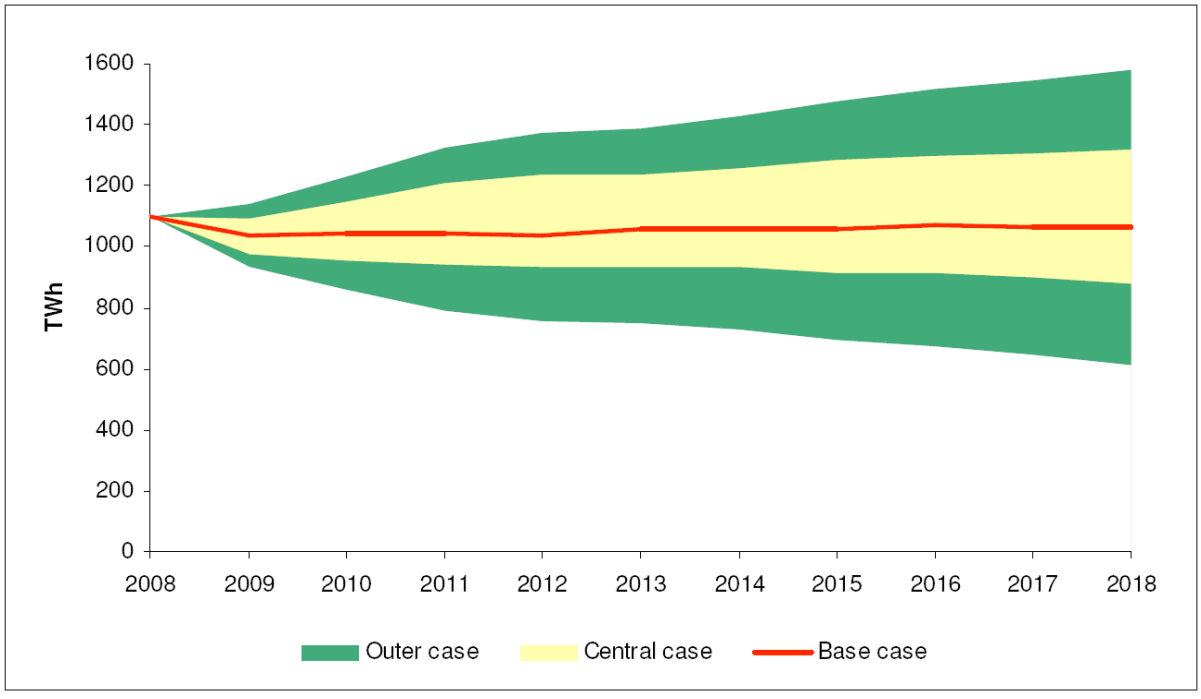
98. Over the ten-year forecast period (includes 2009), total gas demand is projected to fall at a rate of around 0.25% per annum, with Distribution Network demand falling at 0.7% per annum and NTS demand forecast to grow at an average of 0.4% per annum.

99. Their base case forecast is shown below.

[1] These are the networks that supply gas to the majority of consumers as opposed to the National Transmission System (NTS) which moves gas around the country to the DN's and supplies a small number of very large customers mainly power stations



100. Around the base case forecast they have developed a range of demands based on numerous sensitivities. These have been developed by changing their assumptions on economic variables, fuel prices, energy conservation, power generation capacity and output, CHP capacity, warm weather and exports to both Ireland and the Continent. In this year's sensitivities they have also developed two 'recession cases' – one with a deep and long lasting recession and the other with a rapid economic recovery. The full range of demand forecasts are shown below:



101. This shows the potential for more growth in demand than decline though there is a high degree of uncertainty, with the UK renewable targets and recession tending to reduce gas demand but the closure of coal and nuclear generation plant increasing gas demand.

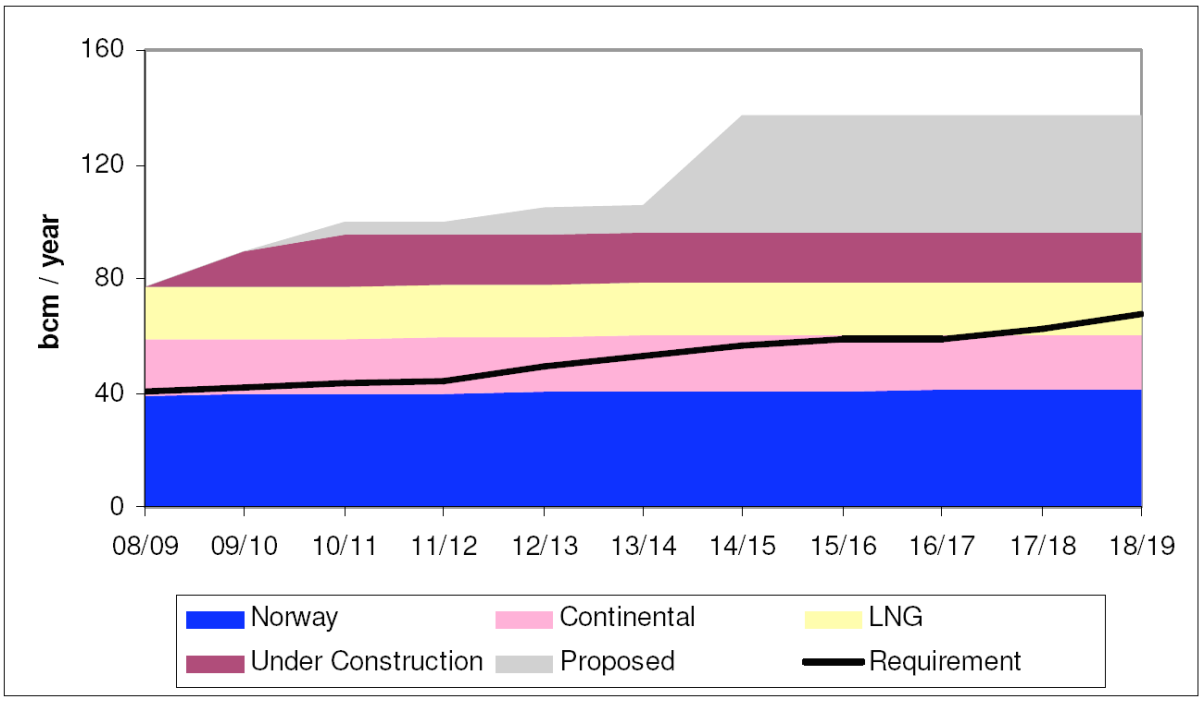
Supply

102. As described earlier the UKCS supplies are declining at a rapid and sustained rate and large amounts of gas imports will be required during the next ten years. National Grid are predicting high levels of uncertainty with regard to where imports will be landed to meet demand. This uncertainty is categorised by assigning a 'priority' to imports. "Core" imports are those that are likely to flow and "Non-core" those that may flow. With import capacity exceeding import requirements, even this approach only partly captures possible supply patterns. The allocation process adopted by National Grid is described below:

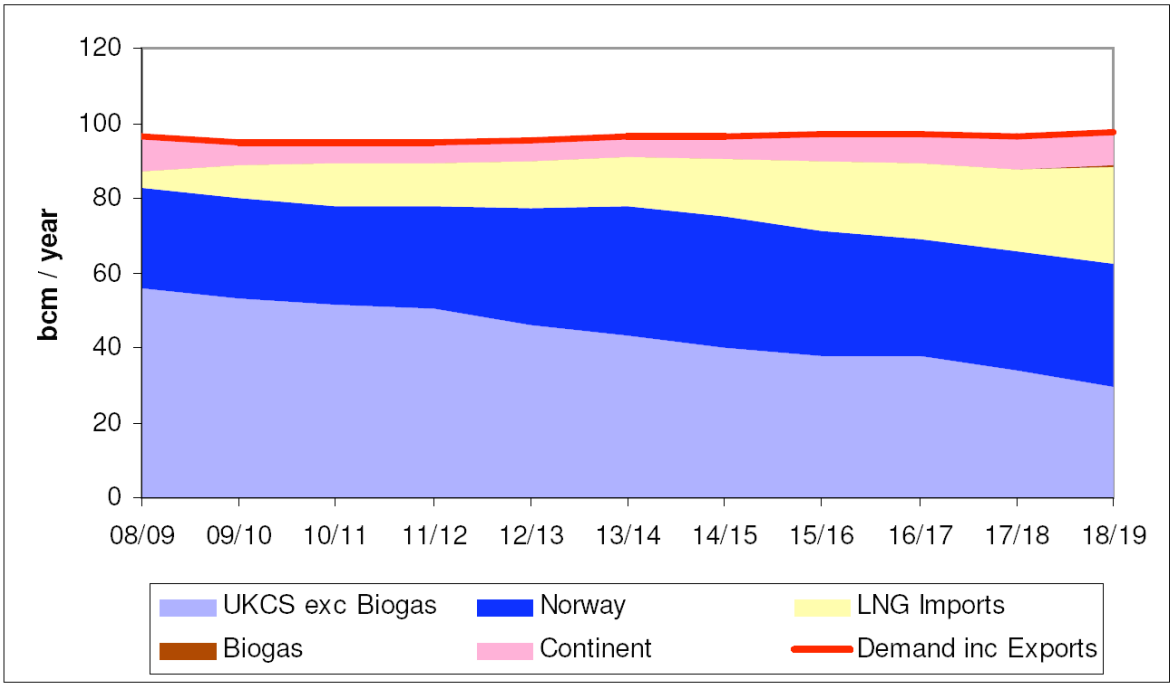
- Allocation of core gas to annual demand;
- By difference, identify the annual supply shortfall to be made up from non-core gas sources;
- Due to large surplus of non-core, further review of non-core gas for each supply source i.e. move from capacity based apportionment to a de-rated[2] based availability; and
- Finally allocate the remaining supply shortfall to all non-core supply sources based on de-rated availability.

103. The diagram below shows NG's forecast of annual gas import requirements compared to the de-rated import capacity.

[2] A de-rated basis relates to anticipated usage of the import capability or basing the capability on recent operational experience



104. National Grid has to make a match between supply and demand in order to assess the impact that new sources of gas will have on their network. The National Grid base case annual match is shown below. This clearly shows a high reliance on gas imports by 2018/19 as a direct result of the decline in UKCS supplies.

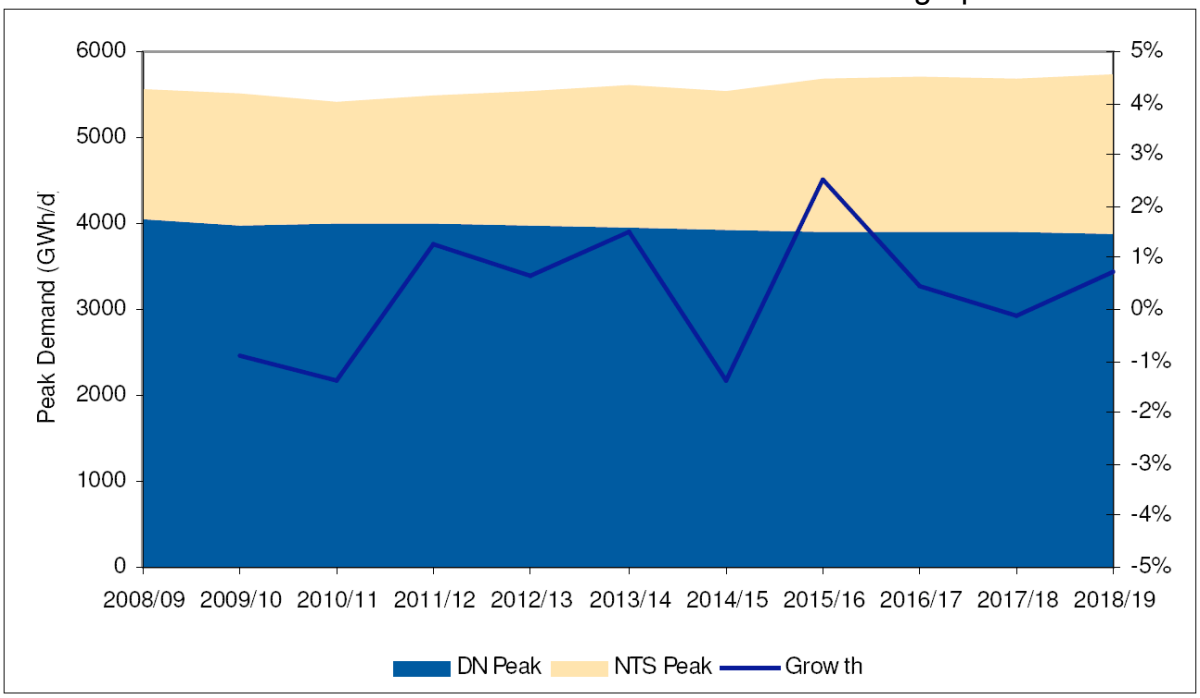


105. As described above, the decline in UKCS production and high reliance on gas for residential heating and power generation means that it is important that new gas storage is built. This also gives UK consumers access to lower priced summer gas supplies.

Peak gas supply/demand balance

Demand

106. With regard to 1 in 20 peak day demand[3] National Grid are forecasting some slight growth in national gas demand along the same lines as their forecast for annual demand as shown in the graph below.

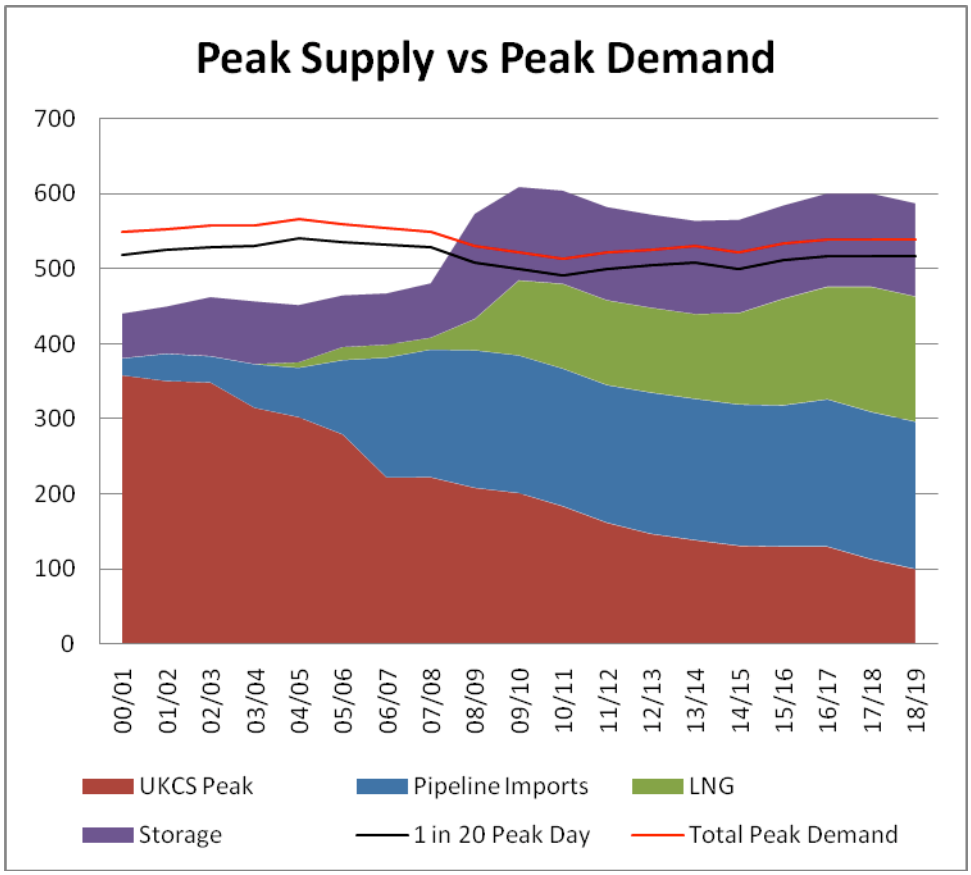


107. This indicates that the demand for gas on a peak day is forecast to remain broadly similar to the level today. In the past, the UKCS provided the majority of peak day gas but this proportion is falling in line with UKCS production. Whilst new LNG importation facilities and pipelines are able to supply gas on a peak day, there is no guarantee that the gas will actually be there – it may have been bought by others and taken to the US or Far East, for example. In addition, there is reduced diversity compared to when this peak gas came from the UKCS and, as a result, having peak supply available in storage facilities such as Saltfleetby is increasingly important.

[3] 1 in 20 peak day demand refers to a level of demand that is used by the industry to define the design criteria for the gas transmission network, and as a basis for setting a maximum level of daily demand to assess gas supply requirements against. It is calculated using statistical simulation techniques, and in any winter the probability of the 1 in 20 peak day demand being exceeded is 0.05.

Supply

108. The development of a peak match is along similar lines to the annual match except that when all available peak delivery from supplies is included there is typically a deficit which has to be met by the inclusion of storage deliverability. National Grid have analysed the UKCS peak capability and there is, as with the annual UKCS supply, a forecast steep decline in peak gas from the UKCS. The following graph, using data sourced from National Grid shows the peak supply deliverability from different sources compared to the peak day demand. The amount of storage deliverability in this forecast is assumed to be the same as that stated by National Grid in their 2009 Winter Operations Outlook consultation.



109. The black line shows the 1 in 20 peak day demand level which is equal to the current design capacity of the transportation network and the red line is the total peak demand, which is equal to the maximum demand that can be taken assuming that all the interruptible customers are using gas on the highest demand day. Currently it is assumed that demand will never exceed the 1 in 20 peak demand. However from the winter of 2011/12 onwards all interruptible customers will have access to firm capacity and will only be interrupted if they have offered to do so under a commercial arrangement with the gas network operator or their supplier. This will clearly have the potential to increase the amount of peak gas required if there is insufficient commercial incentive for these customers to sell back their firm capacity to the network operator, and/or their peak gas to their supplier.

110. The graph illustrates that by 2018 there is around 440 to 460 MCM/D of peak gas capacity to be provided on top of UKCS supplies. It is clear that storage will, for the foreseeable future, make an essential contribution to meeting peak demand. In addition, on a peak day, very high flows of Norwegian gas, continental imports and LNG will be required. At the present time, UKCS gas suppliers do not have such gas on firm contracts with gas producers so there is a significant risk that the gas may not be there when it is required. The best safeguard against this is to have bought lower cost summer gas and put it in storage facilities such as proposed at Saltfleetby. I examine further the risk of losing major supplies later in my evidence.

The consequences of a supply/demand deficit

111. There are two key consequences of a supply/demand deficit. If insufficient annual gas supplies are available to meet average daily demand then the scarcity of supply will drive up the wholesale price of gas, which will ultimately have to be passed on to the consumer as has been seen in recent years.

112. A far more serious consequence however is that if there is a shortage of gas at any time during the year then it will be necessary to curtail supply to gas fired power stations. This will be particularly important during peak periods, but it could occur at anytime during the year. The emergency hierarchy has been agreed with the industry and in the event of supply shortfall emergency procedures are invoked and the largest customers are curtailed first to ensure integrity of the gas supply network. The majority of these sites are gas fired power stations, with the other sites being large industrial users. This clearly has major implications for electricity security. Further comments on this aspect are provided later in this proof.

Conclusions

113. Storage plays a vital role in ensuring gas supply can meet demand during periods of peak demand as there is insufficient flexibility in UKCS gas supplies and imports to provide enough gas for the coldest day. In addition, loss of major gas supplies on a peak day would cause difficulties. The reliance of UK domestic consumers on gas for heating and power generation means that the consequences of a supply/demand deficit are so severe in terms of the viability of the UK economy that the risk of this occurrence should be minimised by maximising the sources of gas supply. Storage has a vital role to play in eliminating the possibility of a supply deficit occurring and can provide an emergency source of gas in the event of major supply losses. Minimisation of supply scarcity will also avoid extremes in wholesale gas prices.

ENERGY SECURITY

Introduction

114. The security of energy supply is of paramount importance to the UK economy and the well being of its population, particularly the elderly and fuel poor. The UK Government has, through its Energy Policies, highlighted the need for a secure long term energy supply for the UK and is encouraging diversity and sustainability of supply. The Government is also supportive of the development of renewable sources but is also supportive of the development of storage facilities as part of that overall policy. This section outlines the role of storage in providing a secure gas supply for the future in the context of current UKG Energy Policies.

Reliance on imported gas

115. As highlighted in the National Grid forecasts, UK gas supply is increasingly provided by imported gas as we move towards 2010 and beyond. It is also stated that there will be a potential oversupply of gas from these import sources should they be utilised to their maximum capacity. However, as stated by National Grid, there is great uncertainty regarding the availability of gas from these new imports. In particular, LNG is an internationally traded commodity which can be delivered anywhere in the world where there is an LNG importation facility.

116. In his August 2009 Report, Malcolm Wickes expressed concerns in relation to availability of actual gas at these importation facilities, an issue distinct from the actual physical capacity of the facilities. Wickes said:

"In the case of Norwegian supplies, for example, some are contracted on a long-term basis, but others are '"swing supplies' provided to the UK market in circumstances were customers on the Continent do not take up all of the gas to which they are contractually entitled. I am concerned that this could leave the UK vulnerable, exposing it to increased price volatility and potentially preventing it physically receiving the gas needed to meet demand, especially during very harsh winters but also at times of geopolitical risk or crisis".

117. Should there be a cold February at the end of a cold winter then there is a risk that the UK will need gas but UK suppliers will be unable to secure it, having not put contracts in place. The way to avoid this is to buy gas in summer and put it into stores like Saltfleetby.

The importance of energy security

118. The loss of imports would have serious consequences for the UK gas market with knock on effects on the economy and the well being of the population and this is an important theme in UK

Government energy policy as has been discussed above. Should this occur during a severe winter then there will be the risk that gas supplies would need to be curtailed (see comments above relating to the ingress of air to gas networks). This will be initially at power stations, but there could be a risk of curtailment to non-domestic customers and even under certain conditions domestic customers.

119. Storage provides a vital role in energy security in that it can be filled at times of low demand and emptied at times of high demand or when other sources of gas are not available e.g. imports.

The consequences of a failure to achieve energy security

120. As outlined above one of the consequences of failing to provide sufficient gas supply security is that electricity security is jeopardised. The sequence of events is however potentially more extreme because of the wider interactions between the gas and electricity supply systems.

121. Once a national gas supply emergency is declared all sources of gas are directed to operate at their maximum capability. This includes storage security inventories which are (in effect) managed by National Grid under industry agreed stock monitors that ensure sufficient volume is maintained to meet expected needs under credible supply/demand scenarios. Should this not be sufficient to meet firm gas demand, then the large gas loads are curtailed, primarily gas fired power stations. As the gas fired power stations produce 40% of the electricity used in the UK there is a grave risk that electricity supplies will be curtailed to consumers as the plant margin is only currently 14. One consequence of this is that the electricity supply to gas fired central heating systems will be shut off and many households will be left with no heating. This will improve the gas supply situation to a degree, but it would only be possible to re-commission the gas fired power stations once it was certain that there would be sufficient gas to meet the surge in demand from this source and all the central heating systems coming back on again all at once.

122. Saltfleetby represents a material contributor to UK energy security. Its storage capacity will represent an increase of around 15% of existing and under development storage. Its peak capacity represents around 10% of the likely UKCS maximum flow-rate by 2020. In addition, I will show that its location close to many UK CCGTs is very helpful to the UK gas market. So, for keeping UK consumers warm and with the lights on, Saltfleetby is important.

Conclusions

123. The consequences of a failure to achieve energy security are so severe to both the economy and the wellbeing and safety of the population that it is important that every option is considered to

maintain current security levels. Storage has a key role to play in energy security.

124. It is vital to manage future energy supply security in a way that controls the impact of unforeseen supply shortfalls as a result of imports being diverted to more profitable markets. There may be substantial import infrastructure but there is no guarantee that any of this infrastructure will deliver gas when it is needed if a competing buyer is prepared to pay more for the gas than UK buyers. Storage can provide a hedge against this risk.

GAS MARKET EFFICIENCY

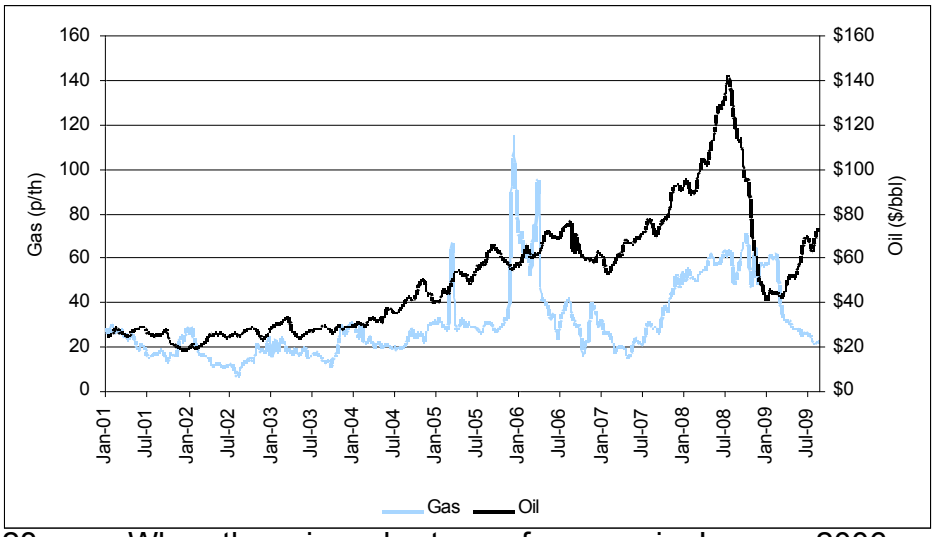
Introduction

125. An efficient gas market requires a number of things. It needs sufficient reliable gas transmission capacity to move supplies to customers, it needs sources of gas that can be relied upon at times of high demand or disruption of major supplies and it needs competition between producers of gas to sell their gas and between gas suppliers to sell this gas to consumers

126. Gas storage is required to provide support in relation to gas transmission capacity and also to provide near to market gas to gas suppliers. As indigenous gas supplies decline, there is a decline in sources of gas demand that can be relied upon at times of high demand. Gas storage is required to ensure that gas is available at time of high demand and/or supply disruption.

Price fluctuations in a volatile energy market

127. The volatility in gas prices seen on the last few years can be attributed in part to the lack of gas storage in the UK.



128. When there is a shortage of gas, as in January 2006 and at the end of 2008, when there is cold weather and/or disruptions to supply, UK prices are very high. Conversely, at times of lower demand, the absence of demand from gas storage operators means that UK prices can be very low. Customers prefer stability in pricing in order that they can plan efficiently and make investment decisions.

129. UK gas suppliers are exposed financially if they do not have sufficient gas to supply their customers, whether due to high cold weather demand or because of a loss of gas supplies. The lack of storage in the UK means that the 'cold weather and disruption' risk is higher than in other markets, leading to higher gas prices than would be the case if the UK had a comparable level of storage to Germany, for example. It is generally the old and less well off who pay a

disproportionate price for these risks. Until there is new gas storage in the UK it can be expected that UK gas prices will remain among the most volatile in the world.

The consequences of gas market inefficiency

130. The discussion above sets out the financial consequences of gas market inefficiency caused by a shortage of gas storage. In addition, there are potentially very severe consequences if there is insufficient gas available to satisfy customers

131. There are two main scenarios that lead to gas demand exceeding supply. First, very cold weather over an extended period of time (when gas storage has been depleted). Second, major disruptions in supplies.

132. In the last few years we have seen a number of examples of both these:

- loss of Rough storage facility in March 2006;
- cold weather in December 2006; and
- disruptions of Russian gas supplies due to disputes with Ukraine and Belorussia.

133. If demand exceeds supply, National Grid attempts to buy additional supplies via the gas market which can incentivise gas users to stop taking gas and hence release gas into the market. If this is not successful in bringing supply and demand into balance, National Grid (acting at Network Emergency Co-ordinator) can declare a National Emergency and shut-off gas supplies to large industrial customers including power generators. Next, other firm customers can have their supplies curtailed. Ultimately, if demand still exceeds supply, National Grid has reserves of gas known as Operating Margins that are injected into the gas grid to manage an orderly rundown of the gas grid. The key objective is to avoid a situation were gas pressures are very low close to consumers which would allow air into the gas grid and a consequent risk of explosion. If this happens it can take many months to flush the air out of the gas system and re-start supplies.

Role of gas storage in achieving market efficiency

134. Gas storage provides a number of roles to different market players:

a. **To gas suppliers**, it allows them to maintain supplies to their customers at times of higher demand and allows them to buy gas at lower summer prices which can be held in storage to supply winter demand.
b. **To gas consumers** in a competitive market gas storage offers a greater level of security of supply and, at the same time, offers lower gas prices due to the ability of gas suppliers to buy gas at lower prices in summer.
c. **To National Grid** as operator of the National Transmission System, gas storage offers the ability to match supply and demand within day on an hourly basis.
d. **To power generators**, gas storage offers an ability to use gas fired combined cycle gas turbines as back-up to wind generation which is only produced for around 30% of the time.
e. **To the UK Government**, gas storage is crucial to maintaining security of supply if there are disruptions to infrastructure or political restrictions on gas flow. At the same time, gas storage provides the flexibility to allow wind generation to be developed without this risking electricity supplies.

135. Going forward, there is forecast to be higher level of imports each year and also greater levels of wind generation. Hence all the above roles will become increasingly significant.

<u>Conclusions</u>

136. It would take an exceptional combination of circumstances to lead to a National Emergency and an orderly run-down. However, it is conceivable that there would be severe adverse consequences as a result of a combination of cold weather and loss of a major gas source (such as the Langeled pipeline from Norway, or the UK-Continent Interconnector, or the gas pipeline across Wales that brings gas to consumers from Milford Haven LNG).

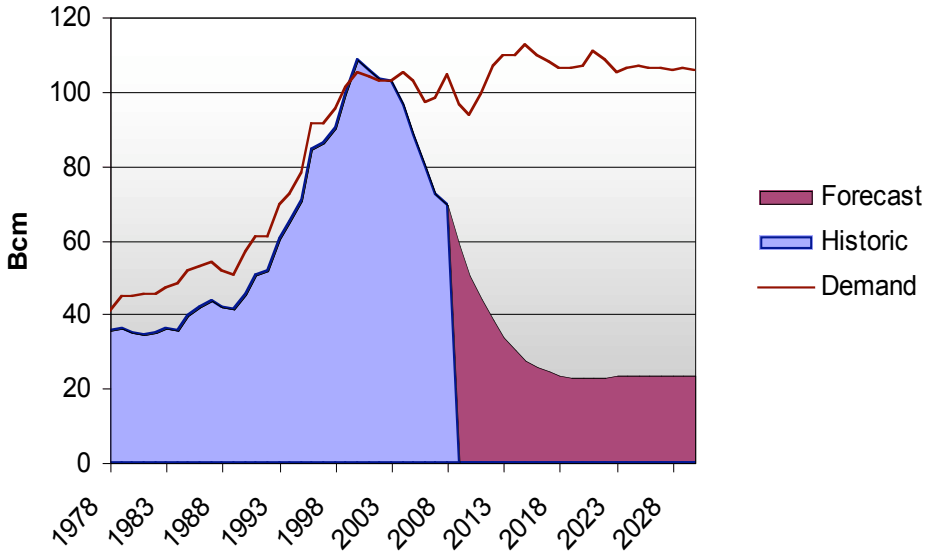
137. Gas storage in the UK is the most secure means of improving the security of supply. Storing additional gas in Europe is useful but does not bring supplies to the UK market if the reason for shortfall was failure of the UK Continent Interconnector for example, nor does it guarantee that actual gas will be made available to the UK.

138. In addition, as discussed earlier, the volatility of gas prices in the UK and 'risk and disruption premium' in gas prices is bad for UK gas and electricity consumers, both residential and industry.

URGENCY OF THE NEED FOR GAS STORAGE CAPACITY

Introduction

139. There is a political consensus in the UK that additional gas storage must be developed as UKCS production and reserves decline. As a result of planning difficulties there has been relatively little development of new gas storage in the UK in the last 25 years, during which time UKCS production has risen and declined, as shown in the graph below:



Urgency of need

140. The forecasts are based on National Grid's 2008 Ten Year Statement figures and illustrate the dramatic reduction in UKCS production in the period 2003 to 2013. In the space of 10 years, UKCS production is likely to fall by around 70 BCM/annum. During this time, a total of only 1.1 BCM of storage is likely to be built.

141. The graph also shows that in the period to 2013, gas demand is likely to grow due to new power generation. The combination of decline in UKCS production together with growth in demand means that new gas storage is important and urgent. The Saltfleetby contribution of 0.7 BCM space and 9.5 MCMD is important and material in the context of the above graph.

142. When the Rough storage facility was built in 1985 it was relatively under-utilised until after year 2000 because of the very large growth in UK gas production. However, as a result of the decline in UKCS production, Rough utilisation has increased significantly and it is now a critical UK asset. Going forward, additional storage is required as UKCS production continues to fall.

143. The rate at which reliance on gas imports is growing and the consequences of losing some of those imports to other countries are

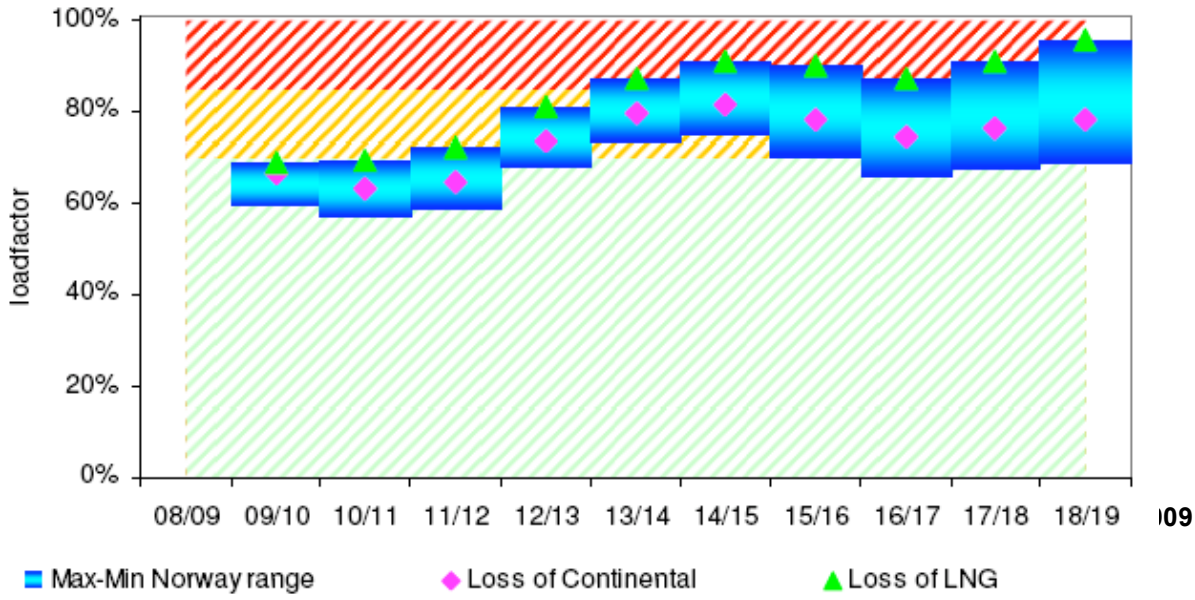
important factors in determining the urgency of the need for gas storage capacity. DECC, Ofgem and National Grid have invested significant effort in understanding the risks associated with the delay in development of new gas storage facilities. In part to address this issue, National Grid have developed a number of different scenarios relating to the loss of specific import sources which provide a good indicator of the risks to gas supply security and the timescales where these risks could develop.

144. The results of their analysis are presented on pages 33 to 36 of their document entitled "Transporting Britain's Energy 2009 – Development of Energy Scenarios" published in July 2009.

145. The assessment looks in turn at the extent to which the "loss" of three alternative import source categories (LNG, Norwegian imports or Continental imports) could be covered by the other sources in making up total import requirements. The conclusions it reaches are as follows:

a. Norwegian imports could be insufficient to cover loss of LNG and this would result in a potential breach of security standards in later years of the plan. In the event of the loss of Continental imports, Norwegian imports would be such that there is the possibility of some reduced supply availability.
b. Continental imports could cover a loss of LNG, but there may be a possibility of reduced supplies in the event of a loss of Norwegian imports.
c. LNG imports could cover a loss of Continental imports, but there may be a possibility of reduced supplies if there were a loss of Norwegian imports, with a possibility of breach of security standards at the end of the plan period

146. To illustrate the urgency with which these circumstances could arise, requiring support from gas held in storage, a diagram from the National Grid document is reproduced below. This looks at the amount of gas that will be needed from Norway (the load factor represents the % utilisation of Norwegian infrastructure) in the event that there is a loss of LNG or Continental imports. Further explanation is given below:



147. The shaded areas in the graph are categorised as follows:

a. Green represents an acceptable level of security with sufficient capacity with only supply availability being potentially limiting
b. Amber represents a challenging level of security with a tightening of the supply position with potentially limiting supply availability and flexibility
c. Red represents a potential breach of security standards with the need to operate at near maximum capacity for sustained periods, thus a requirement for near continuous supply availability

148. National Grid's commentary on this diagram is as follows:

"The diagram shows that for the loss of either LNG or Continental imports for the first few years of the forecast period there is a need for a relatively small increase in load factors for Norwegian flows. This is to be expected during this period as flows from the Continent or LNG are relatively modest. Thereafter the forecast shows a sustained increase in the range out to 2018/19, driven by the loss of significant volumes of LNG from the base case. The chart shows that after 2013/14 for a number of years even the minimum load factors are within the amber range (70%-85%), thus indicating more challenging conditions. In addition by 2013/14 the maximum load factors are within the red range (85%-100%) by 2013/14, an unrealistically high load factor for pipeline supplies, thus requiring near-continuous supply availability and system performance or alternatively a need for new import infrastructure or greater use of non Norwegian import infrastructure."

149. National Grid summarise the overall position as follows:

"Our supply loss analysis shows that in theory even the loss of one type of imported gas could be covered by additional supplies from other supply types at acceptable levels for the next two to three years. Thereafter the increasing level of import dependency means that a loss of one type of supply results in the need for significant flows from alternative import sources. With only modest levels of storage the loss of any import source would provide challenging conditions, notably in the winter period. Hence there is a continued need for new supply infrastructure in terms of new storage or for further imports. We acknowledge that numerous proposals for new storage developments will also assist in maintaining supply if we were to experience a future loss or partial loss of imports; however most new storage developments remain proposals without full planning consents rather than being constructed. Another issue to consider is the increased reliance of future power generation on CCGTs hence the potential impact on electricity supply as well as gas."

Conclusions

150. National Grid have expressed concern that as a result of the potential loss of gas imports to the UK there are risks to the security of supply to the gas and electricity supply systems, which can be alleviated by increasing the level of imports from existing infrastructure. This picks up on the data from Gill Campbell of DECC that declining UKCS production leads directly to a requirement for additional gas storage. They however state that there is a continued need for new supply infrastructure in terms of new storage or further imports. They consider that this problem starts to become an issue for security of supply by 2013/14. The timing and scale of the Saltfleetby facility is therefore important in helping to reduce these risks.

ALTERNATIVES

Introduction

151. As UKCS (United Kingdom Continental Shelf) production falls, with demand generally flat, there is a strong case for the UK needing additional storage. Saltfleetby is attractive because of its location close to existing NTS pipeline capacity and many gas fired power generation plants.

152. To consider the alternatives it is helpful to consider the two distinct roles that Saltfleetby will provide:

Gas provision in winter

153. With UKCS flows declining, there are three main alternatives to the storage of gas in depleted on-shore gas fields such as proposed at Saltfleetby:

- Other gas storage;
- Reduction in winter gas demand; and
- Additional winter gas imports by pipeline or LNG.

Within-day flexibility

154. In addition, in respect to the within-day flexibility provided by onshore gas storage there are a number of alternatives:

- Investment in other gas storage facilities;
- Investment in additional onshore pipeline capacity with surplus linepack; and
- Reduction in wind generation with more base-load gas fired generation.

155. This section reviews alternatives to Saltfleetby in both of its roles.

Alternatives for winter gas provision

156. As previously explained, gas storage is needed to provide additional gas supplies in winter when demand is higher and also to provide flexibility to respond to within day variations in gas demand. There are four main types of gas storage:

- Water aquifer (onshore or offshore);
- Salt cavity (onshore or offshore);
- Depleted oil/gas field (onshore or offshore); and
- LNG storage.

Water aquifers storage

157. In the UK, there have not been any developments associated with water aquifers because of the availability of depleted gas fields and salt strata, both of which offer good capability for storing gas with minimal environmental risk and known costs. There are not believed to be any water aquifer storage projects being considered in the UK.

Salt cavity storage

158. The UK has four areas with salt strata at a depth to be appropriate for the storage of natural gas. East Yorkshire has major facilities at Hornsea and Aldbrough. In Cheshire, a number of salt storage facilities are being developed. There is also salt near Swanage in Dorset were Portland have received planning permission for a storage facility and near Fleetwood in Lancashire were Canatxx are trying to get permission for a salt storage facility.

159. Because the UK has such a shortage of gas storage, facilities in all these salt strata are required and can be expected to be developed in time.

Depleted oil/gas field storage

Offshore

160. As set out above, the UK has a limited number of gas storage facilities. The only offshore gas field, Rough, was developed by British Gas 25 years ago and is the only such facility that has been built. The capital costs associated with offshore storage are much higher than onshore which tends to require facilities to be bigger.

161. The difficulty in financing large offshore gas storage is that they require a lot of cushion gas which remains in the reservoir to provide a basic gas pressure but this cannot be sold when the field is operational. It is possible that other offshore gas storage projects will be developed but this depends on longevity of economic signals of a winter to summer differential price which have not existed.

162. There are three potential offshore depleted oil/gas field storage projects in the pre-approval stage of development. It is by no means certain that any of these will be developed because of the economics of such projects.

Onshore

163. Whilst offshore UKCS has a large number of depleted gas fields, there have been a much smaller number of onshore oil/gas field discoveries. Storing gas in depleted onshore oil/gas fields is an attractive idea because the capital costs are lower and the gas is closer

to market, often close to the onshore National Transmission System and able to utilise existing assets, as in the case of Saltfleetby.

LNG storage

Existing LNG storage owned by National Grid

164. National Grid own and operate three onshore LNG facilities at Glenmavis, Partington and Avonmouth. These were built in the 1970's and contain a relatively small volume of gas but have high deliverability. When these facilities were built they were at the end of NTS pipelines, were filled in summer with the gas available for use in winter at times of very high demand.

165. A fourth facility at Dynevor Arms was closed in 2008 as it was no longer required due to the new gas pipeline bringing gas to South Wales from Milford Haven.

166. One of the main reasons these facilities remain open is to provide 'Operating Margins' gas to manage the orderly rundown of the gas grid in the event of a national gas emergency.

167. These facilities have no access to LNG direct from LNG importation terminals.

168. There are no new developments of similar facilities in the UK or elsewhere in the EU that take gas out of a grid and store it to be re-gasified and injected back into the gas grid at times of high demand. The fundamental difficulty with such facilities is the very high capital and operating cost associated with making and storing LNG, in particular high electricity uses. Such facilities also have a high carbon footprint.

LNG storage at the new LNG importation terminals

169. There are 4 LNG importation terminals in the UK that have been built and commissioned in the last 4 years:

- Isle of Grain (National Grid);
- Excelerate Energy Teesside
- Milford Haven – Dragon (BG); and
- Milford Haven – South Hook (ExxonMobil).

170. All these facilities have LNG storage tanks, with sufficient capacity to be able to unload a full cargo of LNG in around 12 hours. The LNG tankers then return to the source of LNG, such as Algeria or Qatar, to collect the next cargo.

171. None of these LNG facilities is believed to have any plans to invest in additional LNG storage to be able to provide supplies to customers at peak times. The reason is similar to that which applies to the pipeline owners in that to build an LNG tank will cost over £100

million which is not an attractive proposition for a facility that can only take LNG from ships and cannot access pipeline gas. In addition, spot capacity in the NTS may not be available to move the extra gas to market, a situation that does not arise at Saltfleetby because of the existing of un-used NTS capacity at Theddlethorpe.

Reduction in gas demand

172. As described above, gas demand is subject to two main drivers, both environmentally driven. On the one hand, the Government is introducing measures and incentives to reduce gas demand as part of the strategy to have 15% renewable energy by 2020. However, the closure of coal fired power generation plants to reduce harmful emissions and also closure of nuclear power generation plant have combined to lead to a large increase in gas fired power generation.

173. Taking these two drivers together and National Grid forecast that gas demand will remain broadly flat in the period to 2020. The current economic recession has also reduced demand but National Grid forecast that this will recover.

Additional gas imports by pipeline

174. There are a number of pipelines that import gas into the UK:

- UK Continent Interconnector (Bacton to Belgium);
- BBL Interconnector (Bacton to Netherlands);
- Langeled (Easington to Norwegian gas sources); and
- Vesterled (St Fergus to Norwegian sources).

175. There are no projects underway to increase the capacity of these pipelines to bring gas to the UK. For all these pipelines, there are no 'low cost and straightforward' means to increase capacity to bring additional peak volumes to the UK. Given that, there would have to be a very strong economic signals that UK peak gas was valuable in the long term in order for the owners of these pipelines to invest in additional capacity.

176. If such signals existed (and they do not because the forward gas market does not go beyond 3 years), then the key alternative economic option for these pipeline owners would be to invest in gas storage facilities close to the UK market, such as Saltfleetby. It will always be lower cost to build gas storage in the UK that can be filled using the existing pipelines and can move available volumes of gas. The companies that are aiming to make investment in new onshore gas storage in the UK are companies who would bring gas into those facilities in summer using these pipelines and from LNG.

177. Gas storage facilities are built in countries which have demand for gas with the objective of being filled at off-peak times and releasing the gas in winter. This applies to the existing UK gas storage and to

gas storage in Germany, Netherlands, France and other EU countries. It is generally always favoured over additional pipeline capacity though there can be occasions when pipeline capacity can be increased at relatively low cost (eg by changing design of compression plant). No such opportunity exists for the pipelines connected to the UK.

Additional gas import by LNG

178. The main risk facing UK consumers is that, in the event of a cold winter, the UK gas suppliers will need to buy large volumes of LNG from the world LNG spot market. If there is also cold weather in the US and Far East, or if there is a major supply disruption (such as loss of supplies from Qatar), UK will have to compete on price to attract cargoes to the UK. Whilst this may be possible it cannot be relied upon and there is no guarantee that sufficient un-contracted LNG will be available. In addition, if it is, it can be expected that prices would be high.

179. The appropriate safeguard in a commercial and risk sense is for UK gas suppliers to purchase additional volumes of LNG during summer months when more cargoes are available and the price is lower. This LNG can then be re-gasified, input into the NTS and transported to gas storage facilities.

180. For this to take place there has to be gas storage facilities available in the UK to accommodate this gas. Reliance on un-contracted cargoes of LNG to maintain supplies to UK customers during a cold winter represents an unacceptably high risk that is inappropriate for such a basic commodity as natural gas.

Alternatives for provision of within-day gas flexibility

Investment in other gas storage facilities

181. The gas storage facilities discussed above are also able to provide the within-day flexibility that is required to provide gas for changes in demand, primarily as a result of weather changes. As has been described above, the requirement for such flexibility will increase due to the development of wind generation which is intermittent given that an appropriate level of wind is only available for around 30% of the time.

182. Flexibility can be provided by facilities such as Saltfleetby to input additional gas into the NTS or to reduce inputs into the NTS. For example, if Saltfleetby is inputting 5 MCMD into the NTS, if there is an increase in wind generation, there would be too much gas into the NTS as CCGTs would not need it. In this example, Saltfleetby could reduce its input by 5 MCMD. On the other hand, if the offshore wind plants were becalmed, Saltfleetby could increase its inputs to 9 MCMD to provide additional gas for CCGTs. At most times, Saltfleetby will be in

a position to input gas into the NTS to respond to the need for CCGT's to have gas when wind generation is low.

183. The location of Saltfleetby is very good because it is close to a large number of existing and proposed gas fired power generation plant as shown on the map at para 192 below.

184. The analysis by Poyry in relation to the wind and CCGT interaction (para 89 above) together with the decline in UKCS production means that it is likely that all the potential storage developments are required. Whilst Saltfleetby has the advantage of being able to satisfy need by 2013, the other facilities will be needed later.

Investment in additional onshore pipeline capacity with surplus linepack

185. National Grid do not have a policy of making any new investment to provide additional linepack that can be used to support within-day changes in gas demand that occur. For this to be a credible option, there would need to be a means for gas suppliers to purchase such flexibility from National Grid so that they would not need to contract with gas storage facilities for this flexibility.

186. There are no proposals for National Grid to provide a service of linepack storage to its customers and hence this does not represent a viable alternative.

Reduction in wind generation with more base-load gas fired generation

187. As a result of the Energy Act 2008, the UK Government has a legally binding obligation to replace 15% of fossil fuels by 2020 with renewable energy. The development of wind generation is seen as critical in meeting that obligation. This requires gas fired generation as back-up which leads to the requirement for additional flexibility.

188. At the present time, it is not credible to believe that the UK Government will abandon its commitment to the 2020 target and hence this is not a viable alternative.

<u>Saltfleetby benefits</u>

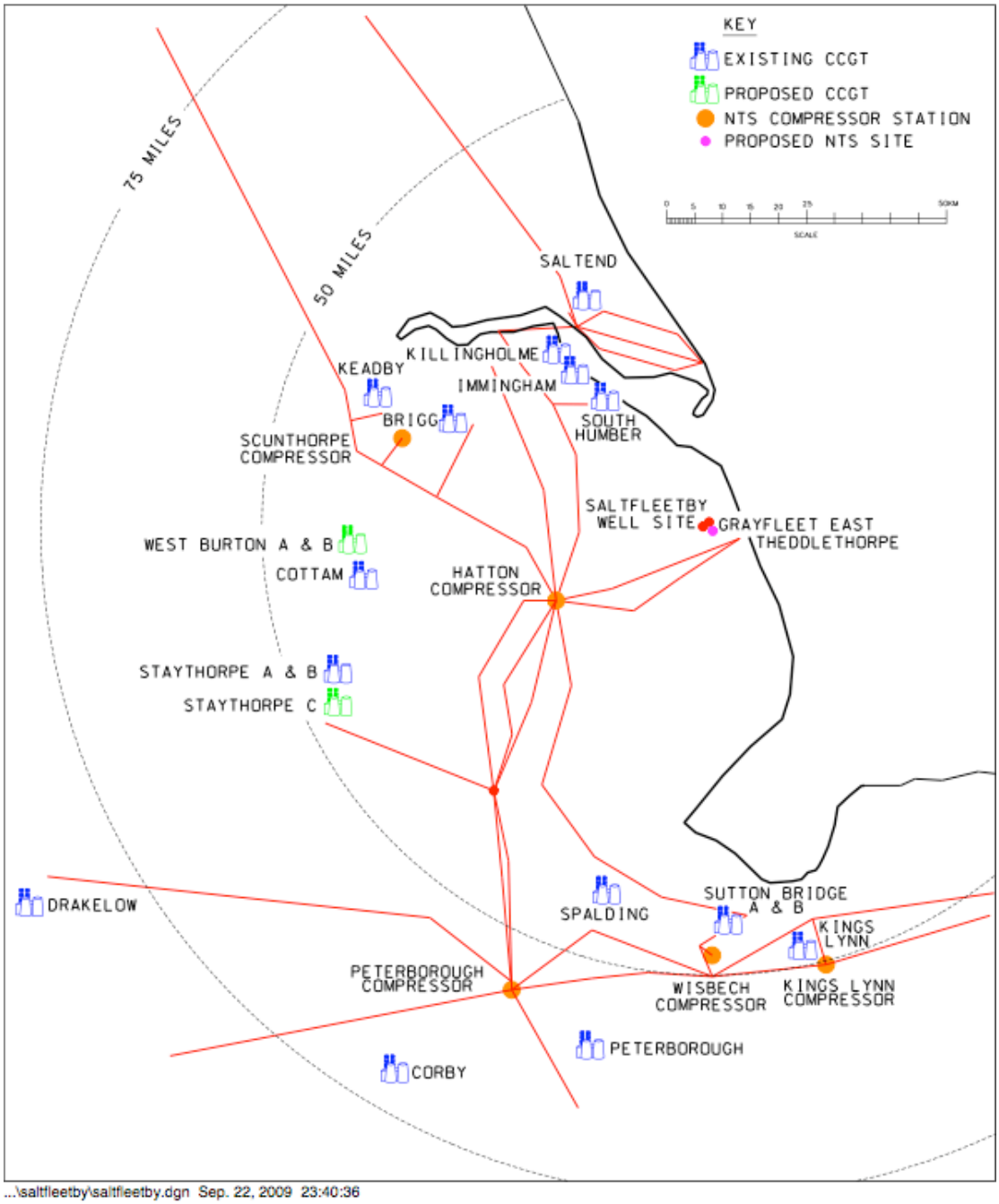
189. The ability of gas from Saltfleetby to enter the NTS at an existing entry point at Theddlethorpe is attractive for UK consumers in that National Grid will not have to make any investment to accommodate Saltfleetby gas flows. This is because the flow of gas into Theddlethorpe has declined significantly, freeing up NTS capacity.

190. In addition, the area close to Theddlethorpe is a critical area of the NTS located between large gas inputs at Easington to the North and Bacton and Isle of Grain to the east and South respectively. Inputting gas at the heart of this network is attractive because it can be

directed down a number of different pipelines, providing flexibility to National Grid. It is also close to around 40% of the UK's CCGTs which will be increasingly important in the provision of electricity if the UK is to meet its climate change targets by 2020.

191. Gas moves relatively slowly through the NTS (around 30 mph) and hence the changes in demand for gas caused by the wind-CCGT interaction cannot easily be met by pipelines moving gas over long distances. NTS linepack may be able to provide some short term flexibility, but this is limited in volume and duration. Saltfleetby's location can provide more of the necessary flexibility due to its proximity to CCGTs.

192. The drawing below shows the NTS around Saltfleetby, including the compressor stations, and the existing and proposed CCGTs that are located within around 60 miles. The reason so many plants are in this area relates in part to the development of the electricity grid when the UK had a large coal industry and the majority of electricity came from coal fired generation.



193. There are not believed to be any other prospective onshore gas storage facilities (depleted field or salt cavity) which are able to so use existing NTS assets and capacity and, as such, Saltfleetby is a uniquely attractive location. More so because of its proximity to a large number of CCGTs.

Conclusions

194. Gas demand is forecast by National Grid to remain broadly flat in the period to 2020. Given this, decline in UKCS production means that additional gas storage is required in the UK

195. Providing that the geology is suitable for gas storage, it can reasonably be expected that a majority of depleted oil/gas fields will be converted into use for gas storage and the projects identified above indicate that this is the case.

196. Given the difficulty of financing offshore gas storage facilities, it can be expected that depleted onshore oil/gas fields together with salt cavity storage will provide the majority of new storage in the UK. The advantage of such facilities is that because they are smaller and closer to market than offshore storage, they generally have more flexibility to increase or reduce flow-rate which is a characteristic that will become increasingly important as wind generation is developed leading to more flexible gas supplies for power generation.

197. Within the community of onshore depleted fields, Saltfleetby is particularly attractive because of its proximity to the NTS at Theddlethorpe, which has surplus capacity, and to gas fired power generation plants which will be critical in providing back-up to wind generation.

CONCLUSIONS

198. The key themes that I have described with reference to the UK Government policy, supported by National Grid data in particular, are as follows:
- Steep decline in UKCS gas production from 2003 – 2013;
- Delay to new gas storage with only 1.1 BCM of new storage during this ten year period that will see a decline in UKCS production of around 40 BCM/annum;
- Requirement for new gas storage to be developed as UKCS production falls and imports increase;
- Difficulty of financing new storage projects even when planning permission exists;
- Risk to UK gas and electricity supplies due to supply disruption or inability to secure additional gas volumes in a cold winter;
- Risk of higher gas prices to UK consumers, in particular vulnerable groups, caused by a 'cold weather and disruption' risk premium which can and should be mitigated by building new gas storage;
- Need for significant flexibility to be located close to the new and existing gas fired CCGTs that will have a changing role in the future due to the growth of intermittent wind generation; and
- Increasing urgency that is recognised by the main stakeholders in the UK gas market .

199. There is a clear Need for the Saltfleety storage facility, a case that has been accepted by Lincolnshire County Council. If planning permission is granted, the facility can be contributing to the UK gas market and providing a number of clear benefits:

- It converts the UK's largest onshore gas field into the largest onshore depleted gas field store, the 0.7 BCM of space representing around a 15% increase in UK gas storage volume;
- The deliverability of 9 MCMD is able to provide around 2% of UK peak deliverability;
- Saltfleetby is located within 60 miles of around 40% of UK CCGTs and as such is well placed to provide some of the flexibility required to deliver gas for intermittent power generation, backing up low carbon wind generation; and
- Crucially, the storage facility can be completed by 2013 which is earlier than any other proposed facilities.

200. We are in an important time for the UK gas market and I believe it is imperative that the UK is able to identify gas storage opportunities, achieve planning permission and finance, and develop these projects. If we are unable as a country to do this on a significant scale then there is a real and growing risk of gas and electricity disruptions to UK consumers. I believe that the need case for Saltfleetby being developed on the 2013 schedule is compelling.