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Liquidity in the GB wholesale energy markets

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Target audience: Energy suppliers and generators, consumers, consumer organisations and representatives, academics and other interested parties.

Overview:

In October 2008 Ofgem published the findings from its investigation into energy supply markets. The report found that the level of wholesale market liquidity, especially in the electricity market, was of concern and we noted that we would investigate this further. Industry participants and others have also raised concerns about wholesale liquidity, suggesting that inadequate liquidity is acting as a barrier to new entry into supply markets and may be a source of competitive disadvantage to small suppliers.

This report finds that liquidity in the electricity market in Great Britain (GB) is lower than other energy and commodity markets, including a number of European electricity markets. The report analyses a range of factors that have contributed to the low level of liquidity in the GB electricity market, and outlines possible policy options that could improve liquidity.

We welcome views on the analysis, findings and conclusions in this report. We would also welcome comments on the list of possible options to improve liquidity. Drawing on responses to this report, we intend to publish a consultation document setting out in more detail a range of proposals to address the issues identified in this report.

Contact: Ijaz Rasool, James Crump or Vanja Munerati

Tel: 020 7901 7000

Email: gb.markets@ofgem.gov.uk

Team: GB Markets

Associated Documents

- Energy Supply Markets Probe - Call for Evidence, 27 March 2008
- http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Markets%20Probe%20-%20Call%20for%20Evidence.pdf
- Energy Supply Probe - Initial Findings Report, Ofgem, 6 October 2008:
- http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20Initial%20Findings%20Report.pdf
- Energy Supply Probe – proposed retail market remedies, Ofgem, 15 April 2009 http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20proposed%20retail%20market%20remedies.pdf
- House of Commons, Business and Enterprise Committee: Energy prices, fuel poverty and Ofgem, Eleventh Report of Session 2007–08, 28 July 2008, Volume I http://www.publications.parliament.uk/pa/cm200708/cmselect/cmberr/293/293i.pdf
- Code Governance Review – role of code administrators and small participant/consumer initiatives, Ofgem, December 2008, http://www.ofgem.gov.uk/Licensing/IndCodes/CGR/Documents1/Code_admin_condoc_191208.pdf
- Addressing Market Power Concerns in the Wholesale Electricity Market - Initial Proposals, 30 March 2009 http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/Documents1/Market%20Power%20Concerns-%20Initial%20Policy%20Proposals.pdf

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Summary

Context

The recent Energy Supply Probe raised a number of concerns relating to wholesale market liquidity. In addition, a number of industry parties have expressed concern that liquidity, particularly in electricity, is insufficient for their needs.

Illiquid markets may act as a barrier to entry into both the generation and supply market and may act as a source of competitive disadvantage to small suppliers. Conversely, liquid markets provide investment signals to market participants and reduce the possibility of parties manipulating prices. Illiquid markets may therefore reduce the efficiency of wholesale energy markets and reduce competition between industry parties.

In light of our principal objective to protect consumers, wherever appropriate by promoting effective competition, this report examines liquidity in GB wholesale energy markets.

Liquidity in GB energy markets

We find that liquidity in the GB wholesale gas market compares well to that in other countries and other commodity markets. Whilst concern has been expressed over liquidity in the GB gas forward market, analysis has shown that forward trading in the GB gas market is superior to most gas markets elsewhere and markets for other commodities. In discussion with market participants, the majority have indicated that gas market liquidity is sufficient to meet their needs.

We find that liquidity in the GB wholesale electricity market is low compared to that in many other European electricity markets, the GB gas market and other commodity markets. It has fallen significantly since the start of the decade although there has been a modest improvement in the last few years.

Whilst, we have not seen a marked reduction in liquidity since the onset of the current credit crisis and economic downturn, we have seen the exit of two small suppliers and several market participants have reported that credit requirements have increased making it more expensive to participate in the market. It is therefore possible that the impact of the current economic conditions has not fed through to wholesale energy markets yet.

Causes of low liquidity in the GB electricity market

The level of liquidity in the wholesale electricity market is likely to be a function of a range of different factors and the interrelationships between these.

The period of rapid growth in vertical integration, which followed the collapse of Enron in 2001/2 and the exit of a number of active wholesale market participants,

saw traded volumes halve in two years (liquidity has failed to recover significantly since). While this could imply that vertical integration has reduced liquidity, correlation does not necessarily mean causation: Electricity markets in other countries such as Germany, and to some extent the Nordic area, also have a high levels of vertical integration, but other features such as the level of interconnection or participation from large electricity users and financial institutions appear to have supported liquidity. Uncertainty about the future policy and regulatory framework is also likely to impact on whether firms rely on the market for the provision of wholesale energy or adopt alternative strategies.

Confidence that the market is competitive is also important. In this context, Ofgem is proposing options for addressing potential abuse of market power in the wholesale electricity market in a separate consultation document[1]. We are currently considering consultation responses to this document.

Aspects of both centrally designed and voluntary trading arrangements may also have contributed to lower levels of liquidity in the GB market. Some have argued that balancing market arrangements may reduce trading by acting as a barrier to entry for smaller independent parties and discouraging more active participation or entry by non-physical participants. However, the arrangements are designed to ensure they reflect the cost of balancing the system and provide appropriate investment signals. It is notable however, that liquidity was significantly higher in the years following the introduction NETA, when many features of the current arrangements were present.

With regard to voluntary trading arrangements, it has been suggested that price volatility, volumes being lost to the more liquid gas market[2] and a lack of robust reference prices may have constrained the development of liquidity. In addition, the GB electricity market has not seen the development of exchange based trading as observed in some countries, where they are considered an important driver of liquidity.

Finally, it is likely that credit arrangements and collateral requirements have contributed to the fall in liquidity in the GB wholesale electricity market. Increased requirements to post collateral followed the collapse and exit of Enron and others in 2001/2, and the recent economic downturn has also impacted on the ability of smaller market participants in particular, to trade. This may have been exacerbated by the lack of exchange based clearing in the GB electricity market compared with markets such as the Nordic area and Germany. However, the move towards greater collateral requirements may represent a rational response by the larger participants to earlier defaults and worsening of economic conditions more recently.

1 http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/Documents1/Market%20Power%20Concerns-%20Initial%20Policy%20Proposals.pdf

2 There is a high degree of correlation between the GB gas and electricity market prices

Our concern is that the combination of a range of factors have acted together to reduce liquidity and that there is the potential for a further downward trend, as low levels of liquidity make existing market participants and potential entrants less willing to engage in the market. We have therefore set out a range of potential options for addressing the low level of liquidity in the GB electricity market.

Next steps

We strongly encourage industry participants and others to respond to the findings in this document and the questions it raises. During next few months Ofgem will meet with interested parties, assess responses and develop a range of proposals to improve liquidity in the GB wholesale electricity market.

We are, however, aware that the current economic climate poses a particular challenge to the development of liquidity.

1. Introduction

This Chapter reviews the key conclusions on GB wholesale market liquidity from the October 2008 Energy Supply Probe document, outlines the concerns raised by industry participants, and sets out what liquidity is and why it is important.

The Energy Supply Probe

1.1. In response to mounting consumer and public concern over the competitiveness of the GB retail gas and electricity markets, Ofgem launched an investigation into the electricity and gas supply markets for households and small businesses early in 2008. We investigated a range of aspects of the GB retail energy markets and in October 2008 published our *Energy Supply Probe - Initial Findings Report*[3]. The report found:

- that the market was working well in important respects; and
- no evidence of a cartel and no evidence of prices rising by more than can be justified by wholesale costs.

1.2. Whilst the Energy Supply Probe focused on the operation of the retail energy supply markets it recognised that wholesale markets can have a significant impact on retail markets[4].

1.3. The main wholesale markets issue identified by the report related to the level of wholesale market liquidity in GB, particularly in electricity. The Energy Supply Probe found that liquidity in the GB wholesale electricity market appeared to be low when compared to other energy markets. The Energy Supply Probe also suggested that the degree of vertical integration in wholesale markets (in particular electricity) and wholesale liquidity were closely related issues. The Energy Supply Probe concluded that:

- low levels of wholesale liquidity could act as a potential barrier to entry into supply markets and a source of competitive disadvantage to small suppliers[5]; and

3 'Energy Supply Probe - Initial Findings Report', Ofgem, 6 October 2008: http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20Initial%20Findings%20Report.pdf.
4 The introduction of retail competition gave domestic consumers the ability to purchase energy from the supplier they feel provides the best offering in the market, thereby creating strong incentives on suppliers to ensure that they are competitive and innovative in offering energy to customers. As wholesale energy forms a large part of the cost of supplying energy to customers, efficient and effective wholesale energy markets are therefore important to support the development of effective competition.
5 ibid pp139-140

- we need to be confident that the vertically integrated industry structure does not exacerbate these liquidity issues or distort long term investment decisions in wholesale businesses.

1.4. The Energy Supply Probe also stated that Ofgem will seek views on whether it needs new or additional powers to guard against potential market abuse in wholesale electricity markets. In this respect Ofgem published a document in March 2009, *Addressing Market Power Concerns in the Electricity Wholesale Sector - Initial Policy Proposals*, presenting a range of possible policy options.

1.5. This document investigates the issues raised in the Energy Supply Probe with respect to GB wholesale energy market liquidity.

Business and Enterprise Select Committee (BESC)

1.6. In spring 2008 the Business and Enterprise Select Committee (BESC) inquiry into retail prices considered the role of liquidity and its impact on energy markets. The committee considered a wide range of views, including witnesses from consumer associations who cited the high level of vertical integration and high volumes of energy tied up in off-market contracts as major impediments to the effective functioning of the market. Conversely, some representatives of the 'Big 6'[6] energy suppliers highlighted vertical integration and the use of off-market contracts as an efficient response to issues in procuring energy in the wholesale markets, in particular uncertainty and price volatility[7].

Liquidity

What is liquidity and why is it important?

1.7. In a liberalised energy market, it is important that markets are seen to be effective and competitive. Such wholesale markets provide a mechanism, particularly for non-vertically integrated industry participants, to manage risk and purchase energy, which in turn can facilitate new entry into all parts of the energy supply chain.

1.8. Liquidity is an important feature of a well functioning market. We can define liquidity as the ability to quickly buy or sell a desired commodity or financial instrument without causing a significant change in its price and without incurring significant transaction costs. A key feature of a liquid market is that it has a large number of buyers and sellers willing to transact at all times.

6 These are Centrica, ScottishPower, Scottish and Southern, RWE, EON and EDF.
7 http://www.publications.parliament.uk/pa/cm200708/cmselect/cmberr/293/293i.pdf

1.9. In the context of a fully liberalised energy market, liquid wholesale markets are desirable as they:

- facilitate new entry in generation and supply by allowing new entrants to buy and sell electricity to match their output and customer base with confidence;
- reduce the ability of market participants to engage in market manipulation;
- are likely to provide a wider range of products and counterparties for participants to hedge their risk exposure;
- increase confidence in traded prices (a large number of gas and electricity supply contracts between buyers and sellers are referenced to market prices);
- allow non-vertically integrated entrants to participate on the same terms as vertically integrated incumbent firms;
- can allow parties to better manage long-term risk and provide long term price signals about future market development, which inform investment decisions and promote long term security of supply; and
- can allow market participants to fine tune their positions without expensive costs (e.g. tight bid-offer spreads - see Chapter 2).

1.10. Liquidity is important in creating competitive pressure in both the retail and wholesale markets, in particular by facilitating the buying or selling of energy in the market to maintain new entry (or the threat of new entry). Without a liquid wholesale market, new suppliers may find it difficult to enter the market and independent generators/producers may not be confident of a market for their output. In addition, potential investors may be reluctant to invest. This is because low levels of liquidity can increase market risk as it becomes more difficult to hedge and respond to changes in market conditions.

1.11. Declining liquidity is of concern as there is likely to be a 'baseline' level below which liquidity is insufficient to meet the needs of market participants. Once such a situation has been reached it is possible for the market to enter into a self-reinforcing cycle where low levels of liquidity may prevent entry and lead companies to find alternative ways of trading which in turn may lead to further reductions in liquidity.

1.12. However, it should be noted that whilst liquidity is a typical characteristic of a well functioning energy market, it should not be taken to be an end in itself and it does not provide a guarantee that the market will operate efficiently.

1.13. The next section provides an overview of how energy is traded in GB and outlines the key market participants present in the GB wholesale energy markets.

How is energy traded in GB?

1.14. Currently suppliers, generators and gas producers have a range of options for buying and selling electricity and gas. They can trade on the wholesale market (both prompt and forward) using exchanges or over-the-counter (OTC) platforms. They can also enter into structured contracts with each other. Alternatively, they can

adopt a strategy of vertical integration whereby they can source the volumes they need to meet their customers' requirements internally.

1.15. Trading can take place on **exchanges,** which allow parties to anonymously trade commodities, derivatives and other financial instruments. Exchanges trade standardised contracts on standard terms and conditions and provide clearing services that help to eliminate counterparty risk for traders. Exchanges also publish pricing information which is often used as a reference for both OTC and structured contracts.

1.16. The key exchange provider in the GB electricity market is the APX Group which provides platforms offering a range of products including half-hourly, peak and base-load and day-ahead contracts. In the gas market, the On-The-Day Commodity Market (OCM), also operated by the APX Group, is used by parties (including National Grid (NG)) for balancing and hedging purposes. The other main energy exchange in GB is the Intercontinental Exchange (ICE) which offers a range of monthly, quarterly and seasonal gas futures products. ICE also offers electricity futures, although volumes traded in these products are relatively low when compared to OTC volumes.

1.17. The **OTC market** is where the majority of electricity and gas trading occurs in GB. It is used for bilateral trading between parties and may be voice or electronically brokered. Various platforms are offered for OTC trading in GB by brokerages such as Spectron and Tullet Prebon. Counterparty risk is borne by the counterparties themselves, although in some cases brokerages may clear trades through exchanges or offer bespoke clearing services. For the purpose of this document OTC traded volumes are defined as volumes traded via the OTC brokerages (i.e. traded on the open market).

1.18. Another mechanism for trading energy is through **structured contracts** where energy is purchased directly from generators or producers using contracts that are arranged bilaterally, often on a long term basis (structured contracts are often considered as a subset of the OTC market). Structured contracts may not enhance liquidity as the energy is not sold via the wholesale markets (OTC platforms or exchanges), although volumes sold using structured contracts may be subsequently traded in the GB wholesale markets (contributing to liquidity). However, the volumes and prices of such contracts may not be known which frustrates transparency, in particular price discovery.

1.19. Trading can take place on spot, prompt or forward markets. Definitions of these terms can vary across different markets, but we have endeavoured to use a consistent definition for the purpose of this document.

1.20. **Spot trading** refers to trading for delivery on the same day as the trade (within-day). **Prompt trading** refers to trading for delivery between (but not including) within-day trading and the next month (front month). This includes a number of products, such as products for delivery in the following day (e.g. day-ahead), weekend, weekdays, and trades for the balance of week and balance of month. **Forward trading** refers to delivery in the front month and after, and may

include trades months and years ahead of delivery. Forward trading generally consists of trades over a longer duration than prompt and spot trading, with contracts for delivery over months, seasons or years.

1.21. Market participants who trade on the wholesale markets can be divided into two broad categories: physical participants (generators and suppliers) and non-physical participants (defined for the purposes of this document as participants who prefer to trade out positions ahead of delivery).

1.22. Generally, physical market participants buy or sell energy forward[8] and use spot and prompt markets to fine-tune their positions. Non-physical market participants usually trade for speculative purposes, although physical participants may also engage in this type of trading.

1.23. A liquid spot and prompt market is important for non-physical participants to ensure that they are able to trade out positions ahead of delivery. In the absence of a liquid spot or prompt market, participants may not be able to easily close out their positions (or only at very high cost) and may therefore face exposure to imbalance charges (i.e. cash out prices - see Chapter 3). A liquid forward[9] market is also desirable as low levels of forward liquidity make it harder for industry participants to hedge their positions, which reduces trust in reported prices and dilutes investment signals.

1.24. Spot and prompt prices are largely determined by the interaction of demand and supply fundamentals, such as unplanned generation outages and change in the weather. Forward prices largely reflect expectations of price in the future and are mainly influenced by factors such as forward prices of fuels such as coal, oil and gas.

1.25. Other important participants in the GB wholesale energy markets are price reporters who provide price information on energy markets (generally based on surveys of market participants). Price reporters can promote liquidity by providing indices, which may be used by traders to benchmark for trades and clear forward trades. Price reporters operating in the GB market include ICIS Heren, Platts and Argus.

8 This is often to provide more certainty over revenues from the sale of energy (generators and gas producers) and over the costs of energy (suppliers), i.e. provide protection from price volatility; market participants therefore, enter into contracts with each other (known as hedging). An alternative approach to managing this risk is for firms to vertically integrate.
9 A party buying or selling a forward contract is agreeing to purchase or sell a specific volume of energy, at an agreed price for delivery at a particular point in the future. A variation on a forward contract is a futures contract. The key difference is that a futures contract is exchange traded, whilst forward contracts are bilateral agreements between two parties which exposes these parties to counterparty risk.

Industry views on liquidity

1.26. A wide range of industry participants have raised concerns about the level of liquidity in the GB wholesale markets, particularly in the electricity market. They have cited a range of reasons why they believe wholesale market liquidity is low. Their views are summarised below and discussed in more detail in Chapter 3 and Appendix 4. The key reasons put forward by market participants to explain why liquidity in the GB wholesale markets is low are:

- Industry structure - including vertical integration, absence of independent generators/suppliers and lack of demand side participation;
- Trading arrangements - including current cash-out arrangements, product availability, lack of market information, price volatility, lack of reference prices, and lack of exchange based trading; and
- Credit risk management practices - i.e. collateral requirements.

Outline of the document

1.27. Chapter 2 assesses the current level of liquidity in GB and how it has evolved over time. It then compares this to other related markets, both nationally and internationally, to help assess whether liquidity is low in the GB wholesale markets.

1.28. In Chapter 3 we examine the arguments for why GB wholesale electricity market liquidity is low. The analysis considers the level of liquidity in both the prompt and forward markets and on both exchanges and OTC trading platforms[10].

1.29. Chapter 4 outlines, at a high level, a range of possible measures that could be adopted to improve liquidity in the GB wholesale electricity market. It also describes a number of industry initiatives aimed at improving the level of liquidity in GB.

1.30. Appendix 2 presents additional analysis on the level of liquidity in GB wholesale markets, whilst Appendix 3 provides additional information on comparator markets. Finally, Appendix 4 provides a detailed summary of market participant's concerns.

Notes

1.31. With trading split across a range of different platforms, and no requirement to publish information on traded volumes, it is very difficult to obtain a complete picture

10 The use of the term "market" in this document does not indicate Ofgem has formed a view as to the correct market definition for the purposes of either the Competition Act 1998 or the Enterprise Act 2002.

of liquidity in GB wholesale energy markets. This problem is compounded in international markets.

1.32. In this document, we have therefore relied on estimates of traded volumes from a variety of sources including: NG, brokers, exchanges and independent data reporters (e.g. ICIS Heren) as well as market participants and reports by organisations such as the Financial Services Authority (FSA) and the European Commission (who also rely on the similar sources). We note that brokers, exchanges and independent data providers do not necessarily have full market coverage so some of the data, whilst the best available, is subject to estimation error. However, we believe the evidence presented in the document provides a good description of overall trends in the market.

1.33. It should also be noted that this document does not attempt to identify an 'ideal' or 'target' level of liquidity, rather it seeks to assess current levels of liquidity and examine whether there is evidence to support the concerns expressed by industry parties on wholesale market liquidity.

2. Liquidity in the GB wholesale gas and electricity markets

This Chapter summarises trends in liquidity in GB electricity and gas markets. It benchmarks liquidity in the two markets against each other and, where data exists, against liquidity in international markets. The key findings are that liquidity in the GB wholesale gas market compares well to other countries and commodity markets, but that liquidity in the GB wholesale electricity market is low.

Introduction

2.1. In this Chapter we set out a number of ways in which liquidity can be measured and assess the levels of liquidity in the GB wholesale energy markets. We also examine the level of liquidity in international energy and commodity markets. Supporting material on the analysis presented in this Chapter is set out in Appendix 2.

Assessing the level of liquidity in GB energy markets

2.2. An important measure of liquidity, particularly in commodity markets, is the **churn ratio.** This is the ratio of traded volume of a commodity to throughput or generated output, or some other measure denoting physical consumption of the traded commodity[11].

2.3. Measurement of churn allows comparison of levels of liquidity across markets of different sizes and geographical areas, and between different commodities. Liquid markets usually have churn ratios of several times the rate of physical consumption.

2.4. Another measure of liquidity is the total **number of trades** which provides an indication of how frequently trading occurs in particular products. Assessing the **range of products** available to market participants is also useful, as we would expect to see a wide range of products in liquid markets to enable buyers to match the 'shape' (usage profile) of their energy requirement.

2.5. As noted a liquid market is one in which a trader has the ability to quickly buy or sell a particular item without causing a significant movement in the price. For this to be the case, there must be a large volume of willing sellers who are prepared to sell at a price (offer price) not much higher than the price at which a large volume of willing buyers are prepared to buy (the bid price). Therefore, in a liquid market **bid-offer spreads** should be fairly small in relation to the market price so that market participants can buy and sell without incurring significant transaction costs.

11 Thus, if all energy consumed is traded only once in the wholesale market the churn ratio is 1, whilst if all energy is first bought by an intermediary and re-sold once the churn ratio is 2.

2.6. The extent of **forward trading** can also provide an indication of the level of liquidity. The further forward products are offered to market participants the further forward they are able to hedge. The volumes or depth of products traded along the curve is also important. The **number of market participants** is also a useful measure as a high number of active participants within a market can be an indication of confidence in the market which can help support the development of liquidity.

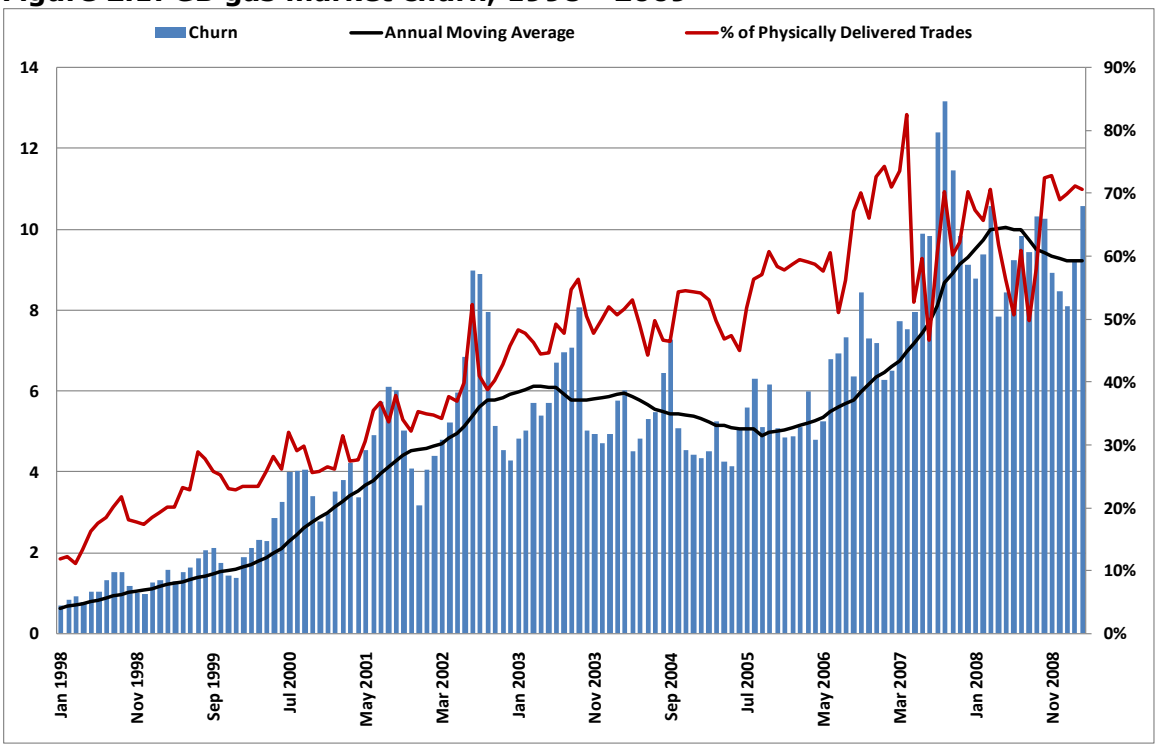
2.7. The remainder of this Chapter examines the level of liquidity in the GB energy markets, starting with the gas market and then the electricity market.

Gas market liquidity

Overview

2.8. GB gas market liquidity has generally grown over the last decade, as shown by Figure 2.1. Churn has grown to around nine times the size of physical consumption, although has declined slightly over the past 12 months. The total churn Figure compares well with churn in other wholesale gas markets and commodity markets. In discussion with a range of GB market participants, the majority have indicated that they consider GB gas liquidity to be sufficient for their needs.

Figure 2.1: GB gas market churn, 1998 - 2009



Source: National Grid

2.9. Volumes traded in the GB gas market are significantly higher than in other European energy markets. For example, volumes traded in the GB gas market in

January this year (at the National Balancing Point (NBP)) were almost five times that of other European hubs[12]. Churn at the Dutch TTF (Title Transfer Facility[13]) was around 3.2, whilst it was 2.5 in Belgium and averaged around 3 on the Austrian hub, during 2008.

2.10. Figure 2.1 also shows that an increase in the percent of total gas physically delivered onto the gas system which is traded in a way that is visible to the market (at the NBP), averaging 70% in 2008, up from an average of 16% in 1998[14]. This compares to just 8% in the Dutch market during 2007.

Traded volumes

2.11. The OTC market currently accounts for the majority of gas volumes traded, with OTC volumes for 2007/2008 at around 915bcm (corresponding to a churn of around 9)[15]. The remaining volumes are traded on exchanges.

2.12. Some exchange traded volumes include OTC trades being cleared through the exchange, which allows OTC counterparties to reduce counterparty risk (discussed further in Chapter 3). Indeed, ICE has indicated that there has been an increase in the take up of their OTC clearing services recently (see Appendix 2).

2.13. Liquid spot and prompt markets are important in providing non-physical market participants with the confidence that they will be able to close out their trading positions ahead of delivery. Forward and futures volumes (i.e. volumes traded for delivery beyond front month), rose by 13% in 2008 from the previous year (giving a churn of around 9).

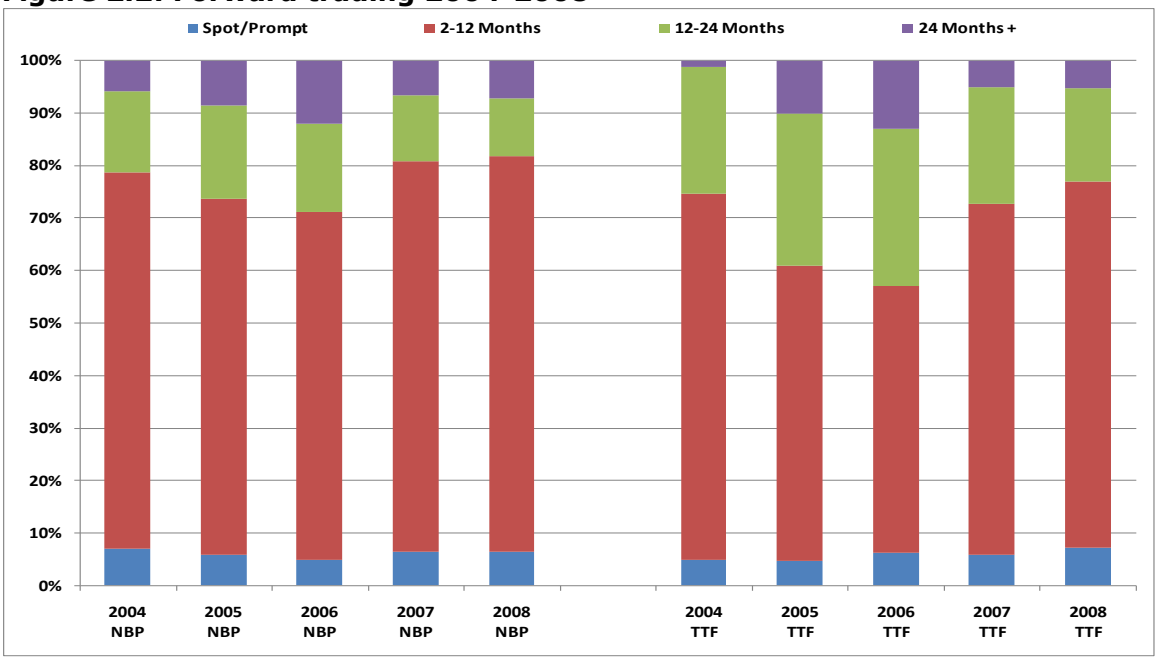
Forward trading

2.14. Market participants can generally obtain quotes for around four years ahead allowing them to hedge positions over this time horizon, although liquidity is significantly lower further along the curve, i.e. for products for delivery further into

12 Total traded volume was around 21bcm in January 2009 on a range of European gas hubs (TTF, Zee, EGT, CRTgaz, CEGH and BEB), whilst the figure was 95bcm for the NBP (Source: ICIS Heren).
13 The TTF is not a spot market for gas but a platform where gas is traded in a number of ways including OTC and bilateral agreements which accounted for the majority of this trading.
14 The data underlying Figure 2.1 is provided to NG by shippers on a voluntary basis and therefore may not be fully comprehensive. However, we believe it to be a good representation of the market. Further examination of the limitations of this data may be found in Ofgem's decision letter on UNC Modification Proposal 219: http://www.gasgovernance.com/NR/rdonlyres/B70AC860-4961-4052-A8B3-8CF11F8FC808/32492/UNC219D.pdf
15 http://www.fsa.gov.uk/pubs/other/analysis_energy_2008.pdf

the future. Figure 2.2 shows the percentage of volumes of NBP gas traded, across all OTC products, by period of delivery and compares this to the Dutch gas hub (TTF). The blue segments show gas to be delivered in less than one month (spot and prompt trading), the red is gas to be delivered between one month (front month) and a year out, the green is one to two years out and the purple is gas for delivery in two years time or more. The columns on the left hand side are NPB gas whilst those on the right are TTF gas[16].

Figure 2.2: Forward trading 2004-2008



Source: ICIS Heren, broker data

2.15. Figure 2.2 shows that the shares of traded volume in each of the groupings are broadly similar to what they were in 2004, with the share of trading one year or more ahead of delivery increasing somewhat between 2004 and 2006, then falling back again in the last two years. A similar pattern is visible in TTF trades, where trading for one year and more ahead of delivery accounts for around 25% of delivered volumes compared to around 20% in GB. It is important to note that although shares of trade beyond one year out are slightly higher at the TTF than the NBP, absolute volumes delivered at the NBP are significantly higher than volumes at the TTF.

16 Note that market participants may prefer to use exchange platforms rather than OTC for very near-term trading, so the proportion of volume for delivery in shorter timescales may be somewhat higher than in the figure.

2.16. In terms of how far forward products are traded, the GB gas market compares favourably with some other commodity markets such as oil and other gas markets (Figure 1.5 in appendix 3). In particular, it is interesting to note that around 90% of trading in Brent oil (generally considered to be a liquid market) is for contracts with expiry of less than one year.

2.17. Although analysis shows that the GB gas market (both prompt and forward) compares favourably with other markets, concerns have been raised by some parties. In particular, in 2008 the BESC noted major industrial customer's concern that gas producers seemed unwilling to trade in the forward market. The BESC also suggested further investigation should be undertaken into the lack of price transparency for forward contracts[17].

2.18. These issues have been investigated in the past. In 2005 the DTI commissioned IHS Global Insight (GI) to examine the gas forward market[18]. The report considered a range of concerns including the allegation that producers and continental gas companies were not as active in selling gas forward as might be expected. It also examined the perception that there was a lack of liquidity in forward trading and that this meant that the market was flawed.

2.19. The report found that the UK gas forward market was a functionally liquid hedging and trading market and was free from major distortions and market abuse. However, the report also noted that it had not yet developed to full maturity, possibly due to structural reasons and may therefore need further liberalisation in European gas markets for it to develop further. It was noted that the UK forward gas market was less liquid than the US forward gas market.

2.20. With regard to forward selling by gas producers the GI report found that whilst producers appeared to prefer exposure to front month prices rather than forward prices, "this is for reasons that have a clear and entirely defensible commercial logic".

2.21. Our analysis has shown that churn in the GB gas market has risen significantly since 2005. In addition, GB gas volumes trade at higher levels and further along the curve compared to other European gas markets and a number of commodities (see Figure 1.5 in appendix 3). In particular, the oil market, often cited as an example of a liquid commodity market does not trade particularly far along the curve.

17 Report of the House of Commons Business and Enterprise Select Committee: "Energy prices, fuel poverty and Ofgem", http://www.publications.parliament.uk/pa/cm200708/cmselect/cmberr/293/293i.pdf, p11
18 BERR: 'Ensuring Effective and Efficient Forward Gas markets', http://www.berr.gov.uk/files/file33153.pdf

2.22. In terms of price transparency, there is widespread reporting of forward contracts by price reporters, whilst OTC forward price data can be obtained from a number of the OTC brokers. The 2005 GI report also found that because the OTC forward market arbitrages efficiently with more transparent markets (e.g. ICE) it is in effect transparent by proxy with respect to price.

2.23. In discussions with market participants during our investigation into GB wholesale market liquidity only a few highlighted forward gas market liquidity as a concern. As such Ofgem would welcome views on whether market participants feel forward gas market liquidity is of concern and any evidence in support of these concerns.

Bid-offer spread

2.24. Another indicator of whether a market is liquid is the spread between bid and offer prices. A tight bid-offer spread is likely to indicate a large number of participants in the market. Tight spreads should encourage entry into the market as participants can be confident of easily buying and selling at low cost.

2.25. Our analysis shows that bid-offer spreads are considerably lower in the GB gas market than in electricity. Spreads are as low as 0.1% of the market price for day-ahead gas trades, rising to around 0.4% to 0.6% for monthly and seasonal trades (Figure 2.5). Whilst these spreads are higher than those present in the most liquid global commodity markets (such as the oil market where spreads are often less than 0.1%), they allow market participants to trade with relatively low transaction costs. Figure 2.5 below also shows that spreads have fallen in the last year.

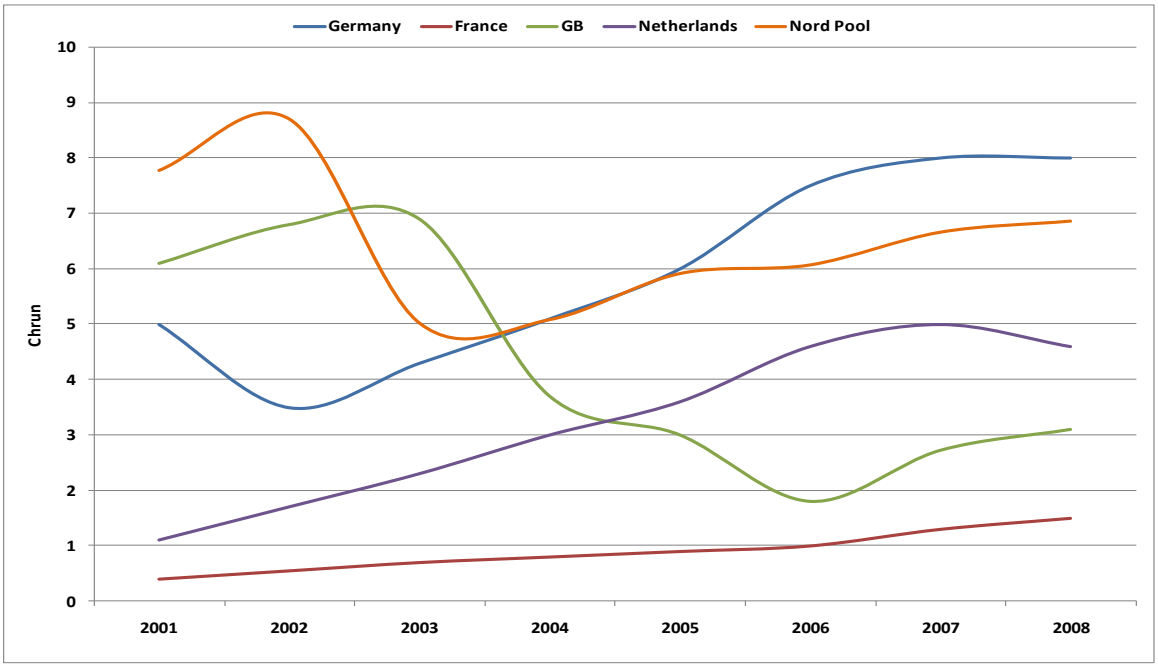
Electricity market liquidity

Overview

2.26. Liquidity in the GB electricity market is significantly lower than in the GB gas market, with churn currently at around 3 times underlying physical consumption, compared with around 9 times in the GB gas market. Liquidity in the GB electricity market is also below that in a number of other European countries (Figure 2.3). Whilst the Nordic area has experienced consistently high levels of liquidity with churn at around 7 in 2008, liquidity in the German and Dutch markets has grown in recent years to overtake liquidity in the GB market. Overall, churn for the German market (OTC + exchange trading) has been estimated at around 8 for 2008.

2.27. The GB churn Figures presented here relate to the period before the acquisition of British Energy by EDF, previously the largest independent generator in the GB market. It is not yet clear what impact this may have on liquidity. In addition, the Figures may not fully reflect the impact of the recent economic turmoil, which is likely to have had an impact on the trading activity of market participants, particularly smaller participants.

Figure 2.3: Churn rates in the GB and European electricity markets, 2001–2008



Source: European Commission, Nord Pool, CRE, Regulators, Bloomberg, Ofgem calculations - (smoothed lines)[19]

2.28. Figure 2.3 shows that liquidity in the GB electricity market (as measured by churn rate) has fallen from a high of around 7 in 2002 to around 3 in 2008[20]. It has been argued that this was in part due to the significant vertical integration and consolidation in the industry following the collapse of Enron (and others) and the withdrawal of a number of previously active market participants. (discussed further in Chapter 3).

2.29. We have outlined a range of possible reasons for the differences in liquidity in the GB electricity market and these other European electricity markets in Chapter 3. However, it has been suggested that greater levels of interconnection, greater participation from the demand side, higher utilisation of clearing and exchange based trading, and robust and reliable reference prices are the key drivers for liquidity in other European electricity markets.

19 Note that the data for Germany, France and the Netherlands, prior to 2005, excludes exchange traded volumes. This means that increases between the period prior to and after 2005 may be exaggerated for these countries. However, in level terms liquidity in Germany and the Netherlands is higher than in GB.
20 Note that this data excludes BM (Balancing Mechanism) trading (around 7TWh in 2008), exchange trading (around 12TWh in 2008) and embedded generation. However, these additional volumes are unlikely to materially influence the churn rates presented above.

2.30. A Europe wide study[21] of wholesale energy markets in 2008, which surveyed a wide range of market participants, ranked the UK fairly highly (5th out of 19 countries) with respect to liquidity and efficiency in the wholesale electricity market[22]. The UK market scored well in a range of categories including number of active traders (4th), ability to trade forward (4th) and volume of trading (5th), but less well in others, including the number of new entrants (7th) and representative prompt market price (11th).

Traded volumes

2.31. As described in Chapter 1, there are a number of mechanisms by which GB market participants can trade energy, including OTC and exchange based trading. The majority of trading in the GB electricity market occurs on the OTC market, with around 1,100TWh traded in 2007/2008, up around 12% from the same period last year. OTC trade alone implies a churn of around 3, as exchange based trading is very limited.

2.32. The majority of exchange trading that does occur in the GB electricity market is prompt trading on the APX Power UK exchange. Whilst traded volumes on this exchange have risen over time (Figure 1.1 in Appendix 2), in 2008 it still only totalled around 11.5TWh (about 3% of physical demand, i.e. churn of 0.03).

2.33. Exchanges play a much greater role in most European electricity markets than in GB. Around 298TWh was traded on Nord Pool's day-ahead spot market, which represents around 70% of physical consumption in the Nordic area (or a churn of around 0.7). In Germany, total volume of trade on the prompt market (EEX) was around 154TWh, or around 30% of consumption.

Forward trading

2.34. In terms of spot and prompt volumes, many market participants felt that liquidity in the prompt markets was sufficient for their requirements but indicated that liquidity further along the curve was of particular concern.

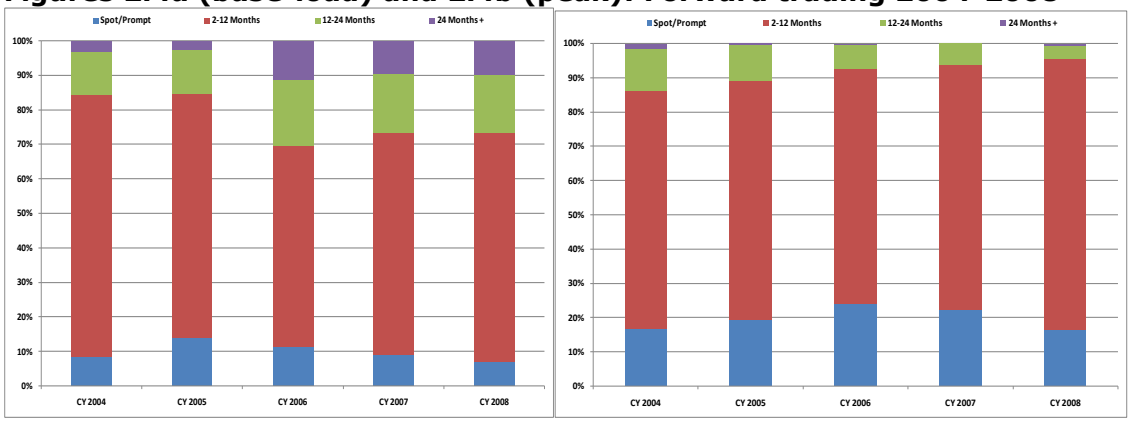
2.35. Figure 2.4a shows the percentage of volumes traded, across all electricity OTC base-load products by period of delivery. As in Figure 2.3, blue denotes products with less than one month to delivery (spot and prompt trading), red is products for delivery a month to a year out, green is one to two years out and purple represents

21 Review and Analysis of EU Wholesale Energy Markets, Evaluation of Factors Impacting on Current and Future Market Liquidity and Efficiency, Moffatt Associates for European Commission DG TREN, 2nd July 2008: http://ec.europa.eu/energy/gas_electricity/studies/doc/2008_eu_wholesale_energy_market_evaluation.pdf

22 In gas the UK ranked first out of 10.

the proportion of products for delivery in two years time or more[23]. Figure 2.4b shows the same for peak products[24].

Figures 2.4a (base-load) and 2.4b (peak): Forward trading 2004-2008



Source: ICIS Heren

2.36. Figures 2.4a and 2.4b show that for base-load products the proportion of volumes traded further along the curve (one year out or further) has increased since 2005. However, the proportion of peak products traded further out shows a marked decline, with only around 4% of products trading further than 12 months out and virtually nothing traded further than 24 months ahead of delivery in 2008. Analysis of product availability is discussed in more detail in Chapter 3 and Appendix 2.

2.37. Tables 1.3 and 1.4 in Appendix 2 show that there is a somewhat higher proportion of peak products traded along the forward curve in the German electricity market, with a greater proportion of products being traded both one year and two years ahead of delivery compared to the GB peak electricity market. Base-load trading shows a generally similar distribution in the two countries, though with a slightly higher proportion of base-load products being traded more than two years out in GB.

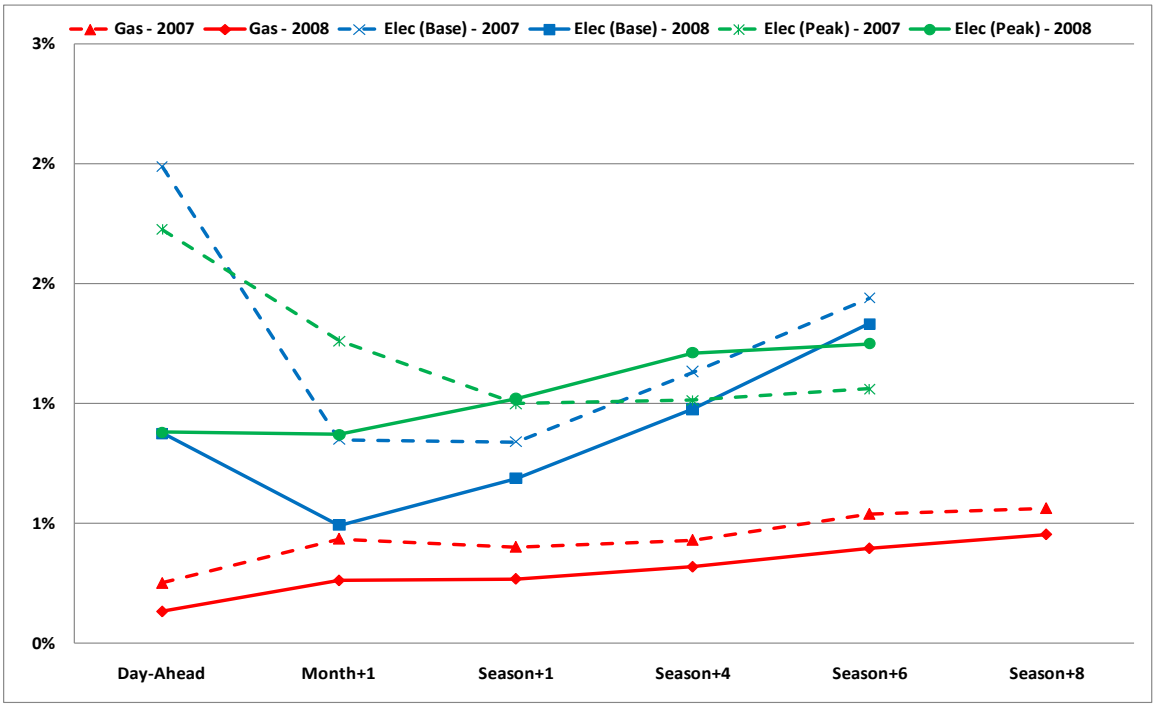
23 Base-load: delivery 24 hours a day. Off-peak: delivery in trading blocks 1, 2 and 6 (7pm-7am). Peak: delivery in trading blocks 3, 4 and 5 (7am-7pm), or in any period which falls between these hours. Where products are traded which overlap off-peak and peak trading (e.g. Blocks 3,4,5, and 6) these have been considered to be peak trades if the majority of the period falls in peak hours.

24 The charts do not include volumes traded on the APX (prompt) exchange, and ICE Futures exchange. However, as electricity exchange based trading is limited in GB this is unlikely to materially alter the results.

Bid-offer spread

2.38. As noted above, the bid-offer spread is another useful indicator of liquidity. Figure 2.5 shows that bid-offer spreads in the GB electricity market are markedly higher than in the GB gas market. It does, however, show that the spreads for both base-load products and peak products for delivery day-ahead, front month and front season fell between 2007 and 2008. Spreads for peak products further out (4 seasons our or more) rose between 2007 and 2008.

Figure 2.5: Average bid-offer spreads in the GB gas and electricity markets 2004-2008



Source: ICIS Heren. Gas: Red line, electricity base-load: Blue line, electricity peak: Green line, 2007: Dotted, 2008: Solid.

Summary

2.39. The evidence presented in this section shows that:

- Liquidity in GB wholesale gas market has been increasing over time and is higher than gas markets in other European countries. While concern has been expressed over liquidity in the GB gas forward market our analysis shows that forward trading is higher than comparable gas markets and markets for other commodities.
- Liquidity in the GB wholesale electricity market is significantly lower than in the GB gas market and a number of European wholesale electricity markets. Liquidity in the GB electricity market is concentrated in spot, prompt and forward markets up to one year ahead of delivery with limited trading further along the

curve (more than one or two years ahead of delivery). The proportion of volumes trading further along the curve has remained broadly similar over the past few years.
- Bid-offer spreads in GB electricity market are higher than in the GB gas market, although base-load electricity spreads and spreads for season-ahead peak products fell in 2008 compared to 2007.
- Our analysis indicates that the GB wholesale electricity market is the most significant area for concern. For this reason we will focus the remainder of this document on the GB wholesale electricity market.

Question box

Question 1: Do you agree that there is sufficient liquidity in the GB gas market, or are there some segments of the market where liquidity is insufficient? If so, what is the evidence for insufficient liquidity and what is its impact?
Question 2: Do you agree that there is insufficient liquidity in the GB electricity market. If not, can you provide evidence to show that GB electricity liquidity is sufficient?
Question 3: Do you consider that the data and evidence presented here portrays a true and fair picture of GB wholesale liquidity for gas and electricity? If not, why not?
Question 4: Do you think that it is right that Ofgem should be concerned by low levels of liquidity in the GB electricity market? If yes, please explain which particular aspects/market segments Ofgem should be concerned with and why? If no, please explain why, in light of the evidence in this Chapter.

3. Possible causes of low liquidity in the GB electricity market

This Chapter examines possible causes of the low levels of liquidity in the GB wholesale electricity market. It considers the impact on liquidity of industry structure, aspects of the trading arrangements, both the centrally designed balancing arrangements and the operation of commercial markets for short term and forward trading, and also credit arrangements.

Introduction

3.1. The focus of this Chapter is on the GB wholesale electricity market although we do comment on the GB gas market as a relevant comparator market.

3.2. We have structured the discussion of potential causes of the low levels of liquidity in the GB electricity market into three broad areas:

- Industry structure;
- Trading arrangements; and
- Credit risk management practices.

3.3. The level of liquidity in a market is likely to be a function of a number of different factors and the (often complex) interrelationships between these, which makes it difficult to attribute the low levels of GB electricity liquidity over the past 3-4 years to a single cause. Similarly, factors which may appear to have had a negative impact on liquidity in a particular market may be equally present in other wholesale energy markets that nonetheless enjoy better liquidity because of other offsetting factors (for example, more interconnections to surrounding regional markets).

3.4. It is also important to note that developments, which in isolation may appear to have a negative influence upon liquidity, may be justified for other reasons. One example is the move to margining and collateralisation of credit risk, which has become the norm across the GB energy industry over the past 3-5 years (as it has in other European markets). Whilst this move has decreased the risk from counterparty default, it has considerably raised the capital required for trading and, as such, in isolation probably reduced the ease of market access and the ability to trade for smaller participants with lower credit standings.

3.5. Finally, there are strong feedback loops which can make it difficult to distinguish precisely between cause and effect. The impact of declining liquidity may force market participants to seek alternatives to trading in wholesale markets, which may create a 'vicious circle', leading to further reductions in liquidity. For example, in markets which suffer from low liquidity, participants are more likely to pursue alternative means of risk management (through, for example, integration). Similarly, brokers and exchanges are less likely to launch new products (which may further dilute liquidity in existing products) and potential new entrants may be

deterred by a perceived inability to buy and sell products. Conversely, in markets with high liquidity and robust reference prices, brokers and exchanges may offer a more diverse range of products, which may facilitate market entry. Hence, markets which already have a high level of liquidity may encourage new entry, which in turn may further stimulate trading and increase liquidity.

3.6. The challenge confronting the GB wholesale electricity market is how to "kick-start" such a virtuous circle of liquidity generation.

Industry structure

3.7. A number of industry participants raised concerns about the impact of industry structure on liquidity in the GB electricity market. This section considers the impact of the following aspects of industry structure on liquidity:

- Vertical integration;
- Market size;
- Interconnection to other markets;
- Demand side participation; and
- Policy uncertainty.
-

Vertical integration[25]

3.8. The key concern relating to industry structure is that the increase in vertical integration in the GB electricity market has had a detrimental impact on wholesale market liquidity. It is argued that vertically integrated companies do not need to access the wholesale market, as their own plant will "provide the necessary price and volume protection". In this respect, the European Commission's 2006 energy sector inquiry noted "Vertical integration of generation and retail reduces the incentives to trade on wholesale markets. This might lead to a drying up of wholesale markets. Illiquid wholesale markets are a barrier to entry as they are characterised by higher price volatility. Volatile wholesale markets might oblige new entrants to enter as a vertically integrated generator and supplier, which is more difficult"[26].

3.9. This section first describes the reasons for vertical integration and possible alternatives to vertical integration. It then outlines developments in the wholesale electricity market since privatisation and explores why integrated companies need to trade. Finally it examines the impact of vertical integration on GB market liquidity.

25 By vertical integration, in the context of this document we are referring to consolidation between retail supply and generation/production businesses.
26 Final Report of the European Commission Energy Sector Enquiry, http://ec.europa.eu/comm/competition/sectors/energy/inquiry/full_report_part2.pdf; p128 and p. 169

Why do firms vertically integrate?

3.10. There are a number of reasons for companies to vertically integrate. Some of the Big 6 have highlighted that vertical integration is an efficient approach to procuring energy in the wholesale markets[27]. Companies may seek to vertically integrate to:

- reduce transaction costs (cost incurred in buying and selling energy);
- reduce exposure to wholesale energy market volatility (this may be an important reason for integration if alternative mechanisms for managing this risk are perceived to be inadequate to meet this requirement);
- save on operating costs (reduced IT, staff, infrastructure costs);
- smooth upstream and downstream profits (particularly where the profits in each sector are negatively correlated in relation to key drivers of profitability, e.g. energy prices); and
- minimise counterparty default risk – a series of high profile defaults in the energy market during the early part of the decade are likely to have contributed to the high levels of vertical integration observed during this period (e.g. TXU, Enron).

3.11. One undesirable consequence of vertical integration is the possibility of market foreclosure. This is where a vertically integrated company tries to use its presence in one sector where it operates to reduce competition in another in an attempt to increase profits. An example in the energy sector could be where a supplier buys an upstream generator and then uses its generation business to offer less favourable terms to its competitors and/or new entrants in the supply sector. The purpose of either strategy is to drive out existing competitors and/or discourage new entry into either sector, thereby increasing profitability.

3.12. It is important to note that for such a strategy to be successful the vertically integrated company must have some degree of market power in either sector it operates in (upstream or downstream). In addition, such a strategy must be profitable for the company. Ofgem has not received any evidence that any market participant is acting to foreclose the GB energy markets.

Alternatives to integration - contractual arrangements

3.13. It is possible for a company to achieve some of the advantages of vertical integration identified above by contracting with other firms operating in different

27 House of Commons Business and Enterprise Committee Energy prices, fuel poverty and Ofgem, Eleventh Report of Session 2007–08, Volume II, Oral and written evidence, Evidence 193: http://www.publications.parliament.uk/pa/cm200708/cmselect/cmberr/293/293i.pdf Some of the Big 6 have also stated to Ofgem that they do not sell energy directly from the upstream generation business to the supply business, but instead employ a separate trading arm to optimise all output and supply requirements using the open market.

parts of the supply chain rather than vertically integrating. For instance, depending on the nature of the agreement, contractual arrangements between suppliers and generators for the output from a particular power station can give exclusive control without direct ownership (replicating some of the effects of integration). For example, where a party enters into a tolling agreement with a generator, the party supplies the input fuel (e.g. gas) to a generator, in return for the electricity (or an agreed volume of the electricity) produced using the fuel. Such contracts can extend an entity's control over a wider generation portfolio than is reflected in unadjusted structural indicators.

3.14. In practice however, companies may prefer vertical integration to contracting as it may be more efficient, for instance where it is difficult to write 'complete[28]' contracts, where contracting incurs very high transaction costs[29] or where there is information asymmetry between parties[30].

Developments in vertical integration

3.15. In contrast to the GB gas market[31] significant vertical integration has taken place in the GB electricity market over the past 10 years. This process of consolidation has continued, with the recent acquisition of British Energy by EDF and Centrica's recent announcement that it is intending to purchase a 20% stake in British Energy. Whilst independent generators such as International Power, Drax and InterGen remain, the market share of independent generators is reduced from a few years ago, with some seeking to build supply bases, as evidenced by the takeover of Haven Power by Drax and International Power's stake in Opus' supply business.

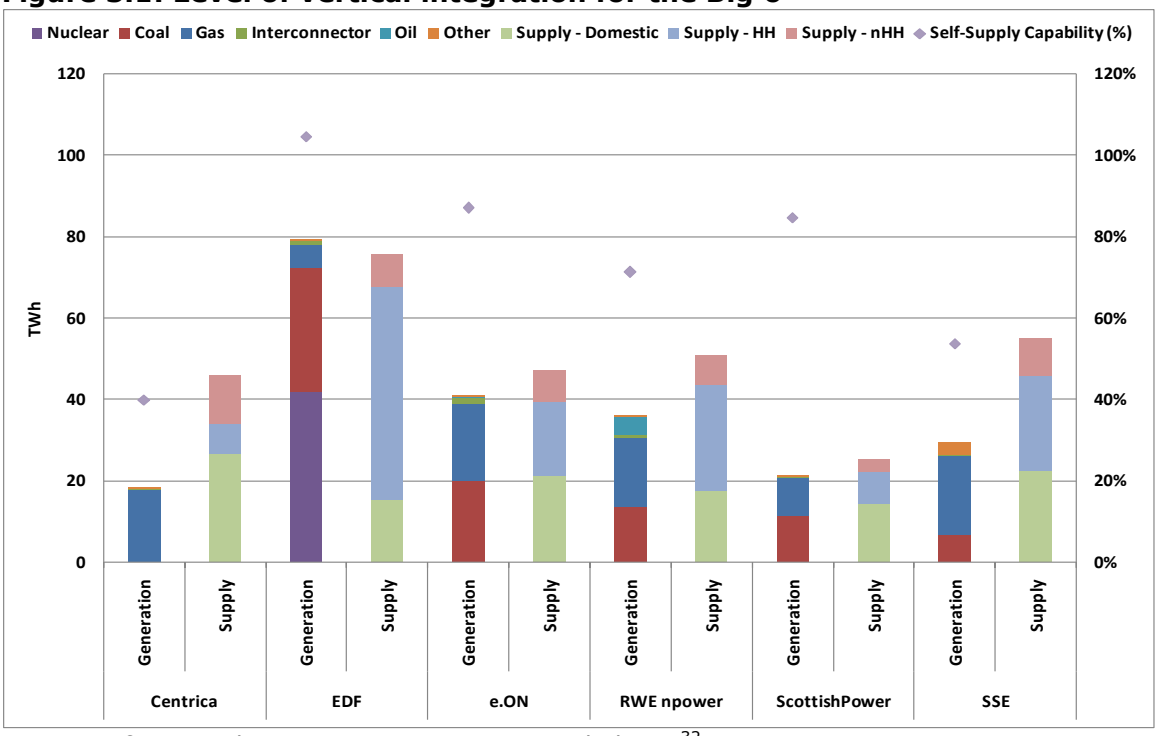
3.16. Notwithstanding the increase in market concentration since 2001, there is some investment being undertaken by non-utility participants and non-vertically integrated new entrants. Recent examples include the 470 MW expansion of ConocoPhillips Immingham CHP and the acquisition by DONG Energy of the 800MW Severn Power CCGT.

28 These are contracts where all possible material eventualities can be identified and covered.
29 These may include contracts that are highly complex or difficult to enforce.
30 Market confidence in long term contracts was significantly weakened following the collapse of Enron and TXU which had long term contracts with a number of market participants.
31 There has been limited vertical integration between supply and production businesses in the GB gas market. In addition, the GB market for gas supply is well connected with other markets through import pipelines, interconnectors and LNG import facilities, providing a diverse source of supply of gas. This is in contrast to the electricity market where there is currently only 2GW of interconnector capacity (around 3% of maximum demand in GB).

Vertical integration and the requirement to trade

3.17. Figure 3.1 shows the generation and supply position of the Big 6 for 2008. Whilst we have included the generated output and customers of British Energy within EDF's stacks to reflect their acquisition of BE, we have not reflected the proposed acquisition of a 20% stake in British Energy by Centrica. The dots show the proportion of the supply requirement which can be met by a company's own generation (right axis). The columns show the level and composition of generation capacity and supply requirements (TWh, left axis). The chart shows that in 2008 the Big 6's own generation exceeded the demand from their domestic customer base and generated more than half the level of their total customer requirements (i.e. domestic, small businesses and demand from large industrial and commercial customers), with the exception of Centrica.

Figure 3.1: Level of vertical integration for the Big 6



Source: Ofgem analysis, BERR, Datamonitor and Elexon[32]

3.18. Care is needed in the interpretation of Figure 3.1. Even where total generation output in energy terms matches supply requirements, this does not eliminate the need for some trading in response to:

32 In Figure 3.1, HH reflects the volume demanded by half-hourly metered customers; nHH: the volume demanded by non half-hourly metered industrial customers, and domestic the volume demanded by households.

- Profile mismatch:
  - Generators often prefer to sell output further out compared to the period over which the suppliers generally purchase energy;
  - The generation mix may prevent integrated companies from internalising significant volumes (for instance, where a generation portfolio is largely made up of oil fired units which only run at times of peak demand); and
  - While vertical integration may allow companies to internalise some profile risk, i.e. cover the profile of demand (high at peak times, lower otherwise) with a similar profile in their generation capacity, demand profiles are not entirely stable or predictable. This means there is likely to be imbalances between the profile of generation and demand in operational timeframes which creates a requirement to access the market.
- Reliability:
  - Generation reliability can be a significant risk close to real time, as forced outages will require the generation that has been sold forward but that cannot now be generated to be purchased in the wholesale markets;
- Market dynamics:
  - Parties may adjust the manner in which they buy and sell their supply requirements and generation output in response to changes in market conditions. For instance, an increase in the coal price may mean that it is more profitable for an integrated company with predominately coal fired plant to turn down its stations and buy energy from the market; and
  - The frequency of updated or new information coming into the market is an important driver of liquidity, for example information on outages, demand, weather etc, as it determines the frequency market participants have to rebalance their positions.

3.19. More generally, integrated companies that are long in generation (where generation output is greater than their own supply requirement) have a need to sell this surplus output and those that are short need to make up this shortfall via the market.

3.20. In addition, whilst vertical integration may reduce the requirement for trading through the wholesale market, this does not necessarily mean that integrated participants actually trade less. For instance, information received during the Energy Supply Probe indicates that suppliers tend to source their Industrial and Commercial (I&C) customers' demand requirements directly from the wholesale market.

3.21. The Big 6 have also indicated, both as part of their evidence to the BESC and in meetings with Ofgem, that they traded in excess of their total energy requirements using the GB wholesale energy markets. According to Figures provided by the

companies, they churn (trade) over five times their underlying generation, which is above the market average churn of around 3[33].

Impact of vertical integration on GB liquidity

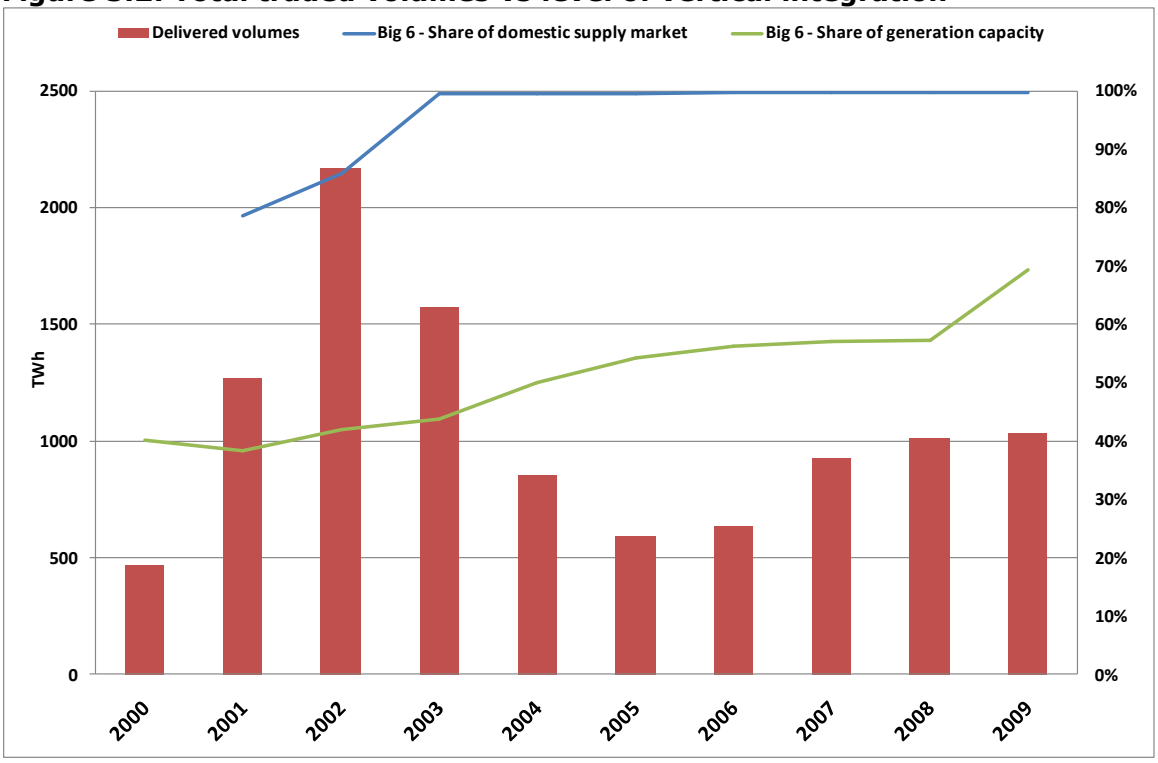
3.22. Figure 3.1 (above) shows the generation/supply position of the Big 6. If we accept that all integrated participants source their I&C supply requirement from the wholesale market and their domestic supply requirement with own generation, this implies that only the residual generation (own generation minus domestic supply requirement) would be made available to the market. This could imply that a significant volume of electricity may not been traded through the market.

3.23. While integrated participants may use some of their generation capacity as a hedge for their retail businesses, in liquid and accessible wholesale markets non-integrated participants should be able to substantially emulate this through trading. However, if liquidity and product range is insufficient to support effective risk management through the market, independent suppliers and generators may be disadvantaged. In liquidity constrained markets, vertically integrated participants with a flexible (multi-unit) generation fleet are likely to be better positioned to manage profile and balancing risks than independent suppliers and generators.

3.24. For the Big 6, Figure 3.2 shows their joint share of generation capacity (green line, right axis) and their share of the domestic supply market (blue line, right axis). Total annual volume traded is shown by the red bars (left axis).

33 There are a number of possible limitations to this data. For instance, the methodologies used in calculating this data may not be consistent across all suppliers and the data may include some internal trade.

Figure 3.2: Total traded volumes vs level of vertical integration



Source: ICIS Heren, NG, Ofgem analysis (volume for 2009 is calculated by multiplying volumes observed in first 4 months of 2009 by three). Generation capacity does not include equity shares in power stations.

3.25. The chart shows that the share of the Big 6 in the GB retail market has increased to over 99% from 2003. It also shows that a rapid growth in the share of generation capacity by the Big 6 has been accompanied by a reduction in volumes traded, although there has been an increase in recent years.

3.26. The GB wholesale gas market is an interesting comparator market to the GB electricity market in this context, as there is limited vertical integration in the gas market which leaves all suppliers short, and it has very high traded volumes. However, it is possible the characteristics of gas may explain some of the differences observed (gas is storable and is balanced on a daily basis, in GB, rather than instantaneously).

3.27. While Figure 3.2 shows that the period of declining liquidity has broadly coincided with increased vertical integration, it is important to note that correlation does not necessarily imply causation. In addition, the chart shows that traded volumes have risen recently, despite continued increases in integration. It is also notable that the German wholesale market, which is more liquid that the GB market, is also highly vertically integrated. Liquidity is thus likely to be driven by a number of different factors, and further potential drivers are discussed below.

Market size

3.28. It has been suggested that the current level of liquidity in the GB electricity market is as high as can be sustained in a market with its characteristics, i.e. it has too few participants and physical size. To the extent that this a valid concern, one solution is further integration of the GB market to other markets, through enhanced interconnector capacity (as discussed below) and further integration of the GB market in a regional context.

3.29. However, it is noteworthy that churn in wholesale electricity was 7 times the underlying physical market in 2002, which is as high as the most liquid electricity markets today. This does suggest that the GB electricity market is big enough to sustain a wholesale market with much higher levels of liquidity. It is also worth noting that the Nordic market is of a similar size to the GB electricity but has a much higher level of liquidity.

Interconnection with other markets

3.30. Related to the issue of market size is the role of interconnection capacity in supporting liquidity. More interconnection may potentially improve liquidity by bringing new physical participants into the market, expanding the geographical reach of the market and can help to reduce price volatility.

3.31. Flows between the GB market and other markets are currently low, at around 3% of total consumption[34]. Table 3.1 shows interconnector flows as a percentage of consumption in GB and other European countries.

Table 3.1: Interconnector flows as % of consumption for GB and other European countries

	2007 flows (TWhs)			**Total flows as % of consumption**
	Imports	**Exports**	**Total**	
GB market (1)	8.5	2.4	10.9	3%
Nord Pool (2)	2.4	16.9	19.3	5%
France	10.4	65.5	75.8	16%
Germany	44.3	63.4	107.7	19%

(1) Capacities only include French interconnection. (2) Capacities exclude interconnection within Nordic countries as well as interconnection with Russia. Source: UCTE

3.32. High levels of interconnection combined with a number of market coupling initiatives[35], has meant that the German market has attracted participation from the

34 This excludes the relatively limited flows on the interconnector with Northern Ireland.

surrounding regions, increasing liquidity. However, a high level of interconnection alone is not a sufficient condition for improving liquidity, for instance, despite high levels of interconnection the French market has very low levels of liquidity. It should be noted, however, that the French upstream and downstream electricity markets are dominated by one large state-owned player (EDF).

3.33. Nord Pool, on the other hand, has a comparatively low level of interconnector flows (not including flows between countries within the Nord Pool area), so other factors are likely to contribute to the high levels of liquidity.

3.34. While this analysis suggests a high level of interconnection is neither a necessary nor a sufficient condition to provide high liquidity, it is likely to be a contributing factor to the development of liquidity. In this respect there are a number of interconnector projects planned for the GB electricity market that will increase the level interconnection in GB.

3.35. A number of market participants have suggested that closer integration between countries, via market coupling for example, has been important in increasing the level of liquidity in a number of European countries. The view is that market coupling increases the number of participants who can access and hence trade in the market. As GB's level of interconnection with Europe increases this issue is likely to become increasingly important (discussed further in Chapter 4).

Demand side participation

3.36. It has been suggested that the lack of direct participation from demand participants has contributed to the low levels of liquidity in the GB wholesale market. At present a sizeable section of potential market participants, such as large industrial users and public sector consumers, do not participate directly in the wholesale energy market, and instead prefer to procure energy from supply companies[36].

3.37. GB demand side participants are much less active in trading relative to those in some other countries such as the Nord Pool. There are now more than 200 active participants in the Nord Pool wholesale market, including many of the larger I&C customers. There are also a number of intermediaries which act on behalf of smaller SME businesses as well as individual residential customers. In Norway in particular, higher levels of participation may be partly due to the historic fragmentation of a large number of municipally owned distribution/retail companies and the ease of access to liquid spot and forward markets.

35 Aimed at aligning TSO (Transmission System Operator) arrangements and removing obstacles to cross-border flows.
36 It should be noted that some are flexible contracts provided by suppliers allow de facto participation in the demand side.

3.38. The lack of demand side participation in the GB market may be due to a lack of market knowledge and expertise. The complexity of the regulatory and trading arrangements, such as the requirement to sign up to industry codes and agreements and IT systems requirements are among the factors that may discourage participation from the demand side in GB.

Policy intervention and uncertainty

3.39. Frequent intervention and uncertainty on energy policy by national and European authorities, including regulatory bodies, has been suggested as one possible reason for lower levels of liquidity observed in the GB wholesale electricity market. Significant uncertainty about the future structure of the market means that forward prices are unpredictable thereby reducing the desire to trade forward. For instance, uncertainty over phase three of the EU ETS has been cited as a reason for the reduction in liquidity further along the curve in the GB electricity market.

3.40. Uncertainty about the future policy and regulatory framework can impact firms' decisions on whether to rely directly on the market for the provision of wholesale energy or to hedge by building or acquiring their own generation portfolios or retail assets.

Industry Structure - comparison with other markets

3.41. It is useful to compare features of other energy markets to understand the possible drivers of low liquidity in the GB wholesale electricity market (see Appendix 3 for more details).

3.42. While the German market has been considered one of the least competitive in Europe, it has very high volumes of trade. This is despite the continued large market share of RWE, EON and Vattenfall and is in part due to the extent of physical interconnection with other markets. However, despite the high levels of liquidity observed in the German market, the German federal cartel office has recently launched an investigation into electricity producers and the wholesale market due to concerns that prices remain high despite significant falls in gas and oil prices. Whilst the investigation is still ongoing, this shows that liquid markets may not be sufficient (on their own) in ensuring competitive wholesale and retail markets.

3.43. The French market is also characterised by high levels of vertical integration and interconnection. However, based on the most recently available data, levels of liquidity are significantly lower than in the German market (with a churn of around 1.5). Finally, the GB gas market is an example of a market with fairly low levels of integration and yet high levels of liquidity.

3.44. These comparisons suggest a range of factors related to market structure are likely to drive levels of liquidity and that a high level of vertical integration on its own will not necessarily lead to low levels of liquidity. Other features of these markets such as the size of the market, the extent of demand side participation and the policy environment are also likely to contribute to liquidity.

Trading arrangements

3.45. Concerns have been raised about the impact on liquidity of the current trading arrangements both in terms of the operation of the centrally designed balancing arrangements, as well as the operation of commercial markets for short term and forward trading, such as exchanges and OTC markets that have developed around the centrally designed arrangements. This section explores these concerns.

Centrally designed balancing arrangements

3.46. With respect to the centrally designed balancing arrangements, some industry participants have suggested that the current cash out arrangements in electricity act as a barrier to entry particularly for smaller, non-vertically integrated market participants due to their complexity and high and volatile costs. They argue that the current arrangements reduce liquidity by:

- Discouraging new entrants and thereby trading in the wholesale market;
- Reducing the willingness of non-physical participants to trade in the market as they may find it difficult to trade out their position ahead of real time (this is particularly true where close-to-real-time markets are illiquid)[37]; and
- Discouraging trading due to a large and unpredictable spread between the two cash out prices.

3.47. A key design objective in the move from the previous gross pool to NETA and then BETTA was the desire to create market arrangements which allowed the electricity market to act as far as possible as any other commodity market. Under BETTA prompt and forward trading is left for the market participants to arrange on a commercial (voluntary) basis, with the mandatory arrangements reduced to balancing of the overall system.

3.48. Unlike most other commodity markets, demand and supply for electricity must be balanced in real time and is non storable. These unique characteristics mean that in GB the System Operators (SOs: NGG and NGET) are responsible for ensuring demand and supply are matched (residual balancing). However, actions taken by the SO balance the system incur a cost; the cash-out arrangements are designed to allocate this cost to those parties who are out of balance. The cash-out arrangements provide participants with incentives to ensure their contractual and physical position match[38]. Market participants are thus incentivised to avoid

37 After gate closure, vertical integration has limited benefits in terms of balancing generation and supply, as a supply business is unable to resolve any imbalance position that may arise after gate closure.

38 Mismatch or imbalance occurs where a party is producing or consuming energy at different levels to that covered by contracts.

exposure to cash out prices by contracting for supply ahead of time, fine tuning positions within-day and by maintaining the reliability of their generation.

3.49. Cash-out in GB currently operates under a dual price mechanism, with system buy prices (SBP) charged to parties who are short and system sell prices (SSP) paid to parties who are long. Cash-out prices are calculated based on the cost of the actions NG has had to take to increase the amount of electricity on the system (which feeds through to the SBP) and decrease the amount of electricity (which feeds through to the SSP). There is also a 'main' and 'reverse' price, with SBP being the main price and SSP the reverse price when the system is short (i.e. there is less energy coming on the system than being taken off) and vice versa when the system is long.

3.50. The key concern raised with the present balancing arrangements in relation to liquidity is the impact on smaller participants[39]. Most (but not all) of the large vertically integrated participants have access to significant sources of flexible generation capacity and in general benefit from larger and potentially more stable customer portfolios. Conversely, smaller participants find it more difficult to forecast customer demand/generation output and may also find it difficult to trade any imbalance position out ahead of gate closure (they may lack expertise or round-the-clock trading teams).

3.51. Analysis of the cash-out prices over the past five years shows that imbalance prices have become more volatile and the absolute levels of prices has risen substantially (SBP has risen to record levels in 2008). The current cash-out arrangements may have a detrimental impact on liquidity in a number of ways:

- Smaller participants find it more difficult to manage balancing risk. This has a direct impact on liquidity in that it acts as a barrier to entry and reduces the volume of trading; and
- Whilst market depth in prompt and balancing markets has increased over time, the volatility and overall level of imbalance prices has risen sharply. Although these may fully reflect demand/supply fundamentals they may result in non-physical market participants becoming less confident that they will able to trade out positions ahead of gate closure.

3.52. Where the prompt market is considered to be illiquid and exposure to high and volatile imbalance prices undesirable, this provides incentives for self-insurance and

39 During the development of NETA it was recognised that smaller participants would find it difficult to manage balancing risk. Three trading options were developed to help smaller players: direct participation under the BSC in CVA (Central Volume Allocation); trading through a licensed supplier; and trading through another party in CVA such as a consolidator. Alternatively, a supplier can contract with an intermediary for risk management services.

horizontal integration in generation. A portfolio of several units (of which some are flexible and part loaded) is better positioned to manage balancing risk than a single large plant with few units. This may represent a barrier to entry for non-integrated participants. However, it is important to recognise that high imbalance prices may also act as an incentive in attracting new generation into the market and therefore play an important role in terms of security of supply.

3.53. In terms of comparison with cash out arrangements in other energy markets, most European electricity markets require participants to balance at the time of delivery. However, their mechanisms are generally considered to be less costly and prices less volatile than under the GB market arrangements. In the case of the Nordic market, this is in part a result of the extent of flexible (reservoir) hydro capacity as well as a single (marginal) balancing price. In other markets, imbalance charges have historically included some element of averaging and/or administrative set charges which serve to dampen the impact and cost of managing imbalances compared to the present GB arrangements.

Voluntary trading arrangements

3.54. There are a range of issues relating to the impact of current voluntary trading arrangements on liquidity. These are discussed below and include:

- Lack of products over the right timescales or with the right shape to match customers' demand;
- Insufficient information on underlying fundamentals which drive price and lack of a reliable flow of information on trading;
- Complex contractual arrangements to start trading (GTMA contracts);
- Price volatility; and
- Gas being used as a hedge for electricity.
-

Absence of reference prices and limited exchange based trading

3.55. Equal access to transparent price information for all participants is important to ensure fair and competitive markets. For markets and liquidity to develop, there must be trust in the price formation mechanism and open access to reliable and robust price data.

3.56. With the majority of trading occurring OTC, price discovery in the GB market is currently reliant on a range of sources including broker reports, market price reporters and informal market intelligence. It is argued that the range of different platforms used for electricity trading and the lack of exchange based trading[40],

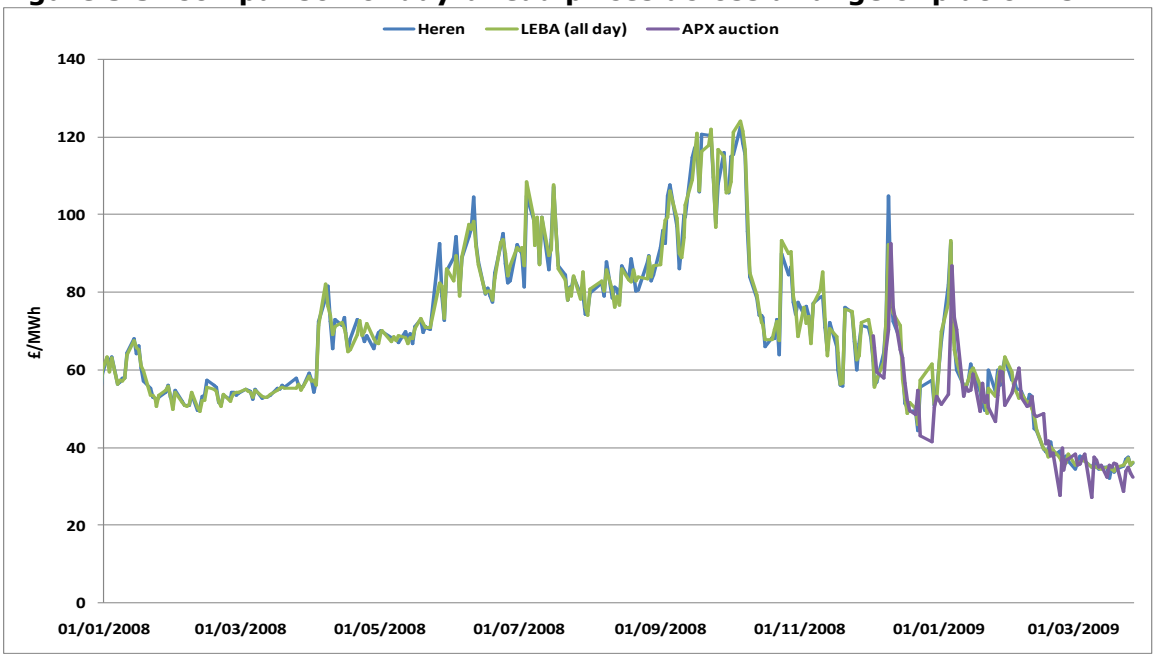
40 Exchanges are considered to be transparent in that they publish detailed price and volume data upon which reference prices can be based.

results in the absence of a single clear and widely accepted reference price for prompt or futures and forward trading. This is particularly important for the development of forward trading, as futures and forward trading rely on the existence of trusted reference prices for prompt trades against which they can be priced and traded.

3.57. The most commonly used reference prices in the GB market are LEBA's (London Energy Brokers Association) indices based on OTC contracts transacted through its members' platforms (see Chapter 4)[41]. These indices are calculated based on a large volume of trades, as most trade in the GB wholesale electricity market is OTC and most OTC brokers are LEBA members.

3.58. Figure 3.3 shows that the prices for the day-ahead base-load contract quoted on a range of different platforms broadly track each other. However, there are occasions where prices diverge, particularly around times of market turmoil (such as unplanned outages). The divergence may be due to differences in methodologies used to calculate the indices and/or the result of incomplete information obtained by any given market reporter. It is possible however, that the divergence may result in a reluctance of market participants from utilising existing reference prices.

Figure 3.3: Comparison of day-ahead prices across a range of platforms



Source: LEBA, ICIS Heren, APX

41 The indices are made up of all reported trades and are considered to be widely used as a reference price for a range of forward trades.

3.59. Exchange based trading is significantly higher in other European countries compared to the GB market as illustrated in Table 3.2. A number of market participants have suggested that because European markets have large volumes of exchange based trading they are able to produce trusted and widely utilised reference prices.

Table 3.2: Exchange trading in 2007

	Market	Spot	Futures	Total
Volumes (TWhs)	GB market	17	1	18
	Nord Pool Region	292	1060	1352
	Germany	124	189	311
	France	44	79	124
	Netherlands	21	28	49
% of total consumption	GB market	4.7%	0.4%	5.1%
	Nord Pool Region	69%	268%	337%
	Germany	22%	33%	55%
	France	9%	17%	26%
	Netherlands	19%	25%	44%

Source: ERGEG

3.60. Of the markets compared above, Nord Pool has by far the most exchange trading across both futures and prompt products in relation to market size. Exchange based traded products still only account for a fairly small share of the overall churn in the German market, but both prompt and futures trading has been increasing rapidly over the past few years.

3.61. The view that prompt trading is an important building block for other trading activities is reflected in recent industry initiatives. The Futures and Options Association (FOA) have appointed Nord Pool and Nasdax OMX to launch an exchange in 2009 which will initially focus on prompt products, and APX launched a day-ahead auction in December 2008. These initiatives are discussed further in Chapter 4[42].

42 A further consideration is continuous trading versus the day-ahead auction model. Proponents of the auction model argue that the continuous approach has already allowed limited short term liquidity to become too dispersed across several time periods. They argue, in contrast, a day-ahead auction would concentrate short term liquidity which in turn might improve prompt price transparency and facilitate the creation of more robust reference data. Conversely, proponents of the continuous approach suggest that an auction approach would reduce liquidity (churn) as there would not be as much of a requirement for fine-tuning positions and would be more open to manipulation. It is difficult to provide a quantitative assessment of whether an auction approach would lead to the development of a robust reference price and thereby higher liquidity. However, whilst the auction approach has been successful in some European markets such as Nord Pool and Germany, continuous trading is also utilised, most notably in Nord Pool's Elbas exchange.

3.62. Markets for exchange traded and OTC products typically feed off one another. Where reliable reference prices are available increased price transparency supports the certainty by which any products (exchange or OTC based) can be priced and valued. Therefore, OTC and exchange trading should be complementary markets in creating a virtuous circle of liquidity generation, rather than competitors.

Insufficient shape, duration and granularity

3.63. The lack of a sufficient range of products and limited depth in trading of forward products is a concern raised by a number of smaller participants. They note that the products they need to manage risks effectively and back offerings to customers in the market are traded infrequently.

3.64. At present, the level of forward liquidity in the GB market is less than comparable European markets which tend to remain relatively liquid some 2-3 years out. Whilst there are a wide range of products available in the GB prompt markets, with high volumes of day-ahead and within-day trading, the analysis presented in Chapter 2 and Appendix 3 shows that liquidity is limited beyond a few seasons and concentrated in base-load products[43].

3.65. Some smaller market participants suggest that their difficulties in procuring energy are in part due to a lack of interest from large participants in general and in obtaining volumes below the typical minimum lot sizes between 1MW to 5MW[44].

3.66. Large market participants have indicated the cost of offering bespoke products can be very high as it is difficult to price products that have a high level of granularity, particularly where demand for such products and volumes requested are low. It has also been suggested that a range of shapes previously offered are no longer traded due to a lack of demand. As noted above, it is difficult to isolate cause and effect, as large market participants are unwilling to offer bespoke products at a competitive price until there is sufficient demand for such products. Smaller market participants, however, may be unwilling to enter until such products are widely available.

3.67. Where markets operate efficiently, we might expect intermediaries to enter and cater for the smaller segment of the market by breaking volumes down into smaller packages for resale. Such intermediaries played a key role in the development of the Nord Pool market. In the GB market there limited evidence to date of a wide use of such services.

43 Table 1.5 in Appendix 2 shows that the number of different wholesale electricity products offered fell by a third between 2004 and 2008, with a particular decline in the number of off-peak products offered.
44 Analysis presented in Appendix 2 lends some support to the view that minimum lot sizes in the GB market are higher than other European markets.

3.68. In a market with low bid-offer spreads, it could be argued that a small supplier with a predominantly domestic or SME load could go some way to managing risk without buying detailed shape far out along the curve. They could hedge a volume equal to their customers' average consumption using a base-load product. This would leave them long during the off-peak and short during the peak. As delivery approaches and more detailed shape products begin to be traded, they could sell off-peak and buy peak electricity to match the load shape of their customers. This approach would go some way towards managing price risk where movements in the price of base-load, peak and off-peak products are correlated. However, the supplier will still be exposed to some risk that base-load, peak and off-peak product prices diverge (basis risk), which may occur particularly at times of system stress. If markets are illiquid and bid-offer spreads are of the order of 1-2% (spreads for base-load products are currently lower) the requirement to buy base-load first and then buy/sell shape products later can impose significant costs in terms of spreads and broker fees incurred, and significantly reduce margin.

3.69. Development of market liquidity requires initial focus on creating market depth in well defined standardised prompt and forward instruments. However, once robust reference prices have been established for such standard instruments, they support the valuation and pricing of tailored product. It has been suggested that the absence of clear market reference prices for standard products in the GB market has resulted in fewer products being available.

3.70. It addition, it is also possible that the characteristics of electricity, such as real time balancing of demand/supply and non-storability, coupled with the current electricity trading arrangements, such as half-hourly balancing, means that providing forward contracts for the period with the precise shapes and sizes demanded by market participants is too difficult to price accurately. Market participants, including some of the Big 6, have indicated that it is difficult to trade shape (other than peak) much before the day-ahead stage. Participants therefore trade what they can using base-load and peak products and fine tune as much as possible within-day, however, they note that they generally remain exposed to some extent on shape. Analysis presented in Appendix 2 provides some support for these concerns.

Information transparency

3.71. An important requirement in ensuring a market is liquid is that market participants have equal access to all the information they require to trade. In addition to price information, this includes relevant information about the underlying "fundamentals" which drive price developments such as information on unplanned

outages[45]. Without such information market participants may lack the confidence to trade in the wholesale energy markets[46].

3.72. The European wide survey by Moffatt Associates[47] indicated that the GB wholesale energy markets are among just a few countries with fairly transparent markets with regular publication of information on maintenance and transmission facilities. The latest survey (2008) ranks the GB gas market as most transparent in the EU whilst the GB electricity market ranks 4th in terms of transparency, behind three of the Nordic countries.

3.73. A number of modifications to facilitate greater gas market transparency have been approved in recent years, for instance UNC 006[48] and more recently UNC modification 219[49]. Likewise, on the electricity side, BSC modifications 219[50] and 220[51] were also aimed at greater information transparency. Some of these proposals were encouraged by the customers' requests for greater information transparency through the DSWG (Demand Side Working Group)[52].

Trading contracts (GTMA contracts[53])

3.74. A generic framework covering energy trading between counterparties, known as the Grid Trade Master Agreement (GTMA) was introduced during the implementation of NETA. GTMA is the standard set of terms under which the

45 In the recent IOSCO (International Organisation of Securitises Commission) commodities paper it was noted that the availability of information on fundamentals necessarily affects the quality of the prices derivatives markets discover.
https://www.iosco.org/library/pubdocs/pdf/IOSCOPD285.pdf
46 ERGEG are advising the EC on how to promote transparency and market integrity in energy trading. Recommendations seek to establish an EU-wide harmonised post-trade transparency scheme as well as oblige the relevant market participants (i.e. power plant operators, network operators) to disclose information that has an influence on electricity and gas wholesale prices (physical products and derivatives). In addition, the Third Package foresees new obligations for information disclosure (including trading with financial instruments) to energy regulators.
47 European Energy Trends survey, Moffatt Associates, 2006
48 Publication of near real time flow data for each UK sub-terminal through NG's website.
49 Information on the level of wholesale liquidity in the GB gas market:
http://www.ofgem.gov.uk/Licensing/GasCodes/UNC/Mods/Documents1/UNC219D.pdf
50 P219 requires publication of additional data items on the BM Reporting Service:
http://www.elexon.co.uk/documents/Change_and_Implementation/modifications/219/P219.pdf
51 More details on P220 can be found at:
http://www.elexon.co.uk/documents/Change_and_Implementation/modifications/220/P220.pdf
52 A group chaired by Ofgem and made up of industry participants to try to improve the level of demand side participation in GB.
53 GTMA is the standard set of terms under which the majority of electricity forward trades take place. However, the framework is not universal and a number of additional individual amendments have been implemented to resolve operational issues.

majority of electricity forward trades take place. However, the framework is not universal and a number of additional individual amendments are required to resolve operational issues. Some simplifications were introduced[54]; however it has been suggested that the number of GTMAs a party has to sign and the need to agree a great number of bespoke schedules acts as a barrier to entry and may reduce willingness to trade, particularly for smaller participants.

3.75. It has been suggested that it can take up to 18 months for sufficient GTMAs to be negotiated with enough counterparties to allow a new entrant into the market to start trading. Conversely, where liquid forward and futures markets exist a non-physical player will only need to sign effectively one GTMA to participate on the exchange and can therefore enter and start trading almost immediately.

Price volatility

3.76. Some respondents have argued that price volatility in wholesale electricity markets reduces trade and liquidity. Protection from price volatility was cited by a number of respondents to the BESC investigation in 2008 for the increase in vertical integration observed since 2000. However, we would also note that exit of market participants from the GB energy market has often occurred around times of high price volatility.

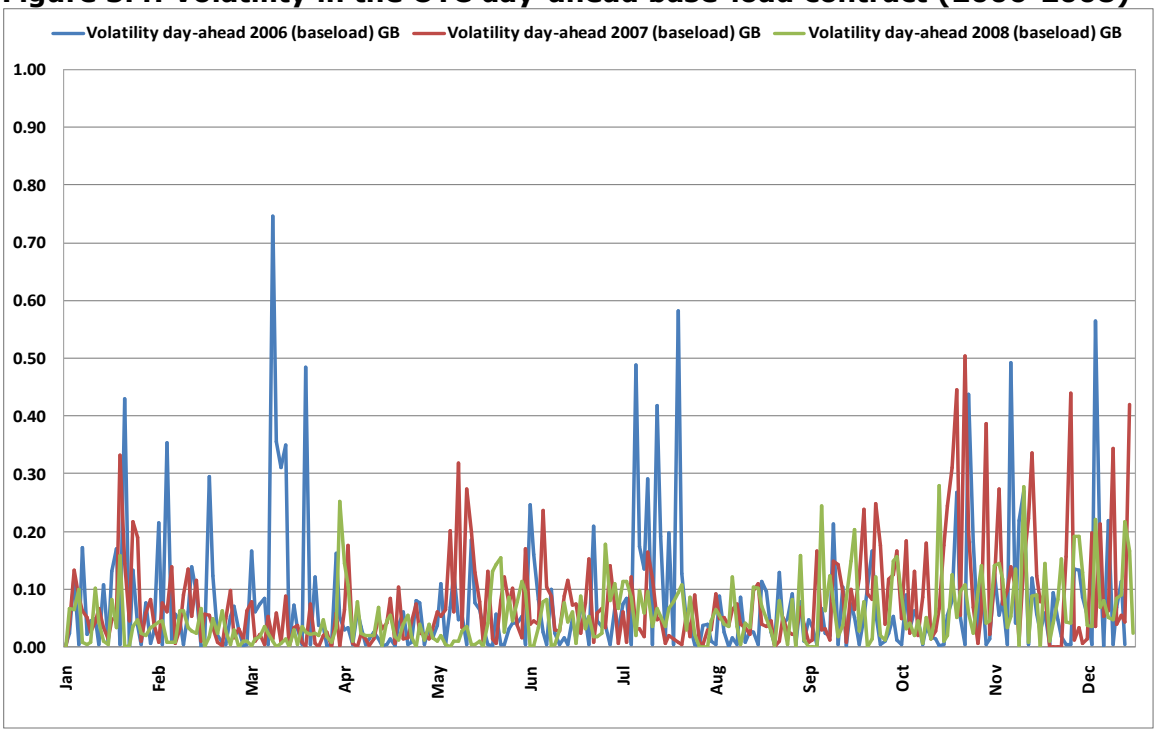
3.77. High volatility does not necessarily imply low levels of liquidity. In markets which are subject to frequent new information on demand and supply conditions (and thus prices) there will be a need for portfolio rebalancing, thus increasing amount of trading in the marketplace. However, 'excessive' volatility can reduce liquidity as market participants are unable to finance their portfolio of contracts as they may have to post collateral when prices change (as explained below). Participants (particularly traders/smaller participants) may therefore tend to restrict their trades in volatile market conditions to limit the risk of a sudden rise in required collateral.

3.78. Explanations for the high price volatility in prompt electricity markets compared to other commodities include the fact that electricity cannot be stored; that supply can be inelastic at times; a lack of demand side participation; real timing balancing requirements; and transmission constraints. All these factors can combine to make prompt prices in particular, volatile at times.

54 Additional standardised documents were designed by the Power Trading Forum's GTMA Working Group for use as part of GTMA in 2004. These new documents reflect developments in the power market since the original GTMA was introduced.

3.79. Figure 3.4 below show that volatility[55] for the day-ahead base-load product has fallen in 2008 (the green line) compared to previous 2 years although it rose slightly towards the end of 2008. The GB wholesale electricity market also exhibits similar levels of volatility compared to other electricity markets, such as the German market.

Figure 3.4: Volatility in the OTC day-ahead base-load contract (2006-2008)



Source: ICIS Heren, Ofgem analysis

3.80. The narrowing of bid-offer spreads in both the gas and electricity markets indicates that any higher volatility observed does not appear to have had an impact on liquidity in the wholesale electricity market.

55 The calculation of volatility has been based on an assessment of historic prices over time. Price volatility is a measure of the standard deviation of day-ahead base-load prices on an annual basis: $\text{volatility}_t = \sqrt{\frac{\sum_{t=1}^{N_t}(\Delta p_t - \Delta \bar{p})^2}{N_T - 1}} \cdot \sqrt{N_T}$. We have calculated the volatility as the standard deviation of the percentage price changes, Δpt, for any given working day within a year interval weighted by the number of observations (254 working days).

Gas traded rather than electricity

3.81. In the GB wholesale energy market, there is a high degree of correlation between electricity and gas prices. This is because almost 40% of installed generation capacity in GB is gas-fired and such plant is frequently at the margin hence setting the price. The level of correlation between the gas and electricity prices is shown in Table 3.3 for a number of products (1 would imply perfect correlation, i.e. prices move together one for one).

Table 3.3: Correlation between gas and electricity prices

	Day-ahead	Quarter-ahead	Season-ahead
2003	0.30	0.96	0.93
2004	0.64	0.98	0.87
2005	0.93	0.99	0.90
2006	0.88	0.97	0.97
2007	0.90	0.95	0.85
2008	0.58	0.95	0.94
2009	0.91	0.92	0.85

Source: ICIS Heren

3.82. The table shows that correlation between gas and electricity prices is high at around 0.9, but that it does breakdown at times. Correlation between day-ahead products was significantly weaker in 2003, 2004 and 2008. Divergences may occur when gas is not the marginal fuel source or where events occur in the electricity market that are unrelated to the gas market (this usually occurs close to real time), such as unplanned generation outages.

3.83. It is suggested the strong correlation allows industry participants to use the more liquid gas market as a means to hedge their exposure to electricity prices rather than using the electricity market itself. In addition, GB wholesale market participants increasingly manage large portfolios which embed exposure to electricity, gas, coal and oil as well as carbon. As a result, the focus of trading and risk management activities is increasingly the margins between the prices of gas and other fuels, carbon and electricity. Much of the trading that takes place today is driven by the need to hedge clean spark (and dark) spreads rather than the underlying electricity price itself[56].

56 The spark-spread is the difference between the converted cost of gas and the price of power, and the clean spark-spread also takes into account the market price of carbon permits. Hence the clean spark-spread is the gross margin that gas generators make on a unit of output (before fixed costs) and the clean dark-spread is analogously the gross margin that a coal generator makes.

3.84. Insofar as that the gas market is a potential outlet for the lack of electricity liquidity, this could suggest that low liquidity in the electricity market may be considered a lesser problem. However, Ofgem remains of the view that liquidity in the GB electricity market remains an important concern in its own right:

- in particular for smaller participants who do not have the scale to carry out large multi-commodity trading operations; and
- using gas to hedge electricity exposures relies on correlations between gas and electricity prices which may not be always be sustained in the prompt and balancing markets. In addition, it will be influenced by availability of market specific gas or electricity assets, with potential basis risk between daily gas prices and half-hourly granularity electricity prices.

Credit risk management practices

3.85. Several respondents to the Energy Supply Probe felt that the current credit arrangements present a significant barrier to entry for small, independent suppliers. It was further noted that few counterparties were prepared to trade without imposing high requirements for upfront collateral, particularly in the current economic climate.

3.86. In particular, the need to provide credit for large margin calls may prevent trading, particularly for smaller companies as they often have insufficient capital. At times, market participants may restrict their trades to limit the risk of a sudden rise in required margins. This is particularly exacerbated in the case of volatile market conditions.

Developments in credit management practices

3.87. The posting of collateral is often required as a means of mitigating the risk of a counterparty defaulting on a trade. The use of margining (described below) as a means of mitigating this risk is commonplace today across financial and commodity markets, including the GB wholesale electricity and gas markets. These practices, which have developed over the past 3-5 years since the collapse of Enron and exit of others, may reflect both a change in credit policy as well as the downgrading of many market participants. Whereas companies previously relied on weaker instruments for mitigating credit risk (such as trusting an implicit parent guarantee), in today's market substantial amounts of cash are typically required to back trading activities, particularly for smaller participants with weaker balance sheets and credit standing.

3.88. Margining is used for both exchange and OTC trades. While exchange trade always requires posting of margins, it is usually also required in OTC trade. In the case of exchange trade, the exchange takes on the counterparty risk, so the margin (collateral requirement) is posted directly with the exchange's Clearing House. In the case of bilateral trades if a margin is posted, it can either be posted with the counterparty directly (most common) or it can be done through a Clearing House.

3.89. While margining of forward trades in GB mainly takes place under bilaterally negotiated contracts, the concept comes from the way in which clearing houses manage credit and payments risk[57]. There are two basic types of margin calls (i.e. requirements to post collateral):

- Initial Margin: The Initial Margin is intended to cover within-day price volatility and is payable at the time the contract is entered into. Clearing Houses typically set this margin in the region of 8%-10% of the contract value (as measured by the current forward curve); and
- Variation Margin: Variation (or "close-out") margin is changed during the life of the forward contract. This margining process requires additional collateral to be posted by the party holding a position that is loss-making against current market prices (in order to mitigate replacement risk[58]). Variation Margins may also include an element for settlement risk - the risk of non-payment (in the event of default) of monies owed under the contract.

3.90. In times of significant price volatility, Variation Margin calls can be very substantial. For example, if a forward contract was struck at, £50/MWh, but prices have risen to £80/MWh, the variation margin call on the seller would be £30 for every MWh delivered under the contract (in addition to the initial margin). More generally, companies from which counterparties are likely to require collateral will need to have sufficient capital available to cover such margin calls if they wish to trade. These requirements can place demands on capital and constrain trading activity.

3.91. The move to use of collateral and margining, which appears to be a response to the need for stronger and more robust credit risk management practices, is likely to have contributed to the reduction in trading and liquidity. However, other European markets have managed to grow liquidity over the same period, which could be due, in part, to the existence and wide use of central clearing services.

57 While bilateral credit arrangements tend to mirror those adopted by Clearing Houses, there are some differences. For instance, Clearing Houses normally charge both margins, whereas bilateral trading often only includes variation margining; bilateral arrangements (particularly where both between counterparties have strong credit standings) may incorporate some element of discounting for forward positions further out the curve.

58 For example, if market prices have risen since the contract was struck the seller will post collateral to make up the difference between the original contract value and the mark-to-market value. This ensures that funds will be released to compensate the buyer from having to replace the contract volumes at the higher market price, in the event that the seller defaults. Likewise, if market prices have fallen since the contract was struck, then the buyer must post collateral to ensure that funds are available to compensate the seller for the loss resulting from having to sell at (now) lower prices, in the event the buyer defaults.

The role of exchanges and centralised clearing

3.92. Clearing Houses act as the counterparty to all trades with its clearing members and thus remove bilateral credit risk. Centralised clearing has always been capital intensive (in so far as it required posting of significant amounts of collateral via Initial and Variation Margin arrangements). For transactions between large counterparties with strong balance sheets and credit ratings, Clearing Houses may be viewed as a capital intensive solution to credit risk management, and a drain on cash reserves. However, in a situation in which margining has become a common practice, it is has been suggested that settlement through a central Clearing House has a number of benefits from the perspective of the industry as a whole, or at least for smaller counterparties:

- Pooling and netting of credit risk: a Clearing House is able to pool and net off multilateral trading positions across all counterparties (clearing members). Such facilities may increase the efficiency of credit risk management across the industry (and reduce the overall cost of credit). Centralised clearing may also serve to reduce the gross amount of funds locked away as collateral. Whereas the Clearing House normally only accept cash as collateral, LCs (Letters of Credit) or the use of Escrow accounts are not uncommon as collateral in bilateral trading when one counterparty has a weaker credit standing. However, while the exchange margins on the counterparty's net exposure to the market, OTC trading which rely on LCs and/or Escrow accounts will tend to "gross up" the amount of capital locked away as security. While the larger participants may deploy some discounting in their mutual bilateral arrangements (which reduces collateral), centralised clearing is likely to benefit the smaller companies as it imposes uniform conditions across all trading parties.

- Elimination of asymmetrical margining: asymmetrical margining is currently practiced by some of the larger incumbent GB participants and limits the potential for offsets and netting of collateral postings. It can potentially result in the weaker counterparty having to post more collateral than required to fully assure the net exposure between the two parties. Such arrangements will tend to benefit the stronger player which earns interest on the excess capital at the expense of the weaker counterparty.

- Restrictions on choice of trading partner: credit and exposure limits set on a bilateral basis may result in the weaker counterparty having to seek out those counterparties with which it can achieve an off-set against existing collateral postings. Hence, this party may find that it can only operate in a subset of the wholesale market.

- Market access and entry: in markets with well established prompt and futures exchanges, the margining and collateral requirements are publicly available and consistently applied. A potential new entrant will have a high degree of certainty as to the conditions for trading and have a secure channel to market (subject to satisfying the exchange and clearing house conditions). All else equal, the existence of liquid exchanges and centralised clearing could help smaller participants (with limited balance sheet strength) which otherwise might be excluded from bilateral trading.

- Transaction costs and complexity: while the Clearing House will charge a fee for its clearing services, this needs to be compared with the time and cost of negotiating and maintaining a host of credit and margining agreements with individual counterparties (and monitoring individual credit limits). Negotiating individual credit arrangements for each GTMA agreement can take up to 18 months.

3.93. Table 3.4 summarises the cleared trades by the major exchanges and Clearing Houses across Europe. While the Nord Pool region historically has led the rest of Europe when it comes to exchange based trading and centralised clearing, other markets, including Germany, have been experiencing significant growth in the amount of trading which is cleared via central Clearing Houses.

Table 3.4: Centrally cleared trading in 2007

	Market	On-exchange	OTC cleared	Total
Volumes (TWhs)	GB market	18		18
	Nord Pool Region	1060	1310	2370
	Germany	311	961	311
	France	124	4	124
	Netherlands	49	73	49
% of total consumption	GB market	5%		5%
	Nord Pool Region	337%	320%	657%
	Germany	55%	169%	223%
	France	26%	1%	27%
	Netherlands	44%	65%	109%

Source ERGEG, Nord Pool

3.94. The table shows that in 2007, virtually all OTC trades (which accounts for the majority of trading) in GB were cleared bilaterally as opposed to through a clearing house. In many other European countries, centralised clearing is used much more extensively, not just for exchanged based trade but also for OTC trade. There is some evidence that centrally cleared OTC trade has picked up in GB in the last six months, probably in response to the current economic environment.

3.95. Whilst countries with high levels of liquidity such as Germany and the Nord Pool region have higher levels of centrally cleared trading, as with other factors, a high proportion of centrally cleared trade does not on its own imply high levels of liquidity. For instance, France has higher levels of exchanged based trading and clearing than the GB market but has lower levels of overall liquidity.

Impact on liquidity

3.96. While the move to margining to mitigate credit risk in isolation has probably had a negative impact on liquidity, this change reflected a need to strengthen credit risk management practices following the fall-out from the defaults observed since Enron and is reinforced by the recent financial turmoil. From the perspective of this

discussion paper, the central issue is therefore not the use of collateral and margining (a matter for individual participants), but rather the extent to which this has reduced liquidity.

3.97. Figure 3.2, showed that traded volumes fell dramatically between 2002 and 2004. It is likely that the exit of a number of previously active participants coupled with a move to reduce credit risk (due to high profile defaults) was a key reason for this fall. Traded volumes started to recover somewhat in 2006 and have continued to do so, albeit at a slow pace, over the past three years, even in the face of the recent financial turmoil. It is possible that the full effects of the crisis have yet to fully feed through. It could also be the case that volumes traded would have been even higher in the absence of the crisis.

3.98. Whilst it remains difficult to directly assess the impact of credit on liquidity, it is likely that this has had a negative impact on smaller participants' ability to operate effectively in the GB market and hence may have reduced GB electricity market liquidity. In this respect we note that a number of smaller market participants who have recently exited the market have cited liquidity and credit requirements as key reasons for their exit. However, we also note that other European markets have been more successful in developing and maintaining a wider competitive fringe of smaller participants in the face of similar developments in credit requirements.

Summary and key questions

3.99. Following on from the observation that GB electricity market liquidity is low, both historically and in comparison to other countries in Chapter 2, this Chapter has reviewed some of the likely causes of the low liquidity. This Chapter indicates that there are likely to be a number of factors responsible for the low liquidity in the GB electricity market. Of these, industry structure (in particular vertical integration, but also limited interconnection and participation by large electricity users) may have played an important role. Aspects of the centrally designed trading arrangements (such as cash-out prices) and the voluntary trading arrangements may also have played a part. The imposition of greater collateral requirements is a further likely contributor. These and other factors may have combined to explain the low levels of liquidity in the GB electricity market.

3.100. We seek feedback from interested parties on the information and views expressed in this Chapter.

Question box

Question 1: What impact has vertical integration had on liquidity in the GB wholesale energy markets? Please provide evidence in support of your view.
Question 2: Is the GB market too small to support higher levels of wholesale liquidity?
Question 3: To what extent has increased interconnection and closer integration in European markets been responsible for higher levels of liquidity observed in those markets? How much of a role has lack of interconnection and integration played in low levels of liquidity observed in the GB electricity market?
Question 4: To what extent has Government/regulatory intervention and policy uncertainty contributed to the low levels of liquidity observed in the GB electricity market?
Question 5: To what extent are current cash-out arrangements reducing GB liquidity and how?
Question 6: Are robust, reliable and widely accepted references prices currently available in the GB electricity market? If not, do you consider the creation of such prices will aid the development of liquidity in the GB wholesale markets?
Question 7: Why do you think there is a lack of exchange based trading and clearing in the GB wholesale market? To what extent has this been responsible for driving liquidity in European markets?
Question 8: We would welcome any evidence market participants can provide us on the difficulties that they are experiencing in obtaining the required products, shapes and volumes.
Question 9: We welcome views from market participants on whether there is a lack of information that is preventing trading on GB wholesale markets and thus reducing liquidity. We would appreciate views as to what type of information provision would be beneficial to improve liquidity.
Question 10: Do you believe that price volatility in the GB wholesale electricity market has had a detrimental impact on liquidity?
Question 11: To what extent is the current GTMA process acting as a barrier to entry and hence reducing liquidity?
Question 12: Do market participants believe that credit/collateral requirements have increased over time? What impact has this had on liquidity in terms of the ability of market participants to trade?

4. Possible measures to improve liquidity

This Chapter considers a number of possible measures that could potentially improve the level of liquidity in the GB electricity market.

Introduction

4.1. Chapter 2 showed that whilst liquidity in the GB wholesale gas market compared favourably to other energy and commodity markets, liquidity in the GB wholesale electricity market, is significantly lower than other European markets. As discussed in Chapter 3, there are a range of factors which are likely to have contributed to the low levels of liquidity in the GB wholesale electricity market.

4.2. This Chapter outlines, at a high level, a number of possible measures that could be adopted to improve the level of liquidity in the GB wholesale electricity market. At this stage Ofgem is seeking views from industry participants on the options outlined below and inviting views on any other measures to improve liquidity.

Existing market initiatives

4.3. Currently there are a range of market initiatives aimed at improving GB wholesale electricity market liquidity.

APX Power UK day-ahead auction

Background

4.4. APX Group launched a day-ahead power auction (Power UK Auction) in December 2008. The model for the auction is based on the day-ahead auction operated by APX Group in the Netherlands. The auction is intended to offer an alternative for trade in next day contracts to the OTC market.

4.5. APX Group believes that the Power UK Auction will provide a focus for liquidity and thus create a transparent and reliable reference price for electricity in GB. It has been suggested that the auction will create a level playing field for all market participants irrespective of size, allowing them access to small volumes and shape as well as clearing of trades.

Performance to date

4.6. The auction experienced a positive start but traded volumes on the platform have declined over time. In December 2008 38GWh was traded on the APX Power UK auction, with a total of 4,063 trades. By April 2009 volumes traded through the auction had fallen to 14.1GWh[59]. It has also been noted that auction prices have not mirrored OTC prices, with differences of up to 16.5% on base-load product on some days. The auction had attracted the participation of around 20 of 60 APX members by mid-January.

4.7. It is possible that unfamiliarity of market participants in GB to the day-ahead auction model is one reason for low volumes and that there is a learning curve. In addition, it is likely that there will be a 'bedding down' period where changes to the platform may be needed. The APX Group has established an Auction Working Group with the intention of addressing issues of auction functionality.

The UK N2 exchange

Background

4.8. The Futures and Options Association (FOA) launched the Market Design Project (MDP) in March 2006 to investigate the feasibility of introducing a new market mechanism in response to industry concerns over falling liquidity in the GB electricity market[60]. Specifically, the aim of the project is to:

- improve access, participation and liquidity, and reduce barriers to entry by creating a standard contract to enable financial trading;
- establish a set of credible and robust reference prices;
- accelerate the introduction of cash-settled futures and other financial contracts which will add to the depth and breadth of the electricity market in the GB; and
- remove diffused credit pools by creating a single, effective, clearing solution - reducing counterparty risk

4.9. The project requested proposals for a market design featuring three distinct phases:

- Phase 1 - the establishment of a single source for the efficient and cost-effective clearing of prompt power; the development of a centralised process for collecting

59 APX Power UK Daily Index Summary: http://www.apxgroup.com/index.php?id=223
60 A Steering Group was tasked to "investigate the reasons for falling liquidity and recommend how that decline in liquidity could be halted and reversed". The Steering Committee contained a wide selection of representatives of key participants in the industry, including the Big 6 suppliers, NG, independent generators, traders and large consumers.

and aggregating transactional information, sufficient to generate a set of reliable and accurate reference prices to provide the basis for a credible power index;
- Phase 2 - the establishment of a linked power auction market, which would include facilitating the trading of power, gas and spark spreads;
- Phase 3 - develop cash-settled futures contracts (based on a reference price using either the auction price established under Phase 1 or a price based on totally cleared prompt), which would meet the hedging and trading needs of market participants.

Progress to date

4.10. . In November 2008 the winning tender - the UK N2EX project (a joint venture between Nasdaq OMX Commodities Nord Pool Spot AS) - was announced[61]. N2EX is intending to launch a physical day-ahead auction in September this year to meet Phase 1. It is anticipated a derivatives market will be launched at a later date, underpinned by a physical reference price provided by the day-ahead auction.

4.11. In their responses to the Energy Supply Probe, the majority of Big 6 suppliers highlighted their membership of FOA's Market Design Project, and supported the aims of the project. In this respect N2EX have indicated that they have received a verbal commitment from some FOA members to trade some electricity on the day-ahead auction and to clear all trading up until the front weekend through N2EX.

4.12. Whilst market participants have broadly welcomed the N2EX initiative to improve liquidity some expressed concern that splitting liquidity across two platforms (N2EX and APX) may hinder the development of a robust reference price. Other concerns are that the lack of similar platforms for gas and spark spread trading will reduce interest the N2EX platform.

LEBA (London Energy Brokers Association)[62]

4.13. In 2003, LEBA first launched a series of GB electricity price indices in an attempt to boost liquidity in the energy markets. Indices can be used by traders as benchmarks for physical commodity trades and to settle financial contracts. The indices reflect all day-ahead electricity trades weighted according to volume and price information supplied by participating brokers, and represent a large proportion of the total volume of trades on any given day. A range of indices are offered including: the day-ahead window index; the working days index; the all-days index and the Monday-Friday peak index.

61 Nasdaq OMX Commodities will provide an execution and clearing platform, be responsible for derivatives trading, and will have overall oversight of the project. Nord Pool Spot AS will be responsible for physical trading.
62 http://www.leba.org.uk/

4.14. In addition to electricity indices, LEBA also produces Carbon (EUA, CER) and European Gas (TTF and EGT) data. Ofgem understands that the LEBA indices are widely used within the industry as reference prices for a range of contracts including financial products.

4.15. We would welcome views from market participants on the LEBA indices to the extent that they can be considered to be a reliable and accurate reference price.

Potential further measures

4.16. A number of measures have been suggested on how to improve market liquidity. Key proposals include:

- Changes to market/governance arrangements such as reintroduction of self supply restrictions;
- Introducing an obligation on large/vertically integrated participants to auction a certain proportion of their generation output;
- Greater information provision by vertically integrated companies;
- Introduction of regulated/subsidised intermediaries/market makers;
- Further interconnection/integration with European markets;
- Reform of cash-out arrangements, such as a move to a single cash-out price or exempting parties below a certain threshold from exposure to imbalance price;
- Measures to make credit/collateral requirements more efficient and potentially ease the burden on smaller participants; and
- Changes to industry structure.

4.17. The 2008 Moffatt Associates survey of European wholesale energy markets found that market participants favoured improved incentives for investment in interconnectors, removal of regulated end user prices, and harmonization of rules relating to TPA and balancing as the key measures to improve liquidity. These were closely followed by more clarity on the third phase of the EU ETS, forcing all generation output to be sold into the wholesale market and increased cross border market coupling via implicit auctions[63].

4.18. We discuss some of these options below. However, in doing so it is recognised that one option is to wait and see the industry initiatives described above develop in terms of improving wholesale market liquidity. Such an approach would avoid undermining any market based solutions which may be successful in improving liquidity.

63 European Energy Trends survey, Moffatt Associates, 2008.

4.19. If Ofgem was to adopt this option we may give industry initiatives a set period of time to delivery increases in liquidity. If we were not to observe a sufficient increase in liquidity then we could seek to implement other measures as appropriate.

Market/governance arrangements

Self supply licence condition

4.20. This option would restrict suppliers/generators from buying/selling all or some proportion, of their energy requirement internally but would instead require them to trade energy via the wholesale market.

4.21. One respondent to the Energy Supply Probe suggested mandating vertically integrated suppliers to demonstrate that they have purchased volumes in the wholesale market equivalent to their retail demand (or a certain percentage of it). The respondent noted that imposing self supply restrictions would additionally deliver transparency on the wholesale cost these participants incur.

4.22. Such a licence condition was introduced into the licences of some former PESs (Public Electricity Supplier) at a time when supply competition was emerging and was designed to facilitate supply competition by promoting liquidity in the wholesale market. However, following consultation Ofgem removed the condition in 2004 after it was considered that the wholesale and supply markets were sufficiently developed enough so as lifting the restriction would not have a negative impact on competition[64].

4.23. We welcome views on whether it is appropriate to reintroduce the self supply licence condition in some form and how useful such a condition would be in addressing lack of liquidity in the GB electricity markets, particularly in light of claims by some of the Big 6 that they currently trade many times their generation output via the wholesale market.

Change to other governance arrangements

4.24. Ofgem is currently undertaking a review of industry code governance which will consider, amongst other things, initiatives to support smaller participants' participation in the major industry codes. Ofgem is concerned that the complexity and fragmentation of current arrangements acts as a barrier for smaller participants

64 Restriction on Self Supply: Final proposals, Ofgem, October 2003: http://www.ofgem.gov.uk/Licensing/Work/Notices/ModNotice/Archive/4960-Self_supply_final_supply_22oct03.pdf

(including new entrants) to engage in major industry code arrangements[65]. Improvements in these areas could help to improve liquidity.

4.25. We would welcome views and evidence from respondents on specific market/governance arrangements that could be acting as a barrier to entry and thereby dampening liquidity.

New product development

4.26. In relation to the concern that smaller market participants face difficulties in buying the products and shape they required to cover their customer demand, one respondent suggested that standard load shapes, similar to those that were present in the GB electricity Pool (the mechanism for buying and selling electricity before the introduction of NETA) should be developed. They argue that this would allow smaller participants to manage imbalance risk exposure. The respondent suggested that Ofgem and the industry should review the current range of EFA blocks and develop standard load shape blocks. They added that if these standard blocks existed, traders, generators and suppliers might be encouraged to quote regular prices for them.

4.27. Ofgem would welcome views on how to improve product offering for smaller participants.

Addressing market power concerns

4.28. Ofgem is concerned that the GB wholesale electricity sector is vulnerable to undue exploitation of market power, both when there are constraints on the electricity transmission system (which limit the amount of electricity that can flow between certain locations) and more generally at times of system tightness.

4.29. Any undue exploitation of market power will make wholesale electricity more expensive and have a detrimental effect on the competitiveness of the wholesale market. For example, there may be a negative impact on investment and new entry a lack of confidence in the ability of prices to reflect market conditions which could all lead to reduced liquidity.

4.30. In this respect Ofgem published a consultation, *'Addressing Market Power Concerns in the Electricity Wholesale Sector - Initial Policy Proposals'* in March 2009

65 The code governance review is looking at reducing the complexity of industry code governance arrangements. For more information, please see: http://www.ofgem.gov.uk/Licensing/IndCodes/CGR/Pages/GCR.aspx

seeking views on a range of possible options[66]. We are currently considering consultation responses to this document.

Auctioning

4.31. This option would introduce a requirement on vertically integrated participants (and possibly others) to sell a proportion of their generation output into the wholesale market through a compulsory auction process, via an exchange or another platform. Apart from increasing liquidity, an auction model has the potential to provide a transparent way of selling electricity and to ease access to the market for smaller participants. Such a requirement could be tailored to offer an amount of forward generation to strengthen liquidity further along the curve.

4.32. One respondent to the Energy Supply Probe was of the view that incumbent generators should be mandated under licence to hold periodic auctions of certain electricity products. It was suggested that monthly auctions should be held for 1, 2 and 3-year ahead (peak and base-load) electricity products.

4.33. There are several examples of compulsory auctions throughout Europe although many of these are driven by the desire to encourage the market opening processes and the need to maintain competition and prevent collusion rather than specifically with the aim of increasing liquidity[67]. However, we note that increased competition is likely to help improve levels of liquidity.

4.34. A recent example relates to the BE/EDF merger where one of the remedies proposed by the merged parties, to address the concerns that the merger may reduce liquidity, was to assign between 25 and 35TWh of base-load electricity for sale to a third party over the period from 2012 to 2015[68].

4.35. Although compulsory auctions could encourage entry into the market and potentially lead to an improvement in liquidity, there are a number of concerns and issues that would need to be resolved before promoting such an approach. These

66 http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/Documents1/Market%20Power%20Concerns-%20Initial%20Policy%20Proposals.pdf

67 To facilitate the opening of the French electricity market, EDF is making available access to 5.4GW of generation capacity in France (approximately 10% of France's electricity supply). The capacity is being made available through products (contracts) conferring rights to acquire energy on certain terms and conditions. These contracts, with durations between 3 and 48 months, are being sold at auctions conducted at regular intervals (approximately every 3 months). In the same manner, Danish company DONG Energy is required to sell a fixed volume of 600MW per annum, in quarterly and annual products.

68 European Commission: "Case No COMP/M.5224 - EDF / BRITISH ENERGY" http://ec.europa.eu/competition/mergers/cases/decisions/m5224_20081222_20212_en.pdf, p38

include auction design, determining the volume to be auctioned and the frequency of the auctions. In addition, evidence from the companies (Chapter 3) shows that they currently trade around 5 times their generation output on the wholesale market. Whilst a compulsory auction may improve access to shapes and products (depending on auction design) which may encourage entry into the market, it is secondary trading that is likely to be the key driver of market liquidity.

4.36. It is interesting to note that such an initiative was considered detrimental to the development of forward market arrangements in New Zealand[69]. In order to restrict the market power of the Electricity Corporation of New Zealand, the government required it to auction hedges equal to a portion of its dry year generation output. However, the initiative was considered to have introduced complexities that prevented trading on secondary markets.

Increased information provision by vertically integrated companies

4.37. As discussed in Chapter 3, market participants need to understand and quantify the risks involved in operating in the GB energy market. A lack of relevant information and/or information asymmetry increases risk and thus can reduce liquidity.

4.38. There is currently a wide range of information available from a wide range of sources on gas, electricity and related markets such as coal and oil. However, respondents have suggested that additional information that is currently not available on the vertically integrated companies would be useful as they account for a large proportion of trading in the GB energy market. Types of information that may be useful include:

- Requiring vertically integrated companies to publish trading information, including information on hedging strategies;
- Publication of separate generation and supply accounts with segmented financial and operational data on gas/electricity production and supply operations to aid price discovery[70];
- Require vertically integrated companies to provide information on their internal transfer pricing; and
- In the past, British Gas/Centrica published the weighted average cost of gas and electricity (WACOG and WACOE) which they paid for their supplies. Introducing

69 Improving Hedge Market Arrangements in New Zealand, Carl Hansen, paper for the 6th Annual National Power New Zealand 2004 Conference: http://www.m-co.com/assets/Pdfs/conference_presentations/10581ImprovinghedgemarketsinNZ.pdf

70 Ofgem have recently published proposals for greater financial transparency including a requirement for separate reporting of financial information for supply and generation businesses. For more information see: http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20proposed%20retail%20market%20remedies.pdf

an obligation on all suppliers to provide this information could increase liquidity by encouraging new/small supplier to enter as they would be able to identify energy costs more easily.

4.39. Ofgem is currently consulting on four options to increase transparency with respect to the relationship between generation and supply activities of the large integrated companies. The options in the consultation include some of the options similar to those outlined above[71].

4.40. We welcome views from market participants on the options outlined above in addition to other items market participants feel would facilitate greater market participation and enhance liquidity. We would also welcome views on information provision more generally, i.e. is there any other information that market participants feel may be useful in improving liquidity in GB wholesale markets.

Government or industry financed intermediaries/market makers

4.41. A number of respondents have suggested that putting in place intermediaries or market makers could help improve liquidity.

4.42. Market makers can improve both liquidity and transparency in wholesale markets. In essence, a market marker always posts bids and offers in a range of products and can also provide a bridging service between consumers, suppliers and generators. For instances, generators generally seek to sell their output a number of years forward, whilst suppliers and customers prefer to buy only a few years ahead. Market makers can bridge such gaps in the market and encourage the development of liquidity by allowing market participants to be confident that they can trade out positions when they need to at reasonable cost. In return for providing liquidity, market makers gain profits by exploiting arbitrage opportunities created by regular re-contracting[72].

4.43. One respondent to the Energy Supply Probe suggested that Ofgem introduce a licence condition to mandate the incumbent suppliers to co-finance an independent market maker. The respondent proposed that such an intermediary could offer terms to licensed suppliers and generators below a certain size on a not for profit basis and with clearly defined terms. They further argued that this proposal would provide an incentive on incumbent suppliers to ensure that market displayed sufficient liquidity and minimised their exposure to the cost of such intermediary.

71 http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20proposed%20retail%20market%20remedies.pdf

72 NERA Economic Consulting, Hedge Markets and Vertical Integration in the New Zealand Electricity Sector, A report for Contact Energy, October 2004, p.26

4.44. One example of a liquid market where compensated market makers are very active and are credited with driving liquidity is Nord Pool. It is argued that market makers (along with demand side participants) drove the process of establishing and developing the forward, futures and options market in the Nordic region.

4.45. As a market maker is generally tied to an individual market (e.g. exchange, auction) there is a question over whether Government should seek to promote or support solutions which create and/or finance market makers around some or all existing/future exchanges. We invite views as to how appropriate it is to introduce the services of market makers in the GB wholesale electricity market. We further welcome views and proposals as to how such services would be financed and whether there are economies of scale for market making in the GB wholesale electricity market without government/industry intervention.

4.46. In terms of offering other small supplier services, Ofgem consulted with industry participants in the past about the lack of development in this segment of the market and we have proposed measures to encourage entry of consolidators to assist small (mostly renewable) generators in selling their output on the wholesale market[73].

Increased interconnection and integration with other markets

4.47. As outlined in Chapter 3, a higher level of interconnection was cited as a key reason for the higher levels of electricity liquidity observed in some European markets compared to GB. It has also been proposed that closer integration in terms of market rules and trading arrangements, including market coupling, has been a key driver in developing liquidity in European markets. In this respect there are currently a number of market coupling initiatives across Europe[74].

4.48. There are several GB related interconnection projects planned to commence operation in near future. An independent merchant electricity interconnector with a capacity of 500MW connecting the GB and Irish electricity market is due to be constructed over the next three years. The same independent company is considering an additional interconnector with a capacity of 800MW between GB and France. NG and the Dutch TSO have been developing the 1GW Britned interconnector project between GB and the Netherlands which is to be constructed and operational by late 2010. Finally, Elia, the Belgian transmission system operator, and NG are investigating the potential for a 700 to 1,300MW electricity interconnector to be built between Belgium and GB. These projects, if completed by

73http://www.ofgem.gov.uk/Networks/ElecDist/Policy/DistGen/Documents1/DE%20con%20doc%20-%20complete%20draft%20v3%20141207.pdf.
http://www.ofgem.gov.uk/Sustainability/Environment/Policy/SmallrGens/DistEng/Documents1/DE%20June%20con%20doc%20-%20FINAL.pdf

74 For more information, see http://www.marketcoupling.com/market-coupling/european-market

2014/15, could amount to a maximum of 8.3% of forecast annual GB peak electricity demand in the same year.

4.49. Increased interconnection with other markets and possibly greater integration may improve liquidity in the GB market by providing access to additional generation in other markets and allowing a wider pool of parties to trade in the GB market.

4.50. We appreciate that this option is not available in the short-term, however, we welcome comments as to how Ofgem can assist the progress of any new interconnector capacity. In addition, we are seeking views on the extent to which market participants feel closer integration through market coupling has driven liquidity in international markets and could do the same in the GB market.

Reforms to the cash out arrangements

4.51. Concern has been expressed that the current cash out arrangements may have a detrimental impact on wholesale energy market liquidity (Chapter 3). The concern is that the current arrangements act as a disincentive for non-physical participants from trading in the electricity market and have a disproportionate impact on smaller market participants. It has also been argued that the dual nature of the current cash out arrangements makes it difficult for them to be used as reference prices.

4.52. Respondents have suggested that changes to the arrangements could be introduced to solve these issues. These include:

- Move to a single imbalance price - this could reduce the risk for smaller, non integrated participants and could serve as a reference price. Ofgem have investigated this proposal in the past[75] and whilst we consider that it could facilitate the development of financial hedging instruments, further examination of wider impacts on balancing incentives was deemed necessary. It was also noted that the spread between dual cash out prices provided an incentive to contract ahead of gate closure, and that reducing this incentive could result in less liquidity in the forward market; and
- Exempting parties below a certain threshold from exposure to imbalance prices. One of the ways of achieving this is through introduction of a 'feed out' tariff into the balancing regime. An administered imbalance price would be applied to all 'top up' electricity taken by an exempt supplier. This proposal would result in socialisation of some of the wholesale cost for small participants across the market.

75 Distributed Energy - Further Proposals for More Flexible Market and Licensing Arrangements, Ofgem, June 2008, p.54 http://www.ofgem.gov.uk/Sustainability/Environment/Policy/SmallrGens/DistEng/Documents1/DE%20June%20con%20doc%20-%20FINAL.pdf

4.53. Analysis performed in the past[76] (Ofgem analysis and Issue 30 Cash-out Review Group findings) indicated that the market would potentially benefit from a shorter gate closure and/or contract notification deadline. Distributed energy, renewable generators and other participants would be able to trade closer to real time with more certain output forecasts and plant availability levels, and thereby reduce their own imbalance risk and the overall imbalance on the system. This is particularly the case for wind output as accuracy of forecasting improves rapidly closer to real time. Other possible changes to cash-out that may benefit smaller participants include increasing the predictability of cash out prices and reducing the spread.

4.54. Ofgem has recently approved a modification proposal to the BSC introducing revised tagging process in calculating the cash out prices so that they are less influenced by system related actions. As noted in the decision document[77], implementation of P217A is aimed at reducing the volatility of cash out prices (and indirectly within-day prices) and reducing large spreads in cash out prices, all of which should encourage new entry and make it easier for smaller market participants to take part in the arrangements[78].

4.55. Whilst Ofgem appreciates that the current cash-out arrangements can have a significant impact on smaller market participants, we continues to believe that cash out prices should reflect the cost to the SO of balancing and provide appropriate incentives for investment. However, we would welcome views on possible changes that could be made to the cash out arrangements in order to reduce barriers to entry where they exist and encourage trading.

Demand side participation

4.56. Active demand side participation has been identified as a possible driver behind the high levels of wholesale electricity market liquidity in other European countries such as Nord Pool and Germany. In contrast demand side participation is significantly lower in GB.

4.57. In response to the very limited demand side participation in the GB wholesale market, Ofgem set up the DSWG in 2005 in order to identify and address any practical and/or commercial obstacles to demand side participation. Proposals developed by the DSWG have resulted in positive developments with regard to

76 ibid, p.57
77 http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/CashoutRev/Documents1/P217%20Revised%20Tagging%20process%20and%20calculation%20of%20cash-out%20prices.pdf
78 More information can be found in Ofgem's Impact Assessment for BSC Modification Proposal P217 http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/CashoutRev/Documents1/P217%20IA_FINAL.pdf

greater information transparency. However, increased market participation remains an issue.

4.58. There are a number of positive developments with respect to demand side participation. For instance, we understand that large energy customers are entering into increasingly sophisticated contracts with suppliers that allow them to adjust the volume of energy they take in response to changes in wholesale energy prices.

4.59. We would welcome views on possible options to encourage greater demand side participation in the GB wholesale energy market.

Credit and collateral requirements

4.60. As Chapter 3 described, a move to margining and collateral requirements is likely to have had a detrimental impact on the ability of smaller parties in particular to secure and trade energy.

4.61. Whilst Ofgem has a limited ability to directly influence the impact on liquidity of higher credit and collateral requirements, we would be interested to hear views from market participants on possible measures to address this impact. One option suggested by a respondent to the Energy Supply Probe is to socialise the costs of credit risk for small market participants across the market. Other respondents have suggested that an increase in exchange based trading and clearing will help to reduce counterparty risk and hence the cost of credit, particularly for smaller participants.

4.62. Ofgem notes that products are being developed by market participants trying to address the challenge of high credit collateral requirements and welcomes these initiatives where parties feel these can be beneficial.

Changes to industry structure

4.63. Whilst many industry participants have argued that vertical integration has been responsible for the decline in liquidity in the GB electricity market, few have proposed making significant changes to the current industry structure such as the separation of generation and supply businesses. Given the large and wide ranging effects of such changes, these would only be considered once other, less radical and potentially less costly, options had been exhausted and only then if we considered such a solution to be proportionate to the scale of the problem.

Summary

4.64. This Chapter has outlined a range of possible measures that could lead to improvements in the levels of liquidity in the GB electricity market. Whilst we do not wish to undermine market initiatives to improve liquidity, where we can identify areas that are restricting the development of GB wholesale market liquidity we will

act to remove these barriers. However, we recognise that any remedies aimed at improving liquidity need to strike a balance between this aim and other industry objectives. We also note the possibility that some of the options could be put in place temporarily until liquidity starts to develop.

4.65. During next few months Ofgem will meet with interested industry parties, assess responses to this report and undertake further analysis to develop a range of proposals to improve liquidity in the GB wholesale electricity market. This will include assessing the benefits from higher liquidity associated with implementing a given option against the cost of implementing the option.

Question box

Question 1: Do you believe that the current market initiatives to improve liquidity are likely to be successful? If no, then please indicate why.
Question 2: Is it appropriate to reintroduce some type of self supply licence condition and how useful would such a condition be in addressing the lack of liquidity in the GB electricity market?
Question 3: Are there current market/governance arrangements which act as a barrier to entry and reduce liquidity? If so, what are these and what changes could made?
Question 4: How could product offering for smaller participants be improved?
Question 5: To what extent do you feel compulsory auction would help to increase electricity wholesale market liquidity? Would this be a proportionate measure?
Question 6: Is there any information on the GB energy markets that, which is not available, or available to just some participants that you believe would facilitate greater market participation and enhance liquidity?
Question 7: To what extent could market makers improve the level of liquidity in the GB wholesale energy markets? Should such a function be funded by government/industry?
Question 8: What changes could be made to the current cash-out arrangements to reduce barriers to entry, where they exist, and improve the level of liquidity?
Question 9: How could the demand side be encouraged to participate more actively in the GB wholesale energy market? To what extent could greater demand side participation improve liquidity?
Question 10: Whilst Ofgem has a limited ability to directly influence the impact on liquidity of higher credit and collateral requirements, we would be interested to hear views from industry parties on possible measures to address this impact. Should costs of credit risk for small market participants be socialised across the market?
Question 11: Are there any additional measures which could improve liquidity in electricity markets? Please outline these and explain why they would be appropriate and proportionate.

Appendices

Index

Appendix 1 - Consultation Response and Questions

1.1. Ofgem would like to hear the views of interested parties in relation to any of the issues set out in this document.

1.2. We would especially welcome responses to the specific questions which we have set out at the end of each chapter

1.3. Responses should be received by 3 July 2009 and should be sent to:

James Crump
GB Markets
9 Millbank, London SW1P 3GE
020 7901 7000
GB.Markets@ofgem.gov.uk

1.4. Unless marked confidential, all responses will be published by placing them in Ofgem's library and on its website www.ofgem.gov.uk. Respondents may request that their response is kept confidential. Ofgem shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

1.5. Respondents who wish to have their responses remain confidential should clearly mark the document/s to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

1.6. Next steps: Once we consider the responses to this consultation, Ofgem intends to publish a consultation document setting out policy options in detail later this year.

Appendix 2 - Liquidity in the GB wholesale energy markets

This appendix provides detailed analysis on the level of liquidity in the GB wholesale gas and electricity markets and compares this with levels of liquidity in other energy markets. We also outline possible reasons for the differences observed.

Introduction

1.1. In Chapter 2 we outlined a number of measures of liquidity and used these to assess the levels of liquidity in the GB wholesale energy markets. We also compared levels of liquidity in the GB market with levels in other energy and commodity markets. This appendix presents supporting material on the analysis presented Chapter 2. Some of the analysis presented in Chapter 2 and 3 is also repeated in this appendix.

GB gas market

Overview

1.2. Figure 2.1 in Chapter 2 showed that churn in the GB market has risen significantly over the past nine years. Traded volumes in the GB gas market are dominated by the OTC market, with around 915bcm traded OTC in 2007/2008 according to the FSA. Around 239bcm was traded on ICE (which includes some OTC clearing), and around 10.5bcm in the APX Gas UK spot and prompt markets (2008 data).

1.3. In the GB gas market, market participants can trade gas through a number of markets/platforms, namely:

- Through the On-the-day commodity market (OCM) which is operated by APX and utilised by National Grid Gas (NGG) for balancing gas demand and supply and offers within-day and day-ahead products;
- On one of two exchanges which trades GB gas:
- APX Group which operates an exchange for prompt trades as well as the gas balancing market;
- The Intercontinental Exchange (ICE) which trades products for delivery further in the future, and provides a clearing service for bi-laterally executed trades; and
- Various OTC brokerages.

1.4. The evolution of liquidity in each of these market places is discussed below.

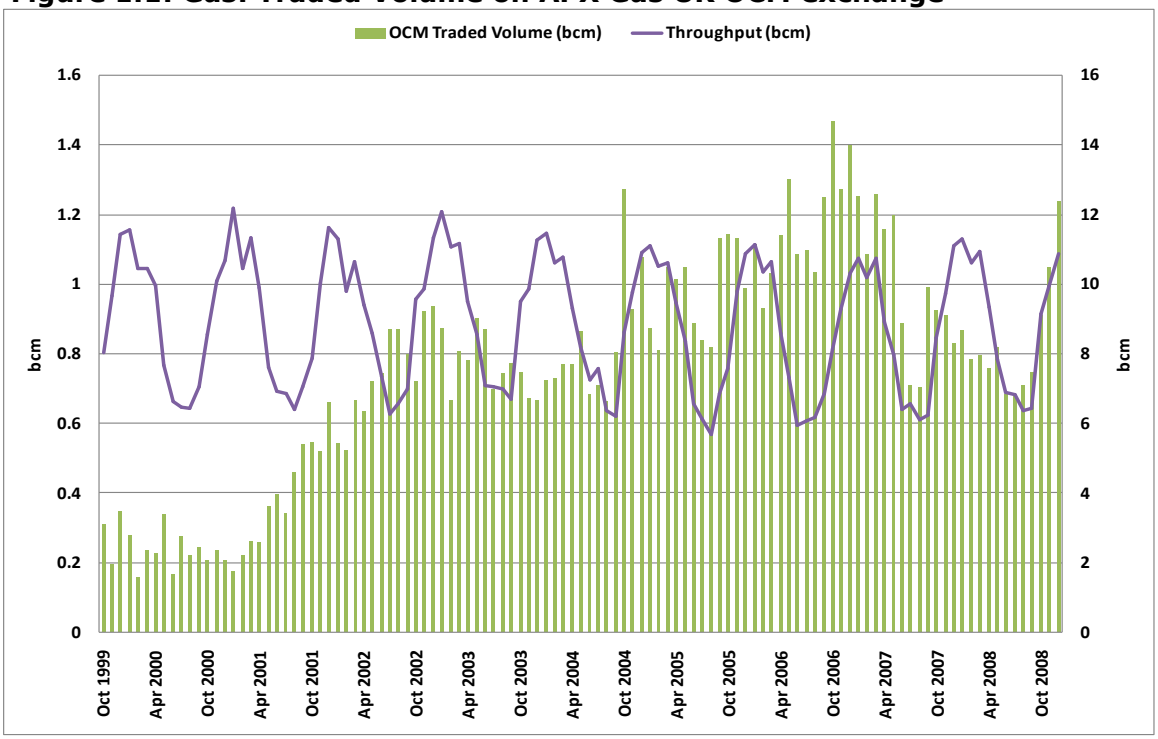
Exchange trading

APX Gas UK - OCM

1.5. Figure 1.1 shows the evolution of traded volumes on the OCM mapped against gas throughput. Whilst traded volumes have grown in the years since 1999 (except for 2007), gas throughput has remained broadly constant or marginally declined. Churn (volume as a proportion of total throughput) on the OCM has risen from around 0.04 in 2001 to 0.1 in 2008.

1.6. Liquidity in within-day and day-ahead products allows parties to adjust their gas positions and to trade out physical positions ahead of delivery, which is important for the development of the gas forward market. Around 10bcm was traded on the OCM in 2008, equivalent to around 9% of total GB gas consumption. Liquid prompt markets support forward liquidity as they may provide confidence to non-physical participants that they will be able to close out positions ahead of delivery.

Figure 1.1: Gas: Traded Volume on APX Gas UK OCM exchange



Source: APX Gas

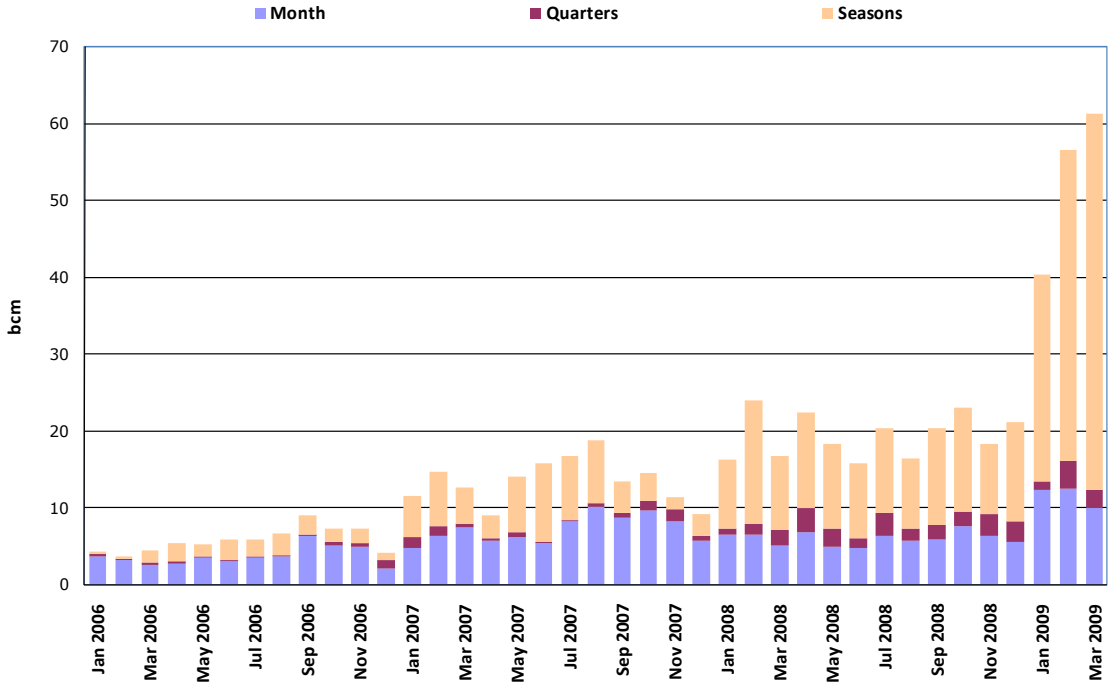
APX Gas UK - NBP market

1.7. The APX Gas UK NBP platform offers a range of physical products for prompt trading, from day-ahead to front month with a range of products in between. The platform is used significantly less than the OCM, with traded volume on the platform totalling 9mcm in 2008.

The Intercontinental Exchange (ICE)

1.8. Figure 1.2 shows exchange based trading on the ICE platform doubled between 2006 and 2009 and has risen dramatically since 2009, with over 1.2 million lots traded in 2008, (or around 640mcm per day). This includes both futures and cleared volume on the platform. In the first three months of 2009 around 700,000 lots were traded, equivalent to 1760mcm per day.

Figure 1.2: Traded volumes, by product, on ICE, 2006-2009



Source: Intercontinental Exchange, Ofgem analysis

1.9. The majority of exchange based trading is concentrated in the prompt, although there is some seasonal and quarterly trade. Figure 1.2 shows total traded volumes on ICE between 2006 and 2009[79]. The recent rise in traded volumes is partly due to higher volumes of OTC trades cleared on the platform which accounted for approximately 15 to 20% of trading in 2008.

79 It should be noted that this analysis shows the total volume traded on the ICE Gas exchange. ICE is a futures exchange and as such the total delivered volume may be less as counterparties may net off their positions against each others' trades. Figure 2.2 is based on Ofgem's analysis of ICE's publically available data.

OTC gas market

1.10. As noted in Chapter 2, OTC trade accounts for around 80% of traded gas volumes in GB. OTC trade also dominated exchange trading in most other European gas markets. In terms of aggregate volume across all OTC trades, trading on the GB gas market is higher that of any other European countries, according to analysis from the FSA[80].

1.11. Table 1.1 shows the development of OTC volumes in GB.

Table 1.1: Gas: GB OTC trading and churn

Year	GB OTC Volumes	GB OTC churn
2003/4	388	3.5
2004/5	470	4.5
2005/6	566	5.6
2006/7	1,182	11.6
2007/8	915	8.7

Source: FSA

1.12. Figure 2.2 in Chapter 2 shows the number of OTC trades for delivery in various time periods for the GB and TTF gas markets. Shares of traded volume in each of the groupings in Figure 2.2 are broadly similar to those in 2004, with the share of trading one year or more ahead of delivery increasing somewhat between 2004 and 2006, then falling back in the last two years. A similar pattern is visible in TTF trades, where trading for one year and more ahead of delivery accounts for around 25% of delivered volumes compared to around 20% in GB. However, since churn is higher in GB than TTF, a higher absolute volume will be traded for delivery further along the curve.

Market participation

1.13. The heterogeneous nature of the OTC market for gas in the GB can make it difficult to obtain a single, accurate Figure for the number of market participants in the GB, as many shippers may access the market using a number of different routes, and larger entities may use the open market to trade between sub-divisions below group level.

1.14. Table 1.2 below shows the number of active participants on the APX Gas UK and ICE exchanges in the GB gas market between 2004 and 2008.

80 Source: FSA at http://www.fsa.gov.uk/pubs/other/analysis_energy_2008.pdf, and previous reports

Table 1.2: Participants and concentration on Gas exchanges, 2004-2008

Year	APX Gas UK	ICE
2004	54	37
2005	58	47
2006	67	69
2007	74	86
2008	75	99

Source: APX Gas UK, ICE

1.15. Both prompt and futures exchanges have seen an increase in participation since 2004. In particular, the number of participants on the ICE trading platform increased from 37 to 99, with new members in all customer types (such as banks, funds, utilities and traders). In terms of concentration on APX Gas UK, around half of traded volumes were traded by the largest five traders in 2008.

Product Availability

1.16. Product availability is less of an issue in gas markets than in electricity, as gas is settled on a daily rather than half-hourly basis and is storable, making the purchase of shape requirements less crucial to a supply business. Our analysis shows that the majority of volume (around half in 2008) is concentrated in seasonal products. The number of different products has remained broadly similar, with 37 different combinations of product length trading in 2004 and 35 in 2008.

GB electricity market

Overview

1.17. Liquidity in the GB electricity market has historically been higher than current levels, with liquidity peaking in 2002 following the entry of a number of independent generators and suppliers following market opening. However, the collapse of Enron and depressed wholesale electricity prices (due to over capacity in generation) lead to the withdrawal of a number of independent generators. As a result the industry entered a period of consolidation.

1.18. In the GB electricity market, market participants can trade electricity through a number of markets/platforms, namely:

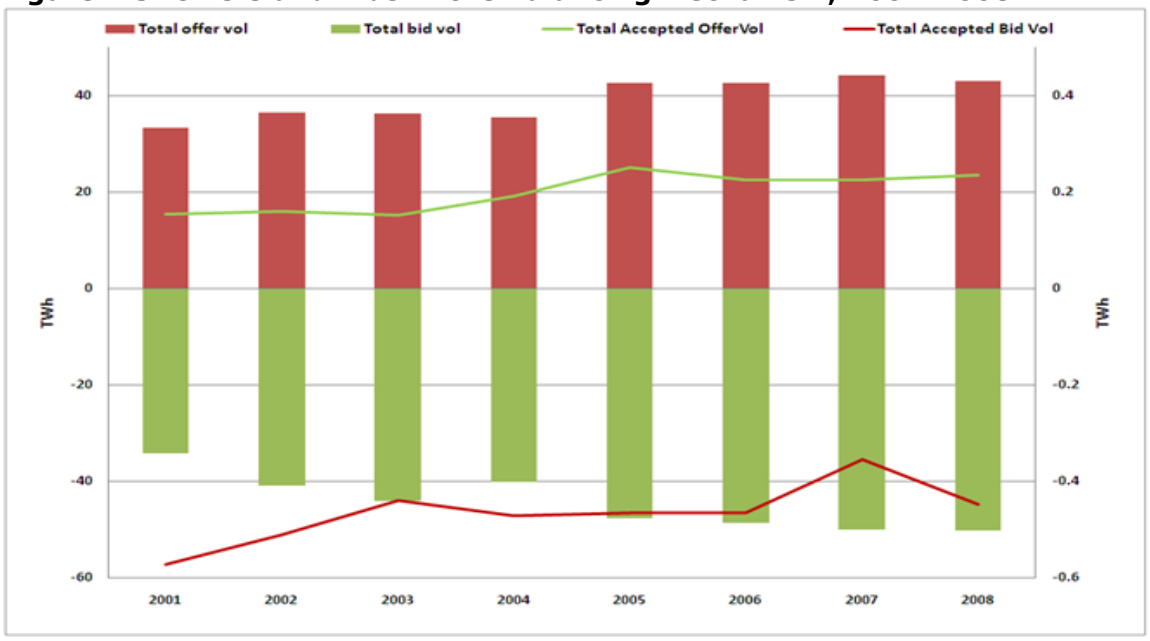
- The balancing mechanism (BM)
- On an exchange such as APX Power UK or ICE; and.
- Through OTC brokerages.

1.19. The evolution of liquidity in each of these market places is discussed below.

The balancing mechanism (BM)

1.20. The BM helps NG to balance electricity demand and supply close to real time by accepting bids (to decrease generation or increase demand) and offers (to increase generation or decrease demand). Figure 1.3 shows the average total volume of offers and bids made into the BM since 2001 across all periods and average of the total volumes of offer and bid acceptances per period.

Figure 1.3: Offers and Bids in the Balancing Mechanism, 2001-2008



Source: National Grid

1.21. Figure 1.3 shows that the total volume of offers and bids into the BM has increased gradually over time. It also shows that total accepted offer volumes rose in 2005 before declining slightly in 2006 and 2007, whilst accepted bid volumes have remained broadly stable, excepting a small decrease in 2007. The increase in available bids and offers is likely to be a positive development as it means NG has a greater range of options to balance the system. However, the sharp increase in imbalance prices over the past few years is likely to mean more expense for small suppliers who are exposed to imbalance prices. Higher and more volatile imbalance prices may also dissuade non-physical market participants from trading the electricity wholesale market.

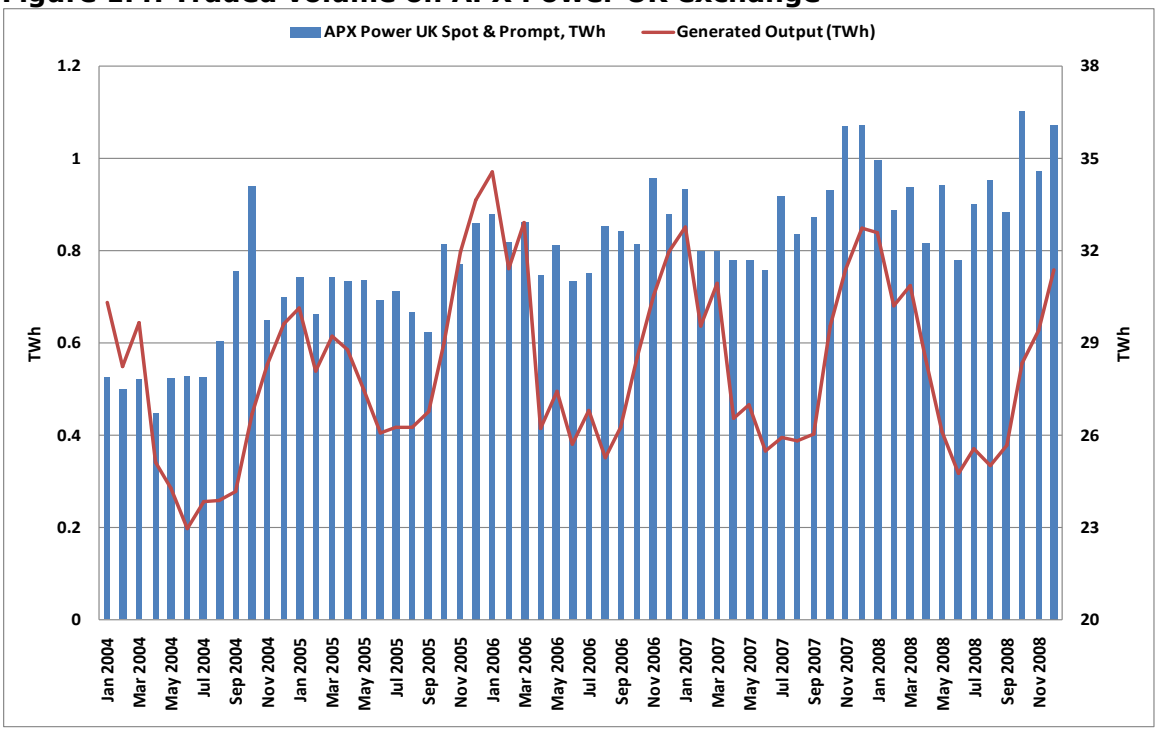
Exchange trading

APX Power UK - Spot and Prompt Market

1.22. Currently exchange trading in electricity is largely concentrated on the APX Power UK Exchange (formerly the UKPX and Automated Power Exchange (APX)) which offers a continuous trading platform. APX Power UK offers a range of within-

day products including half-hourly, two and four hour products and wider prompt products. The APX Group also operates the APX Power UK Day-Ahead auction, launched in late 2008. Figure 1.4 below shows the total traded volume on the APX Power UK exchange since 2004 (although it excludes volumes on APX Power UK's Day-Ahead auction).

Figure 1.4: Traded volume on APX Power UK exchange



Source: APX

1.23. Figure 1.4 shows an increase in volume traded on the APX Power UK market, even as overall generated output has remained largely stable. Total APX traded Power UK volumes were around 11.2TWh in 2008, representing around 3% of annual generated output. Whilst this Figure is lower than OTC traded volumes, it should be noted that APX Power UK trades will typically have a shorter duration than seasonal contracts which make up the bulk of volume traded OTC.

1.24. Around 217GWh of OTC clearing was undertaken through APX Power UK in 2008, following the launch of APX Power UK's OTC clearing service in February 2008. Demand for this product may stem from market parties seeking to reduce counterparty risk following the turmoil in the financial market.

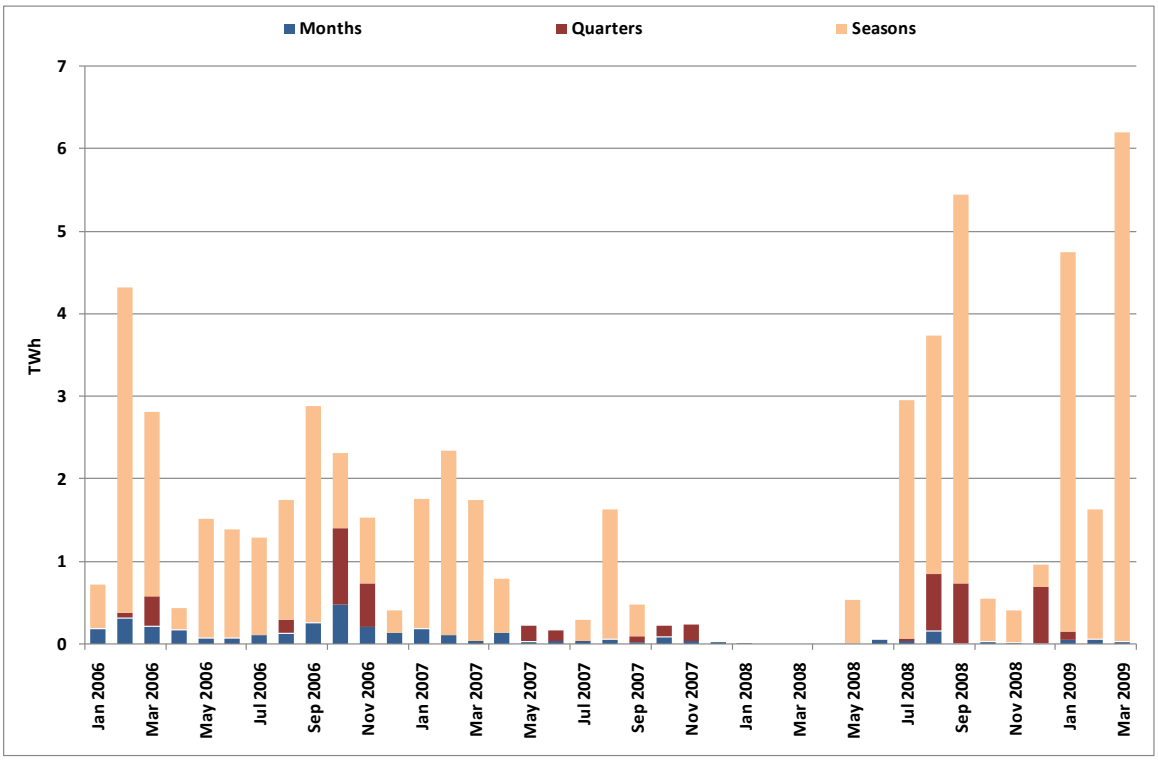
1.25. Total trading on APX Power UK's exchange and day-ahead auction in 2008 was around 11.7TWh (this includes APX Power UK's auction volumes projected at current rates). Exchange based physical volumes traded on other European markets are higher than in GB, for example around 298TWh was traded on the Nord Pool Spot market (comprising the Elbas continuous market plus the (Elspot) Day-Ahead market) in 2008).

1.26. In terms of the number of active participants on the APX Power UK Exchange has risen from 44 in 2004 to 63 in 2008.

The Intercontinental Exchange (ICE)

1.27. Another electricity exchange is offered by ICE, but by the start of 2008 volumes traded were negligible. Whilst there has been a very slight increase in volume for delivery over the past 12 months, around 95% of volumes in 2008 were provided by brokerages clearing trades.

Figure 1.5: Traded volume by product on Intercontinental Exchange (ICE), 2006-2009



Source: ICE, Ofgem analysis

The OTC electricity market in GB

1.28. Total traded volume in the GB OTC electricity market in 2007/2008 totalled around 1,100TWh[81]. The total electricity OTC traded volume in 07/08 gives a churn of around 3.2, significantly lower than levels observed in the gas market. Liquidity (as measured by delivered volume) is markedly lower in the GB electricity market

81 Source: FSA at http://www.fsa.gov.uk/pubs/other/analysis_energy_2008.pdf

when compared to gas, and is significantly lower than levels of liquidity observed in other European countries (Figure 2.3 in Chapter 2).

OTC forward trading

1.29. Table 1.3 shows that the proportion of trades across all OTC contracts for delivery in a number of different time buckets and is broken down by base-load and peak. Around 93% of total volume in 2008 was for base-load products, whilst around 2% was for peak (the remainder is largely made up of off-peak products).

Table 1.3: Percentage of OTC contracts traded for delivery in spot/prompt, one, two and three years forward, 2004 – 2008

	2004 (BL)	2004 (PK)	2005 (BL)	2005 (PK)	2006 (BL)	2006 (PK)	2007 (BL)	2007 (PK)	2008 (BL)	2008 (PK)
Spot/Prompt	9%	17%	14%	19%	11%	24%	9%	22%	7%	16%
2-12 Months	76%	70%	71%	70%	58%	69%	64%	71%	66%	79%
12-24 Months	13%	12%	13%	10%	19%	7%	17%	6%	17%	4%
24 Months +	3%	1%	3%	0%	11%	0%	9%	0%	10%	1%

Source: ICIS Heren; Ofgem analysis.

1.30. Table 1.3 shows that forward trading is almost entirely concentrated in base-load products in particular, with very little trading in products for delivery in more than 2 years and that liquidity is concentrated in the spot and prompt and for delivery in less than one year. Whilst the volume of electricity traded further forward has improved over time and in percentage terms is actually higher than the gas market, it still remains at very low levels. The concern is that low levels of forward liquidity make it harder for industry participants to hedge their positions, reduces trust in reported prices and dilutes investment signals.

1.31. Table 1.4 presents similar analysis for the German market. In 2008 around 91% of total volume was for base-load products whilst 6% was for peak (the remainder being traded in off-peak products). Table 4 shows that whilst there is a similar distribution along the curve in base-load products, there is a somewhat wider availability of peak products more than one year along the curve. Importantly, since churn is higher in Germany, a higher absolute volume (as well as a proportion of traded volume) will be traded for delivery further along the curve.

Table 1.4: Percentage of German OTC volumes for delivery in spot/prompt, one, two and three years forward, 2004 – 2008

	2004 BL	2004 PK	2005 BL	2005 PK	2006 BL	2006 PK	2007 BL	2007 PK	2008 BL	2008 PK
Spot/Prompt	4%	15%	1%	5%	1%	7%	2%	15%	2%	21%
2-12 months	75%	68%	73%	68%	67%	60%	81%	75%	77%	61%
13-24 months	18%	17%	23%	23%	25%	27%	15%	8%	16%	14%
24 months+	3%	1%	3%	3%	7%	7%	2%	1%	5%	4%

Source: ICIS Heren; Ofgem analysis

Bid-Offer Spread

1.32. Bid-Offer spread is a measure of the difference between the price at which buyers and sellers of electricity enter the market. Tight spreads between bid and offer prices are characteristic of a liquid market as it allows market participants to transact at minimum cost and indicates the presence of a large number of participants. Consideration of how the spread have evolved over time and comparison with related markets is useful as it provides a way to quantify the cost of lack of liquidity.

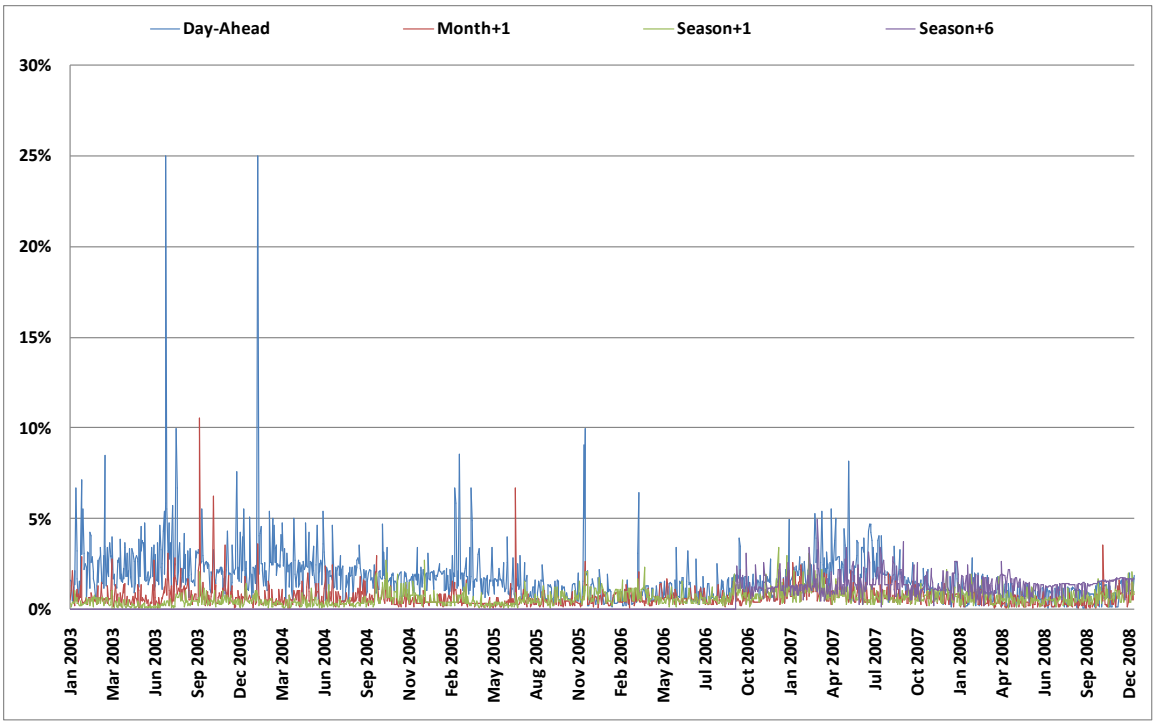
1.33. To use this measure accurately we would need to know volumes that buyers and sellers are prepared to sell as a function of the bid and offer prices. However, detailed information on volumes that were bid but never sold or offered but never bought is difficult to obtain for the electricity and gas markets. For this reason we have used trades actually transacted. The bid-offer analysis presented in this section calculates spread in percentage terms rather in absolute terms (82).

4.66. Figures 1.6 and 1.7 show the evolution of bid-offer spreads for day-ahead, front month, front season and since 2003. Whilst bid-offer spreads in day-ahead power trading have narrowed in both peak and base-load markets in recent years, spreads in seasonal products have remained relatively constant and in some cases actually increased since 2003. Figure 1.6 indicates that day-ahead bid-offer spreads may have been influenced by higher levels of volatility in the years 2003 and 2004.

4.67. Day-Ahead base-load spreads have declined from an average of 2.6% of the bid price in the calendar year 2003 to 0.9% in the calendar year 2008, whereas day-ahead peak spreads have decreased from 3.4% to 0.9% in the same period. Whilst both base-load and peak seasonal products which are close to delivery (such as front month and front season) show average spreads which are lower than or comparable to prompt prices (possibly due to lower levels of volatility), the spreads widen as time until delivery increases.

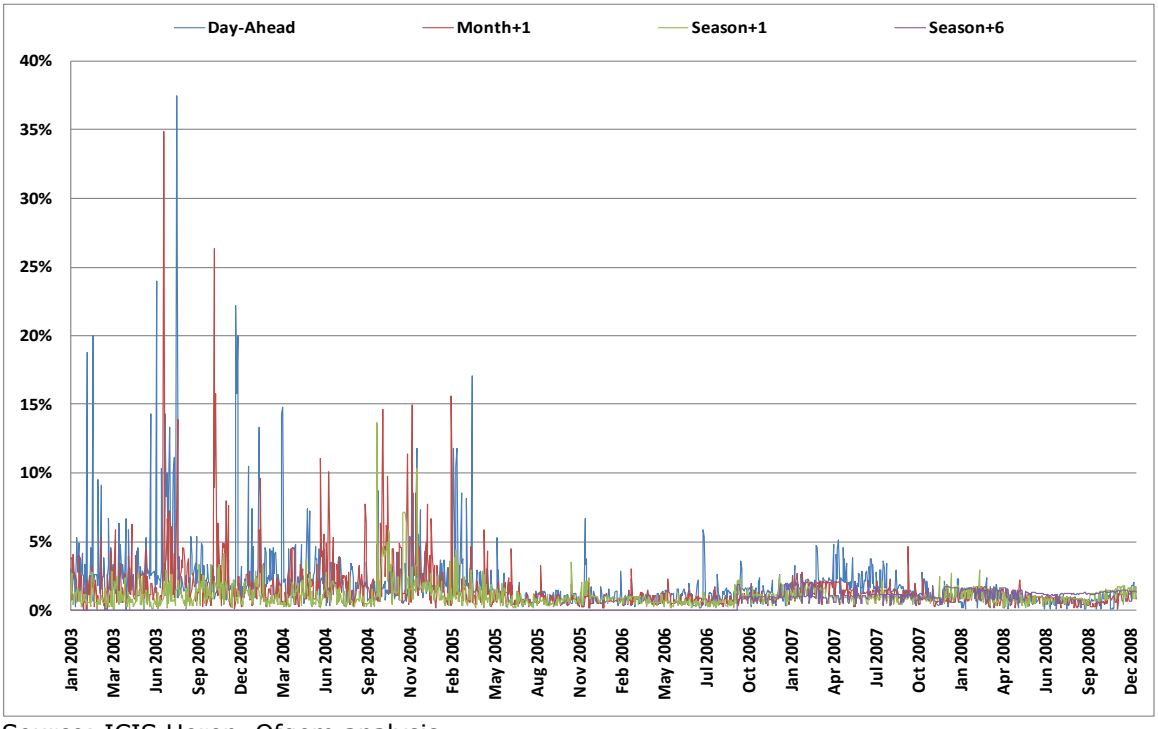
Figure 1.6: Bid-Offer Price Spread in the GB (Base-load) Electricity Market, 2003-2008

82 This is to avoid the issue where a £1 spread on a product with a price of £20/MWh in 2003 is considered equal to a £1 spread on a product with a price of £80/MWh in 2007.



Source: ICIS Heren, Ofgem analysis

Figure 1.7: Bid-Offer Price Spread in the GB (Peak) Electricity Market, 2003-2008



Source: ICIS Heren, Ofgem analysis

Electricity product availability

1.34. Respondents to the Energy Supply Probe have indicated that inability to purchase electricity in bespoke shapes may present a barrier to entry within the retail market.

1.35. Products offered in the electricity market have a range of characteristics including a commodity element (for instance whether delivery is in day-ahead, month-ahead, seasonal products, etc) and shape (the time of day for delivery). In the GB electricity market, shape is traded in blocks constructed from half-hour periods: the most commonly traded shapes are subdivided into base-load delivery or into some combination of six four-hour blocks, running from 11pm to 11pm daily. To meet customer demand, a supplier should be able to access a wide range of products in a range of volumes.

1.36. For the purposes of this analysis, we have considered the availability of products across both commodities and shape, as measured on one OTC platform. The analysis considers each unique combination of commodity and shape to be an individual 'product' and assesses the number of different combinations to be traded in a calendar year. It should be noted that this analysis does not necessarily reflect the availability of products to be offered, merely those which were successfully traded.

Table 1.5: Number of individual products offered, 2004-2008

	2004		2005		2006		2007		2008	
Total Number Of Products Traded	102		96		78		80		69	
Of which:	No.of products	% volume	No.of products	% volume	No.of products	% volume	No.of products	% volume	No.of products	% volume
Baseload	17	91.5%	15	89.5%	9	93.4%	8	94.9%	8	94.6%
Off-Peak	45	3.5%	37	5.8%	35	2.9%	34	2.7%	29	3.3%
Peak	40	5.1%	44	4.7%	34	3.7%	38	2.4%	32	2.1%

Source: Broker data

1.37. Our analysis lends some support to the conclusion that the range of available different products has contracted in the five years since 2004, with a decline from 102 product traded in 2004 to 69 in 2008 (the greatest decline occurring in the range of traded off-peak products). In addition, there has been an increase in the proportion of volume from delivery traded in base-load products.

1.38. We have also applied a measure of concentration in products traded, based on the Herfindahl-Hirschman Index (HHI) commonly used in competition analysis. The index is taken from the number of trades in each product as a proportion of the total number of trades (in effect allocating a 'market share' to each combination of product and shape, as described above). In this instance, we use the index to assess the extent to which trading is concentrated in a narrow range of products. As with the HHI, the index ranges from 0 to 10,000, with higher scores relating to increasing levels of concentration. This measure of concentration has apparently increased over time, from 779 in 2004 to 945 in 2008. It should be noted that the

decline in range of available products may reflect a change in product offering by the brokerage rather than the willingness of market participants to offer products. However, it offers a good indication of the range of products available to those participating in markets.

1.39. A number of parties have indicated that the minimum trade size of electricity they are offered is significantly higher than their requirements. Table 6 shows the average trade size for an annual contract (calendar year for Germany and France and financial year for GB), traded in the first quarter of the previous year. The table shows that whilst average trade sizes in Germany and France for an annual contract have fallen, the average OTC trade size in GB appears to have stabilised at around 13MW.

Table 1.6: Average trade size in Germany, France and Great Britain

Av trade size (MW)	Germany	France	GB (FY)
CY 2002 in Q1 2001	25		22.12
CY 2003 in Q1 2002	25.1	25	21.96
CY 2004 in Q1 2003	24.9	24.2	20.05
CY 2005 in Q1 2004	9.6	12.4	16
CY 2006 in Q1 2005	7.2	6.4	12
CY 2007 in Q1 2006	6.1	5.6	14.5
CY 2008 in Q1 2007	5.4	5.1	13.6
CY 2009 in Q1 2008	5.2	5.1	13.5
CY 2010 in Q1 2009	5.2	5.1	13.3

Source: ICIS Heren, Ofgem calculations

Appendix 3 - Liquidity in other energy and commodity markets

This section assesses liquidity in a number of European energy and international commodity markets.

Introduction

1.1. This appendix presents evidence on levels of liquidity observed in other wholesale gas and electricity and other commodity markets, drawing on existing reports and our own analysis. The structural differences between markets and difficulties in obtaining data make direct comparisons difficult. The comparative market analysis presented in this Appendix cannot provide exact benchmarking analysis, but is intended to stimulate discussion.

1.2. This appendix presents data on liquidity on various European energy exchange platforms and OTC trading, where attainable. More detailed analysis is presented on Nord Pool, Germany, France and Italy later in the appendix. We have also assessed liquidity in international commodity markets such as for crude oil and coal.

Overview of the European Comparator Markets

Background

1.3. The structure of European energy markets was subject to an in depth investigation by the European Commission (the Commission) in 2007. Both for electricity and gas, the Commission identified a number of key issues, including concentration (and market power in electricity), vertical foreclosure (and vertical integration in electricity), transparency and pricing issues. The Commission stated that "a chronic lack of liquidity" leads to a lack of "lifeblood" for wholesale markets to develop[83] and that the persistently low levels of liquidity create a entry barrier in both gas and electricity markets[84].

1.4. In 2008 Moffat Associates (MA) carried out a study examining wholesale market liquidity and efficiency in EU wholesale energy markets[85]. They found that

83 http://ec.europa.eu/competition/sectors/energy/inquiry/index.html. SEC(2006) 1724, p. 14
84 SEC(2006) 1724, p. 8
85 The Moffatt Associates Partnership (2008): Review and analysis of EU wholesale energy markets, An evaluation of factors impacting on current and future market liquidity and efficiency for the European Commission DG TREN, 2nd July 2008:

wholesale market trading is a non-regulated activity with a large and growing proportion of energy market trading (gas, electricity and carbon dioxide) taking place in "the opaque OTC market"[86]. MA also found that there are significant variations in liquidity between gas and electricity and across different national markets. MA found a "strong inverse relationship between the levels of market concentration and the degree of liquidity".

1.5. We have also drawn on the analysis of EU wholesale energy markets published by ECORYS for DG Tren in 2008[87].

Liquidity in European natural gas markets

Import, wholesale and supply

1.6. In continental European markets, natural gas is largely procured using long-term supply contracts between gas producers and incumbent importers. This may create a barrier for new entrants to access gas in the upstream markets. The Commission's inquiry concluded that this form of vertical integration reduces both the incentives and opportunities for incumbents to trade on wholesale markets and leads to sub-optimal levels of liquidity in both electricity and natural gas markets.

Trading

1.7. Natural gas trading is undertaken either through established exchanges (such as APX, EEX and others) or bilaterally (OTC). The Commission's inquiry found that there was a concentration of natural gas trading in North-West Europe with the NBP the most liquid gas hub[88]. The ECORYS report also found that the European gas markets were dominated by the NBP, in terms of volume, and were substantially less developed than wholesale electricity markets across Europe as a whole.

1.8. Natural gas hub operators may offer services that promote the trading of gas, such services include title-transfer facilities and standardised contracts. These

http://ec.europa.eu/energy/gas_electricity/studies/doc/2008_eu_wholesale_energy_market_evaluation.pdf
86 ibid, p6
87 Review and analysis of EU wholesale energy Markets, Historical and current data analysis of EU wholesale electricity, gas and CO2 Markets, Final report, ECORYS Nederland BV for European Commission DG TREN:
http://ec.europa.eu/energy/gas_electricity/studies/doc/2008_eu_wholesale_energy_market_historical.pdf
88 SEC(2006) 1724, p. 35

facilitate the physical transport of natural gas around the hubs and hence promote liquidity[89].

1.9. The Commission's inquiry found that low liquidity can result in "a vicious circle". Low liquidity may reduce the chances of finding counterparties and lead to poor price formation, which in turn increases the risks of trading, which can deter new entry, reinforcing the cycle of low liquidity. The Commission concluded that ensuring sufficient liquidity is crucial to improving confidence in price formation on gas hubs[90].

Exchange and OTC

1.10. As a whole, European gas traded volumes on both exchange and OTC are significantly lower than electricity traded volumes. An exception is the GB gas market which is the most liquid in Europe and is more liquid than its electricity counterpart. However, trading in European gas markets has been increasing in recent years.

1.11. Only a small number of actively traded, liquid trading hubs exist within the European market as a whole, with the most liquid are the NBP, Zeebrugge in Belgium, and TTF in the Netherlands.

Liquidity in European electricity markets

Trading

1.12. As in the GB electricity market, European electricity trading is carried out on both exchanges and OTC, although exchange trading is generally more developed than in the GB market, which is dominated by OTC trading. Examples of European exchanges are Nord Pool, EEX in Germany, APX in the Netherlands, Powernext in France, OMEL in Spain and IPEX in Italy.

1.13. The Commission identified the existence of long-term power purchase agreements within European markets and cited their possible negative impacts upon liquidity[91]. However, the Commission also found evidence of central clearing of OTC transactions by brokers or power exchanges, which could help liquidity develop[92].

1.14. The ECORYS report for DG TREN concluded that an increase in physical connection capacities and market coupling initiatives have increased liquidity and

89 SEC(2006) 1724, p. 34
90 SEC(2006) 1724, p. 9
91 SEC(2006) 1724, p. 116
92 SEC(2006) 1724, p. 121

price signals in the European electricity markets, with traded volumes, market participation and price correlation increasing on the observed exchanges between 2002 and 2007.

Exchange and OTC volumes

1.15. Table 1.1 shows total traded volumes on the key electricity exchanges in Europe.

Table 1.1: Volumes traded (TWh) for the main European electricity prompt exchanges[93]

Exchange	Country	2002	2003	2004	2005	2006	2007	2008
EEX	Germany	31.5	49.1	59.4	85.3	87.6	123.7	154.4
iPEX	Italy	-	-	231.6	323.2	329.8	329.9	337.0
Nord Pool	Norway, Sweden, Finland, Denmark KONTEK (Germany)	124.0	119.0	179.0	215.0	260.0	291.0	298.0
Powernext	France	2.6	7.5	14.1	19.7	29.6	44.2	51.6
APX NL	Netherlands	14.1	12.0	13.4	16.1	19.3	20.9	25.0
APX UK	UK	4.3	6.9	7.2	8.6	10.0	11.0	11.5
EXAA	Austria	0.6	1.3	1.8	1.5	1.7	2.3	2.5
POLPX	Poland	1.0	2.6	1.9	2.0	1.7	2.5	2.1
Belpex	Belgium	-	-	-	-	0.5	7.6	11.1
OMEL	Spain	0.3	0.3	0.3	0.3	0.2	0.3	0.2

Source: Ecroys, 2008[94]; respective exchanges

1.16. The table shows that exchange trading in the GB market is well below many other European markets, most notably when comparing GB with markets with similar levels of generated output, such as Nord Pool. However, as noted in Chapter 2, exchanges play a much bigger role in European markets compared to GB where OTC trading dominates.

1.17. The Commission found that vertical integration of generation and retail within the same group reduces, ceteris paribus, the incentive for trading on wholesale markets. This then leads, in turn, to a reduction in liquidity of wholesale energy

93 It is worth noting that consolidation has started in the European market, with a proposed merger between EEX and Powernext.

94 Final report, ECORYS Nederland BV for European Commission DG TREN: http://ec.europa.eu/energy/gas_electricity/studies/doc/2008_eu_wholesale_energy_market_historical.pdf

markets[95]. However, it is interesting to note that integrated countries such as Germany have relatively high levels of liquidity.

Comparison of European Electricity Markets

1.18. This section provides an overview of some of the main electricity markets in the Europe, notably Nord Pool, Germany, France and Italy.

The Nordic region (Nord Pool)

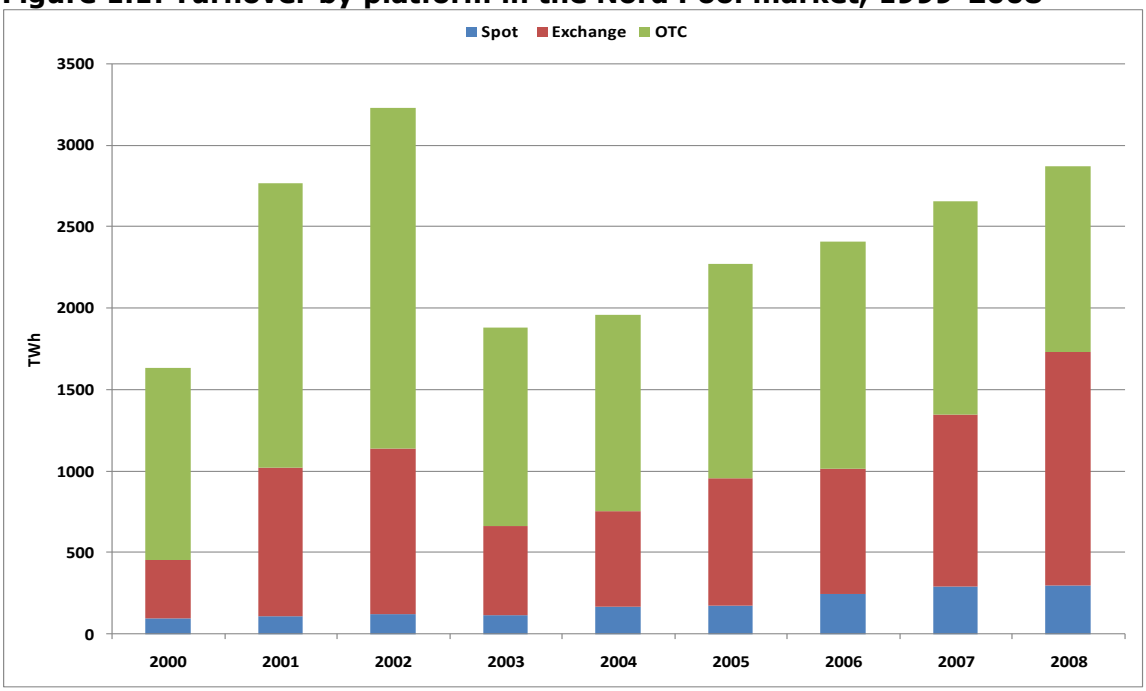
1.19. The Nord Pool market which serves Norway, Sweden, Denmark and Finland is the most mature European electricity market. Total installed generation capacity in the Nord Pool area amounts to 93 GW, with the generation mix dominated by hydroelectric (49%) and nuclear plant (25%), with thermal plant and renewables accounting for the remaining generation (18% and 8% respectively[96]).

1.20. The Nord Pool exchange was established in 1993 to provide long and short-term power prices for the Norwegian market. Between 1996 and 2000 the Day-Ahead Spot market was expanded to include Sweden, Finland and Denmark. In 2008 NASDAQ OMX acquired Nord Pool's international and clearing businesses, with Nord Pool ASA remaining under ownership of Norwegian and Swedish TSOs and Nord Pool Spot under the ownership of TSOs in all four Nordic countries.

1.21. The financial market and the physical markets (made up of two main prompt markets: day-ahead and within-day), were separated in 2002. This entailed the formation of Nord Pool Spot[97] to operate the physical market, and Nord Pool ASA to operate the financial market. In 2008 298TWh (70% of the Nordic physical market) was traded on Nord Pool Spot. The Nord Pool region also contains an active OTC market. Figure 1.1 shows the breakdown of volumes by platform.

95 SEC(2006) 1724, p. 36
96 http://www.erranet.org/index.php?name=OE-eLibrary&file=download&id=6217&keret=N&showheader=N
97 Nord Pool Spot operates the day-ahead (Elspot) and within day (Elbas) markets.

Figure 1.1: Turnover by platform in the Nord Pool market, 1999-2008



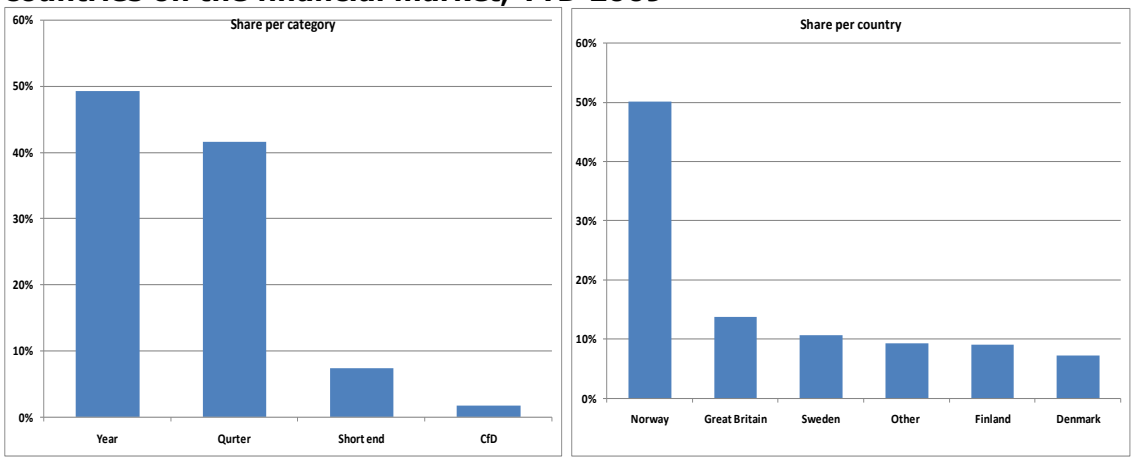
Source: Nord Pool

1.22. As shown in Table 1.1, physical trade on Nord Pool Spot exceeds most other European exchanges. Based on trade across all platforms in the Nordic electricity market, churn was around 7 times generated output in 2008. The Nordic market is characterised by high levels of demand side participation which active participation by financial parties.

1.23. Nord Pool ASA is a financial exchange, offering forward and futures contracts. Contracts are presently offered from ten years ahead of delivery, and are liquid from six years ahead of delivery. Forward contracts are cash settled, and as a result traders are generally feel there is a relatively low risk of high costs at delivery or exposure to cash-out risk.

1.24. The Figure 1.2a and 1.2b illustrates the market share of products traded on the financial market, Nord Pool ASA and the origin of traders on the exchange.

Figure 1.2a and 1.2b: Market share of products traded and participating countries on the financial market, YTD 2009[98]



Source: Nord Pool

1.25. Figure 1.2a shows that over 49% of the volume traded on the Nord Pool exchange in the first months of 2009 is concentrated in annual products[99]. Figure 1.2b illustrates the extent of participation from agents acting outside the Nord Pool region, with 23% of volume traded by participants from outside the Nord Pool region of which majority are GB participants.

1.26. Nord Pool also clears a significant proportion of total OTC traded volume in the Nordic region (90% to 99% of total OTC trades are thought to be cleared through Nord Pool). Volumes cleared rose by 9% in the calendar year 2008, to 2,577TWh from 2,369TWh in 2007. The exchange has a 'clearing customer' category to allow access to clearing services to smaller participants who do not want to become formal members of Nord pool's clearing platform.

Germany

1.27. The German electricity market is the largest physical market in Europe, both in terms of generation and demand. In 2008 gross electric power generation totalled 639TWh, with generation from coal fired plant (around 44%), nuclear (23%) natural gas (13%) and renewables (15%)[100]. Demand in 2008 was around 540TWh[101]. The

98 Trading for the calendar year 2009 to 6 February 2009.
99 Given Figures 1.2a and 1.3b show trading to 6 February 2009 only, Nord Pool have indicated that as the majority of trading for annual products occurs early in the preceding year, this may overstate the total volume traded each year in annual products. However, it is an indication of the depth of forward trading in the Nord Pool region.
100 European Nuclear Society
101 Bloomberg

Germany' electricity market is highly concentrated, with four large electricity companies dominating: RWE, EON, Vattenfall and EnBW (the Big Four).

Role of vertical integration

1.28. There is a high degree of vertical integration in the German market, with integrated companies owning generation, network and supply assets. The Commission's sector enquiry criticised the degree of vertical integration in electricity markets in Europe, including Germany.

1.29. Despite the requirement for legal unbundling of network assets from the competitive parts of the business, vertical integration remains a significant issue in Germany, due to the high degree of cross-ownership of distribution and retail in Germany's electricity sector. The Big Four companies hold significant shares in the regional and local utilities, or Stadtwerke ('municipalities'). Germany's national regulatory authority for energy, the Bundesnetzagentur (BNetzA), is closely monitoring ownership and cross-ownership structures in municipalities, especially in cases of mergers or changes in ownership, in particular at the municipality level.

1.30. With the implementation of the 3rd Internal Energy Market Package, (the 'Third Package') German companies will be able to choose from a set of unbundling options. It is expected that Germany will adopt the Independent Transmission Operator model which does not require separation of generation and supply businesses.

Interconnection capacities, market coupling and integration of regional markets

1.31. Germany's transmission electricity system is linked to neighbouring electricity networks via interconnectors. High levels of interconnection means that the German market serves as a hub for surrounding regions (see Table 3.1 in Chapter 3). However, this may be limited by cross-border congestion of capacity (with the exception of the Austrian and German markets, which are completely integrated). Cross-border capacity is allocated to users using explicit auctions at the interconnection points where there is congestion. A use-it-or-lose-it (UIOLI) mechanism also applies, i.e. unused capacity must be offered back to the market via secondary market trading.

1.32. Initiatives are in place across Europe to promote regional market integration. One such example is European Market Coupling Company GmbH (EMCC) in Germany. This initiative had been launched in 2008 in an attempt to integrate national energy markets to regional markets. In this context market coupling refers to the concept of using implicit auctioning involving two or more power exchanges, allowing commodities to be traded together with transmission (interconnection) capacities and facilitating cross-border trading. This also helps to ensure an optimal flow of energy on the transmission system. EMCC has recently started a market coupling initiative between the German electricity market and the Nordic market, most importantly Denmark in autumn 2008.

Liquidity and trading

1.33. German electricity trading is dominated by the OTC market, but the rate of trading on the EEX exchange is growing (EEX also clears OTC trades). Products on the EEX electricity exchange include the spot (Day-Ahead) market, and intraday market and forwards, options and futures. Products also cover specific hours or blocks of hours[102]. Despite the extent of vertical integration, electricity trading in Germany is growing. As illustrated in table 1.1, electricity trading at the EEX has increased considerably since 2005. In 2008 estimated churn in Germany was around 8.

1.34. EEX operates a market maker system, whereby designated market parties ensure a base level of liquidity through their participation in market activities. Market makers receive remuneration for the provision of their services.

1.35. About 130 active participants trade on the EEX spot market, with about 50 participants trading on the derivatives market. The share of the five trading participants with the highest turnover is about 50%. The market makers' share of total turnover on the Power Derivatives Market is about 10% to 15%.

France

1.36. France is the second largest electricity market in the EU, in terms of both generation and consumption. Total generation amounted to around 570TWh in 2007 with the majority of generation coming from nuclear power stations (80%). Consumption was around 450TWh in the same year[103].

1.37. Two key features of the French electricity market are the domination of a single player, the state-owned Electricite de France (EDF), in both generation and supply, and high levels of vertical integration across generation, network and supply activities. According to the French regulator, CRE, the combination of these two features results in a market structure that has been detrimental to liquidity in the French market[104].

102 EEX also offers products to be traded that are cleared in France or Switzerland (such as the SWISSIX, a spot electricity product traded at EEX for Switzerland).
103 http://www.industrie.gouv.fr
104 CRE Market Monitoring Report, 2007: http://www.cre.fr/en/marches/surveillance_des_marches_de_gros/deliberations_et_rapports#a3

Market concentration and vertical integration

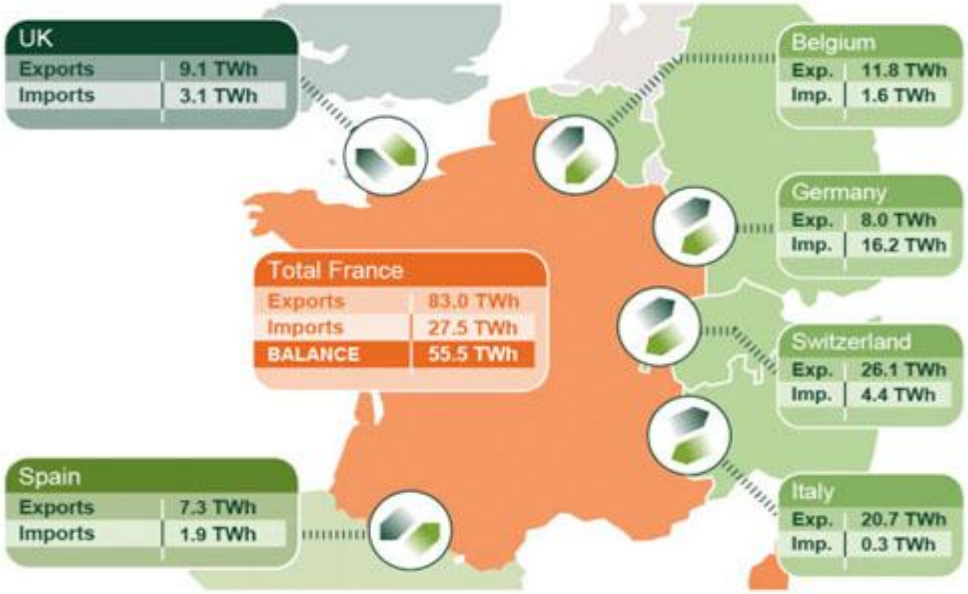
1.38. In 2007 EDF was responsible for 85% of power produced nationally and acquired a further 5% of nationally produced power from independent generators under the purchase obligation system. EDF also supplied electricity to 95% of the French customers (both domestic and non-domestic). Four other main companies operate generating plant within France: Suez (CNR and SHEM), Endesa France, Gaz de France and Total. The remaining small generating plants are operated either by independent generators or industrial companies generating for own use.

1.39. Due to internal transfers of electricity between EDF's generation and supply activities, volume exchanged on the wholesale market remains limited compared to national consumption. In 2007, only 22% of generation and 13% of final customer consumption contributed to transactions on the wholesale market[105].

Interconnection capacities and market coupling

1.40. France's high transmission electricity system is linked to its neighbours' power grids via cross-border connections. French nuclear plant typically generates at a low average cost and is a net exporter of electricity. Figure 1.3 shows the volume of contractual cross-border trade with its neighbours in 2007.

Figure 1.3: Contractual cross-border exchanges 2007



Source: RTE

105 CRE Activity report 2008: http://www.cre.fr/en/documents/publications/rapports_annuels

1.41. Market coupling, a method for integrating electricity markets in different areas, is a common feature of the French market. The TSOs of France (RTE), Belgium (Elia) and the Netherlands (TenneT) allocate the available daily capacities through the market coupling mechanism which is operated by the exchanges (Powernext, Belpex and APX).

Liquidity

1.42. According to CRE[106], volumes traded on Powernext and OTC transactions made through brokers amounted to 579TWh in 2007 implying a churn rate of close to 1.27.

1.43. The majority of the wholesale electricity trading in France is conducted on the Powernext exchange, which offers a spot and futures market and OTC clearing services. Since November 2007, Powernext has been integrated with Belgian and Dutch electricity exchanges via the market coupling process.

1.44. As at 31 March 2008, 117 market participants were active on the French wholesale market, including 66 on Powernext Day-Ahead and 41 on Powernext Futures[107].

1.45. Despite high level of interconnection (Figure 1.3), levels of liquidity in the French electricity market were low, particularly when compared to other highly interconnected markets such as Germany.

Italy

1.46. Italy is European fourth largest electricity market and it generated just over 300TWh in 2007. Thermal sources represent over 80% of generation (of which Gas fired generation comprises 60%), with renewable sources providing the remainder.

Market concentration and vertical integration

1.47. Despite the market liberalisation progress, the Italian market remains highly concentrated[108]. The largest generator Enel's share of electricity generation was

106 CRE Market Monitoring Report, 2007: http://www.cre.fr/en/marches/surveillance_des_marches_de_gros/deliberations_et_rapports#a3

107 See Figure 35 in CRE Activity report 2008: http://www.cre.fr/en/documents/publications/rapports_annuels

108 Prior to liberalisation in 1999, the Italian electricity sector was dominated by a state owned monopoly, Enel. During liberalisation, 32% of Enel was privatised and 3 generating companies were created. The legislative process introduced the first step toward a competitive market: a wholesale market and a single buyer were established, together with

over 30% in 2007, whilst Edison's market share increased to 13.7%. Eni was the third-largest producer with 9.7%, followed by Endesa Italia with 8%, and Edipower with 8%. The Commission's Sector Enquiry indicated that Italy is one of the markets where there is a scope for generators to directly influence the clearing price.

Interconnection capacities and market coupling

1.48. Italy is a net importer of electricity, importing almost 16% of demand from France, Switzerland, Austria, Slovenia and Greece in 2007.

1.49. The daily cross-border transmission capacity between Italy and its neighbouring countries is explicitly auctioned, with buyers and sellers having to explicitly acquire the corresponding transmission capacity. Although auction rules are harmonised there are significant inefficiencies associated with explicit auctioning such as underutilisation of capacity.

1.50. Whilst Italy is not part of any market coupling initiative, there are plans for further integration with other European markets through the Central-South regional electricity market. The initiative, led by the Italian electricity and gas regulator (AEEG) aims to integrate Austria, France, Germany, Greece and Slovenia into a single regional electricity market[109].

Wholesale electricity market and liquidity

1.51. According to the MA survey, the Italian wholesale market was rated weak in terms of the availability of forward trading and existing volumes of trade. There was a strong view among the surveyed parties that incumbents have a high level of influence on the market, with transparency rated as weak. In addition, liquidity as measured by volume of trading was ranked as weak compared to other European markets.

1.52. Wholesale market trade in Italy takes place on the OTC market and IPEX, a pool exchange. IPEX is an umbrella platform for three wholesale electricity markets for physical delivery: the day-ahead, an adjustment and an ancillary services market, although most trades are executed in the day-ahead market. Derivatives

tariff and quality regulatory framework for transmission and distribution business. In addition, an Independent System Operator (GRTN) was created. In 2003 a law enabling further privatisation of Enel was passed. The Italian Power Exchange (IPEX) was established in 2004, and by a successive decree all non-domestic customers are now eligible to choose their supplier.

109 Harmonization of CBT congestion management methods, inter TSO coordination (harmonisation of operational and security standards), transparency, integration of intra-day and balancing markets and assessment of regulatory competences are the agreed as key priorities of the Central-South electricity market.

financial exchange (IDEX) and physical forward exchange (MTE) are planned to be introduced during 2009.

1.53. In 2007, IPEX had over 120 registered participants, ranging from small municipal market participants to incumbent and Edison and ENI. This is a significant increase from 2002, when there were around 70 participants. However, banks and other speculative participants appear to have shown little interest in the exchange.

1.54. In 2008 337GWh were traded on IPEX according to GME[110], representing a churn ration of around 1. It is worth noting that the single buyer accounts for a large proportion of all purchases on the exchange and total demand side volumes for the country.

Other commodities

1.55. This section provides evidence on liquidity in other relevant international commodity markets. We have looked at liquidity in the oil, coal, gold and copper markets.

1.56. Oil is probably the most widely and transparently traded commodity in the world and is characterised by high levels of liquidity. The market for hard coal can be characterised as an emerging global market and has been slow to develop compared to oil market due to a variety of factors. Coal prices have historically been less volatile than oil and gas prices. The volatility of the price of gold is generally relatively low whilst high copper price volatility stems from a lack of responsiveness of both demand and supply in the short term.

1.57. Oil is conventionally priced at various locations with NYMEX WTI crude oil and the ICE Brent crude oil the most commonly used reference prices. Key reference points in terms of price formation for coal are prices quoted for Amsterdam-Rotterdam-Antwerp (ARA) in Europe and South African coal (Richards Bay). Prices are quoted by at NYMEX and Intercontinental Exchange (ICE)[111]. The market price for coal is influenced by freight rates and the availability of shipping capacity. On the other hand, gold has a high value to volume ratio, which makes it easily transferable, with low transport and storage costs. The most significant exchange for both gold and copper is COMEX.

110 http://www.mercatoelettrico.org/it/menubiblioteca/documenti/20090115LM.pdf
111 There are two regional markets for steam coal: The Atlantic market, made up of importing countries in Western Europe, notably the UK, Germany and Spain and the Pacific market, which consists of developing and OECD Asian importers, notably Japan, Korea and Chinese Taipei. The Pacific market currently accounts for about 57% of world seaborne steam coal trade.

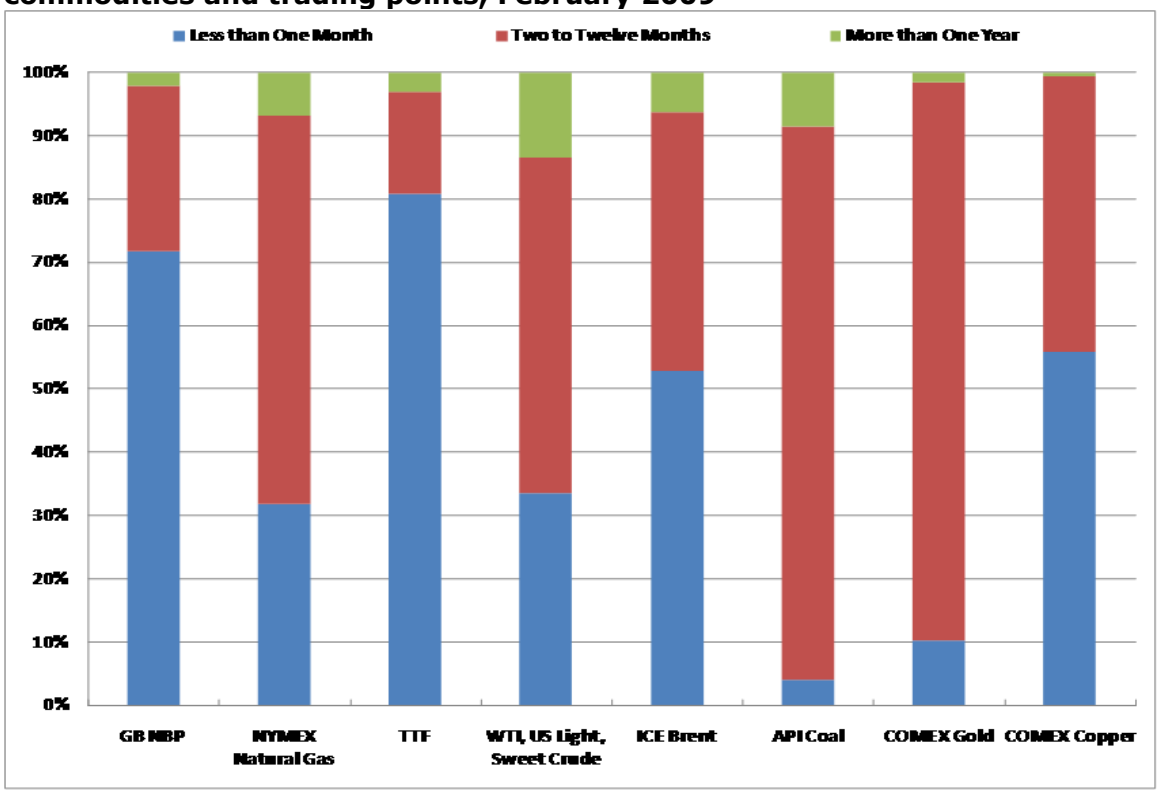
1.58. Daily churn rates in crude oil markets are around 20 times the size of the physical market. However, crude oil is not traded very far ahead of delivery with most contracts traded for delivery within a year[112]. Despite a liquid spot market high volatility in the short term makes forward trading risky. Although trading in annual international spot coal trade has doubled in 2007 compared to the previous 10 years to 600 million tonnes, it still represents only 10% of global trade because the majority is still conducted under long-term contracts[113].

1.59. Oil market participants are diverse, ranging from traditional industry participants (commercial oil producers, refiners, and end users) to major investment banks and hedge funds. More active producers are involved as both buyers and sellers and hedge funds have been increasingly active in the oil market in the past few years. On the coal market, there is a wide range of financial products available to hedge against fluctuations in coal prices. However, hedge funds have not participated actively in derivative and physical coal trading because the markets have not been sufficiently liquid for their needs.

1.60. Figure 1.4 shows the proportion of trading carried out on the main commodity markets (including NYMEX Natural Gas) for a number of periods: prompt/front month (less than one month ahead), short term (between two and twelve months ahead), on a medium term basis (twelve to twenty four months) and long term basis (more than twenty four months ahead).

112 See Chart 3: Outstanding futures contracts by expiry date in The forward market for oil, Bank of England Quarterly Bulletin, Spring 2006: http://www.bankofengland.co.uk/publications/quarterlybulletin/qb060105.pdf
113 Source: Reuters

Figure 1.4: Outstanding Futures contracts by expiry date for selected commodities and trading points, February 2009



Source: Bloomberg

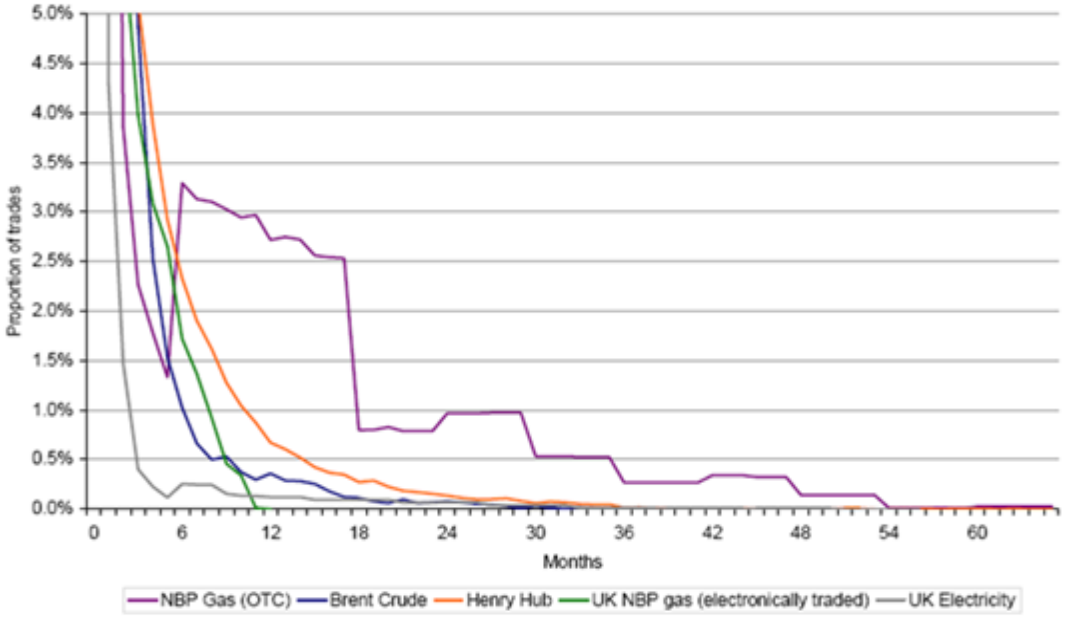
1.61. Figure 1.4 shows that the proportion of short term to longer term trading varies significantly by commodity. Whilst COMEX copper is almost exclusively traded on a less than twelve months ahead basis (99% of all trades in February 2009), API coal is mostly traded on a more than one month ahead (but less than twelve months ahead) basis (88% of all trades in February 2009), probably due to shipping and freight being important in this case. Only WTI US Light Sweet Crude Oil, where 7% of all trades in February 2009 were for contracts more than 24 months ahead, exhibits notable forward liquidity. NBP gas forward liquidity as presented in Figure 2.2 in Chapter 2 compares favourably to these findings, with about 20% of total volumes traded out for more than one year forward.

1.62. This conclusion is supported by a 2006 report from Poyry Energy Consulting[114] which compares the proportion of trades for each month on the forward curve using 2006 data, for Brent crude oil, US gas (Henry Hub), GB electricity trading (ICE) and GB gas trading (both NBP OTC and NBP ICE). Figure 1.6 shows that OTC NBP gas

114 The Future of UK Gas: A Phase Diagram, a report to Oil & Gas (formerly UKOOA) Poyry Energy Consulting, May 2007, Figure 15: http://www.oilandgasuk.co.uk/issues/gas/poyryreport07.pdf

traded a higher proportion of total volumes, further along the curve than any other commodity.

Figure 1.5: Proportion of trades at each month on the forward curve in 2006



Source: Poyry Energy Consulting, ICE and ICIS Heren

Appendix 4 - Respondents' views

This appendix provides a summary of respondents views on liquidity in the GB wholesale energy markets.

Introduction

1.1. The summary of market participants views outlined below includes responses received prior, during and after publication of the Energy Supply Probe report and concerns expressed in meetings between Ofgem and market parties since Jan 2009.

Market structure

1.2. A number of parties, particularly smaller companies and consumer bodies have raised concerns about vertical integration, both in relation to the impact on liquidity and in terms of alleged cross-subsidies between the generation and supply parts of the integrated energy businesses.

1.3. One party expressed concern that vertically integrated participants use own generation capacity and take advantage of poor price transparency to undercut new entrants or non-vertically integrated participants in the retail market. They suggested that low liquidity was both a barrier to entry and a cause of the poor price transparency.

1.4. A number of industry participants noted that liquidity is essential in providing a competitive fringe in the wholesale market. They stressed the importance of defining liquidity in terms of being able to transact volumes and shapes as required at a fair price and cited vertical integration in particular as potentially suppressing price signals in the electricity wholesale market. They also noted that lack of investment from the independent sector in new generation may create a 'downward spiral' in liquidity. It was suggested that the merger of British Energy and EDF may negatively impact liquidity by increasing vertical integration.

1.5. However, a number of industry participants indicated that they consider the GB wholesale energy markets sufficiently liquid for their requirements. This includes a number of independent generators, who noted that they are able to sell most of their output into the electricity wholesale market fairly easily, but add that any further vertical integration is likely to be the 'tipping point' where the market becomes illiquid for their purpose.

1.6. A number of the Big 6 stated that they buy and sell the majority of their generation and electricity requirement from the market. Several also stated that they do not cross subsidise their generation and supply activities to the detriment of the market. It was also noted that VI is the most efficient solution to manage risk: if companies were forced to sell all output in the market, their hedging strategies

would change and hedging costs would rise very significantly. This may indicate that the Big 6 do not believe that there is sufficient liquidity in the GB wholesale energy markets.

Trading arrangements

1.7. Whilst noting that imbalance charges are required to provide adequate signals to the market, a number of parties suggested that the current imbalance risk acts as a barrier to entry. However, there was a disagreement among some parties as to whether the cash out arrangements are impacting directly on liquidity. One participant noted that having a single cash-out price could reduce the risks for smaller and non integrated market participants and provide for a more predictable imbalance price. It may also facilitate the development of financial risk management and hedging products by providing a reference price for such products.

1.8. A wide range of parties expressed the view that Grid Trade Master Agreements (GTMA), are acting a barrier to new entrants due to the cost of signing up sufficient counterparties to enable them to trade. In addition, it was noted that small participants are finding the requirement to sign up to the BSC (Balancing and Settlement Code) and other compliance requirements burdensome. One party noted that misalignment of the UK power calendar with that of European power and NBP gas has been the cause of confusion and settlement error over the years(115).

1.9. A number of respondents cited a lack of granularity of product as a key barrier to entry and low liquidity, arguing that they are unable to procure the shape and volumes required for a small customer base. One party suggested the creation of an independent (possibly government-regulated) market maker as one solution to address the problem of shape. Another respondent expressed concern at the low frequency of power trading of particular products, especially those essential for providing fixed price offerings. Using trading price data from a major information provider, the respondent cited that seasonal base-load products for Winter 2008/09 and Summer 09 traded on only 54% of days between June 2007 and April 2008.

1.10. A number of respondents noted that a reliable flow of information on trading and plant outages would act as a spur to liquidity by reducing the level of uncertainty associated with trading. Another suggested that an independent market authority promoting standard block sizes for trading in the electricity market (as under the old Pool) would possibly encourage trade in these standard products.

1.11. All of the Big 6 highlighted their support for moves towards increasing level of liquidity, and five of the six voiced support for the Futures and Options Association's Market Design Project.

115 UK power is traded and contracts are based on the EFA calendar as opposed to the calendar year which is traded in UK gas and European power.

Credit and Collateral

1.12. Most parties agree that the current credit requirements contribute to the reduction in trading and liquidity, noting that credit is harder to obtain and exchanges (or more specifically clearing houses) are increasing their margin requirement on transactions due to the credit crunch. Smaller suppliers expressed that the credit risk and collateral was their biggest barrier to entry and growth.

1.13. A number of respondents were pessimistic about the outlook for improving liquidity against a background of constrained credit requirements. One suggested that credit issues were causing the liquidity further along the forward curve to dry up, whilst another suggested that encouraging exchange based trading and clearing could alleviate these concerns.

Appendix 5 – The Authority's Powers and Duties

1.1. Ofgem is the Office of Gas and Electricity Markets which supports the Gas and Electricity Markets Authority ("the Authority"), the regulator of the gas and electricity industries in Great Britain. This Appendix summarises the primary powers and duties of the Authority. It is not comprehensive and is not a substitute to reference to the relevant legal instruments (including, but not limited to, those referred to below).

1.2. The Authority's powers and duties are largely provided for in statute, principally the Gas Act 1986, the Electricity Act 1989, the Utilities Act 2000, the Competition Act 1998, the Enterprise Act 2002 and the Energy Act 2004, as well as arising from directly effective European Community legislation. References to the Gas Act and the Electricity Act in this Appendix are to Part 1 of each of those Acts.116

1.3. Duties and functions relating to gas are set out in the Gas Act and those relating to electricity are set out in the Electricity Act. This Appendix must be read accordingly117.

1.4. The Authority's principal objective when carrying out certain of its functions under each of the Gas Act and the Electricity Act is to protect the interests of existing and future consumers, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the shipping, transportation or supply of gas conveyed through pipes, and the generation, transmission, distribution or supply of electricity or the provision or use of electricity interconnectors.

1.5. The Authority must when carrying out those functions have regard to:

- the need to secure that, so far as it is economical to meet them, all reasonable demands in Great Britain for gas conveyed through pipes are met;
- the need to secure that all reasonable demands for electricity are met;
- the need to secure that licence holders are able to finance the activities which are the subject of obligations on them118;
- the need to contribute to the achievement of sustainable development; and

116 entitled "Gas Supply" and "Electricity Supply" respectively.
117 However, in exercising a function under the Electricity Act the Authority may have regard to the interests of consumers in relation to gas conveyed through pipes and vice versa in the case of it exercising a function under the Gas Act.
118 under the Gas Act and the Utilities Act, in the case of Gas Act functions, or the Electricity Act, the Utilities Act and certain parts of the Energy Act in the case of Electricity Act functions.

- the interests of individuals who are disabled or chronically sick, of pensionable age, with low incomes, or residing in rural areas.119

1.6. Subject to the above, the Authority is required to carry out the functions referred to in the manner which it considers is best calculated to:

- promote efficiency and economy on the part of those licensed120 under the relevant Act and the efficient use of gas conveyed through pipes and electricity conveyed by distribution systems or transmission systems;
- protect the public from dangers arising from the conveyance of gas through pipes or the use of gas conveyed through pipes and from the generation, transmission, distribution or supply of electricity; and
- secure a diverse and viable long-term energy supply.

1.7. In carrying out the functions referred to, the Authority must also have regard, to:

- the effect on the environment of activities connected with the conveyance of gas through pipes or with the generation, transmission, distribution or supply of electricity;
- the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed and any other principles that appear to it to represent the best regulatory practice; and
- certain statutory guidance on social and environmental matters issued by the Secretary of State.

1.8. The Authority has powers under the Competition Act to investigate suspected anti-competitive activity and take action for breaches of the prohibitions in the legislation in respect of the gas and electricity sectors in Great Britain and is a designated National Competition Authority under the EC Modernisation Regulation121 and therefore part of the European Competition Network. The Authority also has concurrent powers with the Office of Fair Trading in respect of market investigation references to the Competition Commission.

119 The Authority may have regard to other descriptions of consumers.
120 or persons authorised by exemptions to carry on any activity.
121 Council Regulation (EC) 1/2003

Appendix 6 - Feedback Questionnaire

1.1. Ofgem considers that consultation is at the heart of good policy development. We are keen to consider any comments or complaints about the manner in which this consultation has been conducted. In any case we would be keen to get your answers to the following questions:

1. Do you have any comments about the overall process, which was adopted for this consultation?
2. Do you have any comments about the overall tone and content of the report?
3. Was the report easy to read and understand, could it have been better written?
4. To what extent did the report's conclusions provide a balanced view?
5. To what extent did the report make reasoned recommendations for improvement?
6. Please add any further comments?

1.2. Please send your comments to:

Andrew MacFaul
Consultation Co-ordinator
Ofgem
9 Millbank
London
SW1P 3GE
andrew.macfaul@ofgem.gov.uk

Appendix 7 - Glossary

A

APX

Amsterdam Power Exchange - APX Group is a holding company owning and operating energy exchange markets in the Netherlands, UK and Belgium.

ARA

Antwerp/Rotterdam/Amsterdam. Major coal importing ports in North West Europe.

Asymmetrical Margining

A collateralization agreement between the counterparties that requires more stringent margin coverage from either counterparty, usually because of a difference in credit rating.

B

Balancing and Settlement Code (BSC)

The BSC contains the rules and governance arrangements for the electricity balancing and settlement in Great Britain.

Barrier to Entry

A factor that may restrict a firm's entry into a market.

Belpex

Belgian Power Exchange for anonymous, cleared trading in day-ahead electricity.

BESC

Business and Enterprise Select Committee

BETTA

British Electricity Transmission and Trading Arrangements: The introduction of NETA throughout Britain by combining English/Welsh and Scottish rules on 1 April 2005.

Bid-offer Spread

Indicates the difference between the price quoted for an immediate sale (bid) and an immediate purchase (ask); often used as a measure of liquidity.

Big Six

The name collectively given to the six companies that supply most of the energy to domestic households in the GB market. They are: Centrica plc (three retail brands, British Gas, Scottish Gas and Nwy Prydain in England, Scotland and Wales respectively), E.ON UK, Scottish and Southern Energy (SSE), RWE npower, EDF Energy and ScottishPower.

Bilateral Credit Arrangements

An arrangement to provide credit agreed directly between two counterparties, rather than through an exchange or clearing house.

Bluenext

An exchange for environmental related products, for instance, carbon permits.

BM

The Balancing Mechanism is a market-based mechanism that enables National Grid to instruct generators and suppliers to vary electricity production or consumption close to or in real-time, in order to maintain safe operation of the system.

Broker

Handles orders to buy and sell. For this service, a commission is charged which, depending upon the broker and the amount of the transaction, may or may not be negotiated.

C

Cash-Out Arrangements

Arrangements whereby generators and suppliers pay or are paid for imbalances i.e. shortages and surpluses of power relative to their contracted commitments.

CCGT

Combined Cycle Gas Turbine. A gas fired electricity generation plant.

CEGH

Central European Gas Hub

Churn

The ratio of traded volume of a commodity to throughput or generated output, or some other measure denoting physical consumption of the traded commodity.

Clearing

The centralised process whereby transacted business is recorded and positions are maintained.

Clearing House

An organisation which guarantees the performance and settlement of futures and options contracts, e.g. the London Clearing House in London or the Options Clearing Corporation in Chicago.

Collateral

A borrower will pledge collateral (securities, property etc) in order to demonstrate their ability to meet their obligations to repay monies loaned.

Contract for Differences (CfD)

A Contract designed to make a profit or avoid a loss by reference to movements in the price of an underlying item. The underlying item is not bought or sold itself.

Counterparty Risk

The risk that a counterparty to a contract defaults and does not fulfil obligations.

CRE

Commission de régulation de l'énergie. The French regulator for the electricity and gas industries.

Credit Risk

Possibility of default. Failure to make required payments on a timely basis or to comply with other conditions of an obligation or agreement.

Credit Worthiness

Financial accountability.

CVA

Central Volume Allocation. The determination of quantities of Active Energy to be taken into account for the purposes of Settlement in respect of Volume Allocation Units.

D

Day-Ahead Market

A form of a spot market

DG TREN

Director-General for Transport and Energy

E

EEX

European Energy Exchange. An energy exchange based in Leipzig, Germany. EEX operates Spot and Derivatives Markets for energy and related products.

EFA

Electricity Forward Agreement

EFA Blocks

Six four hourly blocks within the EFA day (being 23.00 hours to 23.00 hours in the immediately following day).

EGT

E.ON Gastransport, formerly one of the virtual trading points in Germany until NetConnect Germany hub was formed.

Elexon

The Balancing and Settlement Code Company (BSCCo) created by the Balancing and Settlement Code (BSC). Elexon procures, manages and operates services and systems which enable the balancing and imbalance settlement of the wholesale electricity market.

EMCC

European Market Coupling Company

Endex

Amsterdam-based European Energy Derivatives Exchange

ERGEG

European Regulators Group for Electricity and Gas.

Escrow Account

An account with something of value held within it under a third party to be retained until the occurrence of a contingency or a condition between two parties is met.

EU ETS

European Union Emission Trading Scheme: The EU-wide greenhouse gas emissions trading scheme, under which governments must set emission limits for all large emitters of carbon dioxide in their country. Each installation is then allocated an allowance for the particular phase in question, with the first phase running from 2005 – 2007 and the second from 2008 – 2012. Installations may meet their cap by either reducing emissions below the cap and selling the surplus, or letting their emissions remain higher than the cap and buying allowances from other participants in the EU emissions market.

Ex-PES

The previous Public Electricity Supplier for one of the 14 electricity regions in England, Wales and Scotland.

F

Forward

The trading of commodities to be delivered at a future date. Delivery can be physical and can be bespoke and is normally struck bilaterally.

Forward trading

Refers to delivery in the front month and after, and may include trades months and years ahead of delivery. Forward trading generally consists of trades over a longer duration than prompt and spot trading, with contracts for delivery over months, winter or summer seasons or years.

FSA

The FSA regulates the financial services industry. It is an independent nongovernmental body, given statutory powers by the Financial Services and Markets Act 2000. It is a company limited by guarantee and financed by the financial services industry.

Future

A contractual agreement to buy or sell a particular commodity or financial instrument at a predetermined price in the future, normally a future is a standardised contract bought/sold across an exchange.

Future & Options Association (FOA)

FOA is an industry association for firms and institutions carrying on business in futures, options and other derivatives or which use such products in their business.

G

Gas Hub

A physical or virtual point within a gas transmission system where gas enters the network, a point used as a reference e.g. for balancing or trading.

Gate Closure

The point in time by which all Contract Notifications and Final Physical Notifications must be submitted for each settlement period. Parties should not change their positions other than through instruction by the SO after gate closure. It is currently set at one hour before the start of the relevant settlement period.

GDF Suez

An energy and environmental utilities company based in France, it was formed by the merger of Gaz de France and Suez.

GTMA

Grid Trade Master Agreement, generic framework covering energy trading between counterparties, introduced during the implementation of NETA.

H

Hedging

Deals based on the future price of a good or service instead of dealings based on the daily price of a good or service. This enables those purchasing a good or service to reduce the risk of short term price movements.

Heren, ICIS

A publisher of gas, power and carbon market information.

Herfindahl Hirschman Index (HHI)

A measure of market concentration calculated by adding up the squared values of market shares for each firm in the market. It is influenced both by the number of firms in the market and differences in their relative sizes. The value of the HHI decreases as the number of firms in a market rises. Similarly the value of the HHI will be greater the larger the degree of inequality in firm size.

I

I&C sector

Industrial and Commercial sector. The non-domestic sector in general rather than any specific group of customers.

ICE

Intercontinental Exchange, an American financial company that operates Internet-based marketplaces which trade futures and over-the-counter (OTC) energy and commodity contracts as well as derivative financial products.

IDEX

Italian Energy Derivatives Exchange.

IEM

Internal Electricity Market

Imbalance Price

The difference between a party's contracted position and metered position measured on a half-hourly basis.

Incumbent

An incumbent is the company of the former monopoly supplier in a particular region. The incumbent in each region for electricity is known as the ex-PES. British Gas (Centrica) is the incumbent in the gas market.

Initial Margin

A margin intended to cover within-day price volatility and is payable at the time the contract is entered into.

Interconnector UK (IUK)

Natural gas pipeline linking the UK with continental Europe (Bacton in the UK with Zeebrugge in Belgium).

Intermediary

Third party between two trading parties offering intermediation services.

Intra-Day Market

Purchase and sale of a product within a given trading day.

L

LEBA

London Energy Brokers Association, formed in 2003 to represent the interests of London-based energy brokers.

Letter of Credit (LoC)

A document issued by a financial institution, used in place in place of cash as collateral in particular where one of the counterparties have a weaker credit standing.

Liquidity

Liquidity is the ability to quickly buy or sell a product without causing a significant change in its price and without incurring significant transaction costs.

Liquid Market

A market characterised by the ability to buy and sell with relative ease.

M

Market Coupling

Market coupling is a method for integrating electricity markets in different areas.

Market Design Project

An initiative launched by the Futures and Options Association (FOA) to investigate the feasibility of introducing a new electricity market mechanism in GB.

Market Maker

An independent trader or trading firm which is prepared to buy and sell futures or options contracts in a designated market. Market makers provide a two-sided (bid and ask) market and greater liquidity.

Market Power

The ability of a company to influence (for example) prices in the market.

Market Share

In this report, this refers to the proportion of total customers (usually as proxied by the number of meter points) within a market that are registered to a particular supply group.

N

N2EX

N2 Exchange, forthcoming GB electricity exchange platform

NBP

National Balancing Point, a virtual trading location used as a point of reference for the sale and purchase of gas in GB. In the case of natural gas the NBP is the National Transmission System (NTS). This price is therefore inclusive of entry terminal charges.

NCG

NetConnect Germany, the virtual trading hub for Germany, former E.ON Gastransport trading hub (EGT).

NETA

New Electricity Trading Arrangements: A system of wholesale electricity trading based on bilateral contracting between suppliers and generators, introduced in England and Wales in March 2001.

NGG

National Grid Gas plc., formerly known as NGT, National Grid Transco.

Non-physical market participants

Participants who prefer to trade out positions ahead of delivery. Non-physical market participants usually trade for speculative purposes.

Nord Pool

Nord Pool, the Nordic Power Exchange, a single power market for Norway, Denmark, Sweden and Finland.

NYMEX

New York Mercantile Exchange

NYMEX WTI

NYMEX West Texas Intermediate. Exchange where the Texas light sweet crude oil is traded. The delivery point is Cushing, Oklahoma.

O

OCM

On the day commodity market. This market enables anonymously financially cleared on the day trading between market participants.

OMEL

Electricity exchange in Spain.

Over the Counter (OTC)

Any market which does not work through an exchange-based system. Trading which is negotiated via OTC brokers.

P

PEG

Refers to one of the trading points of natural gas in France.

Physical Market Participants

Generators and suppliers. Generally, physical market participants sell/buy energy forward and use spot and prompt (close to delivery) markets to fine tune their position.

POLPX

Electricity exchange based in Poland.

Pool

The pool or the electricity pool of England & Wales refers to the trading arrangements in place before the introduction of NETA in 2001. The pool facilitated a competitive bidding process between generators that the set the wholesale price paid for electricity each half-hourly settlement period of every day.

Powernext

A European energy exchange with it's a focus on operations in France.

Prompt Trading

Refers to trading for delivery between (but not including) within-day trading and the next month (front month). This includes a number of products, including for delivery in the following day (e.g. day-ahead), weekend, weekdays, and trades for the balance of week and balance of month.

R

ROC

Renewable Obligation Certificates: Certificates received by eligible renewable generators for each MWh of electricity generated. These can be sold to suppliers in order to fulfil their obligations under the RO.

RTE

Gestionnaire du Réseau de Transport d'Electricité. Transmission system operator in France.

S

SBP

System Buy Price. The price which imbalanced parties pay for a short energy imbalance.

SME

Small and Medium Enterprises (SME) sector the SME sector includes a wide range of non-domestic consumers, from relatively large businesses for whom energy is a major cost to much smaller businesses that may closely resemble domestic consumers in their approach to energy procurement.

Spot Price

The price for the immediate delivery of a commodity.

Spot Trading

Refers to trading for delivery on the same day as the trade (within day).

SSP

System Sell Price. The price which imbalanced parties receive for a long imbalance.

Structured Contracts

Where energy is purchased directly from generators or producers and are arranged bilaterally.

System Operator (SO)

The entity charged with operating either the GB electricity or gas transmission system. NGET is the operator of the high voltage electricity transmission system for the GB. NGG is the operator for the gas national transmission system for GB.

T

TPA

Third Party Access.

Traders

Participants, agents or actors in the process of buying or selling.

Transaction Cost

A cost incurred by a party during the completion of a sale or purchase.

TSO

Transmission System Operator, entity in charge of operating transmission facilities either for electricity or gas.

TTF

Title Transfer Facility, a virtual trading point for natural gas in the Netherlands.

TXU

Texas Utilities, today known as Energy Future Holdings Corporation.

U

UCTE

The Union for the Co-ordination of Transmission of Electricity, association of transmission system operators of the Continental countries of Western and Central Europe.

UIOLI

Use-it-or-lose-it, a contractual term referring to a capacity or rights holder who has either the choice to use their capacity/rights or lose them to the open market.

Uniform Network Code (UNC)

As of 1 May 2005, the UNC replaced National Grid Gas Network Code as the contractual framework for the national transmission system, gas distribution network and system users.

V

Variation Margin

A variable margin payment that is made by clearing members to their respective clearing houses based upon adverse price movements of the futures contracts that these members hold.

Vattenfall

Sweden based vertically integrated energy company.

Vertical Integration

Where one supply group owns two or more parts of the energy supply chain. For example, where the same supply group owns generation capacity and also supplies energy to the retail market.

Volatility

Relative change of prices from one time period to another, often in the short run; also used as a measure of risk, hence viewed as a negative in that it represents uncertainty.

W

WACOG/WACOE

Weighted Average Cost of Gas/Weighted Average Cost of Electricity.

Z

Zeebrugge (ZEE)

Trading point for natural gas in Belgium