Liquidity Intervention Options

Prepared By:

ESP Consulting

4 Barb Mews

London

W6 7PA

United Kingdom

Issued: May 2013

Status: FINAL

CONTENTS

PART I - INTRODUCTION AND SUMMARY

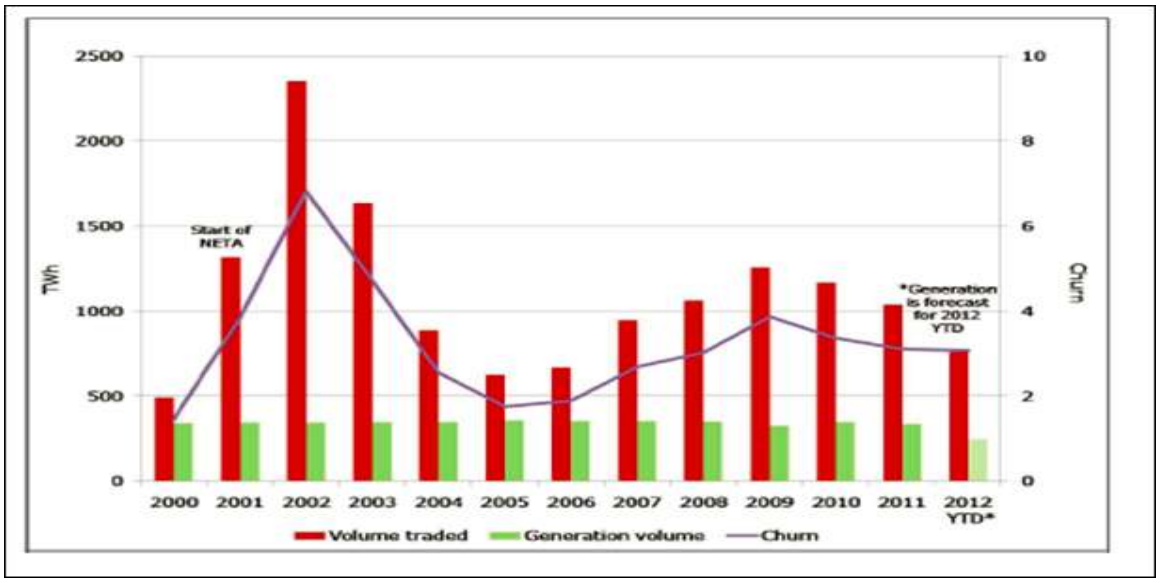
1 Introduction

1.1 Context and Background

1.1.1 The GB wholesale power market exhibits low levels of liquidity relative to other major European markets and international commodity markets. While the recent surge in volumes traded at the N2EX exchange has markedly improved the depth in Day-Ahead auctions and short term markets, liquidity in forward trading products remains poor by comparison to both the NBP gas market and the Nordic and Continental power markets.

1.1.2 According to the latest Ofgem liquidity data, 2012 traded volumes were 900 TWhs, down from 1100 TWhs in 2011. This corresponds to a churn rate, by which we refer to the ratio of traded volumes over underlying physical consumption, well below 3. This compares unfavourably to past levels of liquidity, especially the churn rate greater than 9 achieved briefly by the GB market in the immediate period after the launch of NETA. Figure 1 below illustrates the development of GB power market churn rates over time. (Note that 2012 figures in the graph have been scaled to a full year based on data up to the end of Q3). We have received updated data during this assignment from Ofgem on which the above-mentioned figures are based).

Figure 1: GB Power Market Churn Rates[1]



1.1.3 By comparison, in recent years the NBP gas market has exhibited a churn rate in the range of 10-12 times underlying physical consumption, while the Nordic and Continental power markets continue to deliver churn rates above 6-7 times the underlying physical consumption. Furthermore, what liquidity there is available is predominantly focussed on the front 12 months of the forward curve and standard baseload products. There is very limited depth beyond 12 months or in peak and other shaped products.

1 Ofgem, "Secure and Promote", 2012, p. 7

2 The Financial Services Authority which has been abolished and replaced by two successor organisations. The Prudential Regulatory Authority (PRA) which forms part of the Bank of England and the Financial Conduct Authority

1.1.4 Ofgem first identified low liquidity as an issue in 2008 and since then it has undertaken a number of market assessments and consultations to identify options to address it. In its most recent consultation (December, 2012), Ofgem explored a range of options primarily designed to 'secure and promote' recent industry led developments including "locking-in" the recent surge in Day-Ahead auction volumes.

1.1.5 Low liquidity obscures investment signals and reduces risk management and route to market opportunities. It represents a potentially significant barrier to entry, growth and greater competition in generation and supply markets. A liquid wholesale power market is also a key enabler of the Government's Electricity Market Reform programme which aims to bring forward new investment from a range of sources.

1.1.6 The relatively higher liquidity of the NBP gas market together with its correlation to the GB power market creates the possibility for participants to achieve certain hedging and risk management objectives through the NBP market. Nonetheless, reliance on the gas market as a proxy increases costs and risks and therefore the lack of power market liquidity continues to be a concern.

1.1.7 Given the importance of liquidity to meeting Government's competition objectives, the government is seeking powers in the Energy Bill to allow it to intervene if necessary. We understand that such powers may be deployed should the Government conclude that Ofgem's proposed interventions need to go further and/or can be more quickly delivered through secondary legislation.

1.2 Purpose and Scope

Purpose

1.2.1 The Department of Energy and Climate Change (DECC) has commissioned ESP Consulting to carry out an assessment of the options for intervening. Such an assessment will be used to support ministers during the passage of the Energy Bill and to help identify the Government's preferred approach to provide a basis for consultation, if appropriate. The primary purpose and objectives of this work is to:

i) Define a clear and concise framework for analyzing and assessing different options for intervening in the GB power market. This framework needs to balance the potential liquidity benefits against the costs and risks associated with the intervention (both implementation and ongoing) as well as with the fit and compliance with ongoing and forthcoming market reforms and regulations;

ii) Detail the primary intervention options and the manner and degree to which design features can be flexed to achieve different outcomes (e.g. to achieve liquidity in different areas of the curve, minimise delivery risk, impact on the trading requirements of different business models);

iii) Set out a clearly defined menu of interventions for consideration supported by:

- Clear choices and recommendations relating to the design detail;
- An analysis/explanation of the rationale for particular design choices; and

- Where relevant, descriptions of how these options have been employed in other sectors/markets.

This menu should include not just primary intervention options, but also supplementary measures, which on their own may not be sufficient to meet Government objectives, but which nonetheless might be worth including as part of a wider package; and

iv) Provide technical advice on the implementation and ongoing arrangements (regulatory and/or operational, e.g. trading platforms) necessary under each option for the Government, regulator and obligated parties.

Scope

1.2.2 The Government's primary objective is to promote competition and market access in a way that supports well-functioning wholesale and retail markets and the delivery of EMR. In this context, a well-functioning wholesale market is one which affords participants across a variety of different business models with:

i) Sufficient access and routes to the market to allow them to enter and compete;

ii) An effective suite of instruments which supports trading and hedging activities as well as robust management of wholesale market risks; and

iii) Transparent, clear and unbiased market information and data against which to base trading and commercial decision making.

1.2.3 This implies a longer term and broader focus on removing structural barriers to entry and competition which extends well beyond (short term) measures which potentially deliver an immediate impact on GB market traded volumes. It also implies a focus on the forward markets where liquidity is currently low. While impacts on other areas of the curve are considered and within scope of this report, the Government recognises the recent progress in improving liquidity in the prompt markets.

1.3 Structure of this document

1.3.1 The remainder of this PART I of the report presents a summary of our findings and conclusions in Chapter 2. The main body of the report is divided into two overall parts.

PART II – Liquidity Drivers

1.3.2 Any analysis of potential intervention options must necessarily start from a robust understanding of the issues and factors which have led to the current state of the market. In PART II we therefore examine the key drivers of liquidity in the GB power market as well as the many challenges and headwinds facing DECC and Ofgem in this area:

- **Chapter 3** presents a brief overview of the recent liquidity levels in the GB power market and a summary of the key drivers further elaborated in the following chapters;
- **Chapter** 4 considers the influence of market structure and trading arrangements including the potential impact of the EMR and Ofgem reform initiatives;

- **Chapter** 5 analyses the industry structure in the GB power sector and the impact of vertically integrated business models deployed by the large GB players; and
- **Chapter** 6 finally examines the impact of margining and credit requirements in light of new financial regulations such as EMIR;

Part III – Intervention options

1.3.3 Having considered the key drivers of GB power market liquidity, PART III identifies and evaluates a wide-ranging suite of potential interventions:

- **Chapter 7** provides a brief overview of the primary and supplementary intervention options considered;
- **Chapter 8** sets out the Analytical Framework for assessing different intervention options consistently and comprehensively as agreed with DECC;
- **Chapters 9 through to 12** define and evaluate each of the primary intervention options comprising:
  - Partial or full Restrictions on Self Supply (SSRs) within Vertically Integrated Utilities (VIUs);
  - Options for supporting SSRs with additional constraints on the VIUs' internal organisation aimed at separating up- and downstream trading activities and commercial decision making;
  - Mandatory obligations on large players to participate in auctions for forward products; and
  - Mandatory obligations to offer Market Marking services.
- **Chapter 13** defines and evaluates each of the supplementary intervention options which in themselves are unlikely to deliver the desired outcome, but which nonetheless support and augment the primary interventions; and
- **Chapter 14** finally presents our conclusions and recommendations across all (primary and supplementary) liquidity intervention options.

Appendices

1.3.4 A number of appendices which provide additional or supplementary data and information are included:

- **Appendix A** provides guidelines for the assignment of ratings to each of the individual assessment criteria defined in the Analytical Framework introduced in Chapter 7;
- **Appendix B** outlines typical VIU business models (and some common variations thereof) to support the discussion of VIU liquidity drivers in Chapter 5 and the definition of intervention options in Chapter 5;
- **Appendix C** details the analysis which supports the estimates of potential churn contribution under Partial and Full Self-Supply Restrictions (SSRs) discussed in Chapter 9;
- **Appendix D** includes two case studies from other markets which illustrate SSR interventions as well as interventions which (in addition to an SSR) place additional

constraints on the functional (internal) operation of the business in line with the Agency and Full Separation Models defined in Chapters 9 and 10;

- **Appendix E** provides background information and explanations to support those who are less familiar with the credit and margining concepts discussed in Chapters 6 and 13;
- **Appendix F** details the assessment of each of the intervention options summarised in Chapters 9 to 12; and
- **Appendix G** finally provides a summary of the scores across all Primary and Supplementary interventions of each individual assessment criteria to support the conclusions set out in Chapter 14.

2 Executive Summary

2.1.1 Levels of liquidity in the GB wholesale power market have declined from levels observed in the past, and are currently low in comparison with the NBP gas market and with other major continental European power markets. While market depth in the Day-Ahead and short-term markets has recently improved, liquidity in forward-traded products remains low. Low liquidity is perceived to be a barrier to entry and competition, to obscure investment signals, and to reduce opportunities for hedging and risk management.

2.1.2 The Department of Energy and Climate Change (DECC) has commissioned ESP Consulting to carry out a study of the options for intervening in the wholesale power market with the objective of improving liquidity. The purpose of this study is to detail the potential options for intervention; to analyse and assess the benefits, costs, and risks of these interventions; and to outline the technical arrangements required for the implementation and maintenance of the interventions in practice. This report outlines the results of this study.

2.2 Liquidity Drivers

2.2.1 GB power market liquidity is influenced by a number of factors and drivers, such as the industry structure as well as the structure of the GB wholesale market and of trading arrangements. The study identifies a number of the most important constraints on liquidity. These include, first of all, a relatively small number of market participants compounded by the low level of connectivity of the GB market to other markets. Both the Continental and the Nordic markets benefit from far larger numbers of active participants as well as better connectivity with other markets, and we believe this leads directly to higher levels of liquidity observed. Secondly, the NBP gas market is much more liquid than the power market, and because it is correlated with the power market it provides a substitute (although imperfect) for hedging GB power. Thirdly, vertically-integrated (VI) organisations are the dominant structures in the GB market, and as a result of internal netting, they have relatively fewer reasons to participate in wholesale markets. While VI is a common feature across the European power industry, the greater number of participants and stronger connectivity in, for example, the Continental and Nordic markets, may serve to dilute the liquidity impact of such business models. Finally, the financial arrangements in the power market, such as credit or collateral requirements, create barriers to participation and therefore reduce liquidity. Reforms of financial market regulation, such as EMIR, are expected to further dampen market liquidity.

2.3 Intervention Options

2.3.1 The study considers a wide range of potential intervention options targeted to mitigate low levels of liquidity. These options were identified during a number of workshops with DECC. We distinguish between primary intervention options, which are assessed to have the potential to significantly impact market liquidity, and supplementary intervention options, which, while not likely to completely mitigate low liquidity as a stand-alone solution, would nonetheless support or augment the primary interventions.

2.3.2 An analytic framework to support the consistent evaluation of the primary and supplementary intervention options was also developed and agreed with DECC. Criteria for the assessment of the interventions are established under three high-level objectives, namely to reduce barriers to entry and competition; to minimise costs, complexity, and risks; and to align and comply with reform and regulation.

2.3.3 The primary intervention options include Self-Supply Restrictions (restricting the volume of power a company can supply from its own generation), Functional Separation (constraints on the internal organisation of vertically-integrated companies), Mandatory Auctions (obligations on certain players to participate in auctions of forward products) and Mandatory Market Making (obligations on certain players to continually offer to both buy and sell volumes of power in the forward market).

2.3.4 Applying the analytical framework to the primary intervention options, we find that the assessment of the Mandatory Auction and Mandatory Market Making interventions is overall positive. These interventions have greater scope to direct the forward products (tenor and shape) onto which the intervention is focused, compared to other primary interventions, and therefore to directly support the goals of transparency of price signals and availability of hedging products. The Mandatory Market Making intervention is judged to be the superior option as it is the sole intervention which facilitates market participants to decide for themselves the volumes and products they require, as opposed to a target set of volumes and products determined in advance by the regulator.

2.3.5 In contrast, the interventions which constrain vertical integration (Self-Supply Restrictions and Functional Separation) score negatively on the analytical framework. At first sight these interventions have potential to increase liquidity, assuming trading behaviour (i.e. churn rates) is unaffected by the restriction. However, as discussed in this report, we doubt that this assumption holds. There are a number of advantages which accrue to vertically-integrated companies which experience suggests lead them to churn their underlying (net) positions more actively than non-integrated players (not least independent suppliers). These include diversification along the value chain, collateral-free off-take and sourcing channels within the business, a relatively balanced market risk position, advantages in the short-term market relating to balancing and shaping, and a tendency towards higher credit/debt ratings due to perceived higher stability. Actions which constrain vertical integration are disruptive to these benefits and therefore disproportionally increase costs and there is no guarantee that such interventions will lead to sustainable improvements in liquidity.

2.3.6 Among the supplementary intervention options, a proposal by Ofgem to oblige participants to gross-bid 30% of annual generation into the Day-Ahead auction is judged to be positive overall but insufficient to influence forward liquidity, as is another Ofgem proposal to modify license conditions to require “fair and reasonable terms” when trading with small suppliers. The choice of the low-carbon baseload CfD reference price is very likely to be supportive of liquidity in the particular product selected as the reference. Measures to improve the availability and transparency of market data have the potential to reduce barriers to entry. In contrast, our initial analysis of selected interventions to mitigate credit risk or support smaller players in obtaining credit and managing collateral requirements suggest these initiatives would be either inequitable or impractical. However, more work is required in this area.

PART II – LIQUIDITY DRIVERS

3 Overview

3.1 Introduction

3.1.1 The intervention options considered in Part III of this report must necessarily be analysed and evaluated in the context of the underlying factors leading to the current market state as well as consider potential new challenges and headwinds which may impact the market and its ability to deliver a satisfactory level of liquidity going forward.

3.1.2 In this part we therefore first examine the key drivers of liquidity in the GB power market which we have grouped as follows:

i) GB market structure and trading arrangement such as gas market correlation, changes in generation mix brought about as a result of EMR, impact of NWE market coupling and the EU target model as well as Ofgem's and DECC's ongoing reform initiatives (**Chapter 4**);

ii) GB industry structure in terms of the number of independent active participants, the different types of business models deployed and the level of vertical integration amongst the Big Six (**Chapter 5)**; and

iii) Margining and Credit arrangements in light of recent developments in European financial regulation (**Chapter 6)**.

3.1.3 Before addressing each of these driver groups in depth in chapters 4 to 6, we first briefly summarise our main findings and conclusions in the remainder of this chapter.

3.2 Summary of Findings

Drivers leading to Current Market State

3.2.1 The low level of liquidity currently observed in the UK power market is the result of a number of factors. We have identified the following to be the most important:

i) The GB power market has a low level of interconnectivity to other markets, especially the continental market. Interconnection as a proportion of installed capacity is low compared to the Nordpool market and to other markets on the continent. A direct consequence of the isolation of the GB market is a relatively small number of market participants.

ii) The GB power market is dominated by vertically integrated utilities, active in both the generation and supply markets. This industry structure brings a number of inherent benefits to the vertically integrated companies: natural hedges stabilise cashflows and financial results, shaping and balancing risks are mitigated, credit risk and cash collateral requirements are avoided, etc. While some other countries also have a significant level of vertical integration while maintaining market liquidity, the GB market combines high levels of vertical integration, a small number of participants, and low interconnection to other markets.

iii) The NBP gas market is much more liquid than the GB power market. At the same time, the two markets are highly correlated. Market participants therefore frequently use the NBP gas market as a proxy for the power market, using gas transactions as a hedge against power exposures.

iv) The GB market has relatively complex market arrangements and a penal Balancing Market (BM) mechanism compared to Nordic and North Western European markets, which are direct barriers to entry for new participants.

v) More recently, margining has become more and more common as a mitigation for credit risk (although this is not specific to the GB market).

Potential Future Liquidity Drivers

3.2.2 Looking forward, there are a number of additional drivers that may impact liquidity in part brought about as a result of the many reforms and regulations being introduced over the coming years. While some of these may, in fact, enhance liquidity, others present additional challenges and liquidity "headwinds". Most notably:

i) Changes in the generation mix brought about by EMR, namely a greater volume of intermittent generation, will likely reduce incentives for forward trading and hence (on its own) impact liquidity negatively.

ii) Association of the CfD reference price for intermittent generation with the Day-Ahead market will focus trading efforts in the spot market to the detriment of the forward market.

iii) European financial regulations, and especially the EMIR regulation, have the potential to impact churn in the power market. The EMIR regulation defines a threshold for nominal trading volumes, above which companies would have additional compliance requirements imposed on them. Large companies are expected to reduce their trading activities to remain under the threshold, while those that exceed the threshold will be required to collateralise a greater proportion of their trades.

iv) We expect that market coupling and the EU Target Model will be a positive market development, but the low level of interconnection will mean that the impact will be limited.

3.2.3 These drivers, and the mechanisms by which they impact power market liquidity, are elaborated in the following chapters.

4 Market Structure & Trading Arrangements

4.1 Introduction

4.1.1 This chapter examines elements of the GB market structure together with accompanying trading arrangements which impact trading market liquidity:

- **Section 4.2** discusses the importance of proxy (dirty) hedging strategies and hence whether the observed power market liquidity necessarily paints a true picture of liquidity as well as the impact of recent low price volatility;
- **Section 4.3** considers the current level of power market price volatility and relates this to levels of power market liquidity;
- **Section 4.4** analyses the impact of changes in generation mix and in particular the increase in the share of intermittent generation as a result of EMR;
- **Section 4.5** assesses the impact of market coupling and alignment to the EU target model within the NWE Region;
- **Section 4.6** considers the influence of Ofgem's ongoing reform of the cash-out mechanism as well as the introduction of capacity payments under the EMR programme; and
- **Section 4.7** finally considers the potential impact of ongoing low carbon reforms.

4.2 Gas Market Correlation

4.2.1 The GB power market is highly correlated with the NBP gas market due to the extent of gas-fired generation. While causality may vary short term, on average and over the longer term the gas price tends to drive the power price. As a result of the strong and stable correlation between these markets, some industry parties use the liquid NBP market as a means to hedge their electricity exposure in preference to the more illiquid wholesale electricity market. Anecdotally, it is our experience that such proxy or "dirty" hedging and trading strategies are common and widely used across the GB power sector.

4.2.2 The FSA[2] data presented in the figure below compares the reported market size in both gas and power. Note that these data are compiled for financial year intervals and hence are not directly comparable to Ofgem's data on traded power volumes (which reflect calendar years). While one cannot infer a firm causal connection purely on the grounds of traded volumes, these data do lend some support to the hypothesis that liquidity and observed churn rates in these markets potentially are linked:

2 The Financial Services Authority which has been abolished and replaced by two successor organisations. The Prudential Regulatory Authority (PRA) which forms part of the Bank of England and the Financial Conduct Authority (FCA) which will cover firms interaction with consumers.

Figure 2: UK gas and Power Traded Volumes

Source: FSA

4.2.3 In so far that the gas market is a potential outlet for the lack of power liquidity, this raises a fundamental question as to whether power liquidity on its own should be considered a major concern. If participants can achieve their hedging and risk management through the NBP market, low liquidity in the power market may be considered a lesser problem.

4.2.4 Ofgem remains of the view that stimulating and improving liquidity in the electricity market is an important stand-alone objective. We agree with this view as the current correlation between gas and power cannot be relied on over the long term. The current extent of proxy-hedging depends critically on the current stable correlations between NBP and GB power which in turn rely on:

i) Gas-fired plant remaining the dominant marginal (price-setting) capacity; and

ii) Future developments in the EU ETS and the carbon price floor, which forms a potentially volatile component of the spread between gas and power.

4.2.5 There are many factors which could, and in all likelihood will, destabilise these assumptions including (but not limited to):

i) The decrease in gas fired-generation overall as predicted by DECC's own Central generation scenarios (refer Section 4.4 below). Even if gas-fired generation remains the main price-setting capacity in the GB system, the diminishing importance of generation as a key source of gas demand will likely to dilute the current level of coupling and in particular the stability of spark spreads;

ii) Changes in relative fuel prices in the GB system which pushes gas out of the marginal (price-setting) segment. There is no guarantee or inherent reason which dictates that gas will remain marginal and factors which potentially could change relative fuel prices include:

- Changes in coal prices resulting from changes in global supply/ demand balance in the coal and freight markets;
- Changes in the price of CO2 emission rights;
- Further depression of NBP prices, for example, in response to increased LNG imports or the possible impact of shale gas;
- Increased competition on the margin as a result of NWE market coupling (although we believe this impact to be fairly limited as discussed in the following section); and
- Deterioration of recent stable plant reliability performance (e.g. major outages) which could push more efficient CCGTs back into the baseload segment.

iii) The ongoing EMR reforms as well as Ofgem's regulatory initiatives which impact the power leg, but not the gas leg, of the spark spread.

4.2.6 For these reasons, it is not in our view sound to rely on the NBP as an outlet for power liquidity. Failure to develop the GB power market could expose smaller participants to a future scenario in which they suddenly find themselves struggling to access the forward markets and suitable products. Furthermore, while some smaller participants have started using proxy-hedging strategies, not all may want to, or be equipped to, manage the multiple commodity positions and basis risk that such strategies necessarily entail.

4.2.7 We conclude that over-reliance on NBP is neither a robust nor safe option and that Ofgem and Government therefore are correct in seeking to ensure a well-functioning power market in its own right.

4.3 Power Market Volatility

4.3.1 Volatility is the propensity for market prices to change. A market with relatively stable prices has low volatility, while prices in a market with high volatility (a "volatile market") frequently increase or decrease by relatively large amounts. Figure 2, below, represents the volatility of the third forward season in the GB forward power market, graphed as a function of time. It is evident that power market volatility has declined in recent years, from a peak in 2008, and is now at historical lows. We believe that power market volatility is aa driver of the need for utilities to trade forward and hence power market liquidity and churn due to its relationship with hedging strategy.

Figure 3: GB Power Market Volatility 2002 - 2012

4.3.2 A lower power market volatility reduces the inherent market risk in open positions and therefore facilitates larger open market exposures for a given risk appetite. When power prices are not expected to change rapidly by large amounts, the risk of being unhedged is lessened. Generators and suppliers may therefore not see the need to hedge open volumes to the same degree, or to the same forward tenor, as they would when market prices are volatile.

4.3.3 Even when power exposures are hedged, power market volatility may drive the need to rebalance hedges. One possible hedging strategy for a generator is to hedge on the basis of expected production. A generator will make a forward dispatch plan for thermal assets, and then hedge the expected production (i.e. hedge the purchase of fuel and CO2 required as well as the sale of power generated). For baseload plants in the lower (cheaper) part of the merit order, changes in power prices are unlikely to result in changes to the dispatch plan. However, for mid-merit plants whose avoidable costs are close to power price, changes in the power price (or in the

underlying cost of generation) will change the dispatch planning and therefore hedging requirements. In a volatile market, marginal plant will move into and out of a generator's forward dispatch planning. A generator will respond by rebalancing existing hedges (selling hedges as plant moves out of the dispatch or re-hedging volumes as plant moves in). This activity obviously creates churn in the market. The current low level of GB power market volatility decreases the requirement for the rebalancing of the hedges of generators. We note here that power demand is very inelastic, and consumers do not generally demand less power in response to increases in the power price. Suppliers therefore do not generally need to rebalance hedges in response to changing power prices.

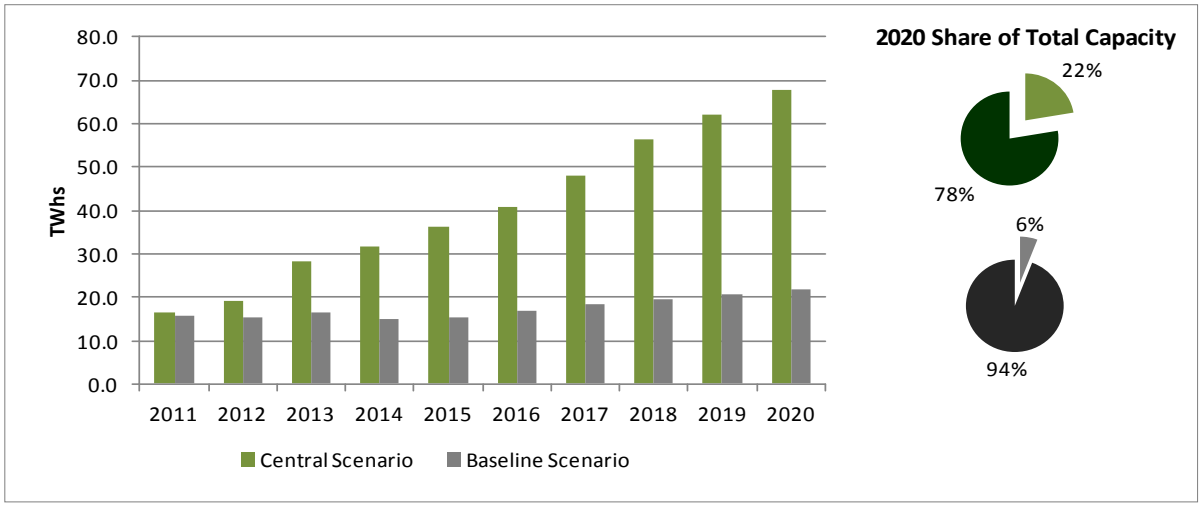
4.3.4 Some thermal generators have a more sophisticated approach to the hedging of marginal plant. Recognising their asset position as a real option, i.e. financial position that may or may not have an associated cashflow depending on market outcomes, they employ a technique called "delta-hedging" for their expected forward generation. A delta-hedging strategy for a power plant is usually applied only for marginal plants and involves hedging a portion of the expected the generation, depending on the time to deliver and the probability of dispatch, which itself depends on the level of power market volatility. For low levels of power market volatility, the delta-hedge position will be rebalanced less frequently.

4.3.5 Low levels of power market volatility therefore lead directly to low levels of churn, either by reducing the need for power generators to rebalance their hedges on mid-merit generation plant, or by permitting all market players to keep a larger open generation or supply position for a given level of risk appetite.

4.4 Generation Mix & Intermittency

4.4.1 The transition to low carbon generation driven by the EMR Programme will fundamentally change the structure and mix of plant within the GB market. While the carbon content of the fuel in itself is of little relevance to liquidity, increased intermittent (unpredictable) capacity on the system is likely to have a negative impact as discussed below.

Figure 4: Intermittent Generation under DECC Baseline and Central Scenarios



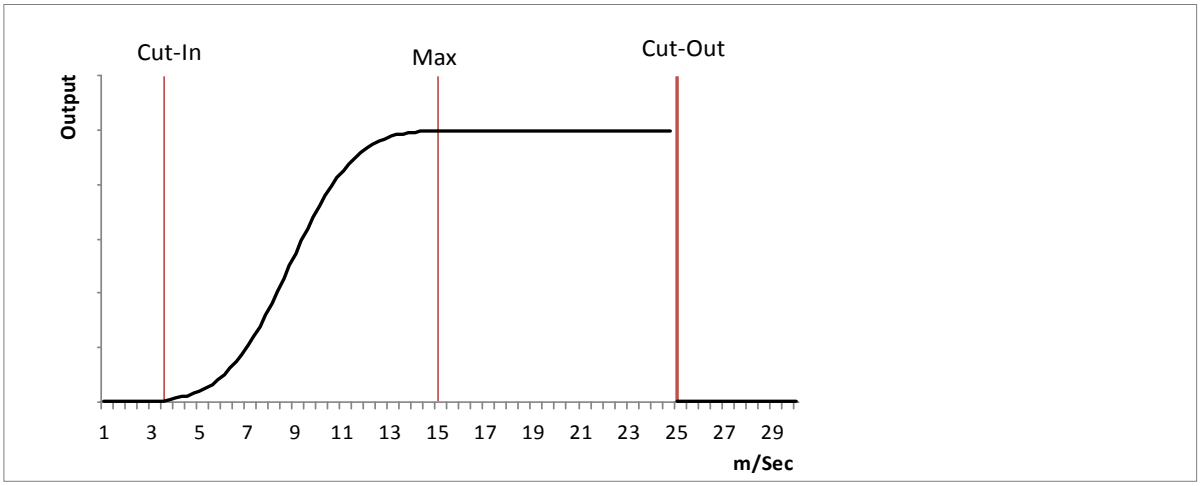
Source: DECC

4.4.2 Figure 4 above presents estimates of the amount of generation delivered by intermittent capacity under DECC's Baseline and Central Scenarios, respectively[3]. For the purpose of this estimate, intermittent generation capacity is defined as all on and off-shore wind plus small Hydro and Solar[4]. As illustrated, the EMR programme will almost quadruple the share of intermittent capacity in the GB system by 2020 (and this trend will continue post 2020). This change in the generation mix will likely reduce incentives for forward trading and hence (on its own) impact liquidity negatively. There are three principal reasons for this conclusion.

Reduced demand for forward trading

4.4.3 Intermittent generators tend to spill their power into the day ahead and intra-day markets. This reflects the inherent uncertainty of generation as a function of (constant) wind speed.

4.4.4 The figure below illustrates the typical generation profile of a wind mill. Speeds below 3 m/sec do not generate sufficient energy to power the mill. Above this level, output will increase with increasing wind speed with the unit typically reaching its rated (maximum) output at around 14-15 m/sec. Above a certain level of wind speed (usually around 25 m/sec), the pressure on the rotors create risk of structural damage and hence the blades are stopped.



4.4.5 While companies are improving their intra-day forecasting of wind speeds and hence generation, the inherent uncertainty of wind forecasting beyond the day ahead stage (i.e. next 24 hours) does not lend itself to forward trading of what is a very unpredictable output profile. For the same reason, the reference price for the Intermittent CfD was chosen as the Day-Ahead auction price[5]. The use of a longer dated period was considered to pass too much risk onto intermittent generators. Conversely, it was considered acceptable to leave intra-day forecasting risk with the participant, as existing wind forecasting techniques do allow generators to have some view of what they will likely generate over the next 24 hours.

3 The Baseline scenario represents forecast of generation in the absence of the EMR (hence represents the "baseline" against which EMR impacts are estimated). The Central Scenario is the current main forecast given the EMR programme.

4 Circa 7% of "Other Renewables" according to the current Duke Statistics.

5 As determined by the Virtual Hub under the NWE market coupling arrangements.

4.4.6 The intermittent CfD strongly reinforces the focus on Day-Ahead trading for intermittent capacity. A generator will be able to achieve strike price under the contract, provided it is able to physically trade its expected generation at the contract reference price. Hence, the least risky behaviour under this contract is to leave positions open until the Day-Ahead stage. It follows that the increase in the share of generation produced from intermittent sources must be expected to reduce the demand for forward trading and hence, everything else being equal, have a dampening effect on overall market liquidity.

4.4.7 It is possible that some of this negative impact could be mitigated through the emergence of aggregators, which are able to create a wider and geographically diversified portfolio. However, in our view it is unlikely that even a widely geographically diversified portfolio will render sufficient stability of generation (i.e. average wind speed) to accommodate and incentivise substantive forward trading. As part of our work on the CfD design for DECC, we briefly looked at wind speed data across the GB and we did not find substantive evidence of strong portfolio effects[6]. However, we recommend that DECC undertake a more in-depth analysis of wind speed data to confirm (or reject) this hypothesis.

Decreased predictability of peaks

4.4.8 Increased intermittency within the GB system is also likely to make peak generation requirements more weather (as opposed to time of day) dependent. While customer demand is broadly likely to continue to follow normal load patterns, the generation capacity available to meet such load will depend on whether (or not) the wind is blowing. Hence, high price periods may occur as a result of very low (or very high) wind conditions and hence become less predictable as the amount of intermittent generation sources on the system increases.

4.4.9 In our view, this has the potential to reduce the relevance of existing peak and shape products which are defined in accordance to (fixed) time periods. Conversely, it may increase the demand for options (or one-way CfDs) which protect the buyer from prices over a defined (peak) price threshold (strike price) rather than during specific time periods. This suggests that liquidity interventions which specifically focus on the existing peak products could be at risk of missing their objective.

Increased dispatch uncertainty for non-intermittent generation

4.4.10 The final impact of increased intermittency concerns the running regime for non-intermittent plant operating in the baseload or in the lower end of the mid-merit. Plant which otherwise would be expecting to operate constantly in the baseload or be predictably dispatched in merit order[7] may find itself pushed out temporarily when the wind blows[8]. In turn, this increased despatch uncertainty could have an (albeit probably limited) impact on such player's appetite for contracting forward.

---

6 This analysis, which was carried out during our year-long engagement on the design of Low Carbon CfDs, was based on review of historic wind-speed data from a wide range of geographical locations across the UK.

7 At current prices this includes, for example, most coal-fired capacity in addition to the nuclear fleet.

8 I.e. between 14 and 25 m/sec.

A rough estimate

4.4.11 A rough estimate of the partial impact on liquidity attributable to increased intermittency may be derived by comparing DECC's Central and Baseline Policies Scenarios (refer Figure 4). This estimate necessarily relies on simplifying assumptions and most notably:

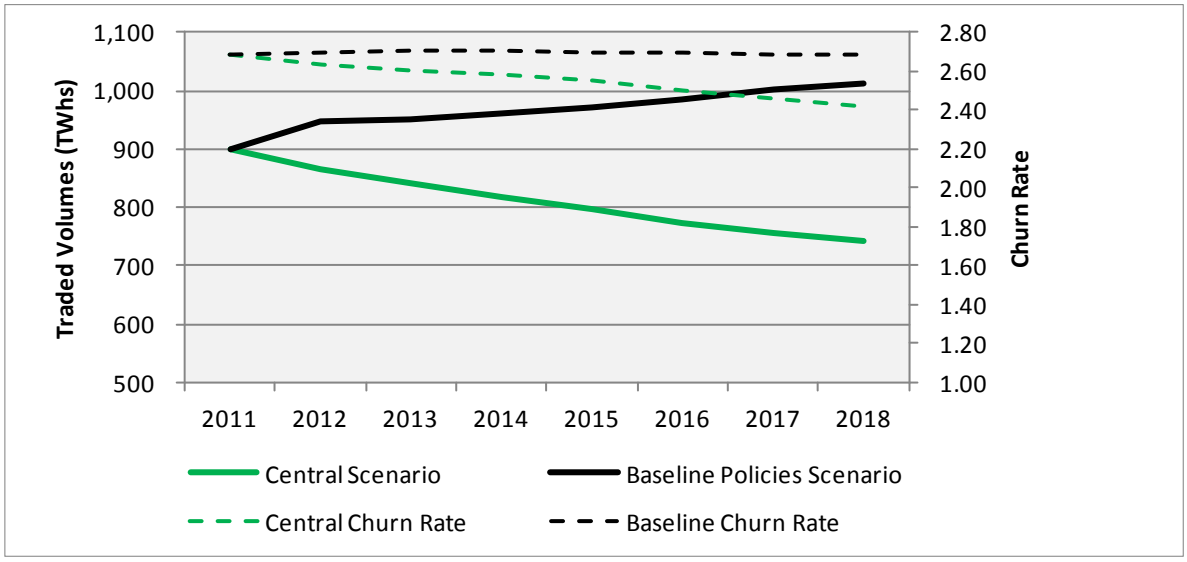
i) All intermittent generators spill into day-ahead and intra-day markets and hence only contribute to the observed trading once (their churn rate is 1);

ii) All observed churn (over and above 1) is assumed attributable to non-intermittent generation sources; and

iii) The observed 2012 churn rates for non-intermittent generation are constant over time (players continue to trade as they do today).

4.4.12 According to the most recent data provided by Ofgem (Secure & Promote proposals, S&P[9]), traded volumes were around 900 TWhs in 2012 which broadly corresponds to an overall GB wide churn rate of 2.8 of underlying generation[10]. Applying the first assumption, intermittent generation is assumed only to contribute towards the observed trading with their own generation which in 2012 was around 19.3 TWhs. Under the second assumption, the remaining 881 TWhs trading observed is attributable to non-intermittent capacity. As non-intermittent generation was around 317 TWhs in 2012, this gives an adjusted churn rate for such capacity of 2.78 (881/317). Assuming non-intermittent trading behaviour is unchanged over time (see assumption iii in paragraph 4.4.11) traded volumes are projected under both scenarios using this historic churn rate. The resulting projection of traded volumes under DECC's Baseline and Central scenarios is summarised in Figure 5 below:

Figure 5: Traded Volumes under Baseline and Central Scenarios



9 Ofgem, Wholesale power market liquidity: consultation on a 'Secure and Promote' licence condition (12-2012)

10 This is down from 1,100 TWhs in the previous year, a sharp fall which emphasises both the importance and challenges of addressing GB power market liquidity.

4.4.13 In conclusion, assuming intermittent generation does not trade forward, while all other players continue to trade as they do today, then increased intermittency is likely to reduce liquidity materially.

4.5 Market Coupling and Physical Interconnection

4.5.1 Market coupling and alignment to the EU Target Model is due to be implemented across the North Western European (NWE) region from 2014, with the exception of the Single Electricity Market (SEM) region[11] which will join in 2016. This initiative will introduce:

i) A single (Nordpool-inspired) price algorithm for Day-Ahead auctions across the entire NWE region;

ii) Implicit allocation of interconnection capacity consistent with zonal price differentials resulting from the daily auction process (so no more capacity bookings); and

iii) A single GB hub for Day-Ahead trading which consolidates the N2EX and APX exchanges to create a single GB wide Day-Ahead bid/offer curve (which is then submitted to the central price algorithm).

4.5.2 In terms of general market development, this is undoubtedly a very significant and positive step. However, in our view any positive impact on GB liquidity is likely to be relatively modest in the foreseeable future (next 4-6 years) and mainly limited to:

i) The creation of a single Day-Ahead hub which may serve to solidify and lock-in recent progress in (N2EX) Day-Ahead volumes[12] since access to the interconnections will be via one of the day-ahead auctions (APX in addition to N2EX) ;

ii) Avoiding counter-flows against prevailing price differentials with the introduction of implicit capacity allocations; and

iii) The creation of a single integrated price zone across the GB and SEM regions post 2016.

4.5.3 While these improvements are important, market coupling will not deliver the same magnitude of stimulus seen, for example, when Nordpool was expanded to include the entire Nordic region. There are two principal reasons for this conclusion:

i) The GB interconnections are already close to maximum utilisation; and

ii) Relative to domestic generation, both existing and planned expansions of GB interconnection capacity is nowhere near the levels enjoyed in the Nordic region or between the major Continental price regions.

4.5.4 Table 1 below compares national interconnection capacities in the Nordpool and GB/SEM regions as a proportion of the total domestic generation capacity. As illustrated, the level of interconnection to surrounding markets is far greater across the Nordics. For the GB market to enjoy similar level of interconnection, 10-15 GWs of additional interconnection capacity to the Continent would be required. This is vastly more than current level of planned (or remotely likely)

11 The SEM region comprises Northern Ireland and the Republic of Ireland.

12 In particular as access to the interconnections now go through the Day-Ahead auctions.

investments over the next 4-6 years. Hence, we conclude the spot prices will substantially remain determined by local GB system conditions and forward liquidity will likewise mainly be determined by local liquidity. By the same token, however, it is also likely that the convergence between the SEM and GB markets with the commissioning of the East-West interconnection will continue to gather pace once both are aligned to the EU Target model[13].

Table 1: Interconnection in Proportion of Total Domestic Generation Capacity[1]

Nordpool

	Denmark	Finland	Norway	Sweden	Lithuania	Estonia
Denmark		0%	3%	7%	0%	0%
Finland	0%		0%	7%	0%	13%
Norway	7%	0%		10%	0%	0%
Sweden	14%	17%	13%		0%	0%
Lithuania	0%	0%	0%	0%		28%
Estonia	0%	2%	0%	0%	21%	
Nordpool	**22%**	**19%**	**16%**	**24%**	**21%**	**41%**
Continent	11%	0%	2%	3%	0%	0%
Total	**33%**	**19%**	**18%**	**27%**	**21%**	**41%**

GB/SEM

	GB	SEM
GB		9%
SEM	1%	
Continent	4%	0%
Total	**5%**	**9%**

1) Where import and export capacities differ, import capacities are applied

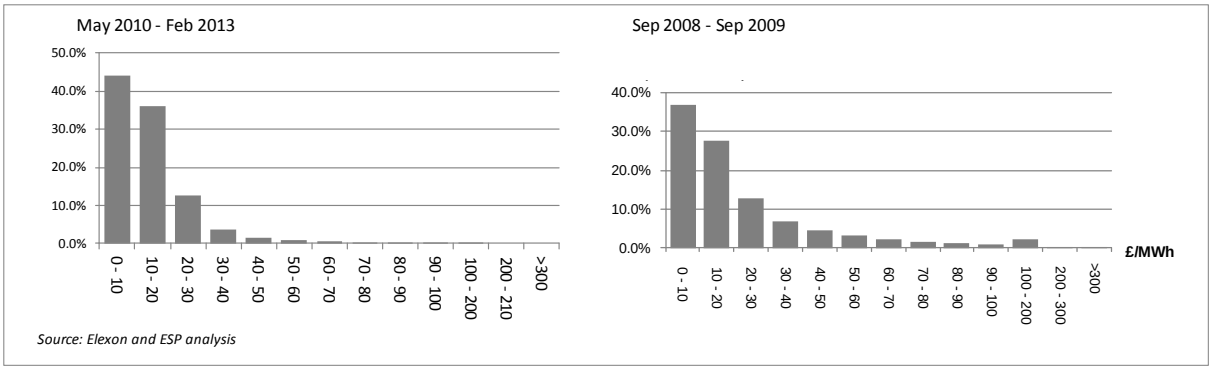
1) Source: NordReg - Nordic Market Report 2012

4.6 GB Trading Arrangements

Cash-Out Reform

4.6.1 While cash-out arrangements in the balancing market (BM) typically are viewed as a serious risk by market participants, recent history has been relatively benign. Figure 6 below compares the distribution of the spreads between System Buy (SBP) and System Sell (SSP) prices from May 2010 to February 2013 and from September 2008 to September 2009[14]. As illustrated, the distribution of the more recent SBP/SSP data is considerably narrower, generally suggesting a lower level of balancing market risk.

***Figure 6:** SBP/SSP Spreads*



4.6.2 While there are a number of factors that contribute to this development, the most important is in our view the current high levels of excess (flexible) CCGT capacity in the GB power system. With Flue Gas Desulphurisation (FDG) equipped coal units running baseload and the reliability of the

13 We understand from industry sources that the East-West Interconnection in its early days of trading are already seeing lower SEM/GB spreads than previously.

14 The SBP/SSP distributions in each graph are computed from the individual half-hours within each of the two periods.

GB nuclear fleet much improved in recent years, CCGTs are being pushed out of merit. Some gas plants are forced to rely on the SBP/SSP spread to make (any) money, leading to highly competitive bidding behaviour in the balancing market.

4.6.3 In our view, the current benign market state cannot be relied upon to persist. While the impact of the Large Combustible Plant Directive (LCDP) on non-FDG units is probably already factored into the market, the current glut of CCGT capacity is not commercially viable in the longer term. It seems likely that such capacity will increasingly become candidate for mothballing[15]. Combined with increased intermittency on the system resulting from EMR, withdrawal of significant amounts of capacity could increase the risk of experiencing periods with serious pressure on system margins.

4.6.4 Notwithstanding the current benign state of the market, balancing market risk remains a driver of VI business models (refer next section) and a potential barrier to entry, in particular in the upstream. Operators of few, but large, units are particularly exposed to significant market imbalances when experiencing forced outages. The dual price design of the balancing market can expose such players to material financial penalties in particular as:

i) A large imbalance may take multiple bids into the balancing market stack to clear the volume lost due to a big outage event; and

ii) Return to "normal" market prices can take hours or even days due to prompt feedback loops.

4.6.5 While the balancing market incentivises reliability, such events are certainly not entirely controllable and represent *ex-ante* a stochastic risk for all generators. Likewise, for intermittent generation balancing market risk is a continuous additional cost which in turn is a key rationale for the (often steep) PPA discounts charged by the larger players in return for taking on third party developed and owned wind capacity. In our view, balancing market risk remains a material concern to market participants and a potential barrier to entry as well as investment.

4.6.6 This conclusion is <u>not</u> inconsistent with the "missing money" problem, namely that the monies available across the industry are insufficient to remunerate sufficient capacity to be available. We understand that Ofgem, as part of its ongoing Significant Code Review, is considering a further sharpening of balancing market price incentives in part in view of this concern. In our view, however, the increased risk accompanying such a change would likely serve to increase barriers to entry for new players in both generation and supply and potentially also exacerbate the missing money problem itself. Investors are unlikely to invest on very spiky, but equally very rare, prices and may well require larger capacity payments as insurance against the associated higher balancing market risk.

4.6.7 The missing money problem is not just a question of the total level of remuneration, but also a function of the uncertainty (risk) on revenue streams. In our view, any reform of the cash-out mechanism therefore needs to distinguish clearly between the total monies required to remunerate sufficient capacity to ensure system reliability and how such monies are factored into market prices. Addressing the missing money problem need not require imposition of increased

15 In so far that this is viewed as an undesirable outcome, it is in itself a reason for the introduction of capacity payments.

(and to some extent uncontrollable) price risk on participants. Indeed, we suspect this is likely to lead to less efficient outcomes for the industry as a whole.

Capacity Payments

4.6.8 The introduction of capacity payments is a fundamental change in the GB market design. In our view, it is arguably the single biggest market event, since the launch of NETA, with structural impact that extends far beyond other EMR components including the introduction of low carbon CfDs.

4.6.9 A change of this nature will almost certainly impact liquidity, but the direction of such impacts is not certain. *Prima facie*, increased P&L certainty for generators may:

i) Reduce entry barriers (hence support long term liquidity generation)

ii) Take some of the pressure off the cash-out mechanism (refer discussion above) if more flexible plant are able to continue to operate, as well as help address the "missing money problem"; but also

iii) Diminish incentives for hedging of generation positions making generators more willing to "ride" short term markets.

4.6.10 The net sum of these impacts is hard to predict, although other power markets with capacity payments tend to exhibit low forward churn (e.g. SEM). However, in most cases these markets have developed around mandatory gross pools, a market design that inherently struggles to generate forward liquidity.

4.6.11 The move away from an "energy only" market to a dual market for energy and capacity may also impact:

i) Product pricing and definition as the reference prices are adjusted to account for capacity payments (and may reopen existing contracts at cut-over to new arrangements);

ii) Spark spreads in the GB power market and hence the interface to NBP; and

iii) Interconnection flows with coupled neighbouring energy only markets.

4.6.12 These impacts depend critically on whether these payments:

i) In one extreme add what is currently "missing money" – i.e. increases the cake; or

ii) In the other extreme, leave total industry revenues unchanged but split value into two components reducing energy price levels relative to the "energy only" market.

4.6.13 While neither of these extremes is likely to eventuate, an outcome closer to the first extreme is in our view less likely to create distortions on the commercial incentives and dispatch on trading with neighbouring markets . Since the capacity payments (in this scenario) adds monies, the drivers of relative prices (spreads) to NBP and neighbouring power markets are (broadly) maintained. In contrast, outcomes closer to the second extreme scenario have the potential to materially change relative prices as the current level of revenue is split into two components.

4.6.14 In this (extreme) scenario, spark (and other fuel) spreads would be reduced potentially distorting despatch signals for international trades. Likewise, the spreads to (as yet) energy-only continental markets would favour exports and GB capacity payments could end up subsidising generation

costs in those markets. This type of structural inconsistency already exists between the SEM and GB market, which is why Irish exports/imports are subject to a surcharge/uplift, but such corrections will not be possible under the implicit capacity allocations required by the EU Target Model. Of course, this concern rests on the near-continental market continuing to trade on an energy-only basis. However, the UK is not alone in contemplating introduction of capacity payments. Were all neighbouring countries to adopt such an approach, this would mitigate (and possibly eliminate) the potential for such distortions. Having chosen to go down this route, in our view, it is now in DECCs interest to argue strongly for inclusion of capacity payments under the EU Target Model (to ensure consistent design and application).

4.7 Low Carbon Reforms

Low Carbon CfDs

4.7.1 While the Low Carbon CfDs depend on robust (liquid) reference prices, these contracts will also stimulate liquidity in the products they reference.

4.7.2 The amount of (basis) risk under any CfD depends critically on the access to trade/hedge the underlying reference price. Provided that the CfD owner is able to trade the underlying reference price, the hedge remains intact and the CfD owner will receive the strike price for the contract volume. In contrast, if the CfD Owner is not able to trade at the reference price, basis risk is created between the value of the market revenue received and the difference payments[16].

4.7.3 Provided that the CfD reference price benchmark is tradable and avoids products that cannot be readily accessed, these instruments will direct liquidity towards their own benchmark. While this does not necessarily increase traded volume, it provides DECC with a strong instrument for directing liquidity along the curve as further discussed in Chapter 13.

GB Carbon price Floor

4.7.4 While the carbon price floor will not impact liquidity directly, it may indirectly influence trading through:

i) Changing relative prices between the GB and neighbouring markets (making the GB market a relatively higher priced market); and

ii) The uncertainty that exists with respect to how the floor is revised and set following the initial 2 year window.

4.7.5 In our view, the second item above does potentially constrain forward trading. We are aware of companies which have prohibited their traders to trade beyond the point at which the carbon floor is certain.

16 i.e. these components will not add up to the strike price value.

5 Industry Structure & Business Models

5.1 Introduction

5.1.1 This section examines the liquidity impact of the GB industry structure including typical business models and the level of vertical integration:

- **Section 5.2** compares the GB industry structure with the Nordic and Continental markets;
- **Section 5.3** considers the trading incentives under typical business models deployed within the GB market;
- **Section 5.4** summarises the main drivers for vertical integration; and
- **Section 5.5** finally provides estimates of the level of integration across the Big 6.

5.2 GB Industry Structure & Concentration

5.2.1 In our assessment, probably the single most significant explanatory factor for the relative low levels of liquidity in the GB power market compared to the Continental and Nordic markets is the number of active participants in each of those markets. The table below illustrates this point:

Table 2: *Exchange Participants/Members*

	DA Auction	Futures/Derivatives
Nordpool Exchange (Elspot and NASDAQ)	363	135
Continental (EPEX and EEX)	206	164
GB (N2EX/NASDAQ only)	40	14

Source: N2EX, Nordpool and EPEX websites

5.2.2 As evident from the table, both the Continental and the Nordic market benefit from far larger numbers of active participants. While the North Western Continental market is much bigger than the GB in terms of physical production, the Nordics are broadly similar[17] It should be noted however that the GB data is based on N2EX members only and there are companies which trade in the GB market via the APX exchange and OTC brokers only. These numbers will therefore understate the total number of active participants in the GB market, although not by a material margin given N2EX's increasingly dominant position[18].

5.2.3 It should also be noted that the number of participants obviously cannot be separated from the level of interconnection between different countries and zones. As noted in the previous chapter, both the Nordic and Continental regions enjoy much higher levels of interconnection than that

17 Based on 2012 electricity production statistics, the total generation across Norway, Sweden, Denmark and Finland is around 15% above the GB.

18 This problem does not exist in the Continental and Nordic markets, where EPEX/EEX and Nordpool/NASDAQ respectively are the only exchanges.

available between the GB and the Continent. By the same token, however, this does not explain the stark differences in the table above.

5.2.4 The large number of active participants within the Nordic region owes much to the historically disaggregated and dispersed industry structure of the Norwegian power sector comprising numerous municipality operations and smaller independent participants including large consumers. Nordpool, which was founded in Norway (then as Statnett Market), was initially established and developed to serve this wide community. Furthermore, while the power industry in other Nordic countries have consolidated much as in the GB, concession rules and municipal ownership have limited this process in Norway.

5.2.5 Another reason is the presence of large reservoir hydro capacity. Such capacity offers great physical flexibility in the despatch horizon which tends to smooth spot price volatility compared to a thermal dominated system. This more benign pricing environment improves the ability of smaller trading entities to enter and operate in the market.. It has also encouraged far more consumers to participate in the market (typically via retail brokers). This combination of the physical flexibility of the Norwegian system and a diverse industry structure was an essential ingredient in the birth and initial growth of this exchange. The extent of interconnection was critical for its subsequent highly successful expansion across the Nordic region.

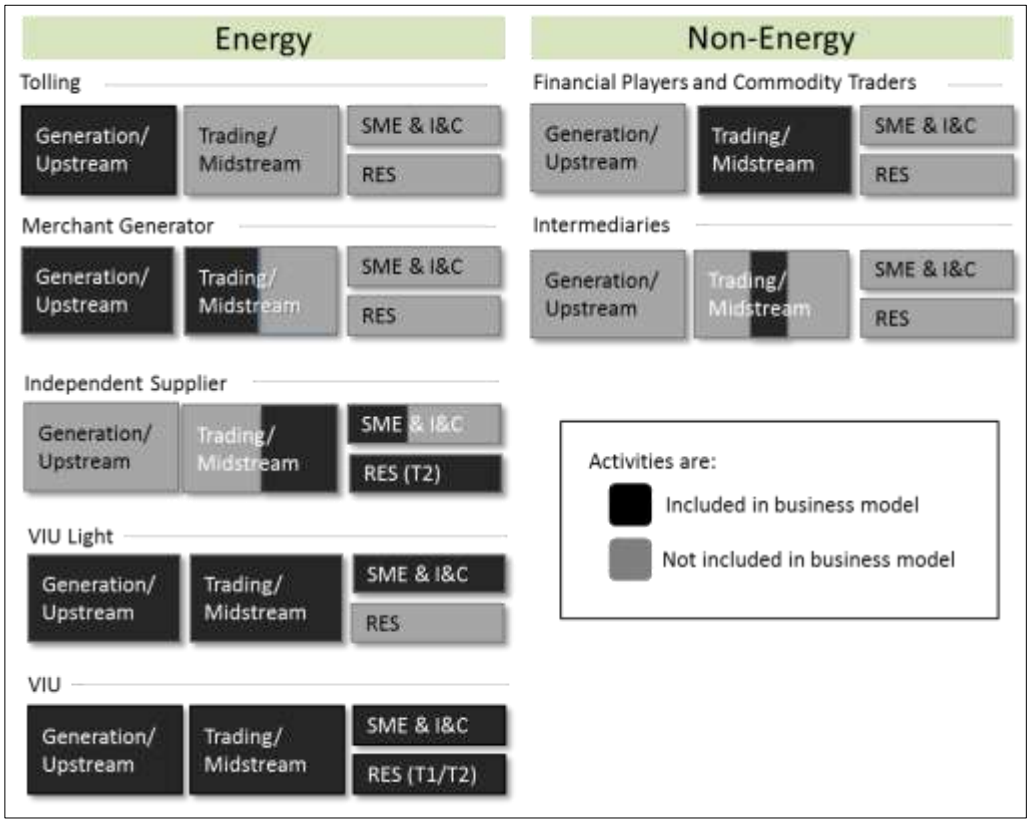
5.2.6 While the French and the Belgium power sectors were historically highly concentrated, the German market was also dominated by numerous small municipalities and Statwerke at the time of liberalisation. These numbered in the hundreds and this diverse industry structure has undoubtedly benefited the development of what later would become the EPEX exchange. As in the case of Nordpool (and even more so), the high level of interconnection was subsequently critical to the merger of the French and Belgium exchanges with EEX. Today, the EEX and EPEX exchanges dominates pricing far beyond the borders of the founding countries (e.g. into Switzerland, Austria and Czech Republic).

5.2.7 While the GB wholesale market is not particularly concentrated (based on competition measures), it never benefitted from the participation of numerous smaller players, so critical to the initial growth of the Norwegian and German markets. Undoubtedly, this is in part a reflection of the industry structure pre privatisation and the absence of smaller independent players at the time of liberalisation. Following the influx of US merchant generators in the late nineties and the subsequent launch of NETA, liquidity did improve considerably as explained in the introduction to this report. However, this stimulus was subsequently lost in the wake of the demise of Enron and the exit of the US players. Apart from major investments in interconnection capacity to the Continent (refer previous chapter), the key sustainable solution to the underlying industry structure outlined above is to encourage new entry and we agree with the Government's prioritisation of this objective. In this regard we note that there are signs of a revival in merchant generation operations as discussed in the following section. With the commodity trader Vitol's very recent announcement of their acquisition of the Immingham power plant, this positive development seems to be gathering pace.

5.3 Typical GB Business Models

5.3.1 Figure 7 below outlines 7 generic business models including financial and other non-energy focussed players and intermediaries. While there are many variations on each of these models, they capture the basic business models present within the GB power market:

Figure 7: Generic Business Models



Tolling

5.3.2 Under the Tolling business model the Toller provides fuel (and carbon) and takes the power output from a plant that is developed and operated by a third party (the Tolling Operator). Normally, this type of arrangement will transfer direct commercial and despatch control to the Toller, while the Tolling Operator is responsible for all technical and operational aspects of the plant. Hence, a pure tolling agreement enforces a clear separation between management of the physical asset and the commercial market exposed positions resulting from its operation. The main compensation paid by the Toller to the Tolling Operation is a fixed fee (normally monthly) which is paid regardless of the level of dispatch. From the perspective of the developer, a long term tolling agreement provides a highly bankable structure, which supports project financing.

5.3.3 Tolling type arrangements became quite popular during the first waves of CCGT investments in the GB market and are also present in other European markets. Initially, such arrangements were often implemented as two separate contracts with a Gas Supply Agreement for sourcing of fuel and a Power Purchase Agreement for the off-take. While the resulting allocation of operational and commercial responsibilities under these structures were slightly less clear, the overall objectives were broadly similar to a single Tolling Agreement. In the GB market, examples of

existing CCGTs operated on a tolling basis include ESB International's (ESBI) Marchwood plant, for which SSE is the Toller, as well as InterGen's Spalding plant, which is contracted to Centrica under a long term PPA[19]. The PPA structures backing various renewable projects are also based on this premise, namely clear separation of the construction of the wind and other renewable capacity and the commercial management and optimisation.

5.3.4 The demand for standard tolling structures for large scale thermal capacity is drying out and there are few recent examples (Marchwood being the latest we are aware of). In part, this reflects that the Big 6 today have the expertise necessary to develop and construct such plants. From their perspective, a tolling agreement imposes unwarranted and unnecessary contractual complexity which (however well drafted) inevitably reduces commercial flexibility and control compared to own operated capacity. In today's market, tolling arrangements will typically require special features (i.e. green power, ROCs and/or location) or grant the Toller an equity share in the asset. For example, the ESBI developed Marchwood CCGT is owned 50% by SSE.

5.3.5 While the Tolling Operator, which developed and constructed the plant, will not trade the output, such plant will contribute to liquidity as part of the Toller's (off-taker's) asset and contractual portfolio. In this respect the liquidity impact of this type of contractual structure is broadly neutral and dependent on the trading activities of the particular Toller.

Merchant Generator

5.3.6 By a Merchant Generator, we refer to a generator without a (material) downstream business which seeks to earn its revenues directly in the wholesale market (i.e. has no long term PPA or tolling agreement). While this model became very popular in the late 90s and early 00s, the slump in wholesale prices in 2002-2004 demonstrated its inherent vulnerability which in turn led to exit of many of the US merchant players as well as the sale of British Energy, the single largest merchant operation. Combined with the consolidation of much of this capacity within wider VIU (Big Six) portfolios, the demise of these players coincided with, and was undoubtedly a significant cause of, the sharp drop in churn rates witnessed in the aftermath of the launch of NETA market.

5.3.7 In the current market, Drax remains the largest single Merchant Generator, notwithstanding that the company acquired the Haven supply business as well as entered into long term off-take agreements with Centrica. Arguably, one might also classify the tolling arrangement for Eggborouogh as a merchant position under Bank of America Merrill Lynch's management since this plant has not been merged into a wider portfolio. Likewise, Macquarie Bank has recently bought thermal stations, namely Baglan (from GE) and Sutton Bridge (from EDF) while also upgrading its GB power trading team. The recent Macquarie acquisitions may suggest a revival of the merchant model led by pension funds and infra-structure developers. As the sharp reduction in liquidity following Neta suggest, in our view little doubt that such capacity did, and still do, contribute positively to liquidity in the GB market. Managing a physical spark or dark spread exposure in the GB market which is in-the-money (i.e. in base or mid-merit) will require frequent adjustment of hedges in response to changes in expected generation. The amount of trading stimulated by such changes as well as delta hedging strategies will in general greatly exceed that of stand-alone downstream operations

19 ESB International is an example of a company which has pursued a tolling strategy to support its CCGT development programme and, for example, also owns and operates CCGTs on a tolling basis in Spain.

Independent Supplier

5.3.8 The Independent Supplier business model covers sales of power to retail and commercial customers sourced directly in the wholesale market, without the backing of substantial upstream asset positions. Hence, this business model incorporates trading (purchasing) and sales functionsas well as all back-office operations required to manage, settle and bill customers. While the Trading/Purchasing function will include hedging and sourcing of sales positions it need not include full 24/7 operations, as such services can (and are) acquired through intermediaries such as E24[20].

5.3.9 The Independent Supplier is dependent on the downstream margin between end-customer prices and the wholesale cost of sourcing and delivering such power (including transmission and distribution costs, as well as balancing and management of volume risks in the delivery timeframe). A number of Independent Suppliers emerged post full deregulation in 1998, but many of these subsequently failed and had their licence revoked by Ofgem or transferred to a larger entity[21]. For a while this left only specialist (green) operations such as Smartest, but more recently general supply operations have re-emerged. Most notably this includes Ovo Energy, Co-op and Good Energy which have succeeded in acquiring and retaining portfolios of domestic power and gas customers as well as smaller SMEs in direct competition with the Big 6. These new entrants have emerged during a period of relative calm in the wholesale market and may face additional challenges in more volatile conditions. In these circumstances, limited access to products to hedge peaks and shape ahead of delivery could expose these companies to material risks. Likewise, more volatile prices would increase exposure to greater and more onerous margin calls for collateralised positions.

5.3.10 Irrespective of the success of Ovo and Good Energy, the Independent Supplier remains an exposed business model. Firstly, all customers on the Independent Suppliers' books have (by definition) moved supplier at least once. In general, acquiring such "Tier 2" customers is a highly competitive and low margin business. In contrast, the Big 6 still retain a sizeable "Tier 1" portfolio comprising customers which have never changed supplier. Tier 2 customers are far more price sensitive and do not (remotely) yield the price stability enjoyed by the Big 6 on their Tier 1 portfolio which tend to exhibit "stickiness" when prices fall.

5.3.11 Secondly, the Independent Supplier is far more exposed to internal shifts in the value chain than an integrated player. Whereas the VIU can absorb shifts in wholesale prices, which are partially or wholly offset by up- and downstream margins, the Independent Supplier model is exposed to the full impact of such shifts. Hence, the Independent Supplier will need to follow wholesale prices up (and down) to retain positive margins and will in general not have scope for under-recovery of margins over any sustained period of time. It is important to note that the VIU's ability to absorb internal value chain shocks is a genuine advantage of this business model (which does not rely on cross-subsidisation or other discriminatory behaviour).

5.3.12 Finally, Independent Suppliers are invariably cash constrained. While some may require pre-payment under direct debit mandates, these companies have to manage their working capital

20 See http://www.pxlimited.com/index.php/services/energy-management.html

21 For example, Atlantic, Eledor, Maverick, Utility Link and Zest had their licences revoked while Energy 4's licence was transferred to Centrica.

tightly. Truly independent operations, which are not supported by a larger parent[22], will in general be rated well below investment grade and hence have limited recourse to external finance at competitive rates. As such, management of cash flow uncertainty under margining terms is a key concern.

5.3.13 With respect to trading, we would expect that most Independent Suppliers contribute less to churn than the industry on average. While these operations may engage in more sophisticated trading and hedging strategies than simply outright purchasing, by and large the overall objective is to lock in margin at the time of customer acquisition. Hence, we would expect churn rates in this segment to be relatively low (i.e. below 2) and lower than Merchant Generators.

VIU Light

5.3.14 The VIU Light business model effectively combines the Merchant Generator with a supply business, typically (but not necessarily) focussed on larger I&C and commercial accounts. These customer segments are both highly price competitive and the main motivation for adopting this model is to improve the ability of structurally-long players to:

i) **Manage collateral and liquidity risks**: As discussed above, the margining risk on a long structural position under a pure merchant business model is potentially very substantial. However, the addition of a supply business provides a channel to market for the generation output which is essentially collateral and margining free; and

ii) **Camouflage Trading Intentions:** Bringing a (naked) structural long position into a market with limited depth may expose the merchant generator to unfavourable pricing terms. As the market knows a merchant generator has a structurally long underlying position which must be sold, counterparties may identify a distressed seller and therefore not feel the need to bid their most competitive prices. Adding a supply business to a structural long position improves the ability to camouflage trading intentions and hence manage these risks.

5.3.15 These benefits were a key reason British Energy (BE, prior to the take-over by EDF Energy) developed what ended up being the single largest I&C portfolio[23]. Without the ability to push a large portion of the nuclear generation through this channel, BE would have been in even greater difficulty. Other previously pure-merchant players have also moved downstream including, for example, Drax with the acquisition of Haven Energy.

5.3.16 While the VIU Light model reduces the need to trade/sell all of the structural long positions through the wholesale market, it equally increases the ability to manage market exposed positions and resulting collateral positions more effectively. It is difficult to judge the net result of these two impacts, but we suspect that the VIU Light model, if anything, contributes more to churn than the pure merchant model.

22 Smartest Energy is an example of an Independent Supplier which is backed by a strong parent (Marubeni).

23 Around 35 TWhs and hence over 50% of the annual nuclear output.

VIU

5.3.17 The VIU business model extends the VIU Light model, discussed above, to include residential customers. The VIU model describes the Big 6 in the UK market and is discussed in-depth in the section 5.4 below.

Financial Players and Commodity Traders

5.3.18 The main financial players involved in GB power include Morgan Stanley, Merrill Lynch, Barclays and JP Morgan. Deutsche Bank recently closed their London desk, but other players such as Macquarie Bank appear to be gearing up on the back of upstream acquisitions. Our industry sources suggest that financial players currently trade somewhere between 10%-20% of total markets volumes. Another related, but distinct, category of players is commodity trading houses such as Vitol and Glencore. While very big in oil, gas and coal internationally, we understand (from the same source) that their involvement in the GB market is very limited at present. In our view, this is a fairly strong signal that the GB power market liquidity is not considered sufficient to support the type of outright commodities trading these companies specialise in.

5.3.19 Finally, some new funds have started trading GB power, although these players do not make up for the loss of similar players over the last 2-3 years.

5.3.20 The very nature of the business of both financial players and commodity trading houses is trade and churn (proprietary) positions. While the contribution from this segment at present is limited, they represent a considerable potential for bolstering market churn rates and liquidity. By the same token, it is noteworthy that some of these players now are acquiring upstream asset positions and hence no longer rely solely on (proprietary) trading. Given the physical nature of the BETTA market, without any liquidity interventions, we struggle to see why the financial players and commodity houses would materially increase their current level of activity.

Intermediaries

5.3.21 We take the Intermediary business model to cover three categories of players in the GB power market:

i) Brokers;

ii) Companies that offer dedicated operational and transaction services on an agency basis; and

iii) Existing (typically large) industry players which in addition to their own business, offer third party risk management and transaction services.

5.3.22 While OTC brokers' business models are self-explanatory, the second category is less well defined. This category covers companies which offer market access and trading, optimisation and operational/logistic services for third parties. In the current GB market, one of the more prominent examples of such service offerings is Energy 24 (the PX Group). Energy24 is particularly aimed at supporting smaller participants and new entrants with both electricity and gas trading and operations. In power, their services include 24/7 trading optimisation of generation & demand positions as well as wider risk management and trading related services. Hence, a new

entrant supplier or generator can use such services in lieu of setting up their own 24/7 operation from the outset.

5.3.23 The final category is those larger players which in addition to managing their own positions also offer third party risk management, transaction services and market access. A typical client to such service might be a large consumer who wishes to make its own trading and risk management decisions, but does not wish to man a 24/7 desk nor develop a full suite of market access channels. This is a well-established model in the Nordic and Central European regions, which has played a critical role in extending wholesale market participation to large consumers and smaller municipalities and Statwerke. It is also a model that exists in the GB market although it is less prevalent here. Arguably, however, one might also include the PPA market for wind within this category as a type of intermediary service[24].

5.3.24 While these intermediary roles typically do not directly generate churn in their own right, there is no doubt that such players are critical in facilitating market access for smaller players and new entrants.

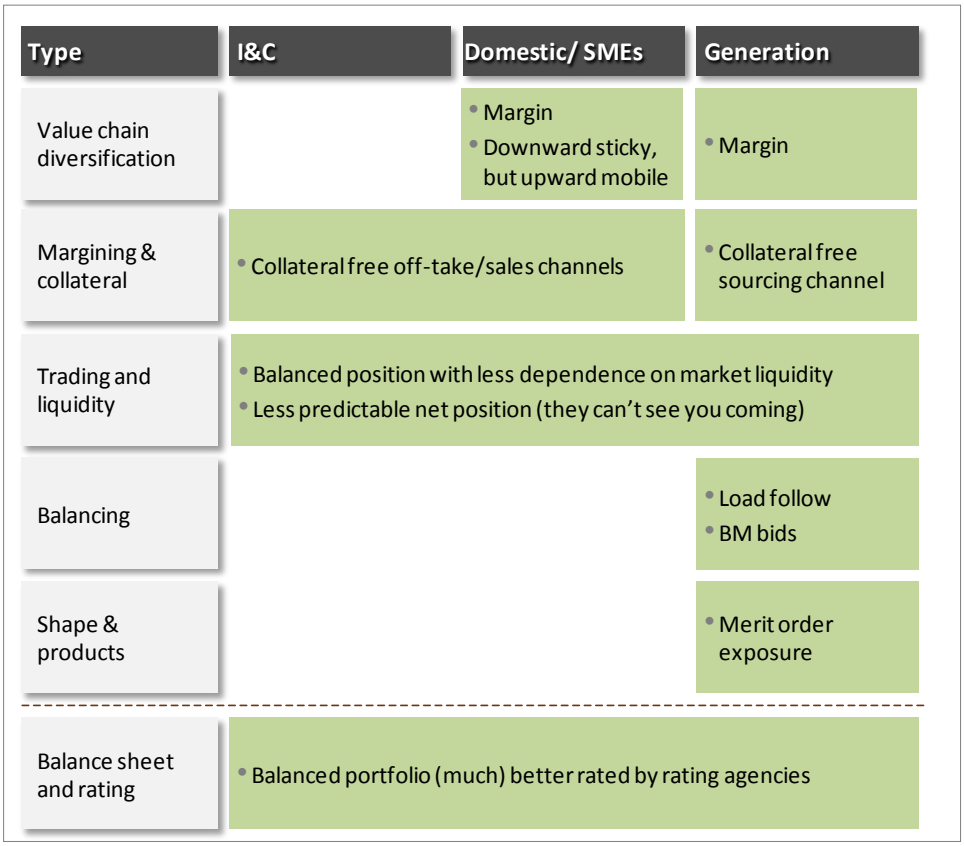
5.4 Drivers of Vertical Integration

5.4.1 While a variety of business models can be observed within the GB market, VIU and VIU Light models are the dominant structure amongst the larger players both here and across the Nordic and Continental markets. There are a number of sub-models of how VIUs organise themselves internally as briefly outlined in Appendix B, but today most VIUs integrated their operations around one centralised trading and midstream hub for all of Europe. Indeed, 3 of the Big 6 (EDF, RWE and E.ON) trade and manage the GB wholesale market activities from a desk within a much larger pan-European trading operations.

5.4.2 The move towards VIU models have been driven by a number of factors as outlined below in Figure 10 and briefly discussed in the remainder of this section:

24 Albeit the PPA transfers title of power and associated volume risk to the PPA provider, so in this sense it is not a true intermediary arrangement.

Figure 8: VIU Drivers



Value Chain Diversification

5.4.3 Diversification across the value chain offers the VIU two important benefits:

i) Ability to capture value along the entire value chain; and

ii) A hedge against internal movements in up- and downstream margins which are partially or wholly offsetting.

5.4.4 It is important to note that the second benefit is not dependent on any operational and transactional activity. Simply being present in both the up- and downstream will create a profit and loss (P&L) hedge on the balance sheet. By the same token, the value of the hedge depends critically on the composition of the downstream customer portfolio. As explained earlier, Tier 1 customers[25] are far more valuable than Tier 2 customers as much of the margin value is eroded at the first transfer of suppliers. Hence, harnessing this benefit is exclusively in the domain of the Big 6[26].

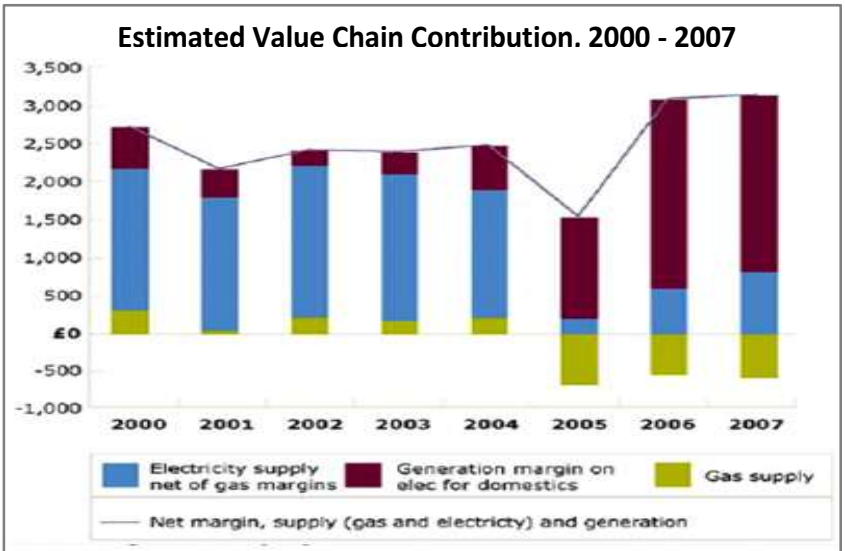
5.4.5 For the same reason, the Big 6 generally appear to seek to match their upstream generation positions with consumption across Domestic and SMEs, which are the mass market (consumption metered) segments that contain price sticky customers. For these players, VI does not necessarily imply balancing the entire load but rather this subset of the portfolio. This conclusion should not

25 Customers who have never moved due to a lack of engagement driven by a number of factors.

26 Note that ownership of Tier 1 customers is not intrinsically linked to VIU business models, but a result of the historic sector mergers and acquisitions.

be taken to imply that VIUs never use internal generation to serve I&C, but rather that the balance sheet hedge is effective across Domestic plus SMEs.

5.4.6 The value of this P&L hedge to VIUs was demonstrated during the large shifts in the GB value chain between 2003 and 2006. As illustrated in the box below, prior to 2005 merchant generators came under sustained financial pressure (and many left). After 2005 independent supplier came under similar pressure as value was shifted from the down to the upstream, at least partly as a result of windfall profits associated with the distribution of EUA certificates following the introduction of the EU Emissions Trading Scheme.



Source: Ofgem

5.4.7 Throughout this period, the VIUs were able to maintain relatively stable margin performance across the entire business as the shifts in upstream margins were offset by opposite shifts in the downstream. It should be noted that this benefit is not without limits. There are several examples of customers, presumed to be sticky, coming unstuck and changing supplier when offered large savings[27].

Margining & Collateral

5.4.8 The VIU business model also improves the ability to manage cashflow uncertainties stemming from trading on collateralised terms. Firstly, adding a supply portfolio to a generation position provides a margining free channel to market since customers typically do not demand collateral. Indeed, this was one of the key reasons a company such as British Energy developed a very large I&C portfolio (prior to its takeover by EDF). Similarly, adding a generation position to a supply portfolio provides a channel for collateral-free sourcing.

5.4.9 Secondly, ensuring a reasonable balance between buys and sells across the subset of the portfolio that is subject to margining terms reduces the cashflow uncertainty from such terms. To illustrate this point, consider a baseload generator that sells a 50MW annual baseload contract at

27 For example, in the early 1990s Oslo Energy faced aggressitve competition from Bergen Brokers resulting in very significant loss of legacy customers. More recently, ESB has lost a significant share of its previously captive customer base since the launch of the SEM.

£50/MWh. The contract value is therefore £219 million[28]. Now assume that market prices rise to £60/MWhs before deliveries start under the contract. In this scenario, the generator will have to post £43.8 million in variation margin[29].

5.4.10 Likewise, consider a supplier which buys the same contract. In this case, should prices fall by £10/MWh (before deliveries commence), the supplier would have to post £43.8 million. Of course prices cannot both fall and rise at the same time, but at the time of entering into the contract neither the generator nor the supplier have any certainty about future price movements. Hence, even if they actually traded with one another, both would have to ensure that they have access to sufficient cash on or off balance sheet to meet and withstand such collateral calls.

5.4.11 We now assume that the generator and the supplier are within the same VIU and that this VIU both sold and bought the contract. Since prices cannot both go up and down at the same time, any cash calls under one of the contracts are offset by incoming collateral postings under the other. In practice, VIUs with large up and downstream positions will engage in the market from both sides and the example illustrates how margining risk is reduced if the sub-set of the portfolio which is subject to such terms is reasonably balanced.

5.4.12 Hence, the VIU model provides improved ability to balance (and, if needed, minimise) trading on margin terms. In this respect, it is a more efficient model able to operate with lower collateral costs. We discuss and illustrate the liquidity impact of cash margining further in Chapter 6. As discussed below, the VIU model is also generally favoured by rating agencies over structurally exposed players and hence tend to have better (and cheaper) access to capital.

Trading & Liquidity

5.4.13 The VIU model is also less dependent on the liquidity (depth) of the market along the curve. A stand-alone generation or supply position is very visible to the market and this can place such players at a disadvantage. In contrast, the VIU's net portfolio position is far less predictable and hence such business models are not at the mercy of the market to the same extent. As a result, they are less likely to suddenly find themselves as a distressed buyer or seller. Furthermore, the VIU model may retain the bid/ask spreads in-house.

Balancing

5.4.14 Flexible mid-merit and peak capacity may support balancing market bids. To the extent that such capacity therefore is load following, such bids can provide some financial hedge of balancing market risks on the supply side (albeit by no means a complete hedge of such risks).

Shape & Products

5.4.15 With market liquidity very much concentrating on standard baseload and (some) peak products, a stand-alone supplier can struggle to acquire the shape and profile required to match their residential and SME customer portfolios. In today's market some independent suppliers have

28 50MW * 8760 hours = 438,000 MWhs * £50/MWh = £219 million.

29 This can be in addition to an additional initial margin which we however ignore here to keep the example simple.

given up on buying shaped products forward and effectively wait to shape their hedges until the day-ahead stage.

5.4.16 In contrast, a VIU with a diversified generation portfolio across both baseload and mid-merit/peaking segments can (to some extent) internalise shape and better support hedging of the supply business in offering shaped products.

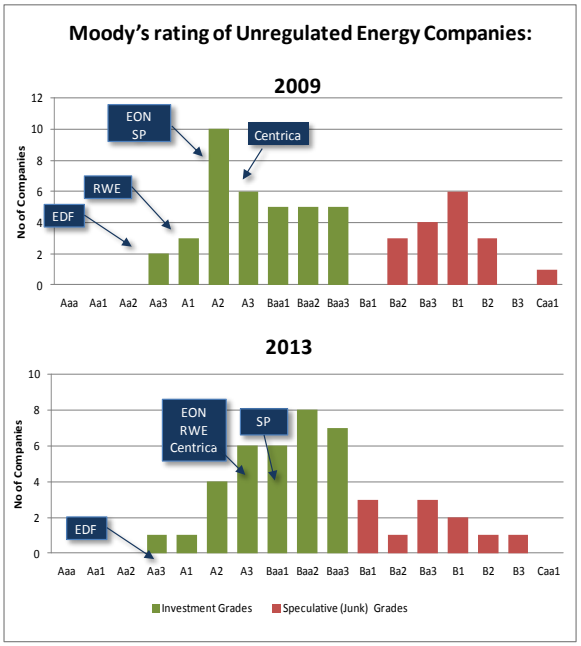
Balance Sheet & Rating

5.4.17 Companies that lose investment grade status (i.e. get downgraded to "Junk" – typically below BBB rating) are faced with a potential financial disaster[30] which seriously impedes the ability to obtain funding (at competitive rates) and operate in the market place as a result of increased security and collateral requirements. Maintaining and defending an above investment grade rating is therefore the primary concern for many (most) Board of Directors.

5.4.18 In part as a result of the VI benefit described above, rating agencies generally value portfolios which are well diversified across the value chain in particular when operating in unregulated net pool markets such as BETTA. Everything else equal, structurally unbalanced companies will generally fare less well than VIUs. In today's financially constrained markets, this is a substantive VI benefit and driver.

5.4.19 The right-hand side graph summarises Moody's rating of unregulated energy companies in 2009 and today (March 2013). Generally, the investment grade companies are dominated by (European) VIUs, whereas the speculative (junk) ratings are dominated by US merchant companies.

5.4.20 As illustrated, there has also been a general downward trend in ratings since 2009. While the number of junk companies is lower, this reflects ratings being withdrawn. The Big 6 have not escaped trend.



5.5 Current Level of Vertical Integration

5.5.1 Figure 9 below summarises the energy balances of the Big 6 in 2011. These data combine:

i) 2011 consumption data for the Domestic and Non-Domestic segments[31] with a further split of the non-domestic data into SMEs (proxy for non-half-hourly (NHH) metered load) and I&C (proxy for half-hourly (HH) metered load) based on DUKES 2011 Energy Statistics. This percentage split, which reflects the industry average, is assumed to apply to all Big 6; and

30 In general, loans and credit agreements will have covenants which greatly increase funding costs and limit access to liquidity in the event of downgrades..

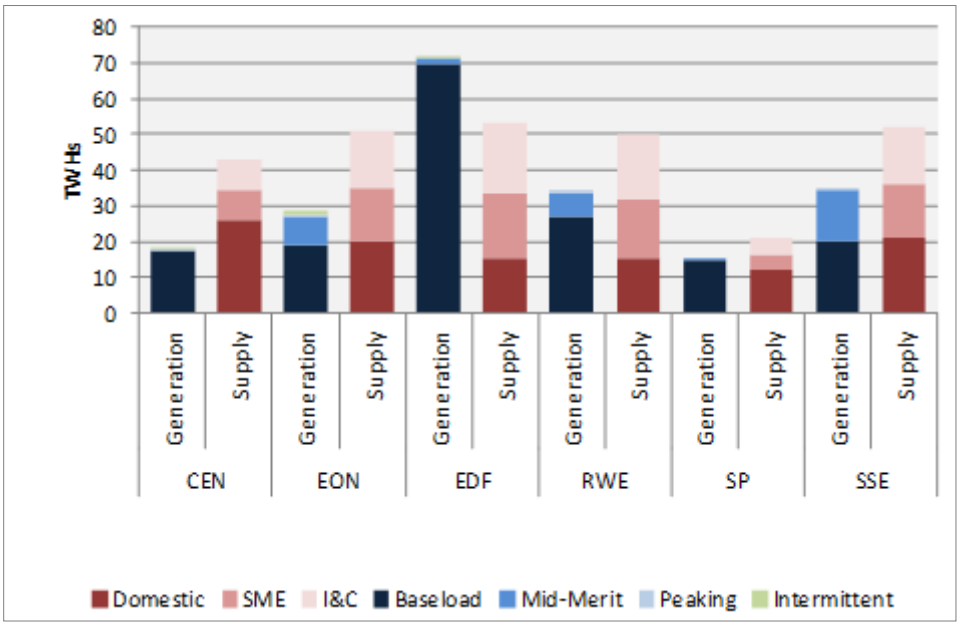
31 See: Ofgem: Publication of 2011 segmental generation and supply statements by energy companies

ii) 2011 generation data under DECC's Central (100g) generation scenario.

5.5.2 As illustrated in the figure, all Big 6 (bar EDF) were short[32]. For the short participants, total generation averages around 62% of total supply. Compared to earlier Ofgem Liquidity Studies[33] which found self-supply ratios above 70% on average, these figures suggest that the Big 6's portfolios have become somewhat less balanced in recent years.

5.5.3 As noted earlier however, companies generally price HH load (i.e. I&C) at market with the primary P&L VI benefits (balance sheet hedge) being derived from the combination of own generation and NHH domestic and SME load. On average the self-supply ratio across the Big 6 (again excluding EDF) increase to 87% when measured against this proxy for NHH load only. However, it should be remembered that the split of non-domestic load into HH and NHH components reflects the industry average split and hence, at best, an approximate measure.

Figure 9: *Big 6 2011 Energy Balance (Unadjusted)*



Correction for Contractual Assets

5.5.4 The physical energy balances presented above do not necessarily tell the whole story. Tolling and other similar long term contracts, which effectively create virtual asset positions, must be taken into account to create a comprehensive picture of the actual energy balances. In our view, whether or not a contract should be considered a virtual asset depends on whether it:

i) Transfers direct operational despatch control to the off-taker (i.e. Tolling) or provides indirect means of directing despatch (i.e. PPAs);

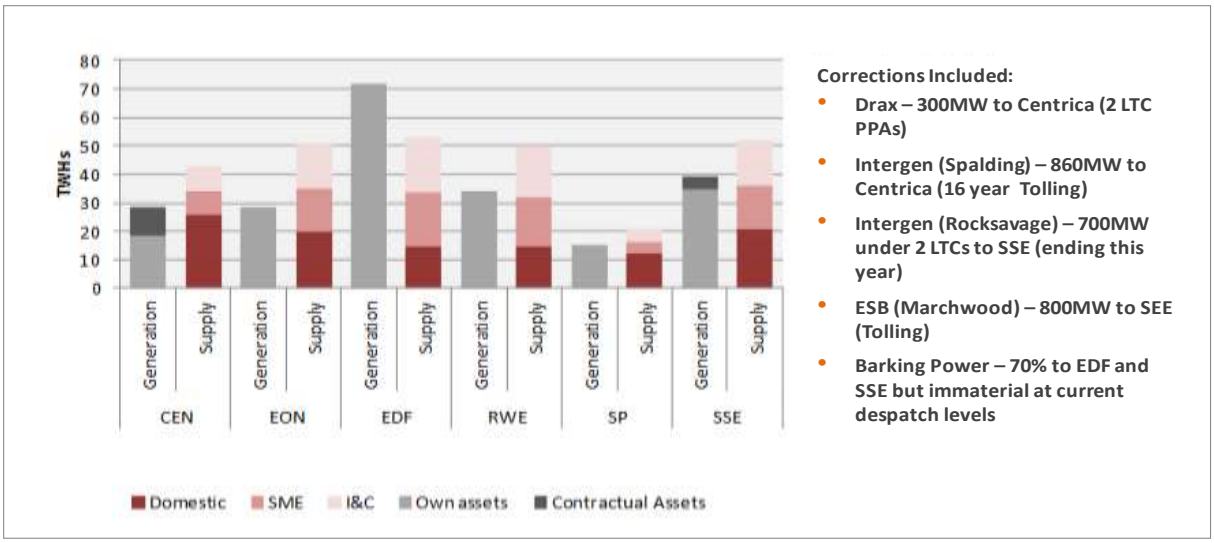
ii) Duration extends well beyond the GB term traded horizon (i.e. more than 3 years)

32 The long EDFE position reflects the acquisition of British Energy's nuclear fleet.

33 See Ofgem: Liquidity in the GB wholesale energy markets (2009)

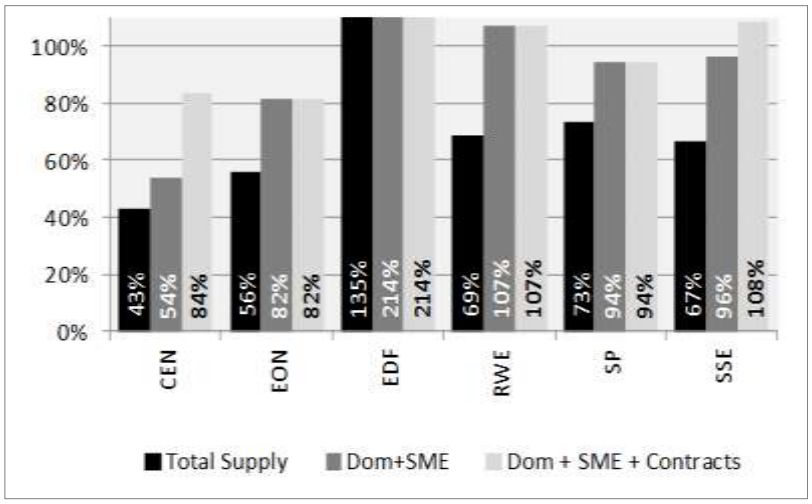
5.5.5 The DECC generation data (100g scenario) includes generation output per station (and generating units) which in turn allows us to correct for known contractual assets. These contracts, and the resulting adjusted energy balances, are summarised in Figure 10 below:

Figure 10: *Big 6 2011 Energy Balances corrected for known Contractual Assets*



5.5.6 When including the adjustment for known contractual assets identified above, the self-supply level increases to 95% across 5 of the Big 6 (again excluding EDF) when measured against our proxy for NHH consumption. It should however be stressed, that this correction is incomplete. In particular, we have not identified any contracts for RWE, E.ON or Scottish Power which is most likely incorrect [34]. Figure 11 summarises the above analysis:

Figure 11: *Big 6 Self Supply levels*



34 For example, RWE note considerable purchase obligation in recent financial statements which suggests the existence of long term contracts, but we have not been able to identify any public domain data on such contracts.

6 Margining and Financial Regulation

6.1 Introduction

6.1.1 Recent developments in European financial regulation with the objective of reducing systemic risk in the financial services industry have important implications for liquidity in the energy markets. In this section we examine the potential consequences for GB wholesale power markets of two pieces of regulation: European Market Infrastructure Regulation (EMIR[35]); and Markets in Financial Instruments Directive/ Regulation (MiFID / MiFIR[36]).

- **Section 6.2** discusses the key components of EMIR, before focusing in more detail on the clearing obligation, which is anticipated to have significant consequences for power trading.
- **Section 6.3** outlines how this clearing obligation can be expected to influence the behaviour of power market participants, and thus power market liquidity.
- **Section 6.4** introduces the recent proposed changes to MiFID (i.e. the "MiFID II" proposals) and the resulting impact on energy companies and consequences for power markets.

6.2 European Market Infrastructure Regulation (EMIR)

6.2.1 EMIR aims to create greater stability, transparency and efficiency in derivatives markets, in order to reduce the risk of a future financial crisis. In seeking increased stability of the over-the-counter derivative market, the regulation primarily targets financial derivatives, but also includes commodity derivatives within its scope. As such, both financial counterparties (such as banks, insurers, commodity trading houses and investment firms) and non-financial counterparties (such as energy firms participating in OTC commodity derivatives markets) are affected.

6.2.2 From the point of view of an energy market participant, the three key features of EMIR are:

i) **Reporting Obligation**[37] applying to both financial and non-financial counterparties, which gives regulators overall visibility of activity in derivatives markets, thus allowing them to monitor systemic risk;

ii) **Clearing Obligation** removing counterparty risk from trading of derivatives. The clearing obligation applies to all financial counterparties and some non-financial counterparties, depending upon the volume and type of derivatives in which they trade; and

35 See REGULATION (EU) No 648/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on OTC derivatives, central counterparties and trade repositories. Available online, here: EMIR Regulation

36 The existing directive / regulations are as follows: Directive 2004/39/EC (MiFID Framework Directive); Directive 2006/73/EC (MiFID Implementing Directive); and Regulation No 1287/2006 (MiFID Implementing Regulation). Proposals for amendment are underway, with latest documentation available online, here: MiFID Directive / Regulation

37 The minimum set of information, required by EMIR, to be reported in trade repositories includes: the parties to the contract, beneficiary of the rights and obligations arising from it, and the main details of the contract including the type, underlying, maturity, notional value, price and settlement date.

iii) **Risk Mitigation Techniques**, including: operational practices such as timely confirmation, portfolio reconciliation, dispute resolution and portfolio compression; and bilateral margining for non-standard derivative where a central clearing party does not exist.

6.2.3 In addition to the above, EMIR stipulates organisational, conduct of business and prudential requirements for central clearing parties (CCPs) and trade repositories (TRs).

6.2.4 EMIR defines "clearing thresholds" which are critical to large non-financial companies (such as the UK Big 6 energy firms) because when companies trade at levels above these thresholds they become subject to the same clearing obligation as the financials. If the clearing threshold is exceeded, the clearing obligation applies to all OTC derivatives, for all asset classes, concluded by the company, regardless of the purpose of the trade. When calculating their position relative to the clearing threshold, companies can exclude hedges. The intuition here is that the derivative is "reducing risk", either by covering the risk of assets or production in the normal course of business, or otherwise qualifying as a hedge under International Financial Reporting Standards[38]. However, once the clearing threshold has been exceeded, hedging activity is not exempt from the clearing obligation.

6.2.5 The clearing thresholds vary by asset class. For commodity derivatives the threshold is Euro 3 billion of gross notional value for OTC derivative commodity contracts, across all group companies in all markets. It remains to be seen which, if any, of the Big 6 UK energy firms will exceed the clearing thresholds, however, it is possible that some will, particularly those that form part of international groups (given this is the gross notional level of trading, calculated at Group level).

6.2.6 The scope of the regulation is summarised in "Figure 12: Scope of EMIR" below:

Figure 12: Scope of EMIR

<table>
<tr><th></th><th>Reporting obligation</th><th>Clearing obligation</th><th>Risk Mitigation Techniques</th></tr>
<tr><td>Financial Counterparties:
Financial institutions such as banks, insurers, investment firms, investment funds</td><td rowspan="2">Yes, applies to all derivatives.</td><td rowspan="2">Yes, applies to OTC derivatives</td><td rowspan="2">Yes, operational risk mitigation standards apply to OTC derivatives. Bilateral margining is required for non-standards OTC derivatives where a CCP is not available.</td></tr>
<tr><td>Qualifying Non-Financial Counterparties:
Entities not involved in financial services whose positions in OTC derivative contracts exceed the clearing threshold</td></tr>
<tr><td>Non-Financial Counterparties, below the clearing threshold</td><td>Yes, applies to all derivatives.</td><td>Not applicable.</td><td>Yes, operational risk mitigation standards only apply to OTC derivatives.</td></tr>
</table>

38 The ESMA Technical Standards specify the clearing thresholds, detailing how they should be calculated and the defition of hedging.

6.2.7 There are certain exemptions to the above scope, including intragroup transactions. Trades between companies in the same Group do not need to be cleared and, if agreed in advance with the regulator (see national competent authorities, NCAs, below), risk mitigation techniques need not apply. However, no trades are exempt from the reporting obligation.

6.2.8 Although EMIR entered into force in August 2012, the obligations will be phased in over the next two years. The implementation timetable, which stretches to summer 2014, was triggered by the entry into force of delegated "regulatory technical standards", drawn up by the European Securities and Markets Authority (ESMA). These regulatory technical standards notably contain details of the data to be reported (in relation to the reporting obligation) and the obligations of non-financial counterparties (including defined thresholds from which clearing obligations apply), as well as requirements for central counterparties. National legislation will enable the implementation of the regulation with "national competent authorities" (NCAs) with supervisory, investigatory and enforcement powers. In the UK, the NCAs are the Bank of England, Financial Conduct Authority and Prudential Regulation Authority[39].

6.3 Liquidity Impact of EMIR

6.3.1 In terms of drivers of liquidity in power markets, the clearing obligation and bilateral margining requirements under EMIR are most noteworthy, as they can be expected to have significant impact on the behaviour of the major market participants: large vertically integrated energy companies (assuming they are above the clearing threshold) and financial players. The objective of clearing is to reduce credit risk, by ensuring a trade will always be honoured even if the counterparty to the trade is insolvent (or otherwise unable to perform). It is a process of collateral exchange with a central clearing party, an institution created to process and hold collateral. After a trade is made between two counterparties, the central clearing party takes both sides of the deal and both parties exchange cash (an initial margin plus variation margin) with the central clearing party on a daily basis as a guarantee of performance.

6.3.2 Under EMIR, all "eligible" OTC derivatives traded between financial counterparties and qualifying non-financials will need to be cleared. These "eligible" OTC derivatives are those that are available for trading on an exchange or multilateral trading facility (such as broker screens), even if traded bilaterally, or have the potential to be cash-settled (even if intended for physical settlement). MiFID/MiFIR (see section 6.4 below) will require standard commodity derivatives to be traded through exchanges. Even where no central counterparty exists (i.e. for non-standard derivatives) EMIR requires bilateral margining, meaning that the variation margin will be exchanged between the two counterparties directly.

6.3.3 Although reducing credit risk EMIR increases cash liquidity risk[40] for market participants. The amount of cash tied up in margining can be considerable with potentially disastrous consequences for a company's cash flow. Such consequences include restrictions on the ability to

39 See http://www.legislation.gov.uk/uksi/2013/504/contents/made for details of the UK legislation: The Financial Services and Markets Act 2000 (Over the Counter Derivatives, Central Counterparties and Trade Repositories) Regulations 2013.

40 See Appendix E for an explanation of the interaction between Credit Risk, Liquidity Risk and Market Risk.

trade, need to secure expensive credit facilities, limitations on the ability to invest, or even bankruptcy risk. The potential level of cash involved is demonstrated in the following example.

6.3.4 Suppose we have a generation exposure of 1000 MW of UK power baseload (for our purposes, assume it is nuclear generation, as we neglect here the underlying fuel and CO2 exposures). Suppose further we hedge the exposure in the following manner:

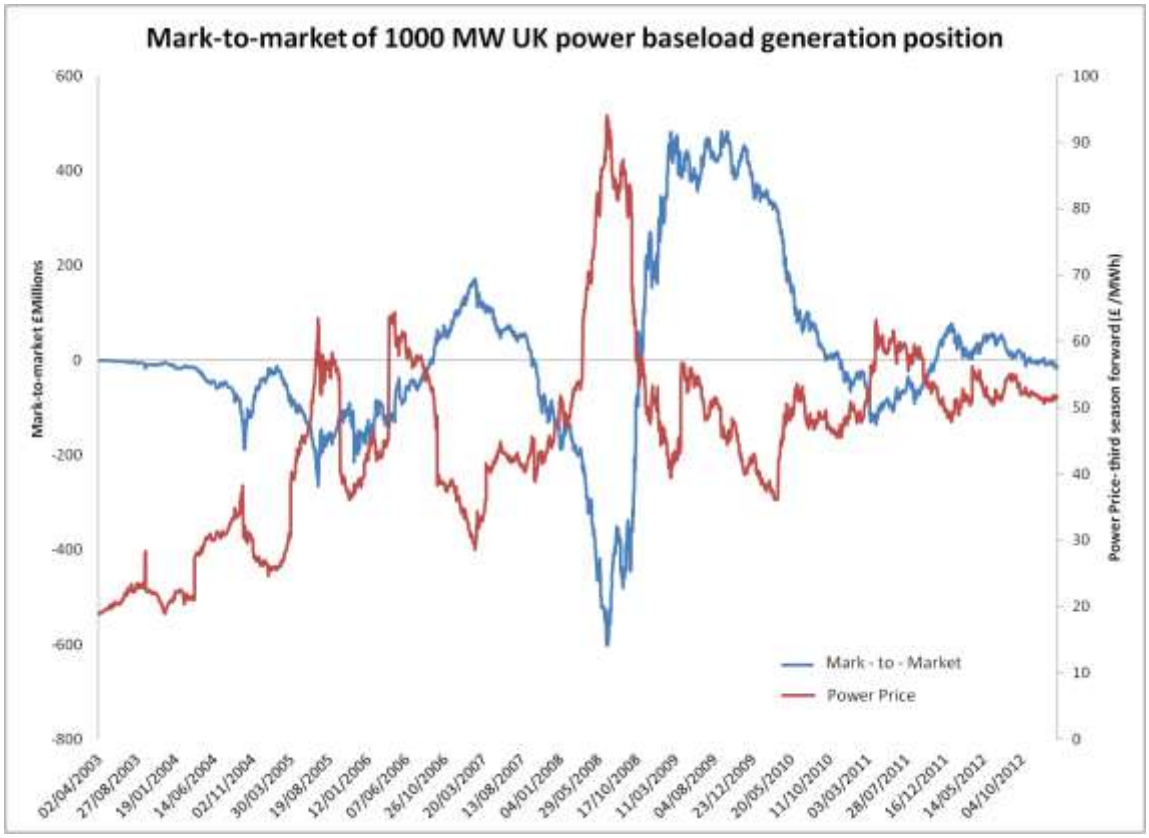
i) Start hedging 24 months prior to delivery

ii) Finish hedging 18 months prior to delivery

iii) Hedge an equal portion of the position each day (over three seasons)

6.3.5 The mark-to-market of our hedge position is a function of the historical prices at which we have hedged and today's forward prices of the next four seasons. Using actual historical prices, we can review the mark-to-market of the position in the graph below.

Figure 13: Example Mark-to-Market Impact on Cash Flow Based on Typical Position[41]



6.3.6 Note that a requirement to collateralise all positions would have resulted in some extreme cash movements. In particular, in mid-2008, the mark-to-market of the hedge position would have been approximately £ 600 million out-of-the-money (which implies that we would have had in excess of £ 600 million in posted collateral). Note that hedging a supply position rather than a generation position would result in a graph with opposite signs.

6.3.7 The requirement to bring power trades to central clearing, or undertake bilateral margining, will place additional demands on companies' liquid cash funds to support margin requirements.

41 Example Mark-to-Market calculated using real price data from January 2003 to January 1013.

Rather than maintain this short-term cash liquidity, we expect many companies will modify their trading behaviour to mitigate this cash liquidity risk.

6.3.8 The potential or actual requirement to hold large balances of cash to support collateral requirements is expected to have a number of negative consequences for power market liquidity:

i) Big 6 energy companies may limit their proprietary trading or "churn" of hedge positions in an effort to remain below the clearing threshold;

ii) Financial counterparties and qualifying non-financials may trade less in order to constrain cash required to support their proprietary trading activities;

iii) Financial counterparties and qualifying non-financials may trade only in near-dated contracts, as these generally have lower cash liquidity requirements because they settle sooner and therefore have less time for the mark-to-market of the trade to grow large;

iv) Large energy companies, having exceeded the clearing threshold, may seek intragroup exemptions, thus reinforcing vertical integration in the industry and reducing power volumes brought to market by companies with both generation and distribution businesses;

v) Those large energy companies may also potentially reduce their hedging activities, preferring the risk of earnings variability to the risk of a cash liquidity crisis.

6.3.9 Despite these negative consequences for power market liquidity, EMIR may also have some positive impacts in the context of the objective of removing barriers to trade and encouraging market entrants. The clearing obligation applies only to trades between two financial counterparties or qualifying non-financial counterparties. When one counterparty is a non-financial counterparty (below the clearing threshold), neither party is obliged to clear. Therefore, by trading with non-qualifying non-financial companies, large qualifying energy companies will reduce the cash required for margining. This will create incentives for companies subject to the clearing obligation to trade with smaller energy companies. Note that this behaviour (i.e. tending to trade with smaller counterparties) would overall increase the credit risk of a company's trading portfolio.

6.4 Markets in Financial Instruments Directive and Capital Requirements

6.4.1 MiFID, which was implemented at the end of 2004, is a foundation of the EU regulation of financial markets. MiFID strengthens competition through the integration of Europe's financial markets and sets out provisions on business conduct to protect customers of investment services. Its scope covers investment banks; portfolio managers; stockbrokers and broker dealers; corporate finance firms; many futures and options firms; and some commodities firms.

6.4.2 In October 2011, the European Commission proposed a number of changes to MiFID and accompanying regulation "MiFIR", to address the recognised need to improve transparency and oversight of less regulated markets and the issue of excessive price volatility in commodity derivatives markets. The final framework for legislation is yet to be agreed between the European Parliament, the Council of the European Union and the European Commission. With final

agreement on the "level I" proposals expected in 2013, the FCA predicts implementation of the new measures no earlier than the end of 2014[42].

6.4.3 It appears likely that the implications for the energy sector will be significant. The current directive provides a number of exemptions, many of which are useful to energy trading firms in avoiding regulation by national financial regulators, but draft revisions to MiFID will restrict or eliminate many exemptions. As a result, energy firms that also engage in proprietary trading in energy markets, or which act as intermediaries in providing portfolio management services to clients in the sector, may become subject to MiFID.

6.4.4 In addition to facing the costs and operational constraints associated with compliance to the additional regulation, energy firms that become subject to MiFID will also become subject to the Capital Requirement Directive (CRD). As a consequence of becoming subject to CRD, energy firms would become subject to Basel II – soon becoming Basel III – capital requirements[43]. The capital requirements oblige companies to reserve high quality capital against potential market losses, the amount of which is a function of the risk in the trading position.

6.4.5 The impact of MiFID and the CRD on power market liquidity has the potential to be significant. First of all, energy companies may curtail certain market trading activities in order to qualify for any remaining exemptions and thus avoid becoming regulated as financial entities. Secondly, to the extent that a company is subject to MiFID, it is likely to eliminate activities which contribute to risk (such as proprietary trading) in order to minimise capital requirements under the CRD. Finally, to the extent that a company is unable to minimise the impact of the CRD, some of the capital held in reserve will no longer be available for new investments in tangible assets, such as generation capacity. Taken together, these impacts of the MiFID revisions are likely to have a negative impact on power market liquidity. In mitigation, it is worth noting that it is a legal entity that is licensed under MiFID, unlike EMIR, which applies to the entire consolidated group of companies. We expect therefore that companies can segregate their MiFID-regulated activities into a separate company while more "corporate" activities, such as sourcing power for delivery to end-customers, would be conducted in non-regulated companies.

42 The Financial Conduct Authority (FCA) website [published 02/04/2013] states that implementation of the proposed changes to MiFID are expected at the end of 2014, at the earliest. However, other [press] sources predict implementation as late as 2016.

43 The CRD legislation currently enforce (that reflects Basel II guidelines can be found online: Capital Requirements Directive. Proposals for a new legislative package, CRD IV, that will reflect Basel III guidelines were adopted in 2011, the latest documentation is available online, here: CRD IV

PART III - INTERVENTION OPTIONS

7 Overview

7.1 Introduction

7.1.1 Having considered the key drivers of GB power market liquidity as well as the challenges facing DECC and Ofgem in this area, the remainder of this report evaluates a wide ranging suite of potential interventions. These options were identified during a number of workshops with DECC during which we also developed and agreed an Analytical Framework to support consistent and comprehensive assessment and scoring of each individual option.

7.1.2 The Analytical Framework is presented in Chapter 8. Chapters 9 to 13 define and evaluate each of the intervention options identified in this section. Finally Chapter 14 sets out our conclusions and recommendations across all options.

7.2 Intervention Options

7.2.1 In presenting and assessing the various options, we distinguish between:

- **Primary Options,** by which we mean interventions which in themselves have the potential to significantly impact the functioning of the market (and hence liquidity); and
- **Supplementary Options,** which in themselves are unlikely to deliver the desired outcome, but which nonetheless support and augment the primary interventions.

Primary Options

7.2.2 The Primary Options are defined and evaluated in Chapters 9 to 12. Overall these may be grouped as follows:

i) **Self-Supply Restrictions (SSR)** which either partially or completely restrict the amount of physical consumption a company can supply from its own internal generation sources (or vice versa);

ii) **Functional Separation (FS)** which supports SSRs with additional constraints on the VIUs' internal organisation aimed at separating (ring-fencing) up- and downstream trading activities and commercial decision making;

iii) **Mandatory Auctions (MA)** which obliges the large players to participate in regular auctions for forward products; and

iv) **Mandatory Market-Making (MM)** which oblige selected participants to make the market in a suite of forward products by continually offering to buy or sell these products within a defined bid/ask spread.

Supplementary Options

7.2.3 The Supplementary Options are defined and assessed in Chapter 13. These options include the interventions set out in the Ofgem's "Secure and Promote" consultation, namely a minimum Day-Ahead trading requirement and inclusion of additional license conditions to promote fair and

reasonable trading terms. While both important, we do not consider these interventions sufficient in scale and scope to deliver the Government's wider objectives as set out in the Introduction to this report and they are therefore classified as Supplementary. These options include:

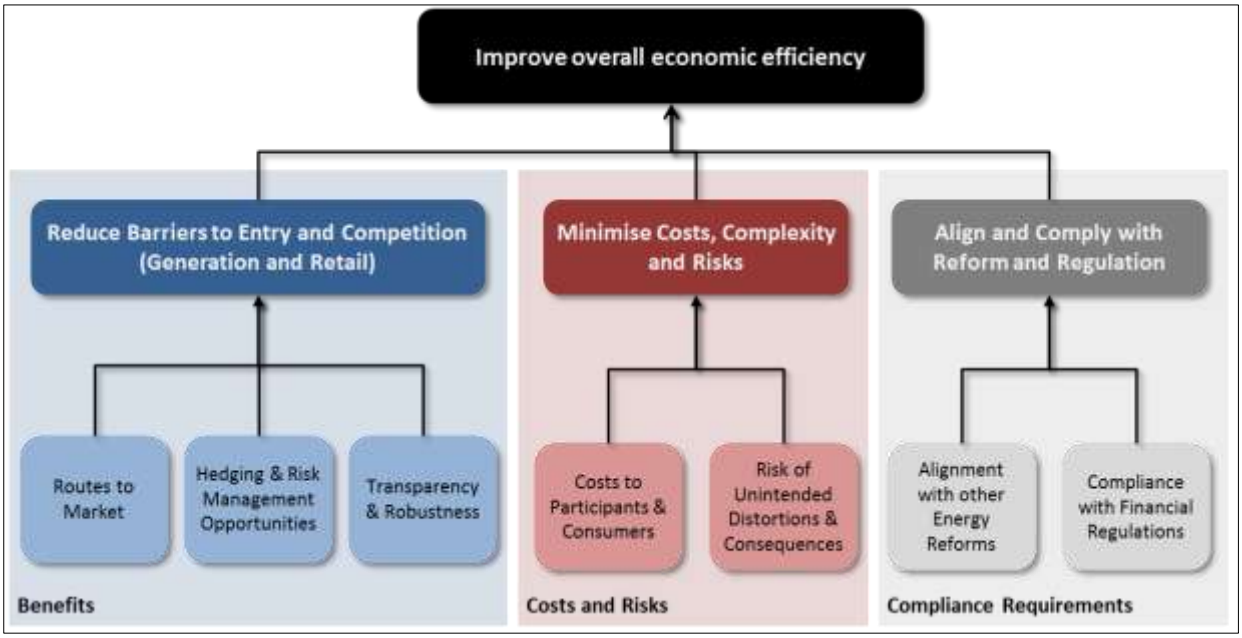
- The reference price in the Baseload Low Carbon CfDs, a choice we see as an important (supplementary) instrument for directing liquidity along the curve;
- Two potential credit interventions, namely mutualisation of credit losses and government backing of credit insurance;
- Interventions aimed at ensuring effective collateral and margining arrangements; and
- Various potential interventions for increasing the general transparency of the GB market.

8 Analytical Framework

8.1 Overview

8.1.1 We have proposed a number of potential interventions in the UK electricity market with the ultimate objective of improving overall economic efficiency by deepening the liquidity of the market. The analytical framework outlined below was developed in cooperation and agreement with DECC to support the evaluation of these interventions by establishing a number of criteria against which each intervention is assessed. The criteria are explained in the following paragraphs.

Figure 14: *Analytical Framework*



8.1.2 The UK Government wishes to reduce barriers to competition and ensure that market participants with a variety of business models can enter and compete in both the generation and retail markets. Market interventions may promote this objective, which must be balanced against the need to minimise costs and risks (both the costs and risks of implementation, as well as ongoing costs and risks) associated with the intervention. An analysis of these benefits and costs, together with the need to comply with current energy and financial market reforms and regulations, informs any recommendation for an intervention.

8.1.3 In order to evaluate the degree to which our objectives relating to benefits, costs and risk, and compliance, are achieved by each of the proposed interventions, we have identified attributes of

each of these pillars in level '3' of Figure 14 above. Each of these attributes is evaluated by a number of assessment criteria (level '4', not shown above). We describe the attributes and assessment criteria for each objective in more detail below.

8.2 Reduce Barriers to Entry and Competition:

Attributes

8.2.1 As illustrated in Figure 14, three attributes of the wholesale markets are considered key to facilitate the overarching objective of market entry and competition:

i) **Routes to Market:** It is important that participants (both on the retail and generation sides of the market) can find a route to market, i.e. a platform or vehicle whereby participants can buy or sell power at a fair price. Existing routes to market include exchanges, the over-the-counter (OTC) market (perhaps facilitated by brokers), and structured long-term supply arrangements, as well as indirect access to the same via intermediaries (such as PPA providers). One major inhibitor to trading directly in the market can be the inability of participants, especially smaller participants, to be offered credit arrangements by counterparties. The most common mitigation for poor credit is the posting of collateral, but again many participants (not only smaller suppliers and generators, but other market parties as well) may face financial constraints on the amount of liquid cash which can be made available to support collateral.

ii) **Hedging and Risk Management Opportunities:** Suppliers and generators both require access to risk management tools to manage their risks responsibly. Different market participants (suppliers, generators, large energy consumers, etc.) will require a variety of tools which include prompt energy and balancing services; traded products at a range of maturities along the curve; baseload, peak, and other shaped products; and a range of clip sizes to facilitate access by smaller parties.

iii) **Transparency and Robustness:** The market requires robust and clear signals to drive operations and support confidence. In particular, opaqueness and information asymmetry increase costs and risks for smaller and less sophisticated participants and thus remain barriers to effective competition.

Assessment Criteria

8.2.2 The benefits of the proposed market interventions will be assessed against a set of defined criteria which support the wholesale market attributes described above. Figure 15 below summarises these criteria and their linkage to these attributes:

Figure 15: *Assessment Criteria – Benefits*

Assessment Criteria	Routes to Market	Hedging & Risk Management Opportunities	Transparency & Robustness
B1: Potential direct impact on churn rates		●	●
B2: Availability and usage of channels and/or platforms	●	●	●
B3: Number and diversity of counterparties	●	●	
B4: Scope for intermediaries	●		
B5: Availability of particular products		●	
B6: Availability, reliability and transparency of price and trade data		●	●
B7: Robust CfD reference Prices			●
B8: Efficiency of margining and collateral arrangements	●	●	

8.2.3 Each intervention is evaluated against the above criteria and rated in accordance with the scoring metrics set out in Section 8.5 and further elaborated in Appendix A. In summary, these criteria are intended to capture:

B1 **Potential direct impact on churn rates:** Interventions may stimulate market participations to increase their trading activity, either by bringing supply or demand to the primary market or by trading positions on the secondary market. We evaluate interventions on their potential to directly stimulate buying and selling activity in traded markets beyond the day-ahead.

B2 **Availability and usage of channels and/or platforms:** Existing channels to market include exchanges, OTC trading via brokers, and the bilateral agreement of structured contracts such as PPAs and supply agreements. Nonetheless, certain market participants struggle to find counterparties willing to trade on terms that they would deem acceptable. We therefore evaluate the extent to which interventions result in either the opening up of trading channels to potential market participants, or an increase in the intensity of use of existing, underused channels by previously excluded participants. Additionally, public platforms or exchanges are, by definition, more transparent than private arrangements and we therefore consider the benefit of structured trading migrating to more standard platforms. When evaluating the impact of each intervention, we consider the net benefit of the intervention on increasing the diversity of channels and platforms as well as their intensity of use. A positive net benefit implies that the intervention achieves more than simply diverting liquidity from one channel to another or fragmenting existing liquidity across a larger number of platforms.

B3 **Number and diversity of counterparties:** Facilitating the entry of more counterparties to the market will directly increase liquidity by creating a larger pool of market participants willing to take the other side of a deal. Participants will more readily take an open risk position if they are assured they can close it in a competitive market on reasonable terms. Additionally, an increase in the diversity of counterparties, including independent suppliers and independent generators, intermediaries and aggregators, financial participants, and large energy consumers, will also boost liquidity and will diversify the patterns of behaviours in terms of timing of trading activity, tenors of products, etc.

B4 **Scope for intermediaries:** Small, independent market participants do not have the scope of operations of larger companies and therefore benefit from the support of market intermediaries. These may include, for example, PPA aggregators, who encourage independent developers of intermittent generation, or balancing aggregators, who can handle the nominations and balancing activities of small physical players. Interventions score highly on this benefit where they support and facilitate the work of intermediaries who in turn provide risk management opportunities to participants.

B5 **Availability of particular products and clip sizes:** Ensuring relevant hedging and risk management opportunities are available to suppliers and generators, of varying size, requires particular products and clip sizes to be traded readily. We consider both short and longer-dated products, as well as both baseload and peakload products to be important. Interventions score most highly on this benefit where they are expected to result in a material increase in the availability in many of these products.

B6 **Availability, reliability and transparency of price and trade data:** Hedging and risk management not only requires the availability of certain products, but the data required to analyse and accurately quantify risk. The availability of robust data also drives transparency and the associated market confidence. Substantial benefit will be gained from an intervention where it leads to the publishing of not only a greater quantity of previously unavailable data, but where that data will be deemed robust and consistent by the market.

B7 **Robust CfD reference prices:** Robust CfD reference prices are particularly important for transparency because only a well-functioning CfD market will attract new, low-carbon investment from a diverse source of counterparties.

B8 **Efficiency of credit and collateral arrangements:** Credit and collateral arrangements can prove a significant barrier to access to the power forward market. We assess interventions on the extent to which they reduce or remove the credit and collateral barriers to access, especially for small participants. Interventions may also have secondary effects in mitigating credit and collateral barriers. For example, a wide choice of products and routes to market enable participants to choose to trade cleared or non-cleared products depending on risk management preference. Additionally, a diversity of counterparties will help avoid a concentration of credit risk in portfolios and also help ensure competitive trading terms.

8.3 Minimise Costs, Complexity, and Risks

Attributes

8.3.1 The benefits delivered by a particular intervention needs to be balanced against the costs to participants and consumers as well as the risks of unintended consequences and market distortions:

i) **Costs to Participants and Consumers:** Any intervention which increase the marginal cost of wholesale electricity, reduce generation system capacity, or increase the cost to supply energy will likely increase the cost to end-consumers. For this reason we analyse both the one-time implementation costs and the ongoing operational costs of each proposed market intervention, as well as the impact on the organisation and operations of the market participants.

ii) **Risks of Unintended Distortions and Consequences:** Market interventions may distort behaviour in undesirable and unintended ways, including investment decisions, choice of counterparty, supplier behaviour (end-user products, market segmentation), and balance sheet management.

Assessment Criteria

8.3.2 The costs and risks of the proposed market interventions will be assessed against the following assessment criteria as summarised in Figure 16 below:

Figure 16: *Assessment Criteria – Costs & Risks*

	Costs to participants and consumers	Risk of Unintended distortions and consequences
C1: Operational complexity of proposed solution	●	●
C2: Impact on participant operations and business model	●	●
C3: Unintended unfavourable impact on ratings performance	●	●
C4: Unintended distortion of normal commercial/trading behaviour	●	●
C5: Unintended liquidity impact outside scope of intervention	●	●
C6: Susceptibility to gaming	●	●
C7: One-off/Static implementation Costs	●	
C8: Ongoing costs to participants and consumers	●	●

8.3.3 As for benefits, each intervention is evaluated against the above criteria and rated in accordance with the scoring metrics set out in Section 8.5 and further elaborated in Appendix A. In summary, these criteria are intended to capture:

C1 **Operational complexity of proposed solution:** Most interventions will require a degree of change to market standards and conventions. The cost of such change will be material where it requires changes to organisations' processes or systems, or if an intervention requires fundamental changes to market platforms or processes (such as monitoring physical nominations to enforce a self-supply restriction) or entirely new platforms (such as the set-up and operation of an auction platform). Intervention options are assessed in terms of complexity of changes required and the scope of the impact on participants (i.e. in terms of number of parties required to implement change).

C2 **Impact on participant operations and business model:** Costs will be incurred and inefficiencies may be introduced if market interventions require either legal or structural changes to the internal organisation of market participants, or changes to the way that organisations communicate and interact internally.

C3 **Unintended unfavourable impact on financial performance and ratings:** Credit ratings are of particular importance to the market, as this directly impacts on the cost of investment in generation assets, the ability to seek favourable trading terms with counterparties, and the overall financial security of the firm. We evaluate intervention options for their direct impact on credit ratings (because we believe an intervention will be likely to cause a rating agency to view certain participants less favourable) or their indirect impact[44]. We also consider the liquidity impacts of additional collateral requirements, either because the intervention is likely to require some or all participants to margin a greater number or proportion of deals, or because the intervention will lead to increased churn and thus have the potential to push the participant's derivative position above the EMIR threshold.

C4 **Unintended distortion of normal commercial / trading behaviour:** Intervening to promote liquidity may distort the natural and beneficial incentives for market participants to behave in a certain manner. While some interventions will deliberately incentivise the use of particular tools or instruments, there is a risk that these will have an indirect negative consequence on other areas that may be costly or impossible to mitigate. These changed behaviours may be in the wholesale trading area (e.g. a greater propensity to trade with certain types of counterparties to the exclusion of others) or in other parts of the value chain (e.g. a change in strategy with respect to investment in new generation)

C5 **Unintended liquidity impact outside scope of intervention:** An intervention may increase liquidity overall yet shift trading patterns in unexpected ways, for example a shift from longer maturity to shorter maturity deals.

C6 **Susceptibility to gaming:** Any chosen intervention should be designed such that gaming opportunities are limited and effectively monitored. The cost to mitigate gaming may be material, beyond normal monitoring measures by regulators. In some cases it may be impossible from a practical standpoint to mitigate gaming effectively.

44 Because we expect an intervention to cause a deterioration in financial performance over time.

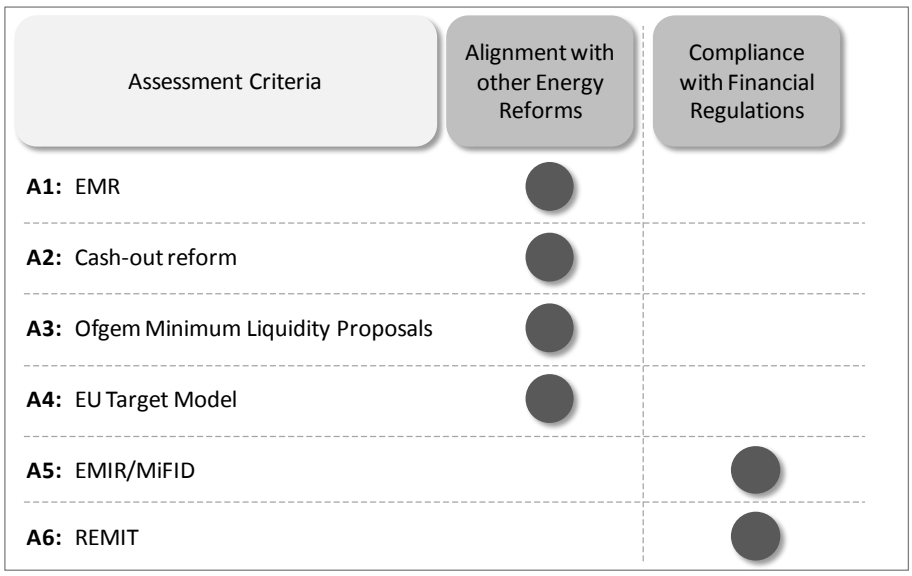
C7 **One-off static implementation costs:** Wherever possible, the relative costliness of implementing the intervention options has been evaluated, based on ranges commensurate to industry programmes of a similar scale.

C8 **Ongoing costs to participants and consumers:** Compliance with new rules established as a result of intervention may have an associated ongoing cost to participants, as would the monitoring of that compliance for a regulator. As for the implementation costs, ranges for these ongoing costs have been defined, which can be considered at low, modest or substantial.

8.4 Align and Comply with Reform and Regulation

8.4.1 Potential interventions must be aligned with other GB and EU energy market reform initiatives as well as compliant with financial regulations such as EMIR and MiFID II. These requirements are captured by the assessment criteria summarised in Figure 17 below:

Figure 17: *Assessment Criteria – Alignment and Compliance*



8.4.2 Each intervention is evaluated against the above criteria and rated in accordance with the scoring metrics set out in Section 8.5 and further elaborated in Appendix A. In summary, these criteria are intended to capture alignment and compliance with:

A1 **EMR:** Any intervention must be designed such that it fits with and, ideally, supports other reform initiatives within the EMR Programme. Examples of the latter might include interventions which improve the ability to define and trade CfD reference prices and/or which create favourable conditions for 3rd party PPA providers.

A2 **Cash-out Reform:** Interventions must be aligned with Ofgem's reform of the cash-out mechanism. Hence, interventions which potentially remove, mitigate or otherwise alter exposures to the cash-out mechanism would score poorly against this criterion.

A3 **Ofgem Minimum Liquidity Proposals**: Interventions must be aligned with Ofgem's liquidity proposals. Whether initiated by Ofgem or DECC, all liquidity enhancing measures must be

encapsulated within an overall package (programme) of reasoned and consistent measures. Since Ofgem has yet to finalise its proposals in this area, we refer only to Ofgem's minimum proposals as set out in their "Promote and Secure" initiative. These minimum proposals, which are detailed in Section 13.2, are limited to a 30% Day-Ahead Trading Requirement as well as new license conditions which stipulate "Fair and Reasonable Trading Terms". Interventions which potentially would cut across these specific (minimum) initiatives would score poorly on this criterion.

A4 **EU Target Model:** Similarly, interventions in the GB market must not introduce market and trading arrangements which are inconsistent with the basic design components in the EU Target Model.

A5 **EMIR/MiFID II:** In addition to being aligned with other reform initiatives, interventions should also be compliant with financial regulations such as EMIR and MiFID II.

A6 **REMIT:** Similarly, interventions must not inhibit participants' ability to comply with REMIT.

8.5 Assessment Scoring

Scoring Metrics

8.5.1 In order to promote consistent evaluation of individual interventions as well as enable meaningful comparison of different options, the performance against each assessment criteria is assigned a score in accordance with the metrics set out in the Table 3 below:

Table 3: Scoring Metric

Benefits		Cost & Risks		Compliance & Alignment	
Ranking	**Score**	**Ranking**	**Score**	**Ranking**	**Score**
Neutral	**0**	Neutral	**0**	Hinders	**-3**
Modest	**1**	Modest	**-1**		
Material	**2**	Material	**-2**		
Important	**3**	Important	**-3**	Neutral	**0**
Substantial	**4**	Substantial	**-4**	Augments	**1**

8.5.2 As illustrated, 0 (nil) represents the neutral impact across all three categories with benefits being assigned a positive score and costs & risks a negative score. In the Compliance & alignment category, a neutral score reflects that the intervention either does not impact compliance or is compliant. An intervention that directly hinders other reforms and/or is not compliant with financial regulations is assigned a high negative score (-3), whereas options which positively supports receives a modest positive score (1).

8.5.3 In order to support consistent grading and comparison across different interventions, Appendix A details grading guidelines for each criterion and provides benchmarks for Neutral, Material and Substantial. The "Important" and "Modest" is applied where we judge the performance falls between these benchmarks.

Weights

8.5.4 In order to derive meaningful average scores, the criteria in each category are weighted internally (and sum to 100%). The resulting average is then assigned a category weighting to allow us to compute a total average score. These weights, which reflects the relative importance of each criteria and category, as determined by us and by DECC, are detailed in the table below:

Table 4: Criteria and category weights

Benefits		
B3: Number and diversity of counterparties	High	17.5%
B5: Availability of particular products	High	17.5%
B8: Efficiency of credit and collateral arrangements	High	17.5%
B4: Scope for intermediaries	Medium	11.0%
B1: Potential direct impact on churn rates	Medium	11.0%
B2: Availability and usage of channels and/or platforms	Medium	11.0%
B6: Availability, reliability and transparency of price and trade data	Medium	11.0%
B7: Robust CfD reference Prices	Low	3.5%
Total		**100.0%**
Category Weight		**50%**
Costs & Risks		
C2: Impact on operations and business model	High	15.0%
C3: Unintended unfavourable impact on financial position and ratings	High	15.0%
C4: Unintended distortion of normal commercial behaviour	High	15.0%
C7: One-off/Static implementation Costs	High	15.0%
C8: Ongoing costs to participants and consumers	High	15.0%
C5: Unintended liquidity impact outside scope of intervention	Medium	10.0%
C6: Susceptibility to gaming	Medium	10.0%
C1: Operational complexity of proposed solution	Low	5.0%
Total		**100.0%**
Category Weight		**40%**
Alignment & Compliance		
A1: EMR	Medium	16.67%
A2: Cash-out Reform	Medium	16.67%
A3: Ofgem Minimum Liquidity Proposals	Medium	16.67%
A4: EU Target Model	Medium	16.67%
A5: EMIR/ MiFID II	Medium	16.67%
A6: REMIT	Medium	16.67%
Total		**100.0%**
Category Weight		**10%**

9 Physical Self-Supply Restrictions

9.1 Option Definition

Introduction

9.1.1 We define a Self-Supply Restriction (SSR) as a partial or complete restriction on the amount of physical consumption a company can supply from its own internal generation sources (or vice versa). It is assumed that the SSR itself can be monitored and controlled through the subject companies' Elexon generation and consumption accounts. Hence, the SSR will require the subject companies to demonstrate that their supply and generation accounts were sourced externally in line with the required SSR threshold which in practice amounts to a restriction on the extent of inter-company trades between these accounts.

9.1.2 Tying the SSR to the Elexon accounts offers significant practical advantages, as the monitoring and reporting infrastructure required to control the SSR broadly already exists. However, we do question the possibility of monitoring generation and consumption positions where the entity in question transfers such positions to a separate trading function with its own Elexon accounts. While we suspect that this potential issue is solvable, the mechanics of monitoring SSRs would need to be explored further with Elexon prior to decision to proceed with this intervention.

9.1.3 The remainder of this chapter and the chapter following assume that the SSR primarily would be targeted at the Big Six. However, the Big Six might well argue that such a SSR is discriminatory as it places them at a disadvantage relative to other (non Big-Six) players, some of whom also enjoy some degree of VI. Notwithstanding the focus on the remainder of this section, one could in principle imagine a much wider scope encapsulating any market participant with both up- and downstream positions.

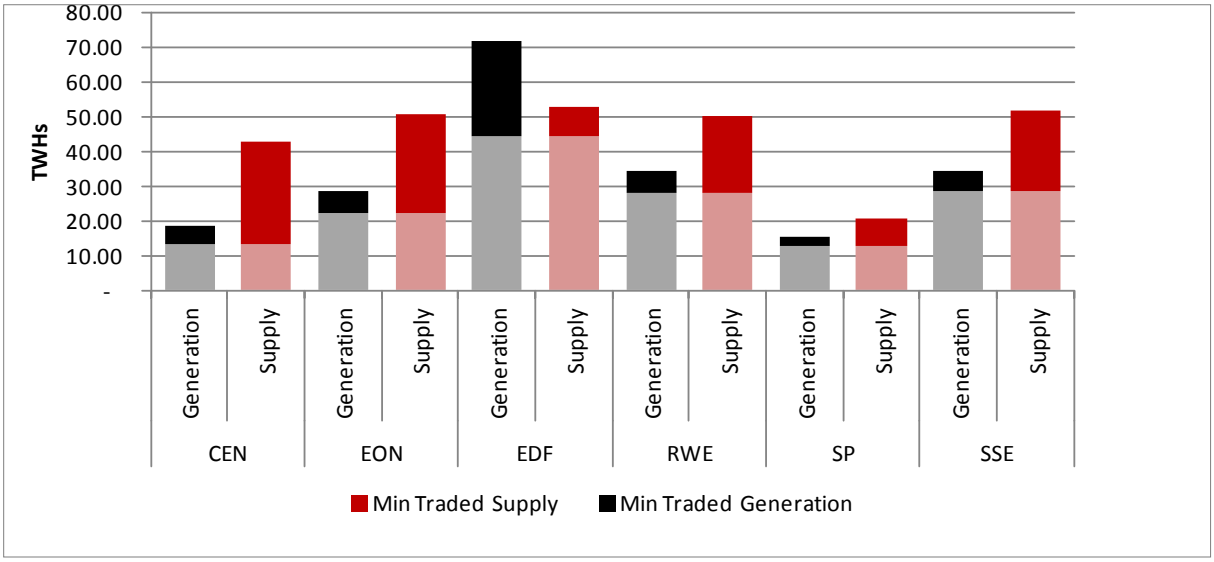
9.1.4 The SSR is aimed at stimulating liquidity by forcing the subject companies (e.g. the Big Six) to trade their up- and downstream positions separately. However, this restriction does not remove or constrain the fundamental value of the VI P&L hedge (one of the key VI benefits discussed in Section 5.4). Even with a complete (100%) SSR, the company's overall financial performance would ultimately be a function of the margin between fuel and carbon prices and end customer tariffs/prices. The wholesale power price itself has limited impact on the overall P&L performance at Group level, provided the entity in question manages to sell (generation) and buy (supplies) at roughly the same prices. This can obviously be achieved by hedging both generation and supply volumes at the same rate.

9.1.5 This observation potentially leaves the SSR susceptible to gaming. It also creates a risk that a subject company might decide to dump all its volume in a particular products and/or market platform. The SSR therefore requires supplementary restrictions on the choice of market channels as well as the tenor of trading. These additional restrictions, which we discuss further later in this section, add considerable operational complexity to the SSR as neither can be monitored (and hence controlled) via the Elexon accounts.

Positions and Liquidity before the SSR

9.1.6 In order to estimate the potential impact of a SSR, it is necessary to first estimate the baseline against which the contribution from the SSR is measured. **Figure 18** provides an estimate of the minimum market positions for each of the Big Six before any SSR. Hence, this figure assumes that the Big Six offset generation and supply position to the maximum possible extent, taking account of the (inevitable) mismatches between customer's load profile and the profile of all generation sources (including intermittent). For the purpose of the estimates shown below, it is assumed that such mismatches are equivalent to roughly 12% of the underlying TWh position. Hence, a company such as Centrica is assumed to have to trade (externally) some of its generation position even though overall the company is short. Based on these assumptions and 2011/12 generation forecasts consistent with DECC's Central Scenario, the minimum TWhs traded both on the up-and downstream are as follows:

Figure 18: *Market Exposed Positions without an SSR*



9.1.7 Across all Big Six, the minimum market exposed positions are estimated at 173 TWhs. Assuming further that the Big Six each churn these underlying open positions in accordance with the average churn observed across the industry according to Ofgem's latest numbers (2.8), the traded volume consistent with these open positions is estimated at 486 TWhs. This is just over 50% of the total observed traded volumes in 2012 as reported by Ofgem (900 TWHs).

9.1.8 If anything, we suspect this level of contribution probably is on the low side. Firstly, it implies that some 400 TWhs are traded amongst non Big Six participants (i.e. trades where neither side are Big-Six. This seems high[45]. Secondly, in particular Big Six players with significant gas and coal capacity will be optimising these against prevailing spark and dark spreads and these players will in practice trade the entire plant. Hence the minimum market exposed positions estimated above underestimates the actual level of exposure.

45 Given the Big-Six' dominant position in the market, we assume that much of the trading carried out by non Big-Six players are with the Big Six.

Design Parameters

9.1.9 There are two basic parameters in the design of the SSR (in addition to the supplementary restrictions discussed later). These are:

i) The level of the SSR in terms of whether it is:

- Partial (less than 100%) and in which case at what level; or
- Full with 100% separation of all up- and downstream physical hedging and trading activities; and

ii) The baseline against which the SSR is set and monitored. The main options are:

- Full supply;
- Domestic plus SMEs;
- Generation; and
- The above options including adjustment for contractual assets.

9.1.10 We analyse the impact of varying levels of SSR (including 100%) in the next sub-section.

9.1.11 With respect to the baseline, the level of VI is much higher when measured against Domestic plus SMEs than total supply as illustrated in Section 5.5. However, while important to explain actual levels of VI, we would not recommend using a baseline which excludes (or seeks to exclude) half-hourly metered customers. Firstly, any SSR referenced against only Domestic plus SMEs can be restated as a (lower) restriction against total demand. Secondly, total physical consumption is captured by the Elexon accounts and any attempt to divide this demand into its constitute components would add complexity for no real benefit.

9.1.12 The SSR could alternatively be set against generation. This does make a difference, since all Big Six bar EDF are short. As illustrated by the estimate presented below, a partial SSR on generation would yield slightly higher volumes[46]. However, we do not consider this impact sufficiently material to sway to argument either way.

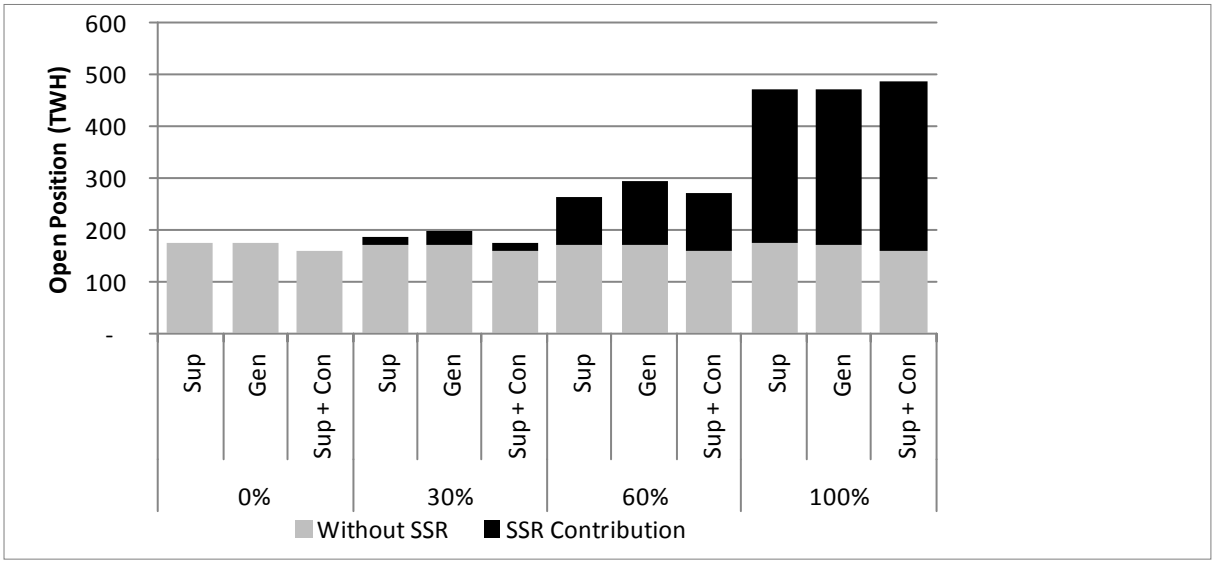
9.1.13 The final question is whether the SSR ought to include the impact of contractual upstream assets as discussed in Section 5.5. Including our (incomplete) register of these assets does increase the level of VI and hence the potential impact of the SSR. However, while this suggests such adjustments in principle are a good idea we do not consider this a practical way forward. Any attempt to define precisely what constitutes a contractual asset would be open to debate and challenge (possibly even legal). It would also create incentives to avoid such structures which may not be in the long term interest of the market as long term off-take agreements provide a means of entry for independent generators. Leaving such assets out of the equation would of course create the opposite incentive and there is a risk more effort would be directed towards creating complex long term virtual assets in preference to owning generation plant outright. However, this is a distortion that the SSR in our view would need to live with.

Rough Impact Estimates

9.1.14 **Figure 19** below shows the impact on the market exposed positions for 0%, 30%, 60% and 100% SSRs. The figures and estimates which make up this figure are detailed in Appendix C.

46 But for a complete SSR there is of course no difference between these alternative baselines.

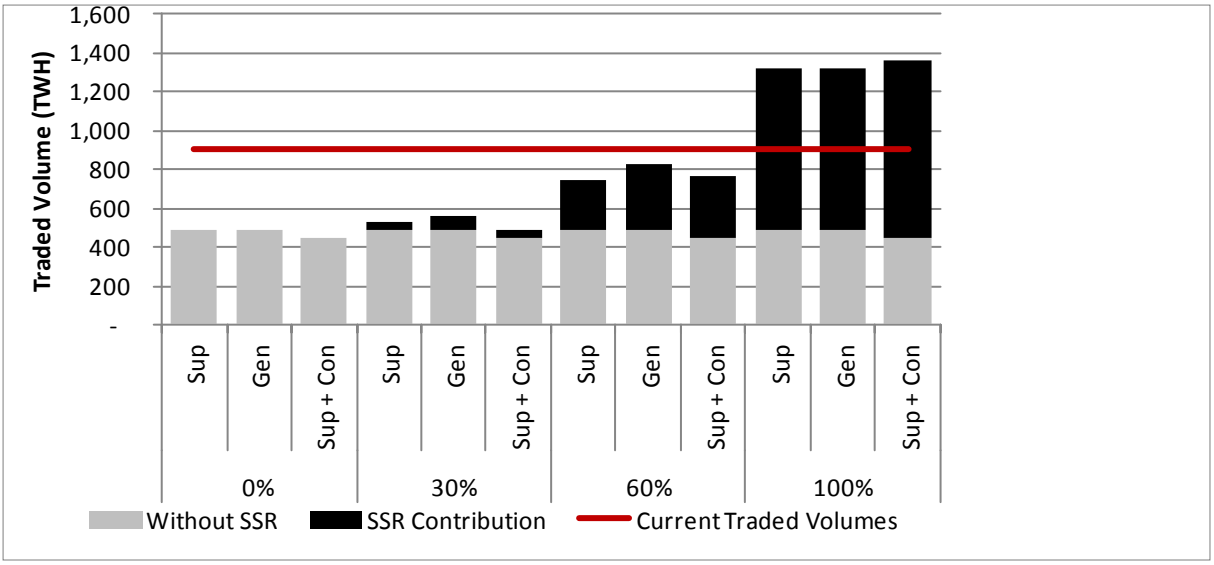
Figure 19: *SSR Impact on market exposed positions*



9.1.15 **Figure 20** provide a rough measure of the potential impact on liquidity attributed to each of the above scenarios. These estimates rely on the (big) assumption that the Big Six continue to churn the positions the SSR forces into the market at the current observed average churn rates across the entire GB market (2.8). For example, for a 60% restriction on supply, total Big Six traded volumes is estimated at 741 TWhs which is 256 TWhs above the expected churn without an SSR. Likewise, a full SSR on supply would generate 1,325 THWs traded volumes of which some 838 TWHs would be attributable to the SSR. At face value, this would nearly double current GB industry average churn rate (2.8 in 2012) and deliver churn at 5 or 6 times underlying generation which is not far behind the Nordic markets.

9.1.16 In practice, however, we do not believe that the SSR liquidity impact will be (nearly) as big as suggested by these numbers. The assumption that the generation and supply positions which have been disconnected through the SSR will be churned the same way as (the smaller) net open position of the VIU portfolio is more than doubtful. In our experience, players which are exposed structurally churn far less than portfolio players. Generally, risk policies would permit a VIU to hold a certain, relatively small, open risk position. The bulk of upstream and downstream risk exposures would be closed in a VIU (i.e. generation production would be sold, and supply requirements purchased), while a marginal open position would be churned, depending on the trading strategy, risk appetite, and market view of the company. It is unlikely that the risk appetite of a company will increase in direct proportion to SSR levels and therefore the estimated level of liquidity benefits will be diminished, possibly materially.

Figure 20: *Estimates of liquidity impact for different levels of SSR*



9.1.17 Subject to this critical reservation, the other main conclusions that we draw from this analysis are:

i) For partial SSR to have a material impact it needs to be set at a quite high level (i.e. above 50%). This may suggest that a complete restriction is preferable, since it is easier to monitor and control.

ii) It makes relatively little difference whether the SSR is benchmarked against generation or supply, although a generation baseline delivers more open position for a partial restriction; and

iii) While inclusion of contractual assets deliver a higher contribution for higher SSR levels, this incremental benefit is not that material[47].

Supplementary Channel Restriction

9.1.18 In our view any SSR will require a supporting restriction on allowable market channels through which the restricted volumes are sold. This is necessary to:

i) Ensure that the required trading volume genuinely is made available to the wider market;

ii) Guard against deliberate mispricing and deals aimed at creating trading volumes not truly exposed to market prices and bid/ask spreads; and

iii) Prevent companies claiming virtual asset transactions as allowable trades (refer to the discussion of contractual assets in Section 5.5).

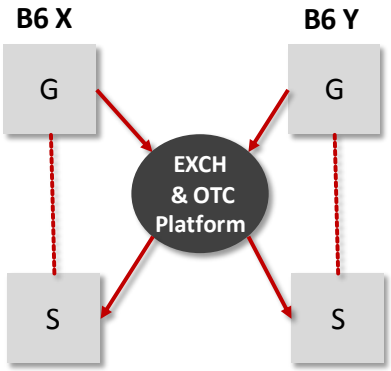
9.1.19 Without a supplementary channel restriction, the SSR is in our view susceptible to gaming.. Theoretically, it is not difficult to construct a deal structure in which two companies agree to buy/sell to one another at (broadly) the same price within a short space of time. The net result of such a structure would effectively leave the companies as if they had offset up- and downstream positions internally and hence frustrate the self-supply restriction. Likewise, without a channel

47 Notwithstanding our register of such contracts is incomplete.

restriction, companies would be able to claim contractual assets as counting towards the SSR, whereas internally these would be viewed as generation capacity. This is mainly an issue under a partial (i.e. less than 100%) restriction.

9.1.20 As far as we are aware, all markets with self-supply restrictions have been accompanied by these additional channel restrictions. This includes, for example, the Californian IOUs in the failed CALPX market, which we include as a case study in Appendix D.

9.1.21 Subject to addressing the above concerns, it is desirable to make the channel restriction as wide as possible. We would propose that the basic channel restriction should require volumes to be posted through a screen based recognised market platform:



i) Recognised exchanges for UK power futures contracts (where available) as well as spot in N2EX and APX day-ahead auctions (Virtual Hub);

ii) Forward OTC brokers such as Spectron, Tullet Prebon, ICAP and GFI; and

iii) Any auctions and/or market making platforms created through other interventions.

9.1.22 As this restriction would direct traded volumes under the SSR towards standard OTC and exchange products, it is likely that the subject companies will raise concerns about margining requirements as well as the impact under EMIR. However, such concerns are not specific to this intervention option. In the current market and regulatory environment, any proposal which forces additional trading to stimulate liquidity will potentially impact margining and cashflows.

9.1.23 We finally note that such channel restriction almost certainly could not be controlled or monitored through the Elexon accounts. Hence, in practice self-supply interventions will necessitate a more involved compliance regime.

Supplementary Tenor Restriction

9.1.24 In addition to the channel restriction, there may also be a need to place some restrictions on the tenor of trade to ensure trading along the curve. Without a restriction of the tenor of trading, there is a risk that the subject companies could decide to meet the SSR entirely through a particular product and/or channel (e.g. spot markets/day-ahead auctions). There are at least two reasons to be worried about such an outcome:

i) As noted above, the VI P&L hedge can largely be preserved by ensuring that the VIU trades its up- and downstream positions. The easiest was to satisfy the SSR while also ensuring that generation sales and supplies are broadly balanced in value terms is to (gross) bid all up- and downstream volume through one of the day-ahead exchanges (i.e. N2EX);

ii) Margining and security requirements are comparably far less onerous on day-ahead trading. Under a self-supply restriction where large volumes are being pushed through the external markets, the margining and collateral requirements associated with selling and buying large quantities in the forward markets could prove a serious concern.

9.1.25 With respect to item i) above, we note that this is not a concern about the gross bidding arrangements currently deployed by the Big Six on N2EX. As discussed in Section 13.2, in our view gross bidding does not remove the incentive to submit economically correct bids and offers into a cleared day-ahead auction. Hence, the concern is not manipulation of auction prices, but simply that an SSR without a tenor restriction might incentivise short-term over forward trading.

9.1.26 Combined with the margining and collateral concern, there is in our view a risk that an SSR could end up destroying forward liquidity, creating serious market distortions which, for example, could see hedging opportunities for independent suppliers severely restricted. Therefore it is necessary to supplement the SSR with a tenor requirement which ensures that a share of trading takes place in forward instruments. However, such a supplementary requirement could clearly not be monitored or controlled via the Elexon accounts, adding to the complexity of monitoring and controlling the SSR.

9.2 Assessment of Partial SSR

9.2.1 Our assessment of a Partial SSR is detailed in Appendix F.

9.2.2 As explained above, within the current industry structure a Partial SSR needs to be fairly significant in order to have any real impact. We have therefore assumed an SSR level of 60% (or above) for the purpose of this assessment. It is further assumed that channel and tenor restrictions are implemented as described above. Applying the Analytical Framework as summarised below and detailed in Appendix F, the Partial SSR scores negatively overall on both an un-weighted and weighted basis.

Benefits:

9.2.3 Based on our analysis, a 60% restriction on self-supply would increase Big Six traded volumes by around 250 TWhs (assuming that companies churn these additional positions in line with current average industry churn rates). This is clearly a material support to market liquidity. However, churn rates for these positions may differ from current industry averages. In fact we believe it is likely that the average churn (per MWh open position) will decrease with increasing restriction levels, thus offsetting some of the benefit of enlarging the VIUs open positions through the SSR. It is our opinion that for a 60% restriction such effects will most likely be relatively small.

Costs and Risks:

9.2.4 The cost of implementing a Partial restriction depends critically on whether or not such a restriction can be readily monitored and controlled via the existing Elexon generation and consumption accounts and reporting capabilities[48]. Provided this assumption holds, the main operational complexity stems from controlling the accompanying channel and tenor restrictions, neither of which can be monitored via the Elexon accounts. We believe these requirements would place material compliance and reporting burdens on the subject companies. However, we do not expect that this assumption holds for companies which transfer their position to a central

48 The systems operated by Elexon record the net quantities traded between parties as well as the physical quantities delivered. This information is required to verify any SSR.

trading function (i.e. most of the Big Six) in advance of delivery. Where the Partial SSR cannot be controlled via the Elexon accounts, material implementation costs could be required to modify Elexon's internal systems. In any event, we assume that the channel and tenor restrictions mainly will be monitored through obligations on the subject companies to demonstrate compliance. We suspect that these reporting and accompanying modifications to existing trading systems may not be entirely trivial. Companies with significant contractual assets may be able to understate their true generation position and therefore limit the proportion of their total nominal generation volume subject to this intervention.

9.2.5 Additionally, the Partial SSR erodes some of the benefits associated with VI business models (e.g. ability to net up and downstream positions internally with a resulting savings on the bid/ask spread) and will require a number of new business processes to support the compliance and monitoring regime. The additional churn associated with the Partial SSR could contribute to pushing a company above the EMIR thresholds and more generally imposes additional margining requirements, but does not fundamentally erode the VI business model and would not likely in itself expose the subject companies to the risk of a ratings downgrade.

Alignment & Compliance

9.2.6 A Partial SSR does not conflict with or hinder the various EU and GB reform initiatives, nor financial regulations such as EMIR or REMIT. While any intervention which increases liquidity and churn also increases the risk of breaching the EMIR thresholds, it does not hinder or prevent a company from complying with the regulation. However, we do find that a SSR potentially could conflict with Ofgem's minimum liquidity proposals, which includes a Day-Ahead gross bidding requirement. It is possible that the level of the SSR under a Partial SSR intervention would still leave sufficient room to accommodate Ofgem's minimum Day-Ahead gross bidding requirement, but such a solution would nonetheless impose divergent and inconsistent trading requirements[49].

9.3 Assessment of Full SSR

9.3.1 Our assessment of a Full SSR is detailed in Appendix F.

9.3.2 The Full SSR, by which we refer to a SSR with a 100% restriction, scores negatively overall on both an un-weighted and weighted basis under the Analytical Framework, as summarised below and detailed in Appendix F. Both measures are very close to the average scores achieved by the Partial options, but this similarity camouflages a number of differences in the scoring of individual criteria.

Benefits:

9.3.3 At face value, implementation of a Full SSR would nearly double the current GB industry average churn rate (2.8 in 2012) and deliver churn at 5 or 6 times underlying generation, a factor which is not far behind the Nordic markets. However, as noted above, these estimates assume that trading behaviour and churn rates are unchanged by the SSR itself. The assumption that the

49 Under gross bidding arrangements the portfolio is kept together to enable trading on both sides of the market whereas under the SSR the requirement is to separate up- and downstream trading requirements.

generation and supply positions which have been disconnected through the SSR will be churned the same way as (the smaller) net open position of the VIU portfolio is more than doubtful. In our experience, players who have structural exposures will churn far less than portfolio players, as they are not able to use proprietary trading to disguise whether they are entering the market from a long or short position (their underlying position is known to all). Hence, we believe it is likely that the trading behaviour will change in response to a Full SSR and that this will materially diminish the estimated level of liquidity benefits relative to a simplistic assumption where churn behaviour is unchanged.

Costs and Risks

9.3.4 A Full SSR will eliminate the need to segregate the GB market portfolio into SSR and non-SSR components and will therefore simplify the monitoring and reporting requirements associated with the SSR itself as well as the supplementary Channel and Tenor restrictions compared to the Partial SSR option. This simplification of the monitoring and control regime holds for both Elexon as well as within the subject companies. As in the case of the Partial option, we assume that the SSR restriction itself can be monitored (and hence controlled) via the Elexon generation and consumption accounts. Greater costs will obviously be incurred should this not prove to be correct. Furthermore, the Full SSR exacerbates the erosion of VIU benefits compared to the Partial option, leaving a larger nominal amount of bid/ask spread in the market, and increasing the risk that higher trading volumes leaves the company above the EMIR threshold.

Alignment & Compliance

9.3.5 In our assessment, a Full SSR does not conflict with or hinder the various EU and GB reform initiatives, nor does it conflict with financial regulations such as EMIR or REMIT. While increasing the SSR to 100% may further increase the risk that the affected participants may breach the EMIR thresholds (addressed above), it does not prevent compliance with the regulation itself. In contrast to the Partial option, however, a Full SSR will not in any circumstances be consistent with a minimum Day-Ahead gross bidding requirement. Hence, we judge this option to conflict with and hinder Ofgem's minimum liquidity proposals.

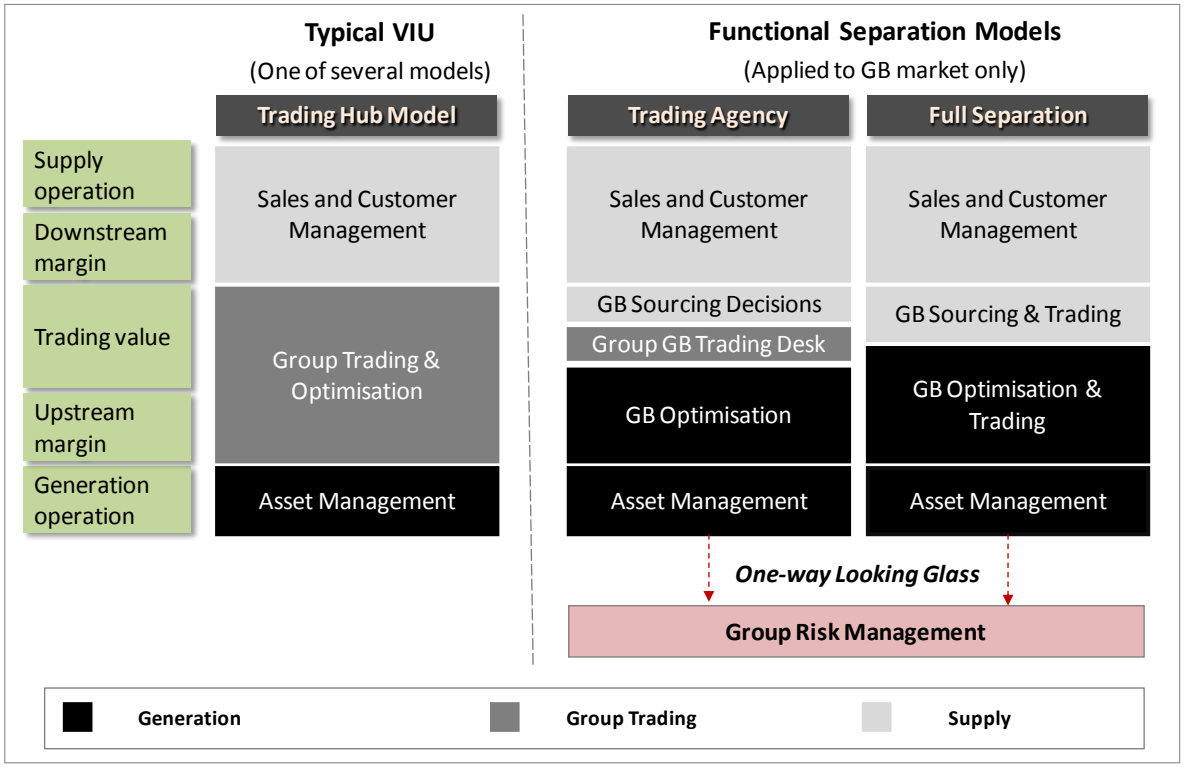
10 Functional Separation

10.1 Option Definition

Introduction

10.1.1 By functional separation, we refer to interventions which in addition to a complete SSR restriction (100%), impose additional constraints on the VIUs' internal organisation aimed at separating up- and downstream trading activities and commercial decision making. **Figure 21** below sets out two possible models for implementing such functional separation and contrasts these models with the common setup of VIU business models:

Figure 21: *Functional Separation Models*



10.1.2 As is visually evident, however, both of the Functional Separation Models (FS Models) represent a very significant departure from the typical organisation of VIU operations in the GB and wider European markets. While there are more than one business model, most VIUs are converging on some form of a (Trading/Commercial) Hub model. Appendix B provides an overview of this type of model as well as other alternative VIU business models.

The Trading Agency Model

10.1.3 Under the Trading Agency Model, all commercial and hedging/trading decisions are moved into the respective up- and downstream functions as is management of delivery obligation (i.e. station dispatch and balancing from day-ahead in into delivery). However, in contrast with the Full Separation model, the Agency model retains a central trading function at group which provides market access and execution services to generation and supply for all forward trading (i.e. beyond despatch/day-ahead stage).

10.1.4 In effect, the central trading function acts as an internal broker which takes orders from the up- and downstream division, but has no visibility of the underlying asset or sales positions and accompanying hedging and trading decisions which such orders serve. In contrast to a normal agency model (refer Appendix B), the trading function is not allowed to settle orders internally[50] . It is however allowed to manage credit and margining risk across all counterparties.

10.1.5 In the immediate aftermath of NETA, one or two GB VIUs did implement a version of the Trading Agency model[51], but these were subsequently abandoned in part in light of the risk management concerns discussed later in this section. There are some current examples of the agency model.

The Full Separation Model

10.1.6 As the label suggests, the Full Separation model requires complete operational and commercial separation of up- and downstream business functions. Under this model generation and supply operates as completely separate businesses, each with fully equipped trading functions (and accompanying analytical and operational support systems and business processes).

10.1.7 These separate trading functions are responsible for all market interfaces through to delivery and settlement on behalf of their respective "parent" business. Hence, they effectively operate as independent third parties, but with the added requirement that they cannot trade with one another. In order to facilitate complete separation of all market and settlement processes (i.e. Elexon), these trading functions have to operate from separate legal entities.

10.1.8 To our knowledge, no VIU has ever adopted this model on a commercial voluntary basis. However, the current agency type model imposed on ESB in Ireland was preceded by stronger regulatory ring-fencing obligations which mirror the Full Separation model. Likewise, Japan has recently announced its intension to break up incumbent VIU structures into separate generation and supply businesses. Both these examples are described in further detail in Appendix D.

10.1.9 In addition to the basic setup outlined above, both Functional Separation models create requirements for the setup of risk management, compliance and operations.

Risk management requirements

10.1.10 Under either of the FS Models, some risk management oversight at group level will be required in order to:

i) Protect the company against accidental (unintended) speculative positions emerging; and

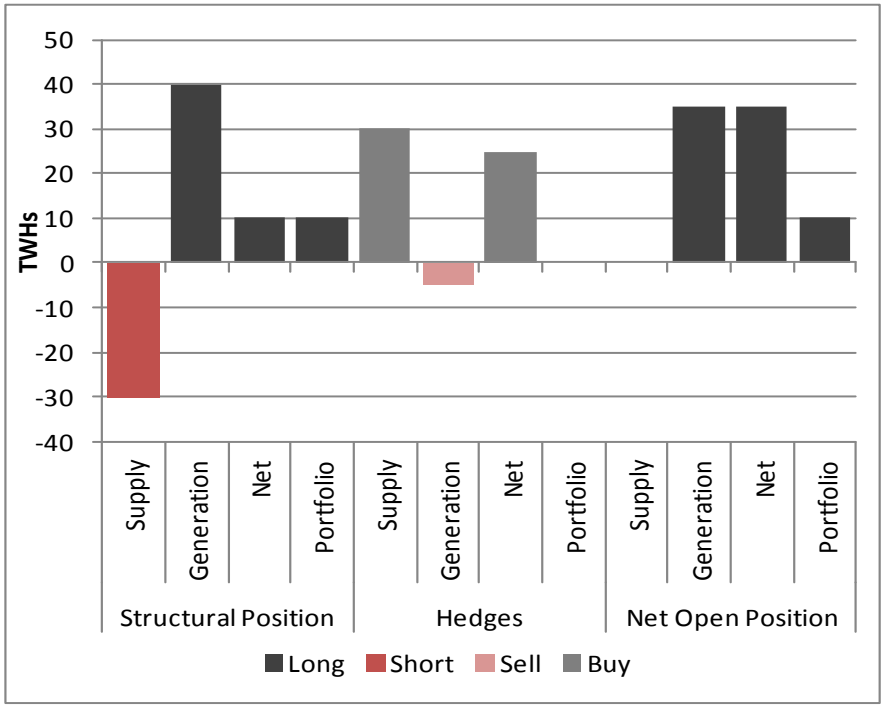
ii) Coordinate credit and collateral exposures (which can only be managed at group level)

10.1.11 Figure22 below illustrates how speculative positions might occur accidentally in the absence of overarching control and monitoring by a Group Risk Management function:

50 Hence, the trading function cannot utilise portfolio offsets and must source all orders from the external markets.

51 In part motivated by a desire to lessen or eliminate internal tensions and arguments about the benchmark for transfers asset and sales positions into the Trading Books.

Figure 22: Example of Accidental Speculative Positions



10.1.12 In the example, Supply is structurally short 30 TWhs whereas generation is long 40 TWhs (before any hedges). Hence, the Group is net long 10 TWhs. Now assume that Supply and Generation act completely independently without any coordination by the Group and that both functions anticipate rising prices[52]. The supply business therefore hedges its entire open position (buys 30 TWhs), whereas generation retains the maximum open position allowed under its risk/VaR Limits. For the purpose of illustration it is assumed that Generation has wide risk limits which allow it to retain a maximum exposure of 35TWhs (hence Generation therefore sells just 5TWhs). The net effect of these transactions is a large increase in the Group's long position (from 10 TWhs to 35 TWhs) creating a massive (unintended) speculative bet on rising prices.

10.1.13 This example is exaggerated for effect. In practice, the risks limits applied to the Supply and Generation books would be far tighter (limiting the potential size of unintended speculative positions). Nonetheless, a similar scenario did actually occur within the GB industry shortly after the launch of NETA, prompting the company in question to abandon its Trading Agency model and (re-) integrate the management of the group-wide energy portfolio.

10.1.14 To mitigate such risks under the Functional Separation models, these models need to be augmented with an overarching regime for monitoring and coordination of risk management at group level. In turn, this requires a central Group Risk Management function which:

i) Can see all positions across all books, but not share this information across the group ("one-way looking glass");

ii) Is mandated to propose and enact corrective measures in the event market exposed positions become seriously misaligned (as in the example);

52 The assumption is not critical and a similar example could be constructed for a falling price scenario.

iii) Is operational responsible for managing all credit risk as well as collateral and margining exposures across the group.

10.1.15 ESB in Ireland, which as explained in Appendix D has been operating at different times under regulatory ring-fencing obligations similar to both Function Separation models, have deployed such monitoring and supervision at group level to mitigate such risks and control deficiencies.

Compliance requirements

10.1.16 The FS Models require additional compliance controls, over and above the monitoring of Elexon generation and consumption accounts for inter-company (physical) trades. These controls need to enable monitoring and ensure that communications and data passing between the restricted entities do not extend beyond what such entities naturally would exchange were they truly separate competing market participants. For example, in the Trading Agency model, communications between the Trading Function and the up- and downstream businesses should be limited to the order placement and confirmation process that such participants typically would exchange with a third party broker. In particular, there can be no communication or sharing of generation or supply forecasts or other information a truly independent company would not want to share with a broker.

10.1.17 In practice it is nearly impossible to monitor and enforce such compliance externally. Where similar requirements have been put in place (for example ESB), they are typically implemented and enforced by obliging the company to create an internal Compliance Office role. To ensure that this role "has teeth" and is taken seriously internally, deliberate non-compliance or failure to act on material compliance issues subsequently identified must result in:

i) Serious disciplinary consequences for the Compliance Office (i.e. he or she is fired); and

ii) Substantive financial penalties (as well as non-financial disciplinary remedies) being imposed on the company.

10.2 Assessment of Functional Separation – Agency Model

10.2.1 Our assessment of the Agency Model is detailed in Appendix F.

10.2.2 Under this model all commercial and hedging/trading decisions are moved into the respective up- and downstream functions as is management of delivery obligation (i.e. station dispatch and balancing from Day-ahead in into delivery). However, a central trading function is retained at group level which provides market access and execution services to generation and supply for all forward trading (i.e. beyond despatch/day-ahead stage). Applying the Analytical Framework as summarised below and detailed in Appendix F, we evaluate the Agency Model negatively overall on both an un-weighted and weighted basis. Our assessment of Functional Separation is more unfavourable than the pure SSR options discussed in the chapter above.

Benefits

10.2.3 The Agency Model embeds a Full SSR, and thus limits (or, rather, eliminates) a company's ability to net positions internally, obliging the company to take all purchases and sales to the wholesale market and thus, in theory, increasing market churn and liquidity. However, we believe this

option is likely to deliver a somewhat smaller contribution to trading volumes and churn than the Full SSR intervention, and hence, by comparison, reduce the positive impact. With the delegation of all commercial and trading decision making to the up- and downstream businesses, respectively, it is in our experience likely that such decisions will become highly focused on (one-directional) simple hedging activities. The fact that these decisions are transacted through a central trading function does not, in our view, change this picture. Under the (ring-fenced) Trading Agency model, this function has no visibility of the underlying generation and consumption forecasts and no way of knowing (in advance) what trading orders the up- and downstream businesses are likely to be and, in particular, when such orders will hit the trading books. Hence, the central trading function will not be in a position to churn the underlying asset and customer positions.

Costs and Risks

10.2.4 The Agency model marks a clear departure from the internal business model that unfettered VIUs would pursue and seriously begins to erode the benefits associated with VI. As discussed in Appendix B, many European VIUs operate commercial hubs which concentrate and consolidate all trading and commercial decisions as well as all optimisation activities. Implementation of the Agency model would therefore require some substantial re-engineering of processes, systems and organisation to set up the new local up- and downstream optimisation functions, equip these functions to act on their own, and create an interface to the central Trading Hub. In addition to changes to operational systems and core business processes, it would force a subject company to change its internal organisation, roles, and responsibilities for part of its business. It will also entail some duplication of capabilities across each of the two separate optimisation functions. These functions will, for example, need to be able to capture and record their internal trades with the central Trading Hub as well as maintain separate position and risk reporting functionality. The end result would essentially be a separate, and distinctly different, business models for GB, while presumably the remainder of the company's European business continues to operate with a larger degree of vertical integration. Furthermore, as explained above, this model would also require participants to implement a new compliance function as well as develop specific risk management processes to enable the "one-way looking glass". It is in our view a complex and expensive solution for the participants to implement. Direct costs arise both through duplication of systems and processes as well as through having to man two separate optimisation functions as well as a new compliance functions.

10.2.5 While margining risks can still be managed and offset at group level, we believe it possible and even probable that the Rating Agencies will be quite concerned about such an intervention. We believe this type of model, in and of itself, could put genuine pressure on ratings performance.

10.2.6 As discussed above, all our experience suggests that portfolio players typically will churn a smaller net open position more than directionally exposed players with large open generation or supply positions. Participants who are structurally long or short cannot disguise their position in the market by buying and selling, and they can adjust their exposure in the market by the timing decisions of their hedging activities, rather than trading in and out of a position. In all likelihood, the commercial and trading decision making in the separated up- and downstream optimization functions will become highly focused on (one-directional) simple hedging activities.

Alignment & Compliance

10.2.7 We conclude that this intervention neither materially augments nor hinders the application of the reforms and regulations set out in the Analytical Framework with two exceptions. Firstly, the Agency Model, which delegates spot and delivery management to the new separate optimisation functions, is not consistent with the 30% Day-Ahead gross-bidding requirement included within Ofgem's Minimum Liquidity Proposals as defined in Section 13.2. Secondly, REMIT requires separate reporting for all generation and upstream activities, a requirement that this intervention supports by separating these activities from the rest of the portfolio (although only in the GB).

10.3 Assessment of Functional Separation – Full Separation Model

10.3.1 Our assessment of the Full Separation Model is detailed in Appendix F.

10.3.2 As explained above, in this model all commercial and hedging/trading activities are restructured from the trading function into the respective up- and downstream functions together with management of the delivery obligation (i.e. station dispatch and balancing from Day-ahead into delivery). Applying the Analytical Framework as summarised below and detailed in Appendix F, the Full Separation Model scores negatively overall on both an un-weighted and weighted basis based on our assessment of each individual criterion.

Benefits:

10.3.3 As for the other separation models (whether supply restrictions or constraints on the functional organisation), the Full Separation Model obliges the company to take all purchases and sales to the wholesale market, creating large, open generation and supply positions which previously did not exist within the VIU. However, for the same reasons as given above for the Agency Model intervention, we believe this option is likely to deliver a somewhat smaller contribution to trading volumes and churn than the Full SSR intervention, and hence, by comparison, reduce the positive impact. When all commercial and trading decision-making is delegated to the up- and downstream businesses, in our experience it is likely that such decisions will become highly focused on simple (one-directional) hedging activities. Hence, the benefit of separating up- and downstream positions will be somewhat eroded.

Costs and Risks:

10.3.4 Complexity and financial costs are higher for the Full Separation Model than for the Agency Model. The latter "just" requires ensuring that local GB Optimisation functions do not communicate asset and sales positions to the central trading hub. In contrast, the Full Separation Model is a complete departure from the typical VIU business model requiring that two new trading entities for the GB region are extracted from the central hub. This will add considerable operational complexity to the overall VIU operations as well as to costs. These new trading functions will require their own systems (instances of the main VIU trading system), back-office and middle office processes, separate and additional staff and so on. For settlement and compliance purposes, we also assume that this option will require the new trading companies to be set up in separate legal entities, something that adds material costs and reporting complexity. Splitting the external market interface into three legal entities (two GB entities and a central

entity for other markets) will potentially also complicate group wide credit risk and margining management. In addition to changes to operational systems and processes, it would force the subject companies to radically change their internal organisation, roles, and responsibilities within the new GB business areas and also with respect to the interface to the central functions and group functions such as risk management. Even more so than under the Agency Model, the end result would essentially be separate, and distinctly different, business models for the GB and the rest of Europe.

10.3.5 The Full Separation Model would place some real and concerning constraints on a company's ability to manage collateral and margining (as well as EMIR thresholds). While in and outgoing cash collateral will continue to be consolidated at group level, the ability to actively manage such calls, for example through selective choice of counter-parties to exploit netting benefits, will be restricted. Since the two GB trading functions must act independently of one another, they cannot be allowed to see the total GB or group credit position. Hence, utilising group wide cross-netting agreements effectively will become an issue.

10.3.6 This Full Separation Model would significantly erode VI benefits by (re-) introducing a business model which is far more geared towards gross pools (e.g. SEM)[53]. In our view, rating agencies will worry about the impact on competitiveness in the BETTA as well as EU Target model (as currently defined). Rating agency credit assessments will normally include and give material weight to company structure and competitive fit. In addition, agencies are likely to be concerned about the trading and operational inefficiencies introduced by this model as well as the risk of further regulatory interventions in other parts of their business. For VIUs with a substantial business in the GB, this type of model would in our assessment put companies at risk of a (1 notch) downgrade.

Alignment & Compliance

10.3.7 In line with our assessment of these criteria for the Agency model, we conclude that the Full Separation model is inconsistent with Ofgem's Minimum Liquidity Proposals while being modestly supporting to the REMIT obligations.

53 Gross pools can and often are specifically designed to accommodate stand-alone operations on either side of the value chain

11 Mandatory Auctions

11.1 Option Definition

11.1.1 The mandatory auction intervention would require large generators or large VIUs to offer power volumes in a periodic auction. By forcing certain large generators to put volume through a transparent market, an auction would support robust reference prices along the curve (at a minimum, around the times of the auction). Additionally, the auction would direct the mix of baseload and peak products and tenors, thus ensuring a range of hedging products are available to the market. We outline our recommendations regarding the design of a mandatory auction below, which broadly follow the design outlined in the Ofgem consultation[54]. We then assess the intervention against the analytical framework.

Participants

11.1.2 A fundamental feature of the auction is the mandatory participation on the sell-side for certain companies. Appropriate criteria will oblige large, vertically integrated utilities to offer a specified proportion of their generation for sale in the auction. Assuming the intention is to have the Big Six, and only the Big Six, participate on a mandatory basis, we propose to require participation from any company both generates and supplies at least 20 TWh per annum in the GB market. In addition to the mandatory participants, any other qualified (i.e. meeting minimum standards) market participant may also offer volumes for sale, including independent generators, independent suppliers, financial participants, etc.

11.1.3 On the buy-side, any market participant can bid for volumes, subject to the buy-side rules (see 11.1.8 below), including suppliers, financial traders, and large energy consumers acting through a nominated supplier. We additionally note that parties for whom participation is mandatory on the sell-side are also permitted to purchase volumes in the auction, mitigating the necessity of allowing an auction reserve price.

Products

11.1.4 Auctioned products are for physical delivery, not (purely) financial settlement, in order to better suit the requirements of small suppliers needing ultimately to deliver energy to their customers. While financial products may allow suppliers to hedge out their market price exposure, they would still need to go into the physical market at a later date to bring them back into physical balance, incurring bid-offer spreads twice. In terms of tenor, we propose the front four Seasons, the first front Quarter, and the first one to three front Months of baseload power, with perhaps somewhat shorter maturity offerings for peakload. Small suppliers will also require small clip sizes (i.e. the minimum volume of energy available for purchase/sale in each transaction) in order to hedge new customer volumes as they are acquired. We propose a minimum volume of 0.5 MW.

54 Retail Market Review: Intervention to enhance liquidity in the GB power market, Ofgem, 22 February 2012

Auction frequency

11.1.5 Key considerations in determining the frequency of auctions are the objectives of increasing price transparency and making available products for hedging and risk management. Although we do expect a boost to secondary markets, price transparency is only guaranteed around the time of the auction (in the absence of other liquidity interventions). Therefore, compared to a quarterly auction for example, a monthly auction would increase the minimum frequency with which a transparent forward price curve is visible to market participants, and would lead to better risk management among both buy-side (independent suppliers) and sell-side (independent generators) participants by making available hedging products on a more regular basis. Increasing the frequency of auctions beyond monthly will likely have negative consequences. These include increased costs, comprising both direct costs in hosting the auction platform and activities, as well as the costs borne by participants to prepare and submit their bids in the auction. Additionally, we believe that auctions which are mandated to be held more frequently than monthly will fragment liquidity.

Mandatory volumes

11.1.6 The auction must carry a reasonable volume in order to be effective and drive prices to reflect the market fundamentals. We suggest the mandated participants be obliged to offer 10% of the GB market on an annualised basis (equating to ~35TWh, or approximately 2.5TWh per monthly auction). For each product (i.e. baseload and peakload at each tenor), mandatory quantities will be specified for obligated parties. Additional voluntary quantities may be offered, by any market participant.

Auction form

11.1.7 A common design choice in European power auctions is the simultaneous ascending-clock auction with a discrete round structure, where each of the auction products are auctioned separately but simultaneously. In each round, bidders specify their demand for each product, at all prices from the product's start-of-round price to the end-of-round price. At the end of each round, the excess demand at the end-of-round price is reported to all bidders, thus helping to improve price transparency. A proxy bidding facility will enable unsophisticated bidders to treat the auction as if it were a sealed-bid auction, by submitting in advance a single price and quantity. The clearing price, paid by all successful bidders, is the lowest price at which aggregated demand is less than or equal to the volume of offered supply. At the end of the auction, the exact clearing price is reported to all participants.

Buy-side rules

11.1.8 Buy-side rules are required to protect against market manipulation. An important provision to limit price manipulation and the potential for collusion is a restriction preventing any single buyer from bidding for more than 50% of the mandatory auction volume of each product. Additionally, we would recommend a further provision to prevent mandatory participants from bidding for between 80% and 120% of their own volume. Among other objectives, these restrictions will ensure that mandatory auction participants have some "skin in the game", i.e. that they cannot structure a bidding strategy leaving them indifferent to the auction outcome. Note that the

restrictions cannot completely eliminate the residual gaming risk related to a contract struck outside the auction, but indexed to the auction price.

Reserve Price

11.1.9 Many auctions permit sellers to set a reserve price. We expect mandated sellers to argue strongly in favour of being allowed a reserve price for offered volumes but a reserve price is not necessary if the mandated sellers are allowed to participate on the buy-side, subject to buy-side rules. If the obligated participants are neither allowed to set a reserve price nor to participate on the buy-side of the auction, then there remains the risk that the auction clears at distressed sale prices.

Choice of auction platform

11.1.10 We strongly recommend requiring a single auction which pools volumes from all mandatory participants (as well as from others joining voluntarily) in contrast to allowing each mandatory supplier host a separate auction for their own volumes. For reasons outlined above in our discussion of the frequency of auctions (see 11.1.5), having all volumes concentrated in a single auction will increase liquidity and decrease costs. Additionally, a single auction will remove barriers to the participation of smaller counterparties, who will avoid having to guess at which auctions their attendance may be most beneficial. Finally, a single auction will reduce the potential for gaming by eliminating opportunities for reciprocal arrangements whereby two parties agree to buy volumes at each other's auctions at off-market prices. Furthermore we do not necessarily see that the auction platform necessarily needs to be an existing exchange. A stand-alone web portal for administering the auction can be established relatively easily, as has been demonstrated by previous VPP auctions mandated by regulators in the past.

Contract terms

11.1.11 Auction terms and conditions must be common to all participants and should not be far from market standard if they are to be accepted by market participants. We recommend that any power awarded in the auction should be governed by the GTMA, which are the standard contract terms used in the UK Power market. The GTMA defines elements such as payment terms, nomination procedures and delivery point. The use of a standard contract provides easier auction access for existing market players and ensures that power contracted in the auction can be easily re-sold on the secondary market without residual risk being retained by the original auction participant.

Credit risk mitigation

11.1.12 In the absence of mitigations, any seller successful in placing volumes through the auction will be exposed to the credit risk of their counterparty, as will any buyer successful in purchasing volumes in the auction (see Appendix E for a discussion of credit risk). Auction participants, and above all mandatory participants, will rightly resist having to accept, via the auction, credit risk on parties that they deem uncreditworthy or otherwise ineligible of having credit extended. It is common practice for auction participants to post a guarantee, the amount of which depends on the maximum volume for which the participant intends to bid and whether the participant is a buyer or a seller (noting here that sellers are exposed to settlement risk whereas buyers are not).

11.1.13 An alternative approach to credit risk mitigation would be to have a central clearing party stand behind all trades completed in the auction and require all participants to post variation margin on a daily basis in support of volumes transacted on the platform, similar to trades transacted on an exchange.

Pre-qualification

11.1.14 In addition to minimum requirements relating to credit (i.e. minimum credit rating, guarantee bond, associating with a clearing bank which is a member at the central clearing party, etc.) an auction participant must demonstrate that it is a signatory to the Balancing and Settlement Code. Additionally there will be a financial pre-qualification due diligence including Know Your Customer, Anti-Money Laundering, solvency checks, etc.

Auction monitoring and Trustee

11.1.15 Auction monitoring is usually done by an independent trustee. The trustee performs a number of functions, including conducting the pre-qualification process for participants, oversee the auction to ensure a level playing field, scrutinise behaviour for evidence of collusion and gaming, communicate with participants including dissemination of auction results, allocate successful bidders to sellers, and produce any required reporting.

11.2 Assessment of Mandatory Auctions

11.2.1 Our assessment of Mandatory Auctions is detailed in Appendix F.

11.2.2 We consider an auction designed along the lines described above, i.e. a monthly auction for forward power products which obliges the Big Six to offer volumes in the auction, and additionally permits any other pre-qualified seller to participate. Pre-qualified buyers may include the mandatory sellers. A Mandatory Auction intervention then scores positively under the Analytical Framework on both an un-weighted and weighted basis based on our assessment of each individual criterion, as elaborated in Appendix F.

Benefits:

11.2.3 By definition, a mandatory auction of forward products creates a new channel to market and thus offers an additional sourcing and hedging opportunity to market players over and above existing channels. Furthermore, we expect the auction products to be traded in the secondary market, thus supporting liquidity in existing OTC markets. There is the obvious scope within the auction design to mandate and direct the particular products desired in the auction in terms of tenor and shape, and the volumes provided. Auction clearing prices for these products will be publicly available and thus the auction products will facilitate transparent and robust reference prices. Although clearing prices from a discrete auction will by definition be visible only at the time of each auction rather than on a continuous basis, we expect that increased activity in secondary markets will enhance price transparency in continuous time. Published auction results can produce a benchmark for the pricing of other transactions, including a CfD with reference price linked to auction outcomes (or, better yet, linked to an OTC or exchange price for a product that mirrors a product offered in the auctions).

Costs and Risks:

11.2.4 We consider the operational complexity of the Mandatory Auction intervention to be material. We would need to consider designing the auction, tendering for a platform and trustees, auction system development and testing, drafting the legal documents, producing documentation of the detailed auction rules and a bidder manual, conducting bidder seminars and mock auctions, and communicating with mandated and voluntary participants. Individual participants would need to first qualify to participate and then, on a monthly basis, prepare and execute their bidding strategy for each auction. This operational complexity may prevent the smallest participants from participating, or more likely they may be excluded from the auction because of their inability to pre-qualify on the basis of insufficient credit, their reluctance to post a bond of sufficient size, or their preference to avoid the cash liquidity risk of bringing volumes to clearing.

11.2.5 As with all interventions that mandate participation or action, there is the risk in the context of EMIR that a company has a level of churn beyond that which it would prefer, thus causing the company to exceed the clearing threshold. To the extent that auction products are cleared, there would be a requirement for a company to have sufficient cash liquidity to support the collateralisation of the mandatory volumes, and no clear escape from mandatory participation in the market in times of constrained liquidity.

Alignment & Compliance:

11.2.6 We have considered the interaction between the Mandatory Auction intervention and current market reform and financial regulation initiatives. To the extent that a Mandatory Auction directs liquidity toward a product which is the reference for the baseload CfD, the intervention would be supportive of EMR, but as this considered above under “Benefits” we neglect it here to avoid double counting. Although the additional transactions required by the Big Six may push them closer to the EMIR threshold, the Mandatory Auction intervention in no way contradicts or violates the application of the EMIR regulation. With respect to the other regulations and reforms, we do not consider Mandatory Auctions to either augment or hinder their application.

12 Mandatory Market Making

12.1 Option Definition

Market Making

12.1.1 Market making involves a commitment to continually show bid and offer prices for a minimum volume of a commodity within a defined bid-offer spread. For example, a market maker (i.e. the party doing the market making) in first season baseload UK power may commit to continually offer to both buy and sell on their own account a given volume at bid and ask prices which differ by at most £ 1/ MWh. If another party accepts the bid or offer, the market maker must immediately replace the volume. Market making is typically done on an exchange or via broker screens.

12.1.2 Market making increases liquidity by ensuring volumes are continually available for purchase or sale. As for an auction, a market making intervention could direct the mix of baseload and peak products and tenors, thus ensuring a range a hedging products are available to the market. However, unlike an auction, market making ensures that reference prices along the curve are continually visible (even in the case where no trading occurs, we can assume that the "actual" market level is generally bounded by the bid and ask prices). We outline our recommendations regarding market making below.

Rewards and Risks of Market Making

12.1.3 Market making is an activity with both risks and rewards. The obvious benefit of market making is the opportunity to earn the bid-ask spread on all volumes churned. This benefit is offset (perhaps more than offset) by the risk of mispricing. In an illiquid market where there may not be current price benchmarks for a particular product, a market maker may not know at what level to set his bid and offer prices. The correct market level will only be found by a costly "trial and error" process as other market parties hit bids which are too high or offers which are too low. Even where the market level is known, a fast-moving market (resulting, for example, from news arising, or some other market shock) may leave the market-maker's bid and ask prices outside the actual price level.

12.1.4 Despite the risks, companies in some markets may choose to be market makers voluntarily. In addition to earning the bid/ask spread (as mentioned above), they may also be motivated by a desire to stimulate liquidity in a particular product. A market maker often attracts new participants to trade in a product and a large incumbent may find the resulting new hedging opportunities sufficiently compelling to undertake itself the market making responsibility. Exchanges, which make money based on the volume of trades performed on their platform and therefore benefit from enhanced market liquidity, may offer reduced exchange fees to a company which enters a market making agreement and therefore commits to making a market (with minimum volumes and maximum spreads specified in the agreement).

Voluntary or Mandatory Participation as Market Makers

12.1.5 Any current market participant could potentially decide to act as a market maker in UK power. The fact that no parties are currently willing to do this indicates that participants perceive the risks of market making to exceed any benefits. A market intervention to stimulate market making would therefore need to either compel or incentivise certain participants. We propose that the Big Six are mandated (as opposed to incentivised) to be market makers in UK power. As for mandatory auctions, the intention to oblige the Big Six (and only the Big Six) to make a market could be stated as an obligation to act as market maker for all companies that both generate and supply at least 20 TWh per annum in the GB market.

12.1.6 The alternative to an obligation on the Big Six to make a market would be an incentive to parties to become market makers. For example, a tender could invite parties to bid for compensation in return for making a market (for certain products according to pre-defined requirements, as outlined below), with the two lowest bidders selected as market makers. The compensation for tender winners would be funded by an annual, industry-wide, compulsory levy. In our opinion, we do not expect an incentivised intervention to be effective. We believe that compensation in the range of, for example, £2 million would be insufficient to compensate any of Big Six for the risks and effort of making a market, especially if such company were one of only one or two market makers showing prices. On the other hand, compensation substantially greater than this amount (for example, an order of magnitude larger) would be difficult to raise as a compulsory levy on participants. We therefore assess a market making intervention where participation by the Big Six is obligatory.

Products and Volumes

12.1.7 As we recommended for mandatory auctions, we propose that the products targeted in a market making intervention are for physical delivery in order to meet the balancing needs of small suppliers. We propose the front four Seasons, the first front Quarter, and the first one to three front Months of baseload power, with perhaps somewhat shorter maturity offerings for peakload. We recommend 5 MW of bids and offers (to be continuously replenished if required) for each of Big Six, with a minimum clip size of 0.5 MW.

12.1.8 We recommend further that market making in short-term products (for example, within one week maturity) should not be obliged on market participants. The risks of market making in shorter term power products are significantly greater than in longer term products. Because electricity is (for the purposes of wholesale markets) a non-storable commodity, supply or delivery obligations cannot be serviced from inventory. This means in practice that the market reacts strongly to news which alters the supply-demand balance. In particular, an expected generation outage must be covered, i.e. if a generator has committed to generate power and has sold the volume forward, and the generation unit fails, then that power must be bought back on short-term markets. This is disruptive to the supply-demand balance and potentially moves the marginal generation unit up the stack. The result will be a large jump in short-term prices. A market marker will likely not react sufficiently quickly to adjust bid and ask prices before existing offers are hit, and will anyway not know at what new level the market will settle. The result is potentially large losses for the market maker. Longer dated products are not subject to the same risks as long-term prices and are not as volatile in response to short-term news.

Market Making Rules

12.1.9 A key design parameter in a market-making intervention would be the rules governing the maximum bid-ask spread permitted. A restriction on the bid-ask spread is important, as offering to sell at a ridiculously high price or bidding to buy at a ridiculously low price is equivalent to making no offer or bid. Considering NordPool or EEX market makers as a benchmark, we would propose a maximum spread of £1 - £2/MWh under normal market conditions. The maximum spread could be varied as a function of potential market depth, for example a tighter spread could be imposed on shorter-maturity baseload products than on longer-dated peakload.

12.1.10 Typically, the rules governing the bid-ask spread are relaxed for a "fast" moving market. A fast market is defined by rapidly changing traded prices. For example, when the difference of two traded prices differs by more than the allowable bid-ask spread within a period of 60 minutes, a "fast market" may be declared. It is assumed that during a fast market the equilibrium level of market prices is less transparent to market makers and therefore they have more difficulty to set their bids and offers. "Fast Market Rules" may permit a wider bid-ask spread than during normal market conditions, or may even completely waive the maximum difference between the bid and offer prices.

12.1.11 Finally, we recommend that any market making intervention specify the trading hours for market makers, for example 9h to 16h on business days (except during "fast market" conditions).

Choice of Platform

12.1.12 Generally, a market can be made on an exchange or in the OTC market via broker screens. We recommend that any intervention be designed around market making on an exchange. This has two main advantages. First of all, an exchange that hosts the market makers can also serve to monitor compliance with the market making rules (with respect to offered products and volumes, maximum bid-ask spread, determination of a "fast market", etc.). In addition, we believe that an exchange may offer better access to small, independents than a broker market. To participate on an exchange, small parties would need a relationship with a clearing bank and sufficient collateral to support margining. In the case of OTC trading via broker screens, small participants would need access to the screens (for which brokers charge all but their best customers) as well as trading agreements (comprising credit and payment terms, collateral support, etc.) with the various parties making the market. We therefore conclude that exchange trading may be an easier route to market for small or independent parties.

Contract terms

12.1.13 If we assume that market making is conducted on an exchange, then all trades will be via the central clearing party and fully collateralised with initial and variation margin. Alternatively if market making is conducted on OTC markets then it is be expected that counterparties have completed due diligence (Know Your Customer, Anti-Money Laundering), concluded a trading agreement (GTMA), have assessed each other's credit and agreed credit terms, etc.

12.2 Assessment of Mandatory Market-Making

12.2.1 Our assessment of Mandatory Auctions is detailed in Appendix F.

12.2.2 We consider a Mandatory Market Marking intervention designed along the lines described above, namely an obligation on all Big Six companies to continually offer to buy and sell a number of mandated products on an exchange, subject to normal market making rules. Such an intervention scores positively overall on both an un-weighted and weighted basis based on our assessment of each individual criterion in the Analytical Framework, as elaborated in Appendix F below.

Benefits:

12.2.3 In our opinion, Mandatory Market Making has the largest scope in increase churn rates in the GB power market. With a Mandatory Market Making intervention, market participants will be able to purchase and/or sell as much volume as they require (although market makers can adjust their prices in response, subject to restrictions on the bid-ask spread). This contrasts with Mandatory Auctions, where (minimum) volumes for mandatory participants are determined in advance. Mandatory Market Making does not create a new channel to market, but instead increases the intensity of use of an existing channel (namely futures trading on exchanges). This is a key advantage of this intervention compared to others described above, in the fact it introduces the least amount of change and conforms most closely to existing market practices and channels. It therefore has the least scope for gaming or other unintended consequences. Market making liquidity in the mandated products on the exchange and thus gives certainty for participants that any open position can be closed. We expect this feature to be attractive to financial participants (or other non-physical participants, such as foreign utilities with neither customers nor generation in the GB market) because the presence of market makers will give assurance that open positions entered speculatively can always be closed at competitive prices, rather than taken to delivery (or closed at distressed prices).

12.2.4 As for mandatory auctions, there is the potential to mandate and direct the particular products desired. However, we do note the current lack of price transparency to enable market makers to set their bid and ask prices may cause mandatory participants to resist a requirement to make a market in long-dated products or complex shapes. Transparent price information for the products in which markets are made will be continuously available. Even in the event that no trades are made, the published bid and ask prices across all market makers can be averaged to give an indication of the market assessment of the price level. CfD contracts can reference a traded price for a product for which market making is mandated.

Costs and Risks:

12.2.5 System and infrastructure costs to establish the Mandatory Market Making intervention are low. There will be a requirement for a small supervision function to monitor market making rules such as maximum bid-ask spreads, which could be performed by the exchange hosting the market making activity. We do not include here any costs to incentivise market makers, as our design assumption is that market makers are required, rather than incentivised, to participate. However, we do anticipate a tender to choose an exchange or broker platform to host the market

making activity and monitor compliance with market making rules. From the point of view of the mandated participants, direct costs (as opposed to risks) related to performing market making desk are assumed to be small. Typically, companies large enough to be considered for mandated market making would already have established UK power trading desks. Market makers will need to ensure their desk is covered during business hours, so that bid and ask prices can be adjusted up and down as the market moves, and bought and sold volumes must be replaced in the market.

12.2.6 Risks to market participants related to mispricing are noted in the description of the intervention above in this chapter. The participation of mandated market makers in the market is not capped, as they are required to replace any volumes purchased or sold. This has the potential to generate a high level of churn in the portfolio of a mandated market maker. Because we recommend the market making activity be conducted on an exchange, the net open position for each product would be therefore subject to daily margining, with associated cash liquidity risks resulting from the requirement to post collateral. We observe, however, that by an appropriate choice of bid and ask prices for each product, it is well within the control of each market maker to keep their net open position close to zero if they so wish. For example, if they find far more buyers than sellers, they can raise their offer price (to discourage buyers) and simultaneously raise their bid price (to attract sellers and also to keep within the required bid-ask spread). Therefore, although there would be a requirement for a company to have sufficient cash liquidity to support the collateralisation of the resulting trades, and no clear escape from mandatory participation in the market in times of constrained liquidity, the burden is manageable through active balancing of bid and ask prices to ensure relatively equal volumes of buys and sells. The requirement to post collateral is most burdensome on small generators or small suppliers, who are likely to be cash constrained and whose activity will be almost entirely one-way (i.e. all buys or all sells).

12.2.7 As with all interventions that mandate participation or action, there is the risk in the context of EMIR that a company has a level of churn beyond that which it would prefer, thus causing it to exceed the EMIR clearing threshold when otherwise it would remain under. We note that the detailed technical application of the clearing threshold to portfolios is not yet tested. However, it seems reasonable to us that for exchange trades, only the net position in each product (as opposed to the history of buys and sells) is considered to determine a company's position relative to the threshold. We contrast this with OTC trading, where we believe that the gross position, rather than the net position, will be considered unless steps are proactively taken to close out and settle offsetting trades. With this observation, we conclude that the risk of mandatory market making in the context of the EMIR threshold, while non-trivial, is not unduly burdensome.

Alignment & Compliance:

12.2.8 We have reviewed the interaction between the Mandatory Market Making intervention and current market reform and financial regulation initiatives. Just as for the Mandatory Auction intervention discussed in the chapter above, we find that the Mandatory Market Making intervention could help direct and reinforce liquidity in the product which is referenced by the baseload CfD, but we score this support above in the "Benefits" section of the Analytical Framework. Similarly, additional churn in the portfolios of the Big Six which results directly from market making could have a detrimental impact with respect to the EMIR clearing threshold, but the intervention does not in itself contradict the application of the EMIR regulation. We judge Mandatory Market Making to neither augment nor hinder other current reforms and regulations.

13 Supplementary Intervention Options

13.1 Introduction

13.1.1 This chapter outlines a number of supplementary intervention options, by which we refer to interventions that might aid and support the overall objectives, but which in themselves are unlikely to be sufficient to achieve the desired level of change. It is structured as follows:

- **Sections 13.2** outlines two interventions currently under consideration by Ofgem, namely a minimum Day-Ahead trading requirement and inclusion of additional license conditions to promote fair and reasonable trading terms;
- **Section 13.3** considers the reference price in the Low Carbon CfDs, a choice we see as an important (supplementary) instrument for directing liquidity along the curve;
- **Section 13.4** outlines two potential credit interventions, namely mutualisation or credit losses and government backing of credit insurance;
- **Section 13.5** similarly considers an intervention aimed at ensuring effective collateral and margining arrangements; and
- **Section 13.6** finally sets out various potential interventions for increasing the general transparency of the GB market.

13.2 Ofgem Minimum Proposals

13.2.1 Ofgem is currently considering two interventions, both of which would be implemented through additional license conditions. Collectively, these two proposals make up what we in the Analytical Framework refer to as being "Ofgem's Minimum Proposals"

Minimum Day-Ahead Trading Requirement

13.2.2 The first of the minimum interventions is additional license terms which oblige participants to gross-bid 30% of annual generation into one of the Day-Ahead Auctions (N2EX or APX). The objective is to secure and lock-in the progress in developing liquidity in Day-Ahead traded volumes (mainly on N2EX), by requiring the licensee to transact both sides of the market (gross bidding).

13.2.3 The table overleaf details Ofgem's proposal:

Table 5: *Minimum Day-Ahead Trading Requirement*

Element	Requirements	Rationale
Required actions	Licensee must buy[20] and sell…	Ensures activity on both sides of the auction, with benefits to both the generation and supply markets.
Volume	…at least 30% of its annual generation…	Secures the volume in existing gross bidding agreements. Calculating volume on an annual basis should minimise reporting costs. No clear benefits from basing the obligation on a shorter time period.
Platform	…through a day-ahead auction (or auctions).	Allows firms to meet the obligation on either an existing day-ahead auction platform, or on a new entrant platform. (All platforms will be connected to a single pool of liquidity via the GB hub).
Information provision	Licensee must provide Ofgem with a statement of its annual generation volume, as well as a list of the generating units whose output is included. Licensee must provide Ofgem with a report from its day-ahead auction provider(s), setting out the volumes bought and sold over the course of the year.	Provides evidence that a firm is meeting its obligation.

Fair and Reasonable Terms

13.2.4 Ofgem is also considering including a number of license conditions which aim to promote fair and reasonable trading terms as detailed in the below table. However, it important to note that as currently drafted (refer to "Scope" in the table) these conditions would only apply selectively to trading with smaller independent suppliers defined as suppliers with less than 1TWh in annual sales.

Table 6: *Fair and Reasonable Terms*

Element	Requirements	Rationale
Clip Size	If requested, licensee must trade clip sizes as small as 0.1MW.	To reflect volume needs of small players.
Product Range	Licensee must offer a range of standard products in baseload from week-ahead to Season+4 and peak from week-ahead to Season+3.	Includes a range of standard products that enable market participants to hedge and compete effectively. It may be possible to include shaped products – eg standard domestic profiles – in this list.
Fair Pricing	Licensee must provide quotes for products based on a recognised market index. The pricing methodology must be shared with the counterparty. Any administrative costs should be itemised.	Ensures prices are calculated fairly and transparently.
Credit and Collateral	Licensee must offer reasonable credit and collateral arrangements, based on a bespoke calculation in relation to each counterparty – eg through an independent assessment[18] of creditworthiness.	Ensures risk of trading with individual counterparty is reflected in collateral required.
Response to trading requests	Licensee must respond to requests in a timely manner: responding to initial requests for trading agreements within 20 working days and subsequent requests to trade within 5 working days.	Ensures that trading agreements can be negotiated within a reasonable timeframe and that subsequent requests to trade are executed in a timely manner.
Transparency	Licensee must publicise its approach in each of the areas above, eg on its public website.	Will increase transparency and confidence; sets clear expectations for trading negotiations.
Scope	Licensee must be prepared to reflect these characteristics in all trading agreements with independent suppliers (eg those who supplied less than 1TWh in the previous year).	Targets S&P at parties facing the highest barriers to wholesale market participation.

Assessment of Minimum Day-Ahead Trading Requirement

13.2.5 Our assessment of Ofgem's proposal to establish a minimum Day-Ahead Trading requirement corresponding to 30% of annual generation is detailed in Appendix F.

13.2.6 Overall we judge this intervention positively, but it is insufficient as a stand-alone solution. We agree that it is worthwhile to lock-in the recent progress in spot and day-ahead trading, something which will also serve to support NWE market coupling arrangements by ensuring robust bid and offer volumes in NG's Virtual Hub. By the same token, this intervention:

i) Does not add liquidity and churn above what the market already delivers today; and

ii) Addresses only the spot market and hence the delivery end of the curve.

13.2.7 With respect to the second item, we note that whilst the existence of active spot markets may be a necessary condition for forward market liquidity, it is a not a sufficient condition. On its own, this intervention does not reduce barriers to entry or provide small suppliers or independent generators with a market in which to hedge.

13.2.8 In taking an overall modestly positive view, we are cognisant that the current N2EX volumes and the proposed intervention would rely extensively on gross bidding. In our view, however, such arrangements are not a material concern in an SMP cleared auction, where deliberate mis-pricing could lead to large imbalances 24 hours before delivery. For price manipulation to work in these circumstances, significant market power would need to be present. While the old GB gross pool was open to manipulation, concentration levels are much lower today. In particular, there are a number of other significant players both locally and through the interconnections in addition to the Big Six.

13.2.9 This conclusion does not imply that gross bidding never could be a problem, but that such arrangements are a far bigger potential issue when deployed on "pay-as-bid" OTC platforms as opposed to cleared auctions[55].

Assessment of Fair and Reasonable Terms

13.2.10 Our assessment of Ofgem's proposal to include license conditions which promote fair and reasonable trading is detailed in Appendix F.

13.2.11 While this intervention appears sensible and easy to implement, it does not achieve an overall positive score in our assessment. We recognise that Ofgem is continuing to develop this option further, but as currently drafted it is in our view likely to prove ineffective. Firstly, it is aimed only at independent suppliers and hence would not support new entrant generators nor address general liquidity issues[56]. Secondly, we have a number of concerns with respect to the individual conditions as drafted:

i) **Clip-Size and Product Range:** The suggested specifications are sensible but unlikely to be effective without a general trade requirement (obligation to trade with any qualifying supplier) or some minimum limits on volumes offered;

---

55 And even then, we struggle to see how deliberate mispricing would be advantageous.

56 But generators and non-Big Six players could easily set up a small supply business to qualify (and existing generators with supply businesses (e.g. Drax) would also qualify).

ii) **Fair Pricing:** Recognised price assessments (such as Platts, Argus, etc.) are published for the previous trade day. If the market were to move significantly (e.g. following a significant market event), these indexes would no longer be reflective of the market level and therefore the Big Six could be exposed to being "cherry-picked". Furthermore, it is inevitable (and legitimate) that the Big Six will want to include risk premia in their pricing (hence pricing formula is index plus premium), but is it not trivial to assess and control the validity of such premiums;

iii) **Credit and Collateral:** Twenty days is not remotely sufficient time to adequately assess new counterparties and this limit might simply prompt the Big Six to offer boiler plate terms with full margining (which cannot be deemed unreasonable given EMIR etc). This could be counter-productive from the perspective of small suppliers, some of whom today have managed to negotiate less than full collateralisation. Conversely, for established counter-relationships 5 days from request to offer is far too long a period and not reflective of actual trading practices;

iv) **Transparency:** While these requirements appear sensible, they will likely at best simply set expectations for negotiations. Where detailed terms are published, a further question is whether such actually could be restricted only to independent suppliers under UK Competition Law; and

v) **Scope:** Some independent suppliers are already at or approaching 1TWh in annual consumption. Where such players are genuinely independent, it is in our view questionable whether is it sensible to exclude them and create a cliff-edge. An alternatively would be to cap total purchases under the arrangement to 1 TWh.

13.2.12 A further scope related question concerns whether the supplier definition would allow generators and non-Big Six players to set up a small supply arm to qualify for sourcing power under the license condition. If so, traders such as BarCap or J ARON could gain access to these arrangements by setting up such entities. In our view, a qualification process to vet who is allowed to trade under these conditions including what constitutes an "independent" supplier would be required.

13.2.13 A final question concerns the governance and control of these conditions. It is not clear who would be able to intervene in the event that a supplier claims not to have been treated fairly nor how "fairness" would be evaluated. Overall, the current broad conditions are in our view open to gaming.

13.2.14 While we appreciate that Ofgem continues to develop these terms, as currently drafted we consider them insufficient as a stand-alone solution. Overall, Ofgem's minimum proposals comprising this and the previous intervention are in our view unlikely to counter the many head-winds discussed in the chapter on liquidity drivers, let alone increase liquidity materially above current levels.

13.3 CfD Reference Price

13.3.1 As discussed in 4.7, the choice of reference prices in the Low Carbon CfDs will have a significant impact on how liquidity is distributed along the curve in the GB market. In this regard, the choice

of the Day-Ahead GB auction price as the reference price for the Intermittent CfD will incentivise intermittent generators to bid into these auctions. Combined with the NWE market coupling, these contracts will therefore also serve to secure the recent progress in day-ahead trading.

13.3.2 The ultimate choice of the reference price for the baseload contract is probably one of the most significant decisions DECC has yet to make which will have direct bearing on how GB liquidity is allocated across the curve.

13.3.3 With the progress in Day-Ahead volumes, we recognise that there could be a temptation to align both the intermittent and baseload contracts on the same reference. However, whereas intermittent generators naturally spill into the spot and prompt markets, baseload generators will, if left to their own devices, tend to contract forward. Choosing Day-Ahead reference for this category of generators would therefore materially change and distort their normal commercial behaviour and potentially destroy GB forward market liquidity. In turn this would disadvantage players such as independent suppliers which rely on access to forward contracting to back fixed priced offerings in the retail and commercial customer segments. It would also result in very large volumes, that would otherwise have been traded forward, being solely traded through the Day-Ahead markets.

13.3.4 Notwithstanding that we recognise the difficulties presented by the absence of a pre-existing robust forward reference price we continue to believe that a forward product is the right choice. For the purpose defining this intervention option more precisely to support our assessment, we therefore assume that the baseload reference price will be:

i) Directly tradable or based on an index which readily can be tracked; and

ii) Based on a forward/term product, although it need not be an annual product (i.e. could be season).

Assessment of CfD Reference Prices

13.3.5 Appendix F details our assessment of this option. While it does not increase liquidity, it scores positively on its ability to support particular products and direct liquidity along the curve. By the same token however, there is a (modest) risk that this could drain liquidity in other products which are not referenced by the CfD. However, this risk exists with any CfD intervention and does not, in our view, offset the benefits from ensuring that the baseload CfD reference price and liquidity objectives are aligned (as assumed by the intervention).

13.4 Credit Interventions

13.4.1 The reluctance of companies to bear credit risk is a barrier to trading in the UK energy market (see Appendix E for an explanation of credit risk in energy trading). Market parties are often unwilling to offer credit terms to their potential counterparties, especially to smaller parties, such as independent generators and independent suppliers. These parties lack strong balance sheets and financial ratios and therefore are perceived to have a higher probability of default. Independent Suppliers offer little opportunity for recovery of credit losses.

13.4.2 We outline below two possible market interventions to mitigate credit risk as a barrier to trading. These suggested interventions are in addition to existing market mitigations for credit risk, which are described in Appendix E.

Mutualisation of Credit Losses

13.4.3 A possible market intervention to overcome parties' reluctance to grant credit terms would require the mutualisation (joint and several liability) of credit default losses. With this intervention, market participants would be collectively responsible for assuming any losses resulting from a default of one of the participants. We expect that with the introduction of the scheme, small contributions per transaction would contribute to a reserve fund over time, from which credit losses would be refunded in the event of a default of one of the participants. Any losses beyond the level of the reserve fund would be refunded from levies on all participants (we propose a levy in proportion to each participant's net open positions, but other methods of contribution could be devised).

13.4.4 We note that the scope of mutualisation must be well-defined, i.e. must apply to a specific set of transactions which are subject to the scheme (for example, all transactions resulting from a particular series of auctions). We further expect that EMIR will take precedence over any intervention to enable credit loss mutualisation. Only products or participants not subject to mandatory clearing may be included for loss mutualisation, as companies subject to mandatory clearing will collateralise their eligible transactions under EMIR.

Government-backed Insurance of Credit Exposures

13.4.5 An alternative intervention to mitigate credit risk is the facilitation of government-backed insurance of credit exposure against an up-front premium. An insurance could be structured in such a way to mitigate the actual level of credit risk (considering the dynamic mark-to-market exposure which is a function of market prices). This intervention potentially has a wider scope than mutualisation of credit losses, as it would be up to each party insured to decide which instruments (including structured deals, supply deals, etc.) it wanted covered under the scheme.

Assessment of Mutualisation of Credit Losses

13.4.6 We see the **benefits** (in terms of easing entry and expansion) of an intervention to mutualise credit losses on a segment of market transactions being primarily with respect to counterparty access to the market. The intervention would mitigate specific credit barriers faced by smaller participants in accessing trading.

13.4.7 The **costs and risks** of an intervention to mutualise credit losses relate primarily to distortions of normal market behaviour. The intervention would very likely suffer from adverse selection, as the least credit-worthy companies would be the most likely to participate, while stronger companies would be more likely to try to escape from the scope of the intervention, for example by trading highly-structured products not subject to loss mutualisation. Additionally, the intervention removes incentives for companies to be credit worthy and maintain good financial ratios.

13.4.8 The intervention hinders **alignment with regulation**, specifically with EMIR. A key objective of EMIR is to increase stability in financial markets by improving risk management practice, while

the mutualisation of credit losses would likely increase the rate of default in the market by removing correct incentives.

Assessment of Government-backed Insurance of Credit Exposures

13.4.9 As for the mutualisation of credit losses, we see the **benefits** of an intervention to offer government-backed insurance of credit exposures as facilitating counterparty access to the market, especially for market parties who already create substantial market-to-market exposure for their counterparties. If pre-existing mark-to-market exposure can be mitigated, parties would be willing to add incremental trades to the portfolio.

13.4.10 However, unlike for the mutualisation intervention, the **costs and risks** of government-backed credit insurance relate more to the cost of insurance rather than market distortions. The cost of the insurance will have to be borne, either by the company that has credit risk and is seeking mitigation, or the company to whom the counterparty is exposed, and who would like additional access to markets. Assuming that the true cost of credit risk is reflected in the insurance premium (meaning that premia are higher to insure companies more likely to default), then smaller, less credit-worthy parties are less likely to benefit from this intervention.

13.5 Collateral Interventions

Government Guarantees of Collateral

13.5.1 A possible barrier to trading, especially among smaller firms, is a lack of cash or other liquid instruments to support calls for variation margin for collateralised deals, or else a fear that cash could become constrained in the future. A possible market intervention to mitigate cash liquidity risk could be the government provision of liquidity to market participants (e.g. guarantees which are acceptable as collateral by CCPs) against a pledge of generation assets or other illiquid assets on the balance sheet. The intervention could be modelled after bank guarantees, which are often acceptable as collateral. Companies would pay a fee to reserve the guarantees.

Assessment of Collateral Interventions

13.5.2 An intervention to provide government-backed collateral against acceptable guarantees to market participants will directly increase access to collateral for parties able to offer the guarantees (and who have need of the additional liquidity). Such additional collateral is a tangible benefit, although we expect that only a limited number of companies could benefit from this intervention because we assume generally only generators would have assets to pledge against liquid collateral, and only a portion of these parties would have assets that are unencumbered. A secondary beneficial effect of the intervention would be to intensify the trading on exchanges and with OTC counterparties who demand collateral as a condition of trading.

13.5.3 A key risk of the intervention is the potential negative impact on a company's rating as a result of the additional encumbrance of any balance sheet pledges.

13.5.4 We consider the intervention to be broadly supportive of financial regulation, especially EMIR, which aims to avoid systemic risk in financial markets by reducing credit risk and ensuring that an

increasing proportion of derivatives trading is collateralised. We note, however, that EMIR specifies the quality of collateral that will be acceptable to Central Clearing Parties under the regulation, and therefore the collateral enabled by this intervention must qualify under EMIR.

13.6 Transparency Interventions

13.6.1 Market transparency refers to the amount of information regarding market conditions made public on a timely basis. Opaque markets tend to benefit relatively well informed dealers and discriminate against smaller, less active, and less sophisticated participants. In particular, energy companies dealing in the "physical" market have ready access to proprietary information relating to the behaviour of their own generation units and the offtake of their own customers. These data on the supply/ demand balance provide an advantage to large, vertically integrated energy companies compared to smaller companies which have fewer data or financial players who lack insight into physical energy flows.

13.6.2 Market information could include both trade information (e.g. price of completed trades, traded volumes, price quotes, etc.) as well as fundamental supply/ demand data (planned and unplanned outages, capacities, generator load factors, customer offtake profiles etc.)

13.6.3 Market transparency therefore levels the playing field for market participants, by reducing information advantage. Transparency makes the relevant information available to participants so that they can efficiently evaluate the benefits and costs associated with their choices. More specifically, improved transparency lowers the cost of searching for information and reduces the risk of mispricing a transaction. For these reasons, improved transparency is expected to improve market liquidity by attracting new participants to the market and encouraging existing participants to transact more frequently. In particular, financial participants have other inherent advantages such as advanced computer modelling systems and relatively efficient allocation of capital, and therefore removing the barrier of asymmetrical market information may entice banks and other financial participants to be more active in the market.

13.6.4 Certain price information (e.g. Argus and Heren price assessments) and fundamental data (e.g. Elexon's Balancing Mechanism Reporting Service, bmreports.com or Leba market indicies) are available to participants. However, market participants typically have lower confidence in price assessments than in actual trade price data, associated with a trading time and trading volume. Furthermore, the Elexon reporting service, while useful, focuses on prompt/ spot information. Overall, we conclude that the GB market presently lacks basic transparency compared to, for example, the Nordpool market.

13.6.5 We note that both trade data and fundamental data are subject to increased reporting requirements. REMIT, EMIR, and MiFID require trade data to be passed to the FSA and ACER/Ofgem. Additionally REMIT requires market participants to publish (with some exceptions) certain fundamental data to be published by market participants, most notably "inside information" which is defined as information likely to significantly affect prices of wholesale energy products, or other information that a reasonable market participant would be likely to use as part of its decision to enter a wholesale energy market transaction.

13.6.6 We observe that making this data available (anonymously) to the wider market will clearly improve transparency. However, the use of trade data submitted to regulators under the

financial and energy market regulations is heavily restricted by the regulations, i.e. publication of the trade data collected under REMIT, for example, even anonymously or in aggregate, is unlikely to be permissible under the regulation. There is nonetheless the potential to require GM market participants to additionally submit trade data to a data aggregator/ consolidator at the same time that submissions are made to ACER, in order to provide market participants with improved visibility of the market.

Assessment of Transparency Interventions

13.6.7 The transparency intervention above will have a significant and positive impact on the availability and reliability of price data. Additionally, the intervention will support robust CfD reference prices. We consider a lack of price transparency to be a barrier to market entry and therefore improved transparency will increase the number and diversity of counterparties.

13.6.8 We assume that trade reporting submitted to trade repositories under the REMIT and EMIR regulation cannot be republished or re-used for other purposes. Considering this, the intervention would require participants to additionally report trade data to another "transparency" agency. Although there are obviously synergies in terms of data format, system technologies, etc., the intervention as designed will create additional costs for each participant as well as costs for the central administration of the intervention.

13.6.9 We do not expect this intervention to conflict with any other proposed market reforms or regulation.

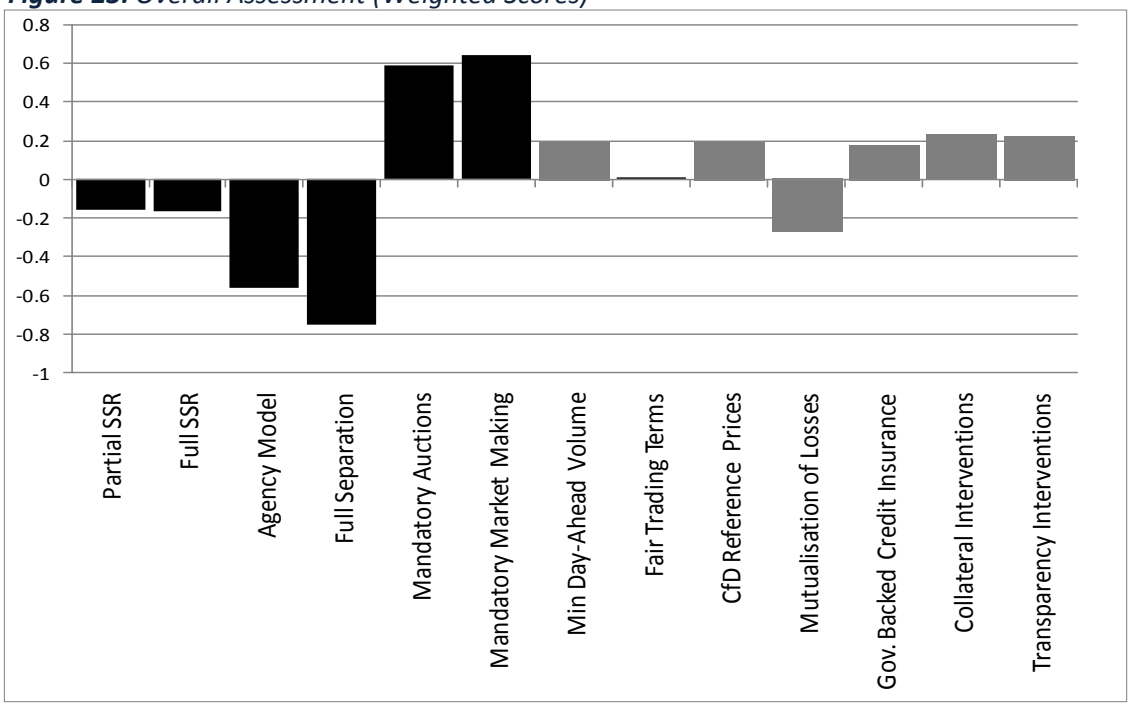
14 Conclusions

14.1 Overview

14.1.1 This final chapter summarises our assessment of all Primary and Supplementary Intervention Options against the Analytical Framework presented in Chapter 8.

14.1.2 The figure below sets out the weighted average score across all evaluation criteria (Benefits, Costs & Risks as well as Alignment and Compliance) for each intervention:

Figure 23: *Overall Assessment (Weighted Scores)*



14.1.3 As illustrated in Figure 23 above, our assessment of the Mandatory Auction and Mandatory Market Making interventions is overall positive. In contrast, the four interventions which constrain vertical integration, either via self-supply restrictions or a more direct intervention in the organisational model, all score negatively. Hence, we do not recommend that these options be pursued.

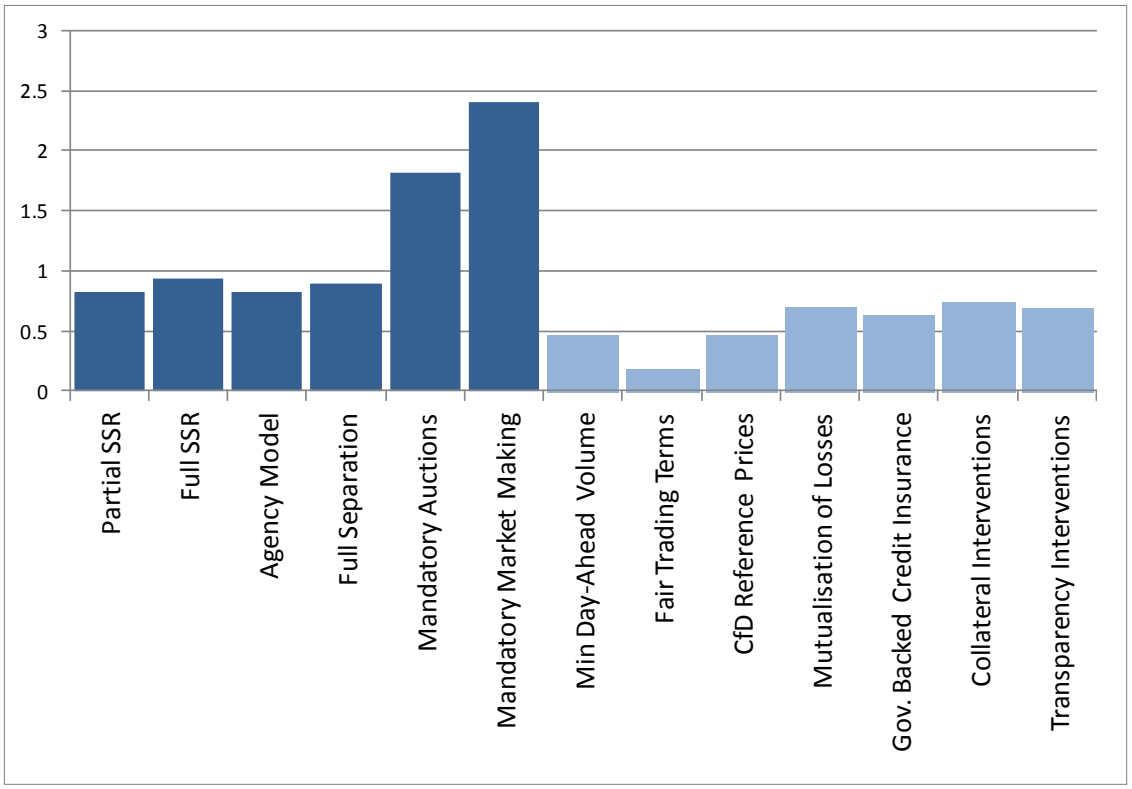
14.1.4 From among the supplementary interventions, most score slightly positive against the analytical framework, with the exception of the Credit Risk Mutualisation intervention (which is negative) and the intervention, as described above in section 13.2, to require Fair and Reasonable Terms (which is neutral).

14.1.5 To better understand the weighted assessment scores we consider separately the benefits, costs and risks, and alignment and compliance assessments.

14.2 Benefits

14.2.1 The figure below summarises the assessment of the liquidity benefits potentially delivered by each of the intervention options. Appendix F.7 provides a graphical representation of the assessment outcomes for each of the benefits criteria.

Figure 24: Benefit Assessment (Weighted Scores)



Primary Options

14.2.2 The SSRs and Functional Separation models are fairly closely aligned in terms of their likely level of liquidity benefits. While we believe a partial SSR at a substantive level such as 60% will likely stimulate liquidity based on the analysis set out in Chapter 9, we do not believe the stronger option of a full SSR will add much further stimulus over and above the partial option. As the VIU portfolio is split into two structural positions, some of the VIU trading advantages discussed in Chapter 4 are reduced or eliminated. In turn, this is likely to focus trading operations on more simple (one-directional) hedging strategies. Hence, while the VIU's open position is increased under the intervention, the VIUs churn rates are likely to diminish, partly offsetting the benefit.

14.2.3 We do not believe that adding additional functional separation (ring-fencing) requirements will deliver additional incremental liquidity. These requirements further reinforce the split of the VIU portfolio and therefore the likelihood of one-directional, hedging-oriented behaviour becomes more dominant.

14.2.4 We score both the Mandatory Auctions and Mandatory Market Making options much higher in terms of their likely liquidity benefits. This is a result of high scores against a number of the benefit criteria.

14.2.5 Both the Mandatory Auction intervention and the Mandatory Market Making intervention have a much greater scope to direct the products (tenor and shape) onto which the intervention is focused, compared to the SSRs and Functional Separation interventions. Although the SSR and Functional Separation interventions could be designed with a tenor restriction (as we recommend), this is an inferior solution to simply mandating specifically which products must be auctioned or made a market. The tenor restriction gives no indication of shape, is a blunt tool for directing liquidity to particular tenors, and is difficult to monitor and enforce.

14.2.6 With respect to the Mandatory Auction and Mandatory Market Making interventions, the ability to specify particular forward products is also an elegant solution for the question of a reference product for the baseload CfD.

14.2.7 The Mandatory Auction and Mandatory Market Making interventions ensure that the mandated products are regularly available for purchase and sale in the market. This assurance that a market in certain products will be available on a regular basis, is especially attractive to participants who require the confidence that a net open position can always be closed on short notice (e.g. financial players). On this point, the market making intervention scores highest with continually available products, while the Mandatory Auction assures that products are periodically available (with, we believe, additional availability on secondary markets).

14.2.8 The SSRs and Functional Separation interventions give no such assurance. In an extreme case, the self-supply restriction interventions are not incompatible with the Big Six refraining from any activity at all in the forward market for long periods of time. It's feasible (although unlikely) that even with a tenor restriction, vertically integrated companies could concentrate their price hedging activities on discrete interventions in the market, separated by long periods of no market activity. We consider this outcome to be neither likely nor optimal for VIUs, but we feel it illustrates the contrast between the four interventions concentrating primarily on the vertically integrated nature of the market and the two interventions that take a more direct approach toward mandating the offer of volumes in the market.

14.2.9 While we attribute significant benefits to both Mandatory Auctions and Mandatory Market Making interventions, the latter option is clearly the strongest in our view. This is fundamentally a reflection that this option is the only intervention which pulls, rather than pushes, liquidity. The Mandatory Auction option sets in advance the volume of power which must be included in the auction (e.g. 10% of annual generation). Although participants can bring additional volume to the market voluntarily, and we do expect secondary effects, this intervention would seem to have a somewhat pre-determined impact on churn. In contrast, with the Mandatory Market Making intervention, the surrounding market (i.e. all other participants) will decide which products they require and in which quantities. Hence, this option is unique in that its success does not depend on how the subject companies (i.e. VIUs) respond to the interventions, but rather on what all other participants want from the intervention.

14.2.10 The Mandatory Market Making intervention is driven by the surrounding market demand for liquidity rather than a pre-determined, mandated volume. This is a very strong feature. While the VIU's dominate trading in the current market, achieving churn rate and liquidity at the level of the Nordic or Continental markets will likely require far greater participation from other players. The Mandatory Market Making solution is better equipped to stimulate these players.

Supplementary Options

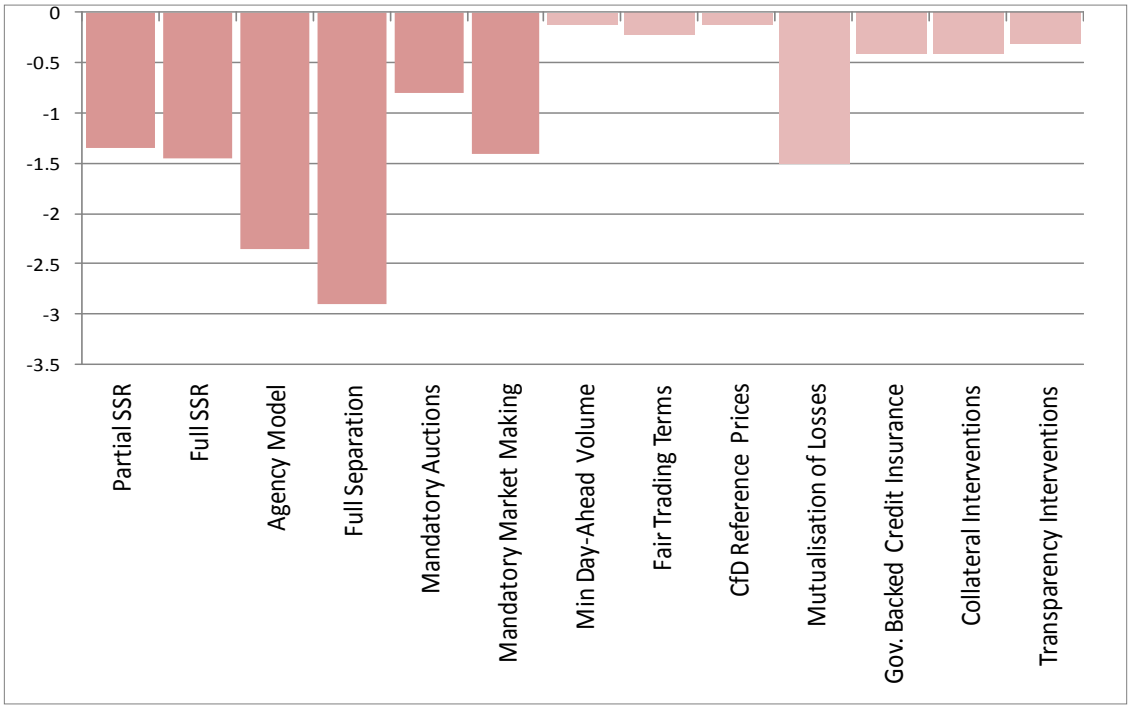
14.2.11 From among the supplementary interventions, most have a positive score on only a relatively small number of the benefit criteria, and these scores are most often marginal. As a result their total weighted benefit scores are less than those for all of the primary interventions.

14.2.12 The supplementary options bring particular benefits with respect to mitigating barriers to entry (credit terms, collateral requirements, fair trading terms, information barriers, etc.) but do little with respect to the availability of hedging products and directing liquidity along the forward curve. For these reasons, the supplementary options are not sufficient to materially increase in the GB market.

14.3 Costs and Risks

The figure below summarises the assessment of costs and risk associated with each of the intervention options:

Figure 25: Cost & Risk Assessment (Weighted Scores)



Primary Options

14.3.1 All of the primary intervention options (as they are designed above) would require the Big Six to participate in the forward market to some degree. A key risk of all of the primary interventions therefore relates to EMIR, as none of these interventions are consistent with one of the Big Six fully withdrawing from trading derivatives in the forward market (e.g. by trading only in spot).

14.3.2 The above observation has two implications. Firstly, we assume that companies prefer to remain below the EMIR clearing threshold (assuming they are not already above). In this case, any trading in the forward market for GB power potentially brings the company's position closer to the threshold and limits their capacity for other activities (e.g. trading in other commodities or

markets). In the worst case, the mandated participation in the intervention results in the company having a position above the EMIR clearing threshold. Recalling that hedging trades may be exempted from the calculation of the position with respect to the EMIR clearing threshold, we note that market activity resulting from the SSRs, Functional Separation intervention, and Mandatory Auction may be classified as a hedge, as this trading would be set against the generation or supply position. However, the Mandatory Market Making intervention is not directly tied to a generation or supply position and therefore would be unlikely to quality as a hedge (in our opinion). It is also this intervention which is likely to generate the most amount of churn. The risk of Mandatory Market Making causing a participant to breach the thresholds is to a large degree mitigated by assuming that market makers will set their bid and ask prices appropriately to keep their net position relatively flat, together with the assumption that positions on exchanges are measured on a net basis with respect to the clearing threshold.

14.3.3 Secondly, we consider the case where a mandated participant is already above the clearing threshold. In this case, all trading with financial counterparties and qualified non-financial counterparties is subject to mandatory clearing or the bilateral exchange of collateral. The impact depends on the particular intervention. It is here that the Mandatory Market Making intervention is somewhat less onerous, given our assumptions that market making uses an exchange platform (as we recommend) and the market makers set their bid and ask prices in such a way as to have a relatively balanced portfolio of buys and sells (which is very likely). In this case, margin calls on short and long positions are likely to offset each other and the net cashflow impact will be small. However, for the other interventions, we assume that they will be met by trading on a variety of platforms and with a variety of counterparties, some of whom will exchange margin, and some of whom will not. It will be difficult or impossible to maintain a balanced portfolio of short and long positions with margining counterparties, and therefore difficult to avoid the cashflow impacts of variation margining. It will be particularly difficult to manage the margin cashflow implications of the Mandatory Auction intervention, because a company cannot choose whether to trade with a margining or non-margining counterparty as buyers are assigned to sellers depending on the clearing price of the auction. It becomes difficult or impossible for a company subject to the clearing requirement to avoid further requirements for variation margining during a cash liquidity crisis by ceasing all new trading, as trading is mandated by the interventions.

14.3.4 Apart from the cash liquidity risks related to EMIR, the interventions which address vertical integration had higher costs and risks than the Mandatory Auction and Mandatory Market Making interventions. Across all primary options, the agency and full separation models generally score poorly. This reflects that these models:

- Impact the operations and business model internally within the subject companies (i.e VIUs);
- Will require changes to the existing organisation, business processes and systems with the added complexity that such changes only apply to a subset of the wider pan-European portfolios that these companies typically operate;
- Will require additional risk management processes to guard against accidental speculative positions emerging at group level;

- Will require new internal compliance functions;

14.3.5 As a result, these options will also impose significant implementation costs as well as some ongoing additional costs incurred due to the process and staffing duplication these models necessarily entail.

14.3.6 Of the two functional separation models, the Full Separation Model fares the worst with respect to costs and complexity, since this option as explained in Chapter 10 requires not only separate optimisation and commercial functions but also stand-alone trading functions (to be split out from the existing centralised hubs). These models, and in particular the Full Separation model may also expose the subject companies to significant incremental cashflow risk under margining terms. In contrast, the success of SSR and functional separation interventions rely heavily on how the VIUs react to the constraints on their business model and internal operations. This cannot be known with any certainty and these models are therefore far more susceptible to unintended consequences.

14.3.7 Based on our experience of assisting companies with internal assessment of their credit worthiness and ratings performance, we believe that agencies would view the commercial inefficiencies introduced with these models with concern. As these models break up and eliminate key VIU benefits, they will be viewed as having a negative financial impact. In particular the Full Separation model might be a sufficiently drastic intervention to create a material risk of a (one-notch) downgrade.

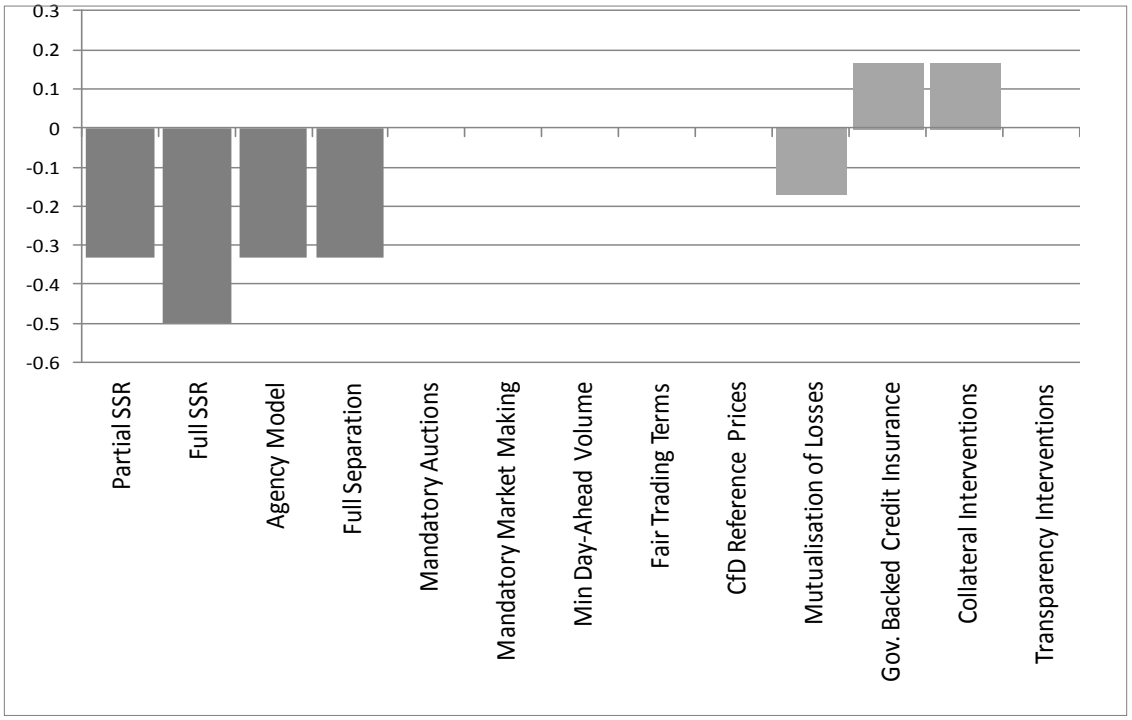
14.3.8 Both Functional Separation models, and again in particular the Full Separation model, are judged as being quite exposed to unintended consequences. This primarily reflects that these models are likely to prompt changes in current trading behaviour as discussed in Chapter 10. By the same token, however, both options score well against the gaming criteria compared with, for example, the pure SSR options and Mandatory Auctions since the functional ring-fencing and accompanying compliance processes provides added controls.

14.3.9 In contrast, the Mandatory Auction and Mandatory Market Making interventions comprise solutions which also exist naturally in a commercial context and hence fit well within the existing normal market structure. These interventions do not impact the VIU's business model materially and are far less likely to lead to fundamental changes in trading behaviour which in turn may dampen or negate the intended stimulus.

14.4 Alignment and Compliance

14.4.1 The figure below summarises the assessment of the Alignment and Compliance evaluation criteria defined in the Analytical Framework:

Figure 26: *Alignment & Compliance Assessment (Weighted Scores)*



Primary Options

14.4.2 We note that a SSR potentially could conflict with Ofgem's minimum liquidity proposals, which includes a Day-Ahead gross bidding requirement. In contrast to the partial option, however, a Full SSR will not in any circumstances be consistent with a minimum Day-Ahead gross bidding requirement. Hence, we judge this option to conflict with and hinder Ofgem's minimum liquidity proposals.

14.5 Recommendations

14.5.1 Our assessment of the Mandatory Auction and Mandatory Market Making interventions is overall positive. In contrast, the four interventions which constrain vertical integration, either via self-supply restrictions or a more direct intervention in the organisational model, all score negatively. The SSRs and Functional Separation interventions were assessed to have large and negative consequences for the organisation and business model, with associated costs to set up and maintain the interventions. Hence, we do not recommend that these options be pursued.

14.5.2 Mandatory Auctions and Mandatory Market Making, while forcing some changes on the organisation, were both evaluated to fit much better within "business as usual" and therefore to be lower cost and lower risk solutions. We recommend the Mandatory Market Making option above all other, given its unique potential to deliver liquidity in line with market demand.

14.5.3 From among the supplementary interventions, most score slightly positive against the analytical framework, with the exception of the Credit Risk Mutualisation intervention (which is negative) and the intervention, as described above in section 13.2, to require Fair and Reasonable Terms (which is neutral).

APPENDICES

A Assessment Criteria

Benefits		
B1: Potential direct impact on churn	**Neutral**	• No direct foreseeable impact on churn rates
	Material	• Incremental churn rate impact between 0.5 and 1.0 as a result of the intervention
	Substantial	• Incremental churn rate impact above 1.0 as a result of the intervention
B2: Availability and usage of channels and/or platforms	**Neutral**	• The intervention leaves use of existing routes to market, such as exchanges and broker screens (e.g. Trayport) largely unchanged
	Material	• The intervention supports existing open channels, such as exchanges and brokers, resulting in an increase in their use over the less accessible and transparent private sourcing arrangements and structured deals
	Substantial	• The intervention supports existing open channels, such as exchanges and brokers, resulting in an increase in their use over the less accessible and transparent private sourcing arrangements and structured deals • New routes to market (such as an auction platform) are created that are accessible to participants who may otherwise face barriers
B3: Number and diversity of counterparties	**Neutral**	• Following the intervention, the group of parties accessing the market is broadly the same as at present
	Modest	• Intervention facilitates use of the market by independent suppliers and generators as well as the large domestic vertically-integrated utilities
	Substantial	• In addition to the Big Six, intervention facilitates use of the market by independent suppliers and generators as well as financial firms and large energy consumers • Asset developers find the products and channels they need to hedge price risk in project, leading to greater availability of funding
B4: Scope for intermediaries	**Neutral**	• The intervention leaves use of existing routes to market largely unchanged
	Material	• The intervention takes particular steps to enable and support independent aggregators (for example, PPA providers)
	Substantial	• The intervention takes particular steps to enable and support independent aggregators (for example, PPA providers) • The intervention further supports potential intermediaries in managing market risks across the consolidated portfolio (for example, measures for mutualising balancing costs for intermittent generation)

B5: Availability of particular products and clip sizes	**Neutral**	• No impact on overall depth and proportion of spot, short-dated, and long-dated maturities • No impact on overall depth and proportion of base, peak, and shape/ blocks
	Material	• Increase in availability of longer-dated baseload products (e.g. at least four seasons forward) • Smaller participants can access energy in volumes commensurate to their needs
	Substantial	• Increase in availability of longer-dated products (e.g. at least four seasons forward) • Smaller participants can access energy in volumes commensurate to their needs • Increase in availability of peak and/or shape and blocks

B6: Availability, reliability and transparency of price and trade data	**Neutral**	• No material change in current level or quality of price and trade data available in the market nor the reliability (or participant's perception thereof) of such data
	Material	• Intervention makes available summarised price and trade data not previously published or improves the quality and consistency of existing data. • Intervention results in concentration of liquidity around a number of key products, resulting in a higher frequency of trading and therefore greater confidence
	Substantial	• Detailed and reliable (anonymous) trade data available • Great trading volumes resulting from intervention lead to increased frequency of trading along the curve and therefore greater transparency and confidence • Bid-ask spreads are materially narrower following intervention

B7: Robust CfD reference Prices	**Neutral**	• Intervention does not deliver additional sources of forward price information nor materially enhance the solidity of existing sources
	Material	• Intervention increases solidity of existing price reference data (Examples would include a minimum day ahead requirement and market making)
	Substantial	• Intervention increases solidity of existing price reference data (same examples as above) • Intervention provides a tradable longer-dated product against which Baselod CfDs can be struck eliminating reference price basis risk under the contract

B8: Efficiency of credit and collateral arrangements	**Neutral**	• Market standard credit and collateral arrangements are largely unchanged as a result of the intervention (relative to the benchmark of what can be expected following full implementation of Financial Regulations)
	Material	• Intervention enables parties to choose to trade cleared or non-cleared products depending on risk management preference
	Substantial	• Intervention enables parties to choose to trade cleared or non-cleared products depending on risk management preference • Diversity of participants, products, and routes to market mean that participants can avoid concentration risk in portfolios (by spreading credit risk among a number of parties)

Costs & Risks

C1: Operational complexity of proposed solution	**Neutral**	• Implementation of the intervention does not change market operations or systems or settlement processes at industry or participant level • No (material) investments by central bodies or individual participants
	Material	• Intervention adds new processes and/or system requirements consistent with the overall existing industry and market arrangements (e.g. a new auction product) • Incremental change which requires modest investments required centrally and/or at participant level
	Substantial	• Intervention requires fundamental changes to existing market and industry trading arrangements, materially increasing operational complexity • Substantial investments required centrally or by participants
C2: Impact on operations and business model	**Neutral**	• No material impact on the way in which the business operates or its internal organisation • The business continues to operate and behave in accordance with normal commercial market incentives
	Material	• No requirement to change the internal organisation legally or structurally, but impact on internal processes (e.g. restrictions on how different parts of the business interact)
	Substantial	• Structural and/or legal changes to organisation required (e.g. ring-fencing of different parts of the value-chain forcing the business to operate as separate entities).
C3: Unintended unfavourable impact on financial position and ratings	**Neutral**	• Intervention is highly unlikely to impact rating agencies assessment of the business, nor impact negatively on its ability to deliver financial performance consistent with (pre-intervention) ratings
	Material	• Intervention may require participants to post collateral beyond their preferred cash position • No direct or immediate impact on the rating agencies assessment, but intervention may potentially impair the company's financial performance over time and hence contribute to putting ratings under pressure
	Substantial	• Intervention may require participants to post collateral to a level that eventually constrains other activities, such as generation investment or asset hedging • Intervention results in trading churn that leads participants to exceed the EMIR clearing thresholds • Rating agencies are likely to view intervention as having a direct negative impact on the company, therefore material risk of a downgrade (1 notch or more) resulting directly from the intervention
C4: Unintended distortion of normal commercial behaviour	**Neutral**	• The intervention is unlikely to change the way in which participants act in the market beyond the intended impact. • Participants unlikely to change their use of trading instruments, choice of counterparties and platforms/exchanges as well as hedging and risk management strategies • Participants unlikely to change generation investment strategies or approaches to supplying customers

	Material	• Basic (normal) commercial incentives and trading patterns unlikely to change but some potential for altering participant's use of specific trading instruments, choice of counterparties and platforms/exchanges beyond the intended scope of the intervention
	Substantial	• Potential for breaking normal commercial incentives and trading patterns beyond the intended scope of the intervention. • Potential for creating imbalances between different participants' incentives for trading along the curve and/or changing the risks of operating in the market • Potential for changing participants' behaviour with respect to investment or customer supply

C5: Unintended liquidity impact outside scope of intervention	**Neutral**	• Intervention has no adverse impact on the choice of channels, market platforms, products, clip sizes etc. • Improvement in liquidity resulting from the intervention represents a net gain in overall market liquidity.
	Material	• Intervention liquidity gain is partially, but not entirely, offset lower liquidity in other parts of the curve and/or existing products
	Substantial	• There is a material risk that the liquidity improvement resulting from the intervention is wholly offset by loss of liquidity in other products • Liquidity is moved around rather than increased (e.g. auctions suck up liquidity otherwise destined for existing products)

C6: Susceptibility to gaming	**Neutral**	• Intervention is robust against gaming
	Material	• Intervention possibly open to collusion and/ or gaming, however there is the possibility to mitigate this risk by relatively straightforward market monitoring
	Substantial	• Intervention susceptible to gaming; sufficient market monitoring and supervision to prevent this would likely be onerous and/or intrusive • Any gaming in relation to the intervention under consideration would be difficult to mitigate effectively

C7: One-off/Static implementation Costs	**Neutral**	• Implementation costs across the industry are less than £[5] Million
	Material	• Implementation costs across the industry range between £[5] and £[15] Million
	Substantial	• Implementation costs across the industry exceed £[15] Million

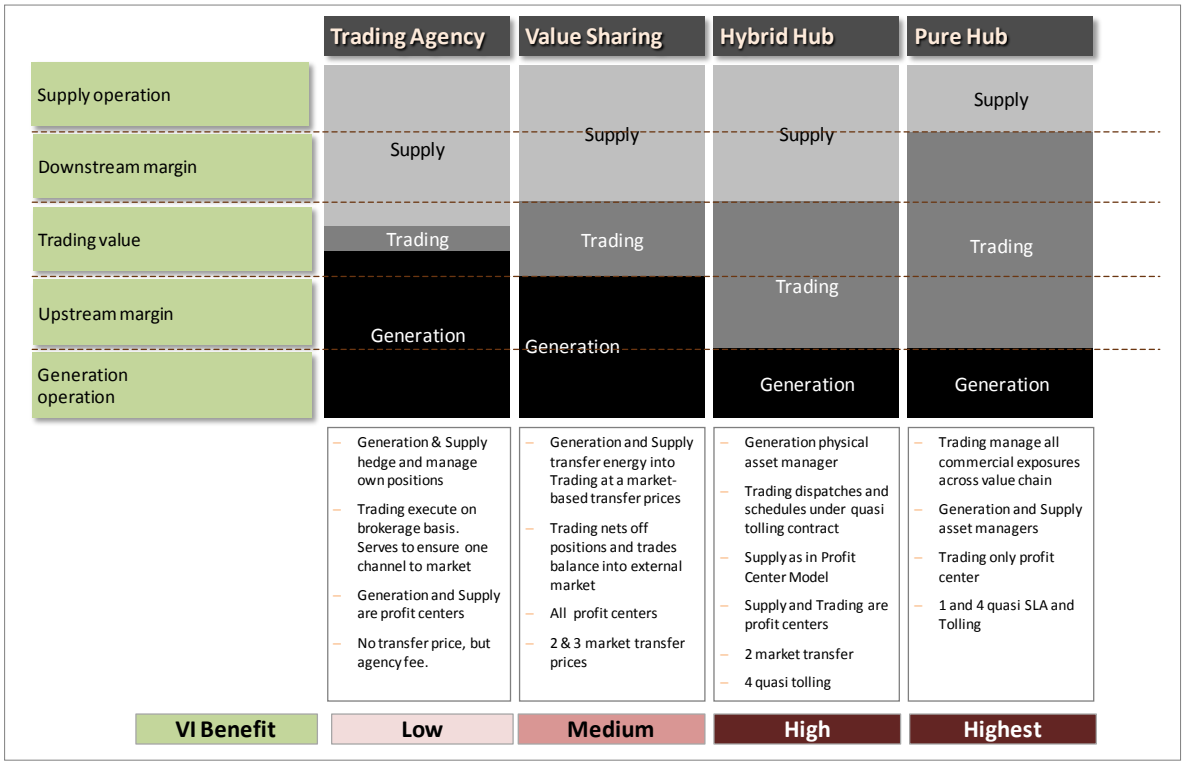
C8: Ongoing costs to participants and consumers	**Neutral**	• Annual costs on participants are less than [1]% of pre-tax operating profit (including both direct costs and charges levied by a central body such as NG to recover industry costs) • Based on 2011 data, this equates to around £5 Million for the least profitable B6 (Npower) and £21 Million for the most profitable (Centrica)
	Material	• Annual costs on participants range are between [1] - [3]% of pre-tax operating profit • Based on 2011 data, this equates to around £5 - £15 Million for the least profitable B6 (Npower) and £21 - £63 Million for the most profitable (Centrica)
	Substantial	• Annual costs on participants exceed [3]% of pre-tax operating profit • Based on 2011 data, this equates to around £15+ Million for the least profitable B6 (Npower) and £63+ Million for the most profitable (Centrica)

Reform Alignment & Compliance

A1: EMR	**Hinder**	• Intervention may potentially hinder, dampen or blunt EMR reforms and/or objectives • Examples might include hard ring-fencing which makes taking on additional intermittent generation under PPAs more risky or interventions which materially increase capital requirements (i.e. Clearing and margining)
	Neutral	• Intervention fits with other EMR reforms, but does not aid the implementation of these initiatives or otherwise enhance their likelihood of success
	Support	• Intervention positively supports and augments other EMR reforms and objectives • Examples include interventions which aid creation of a robust reference price for Baseload CfDs and/or which create favourable conditions for 3rd party PPA providers)
A2: Cash-out reform	**Hinder**	• Intervention may potentially remove, mitigate or otherwise alter exposures to the cash-out mechanism
	Neutral	• Intervention does not interact with or otherwise impact cash-out arrangements
	Support	• Intervention positively supports and augments cash-out reform [SL: struggling to think of an example]
A3: Ofgem Minimum Liquidity proposals	**Hinder**	• Intervention hinders Ofgem's minimum proposal (e.g. Full Separation of generation from supply is not consistent with the 30% minimum Day-Ahead trading requirement which explicitly assumes gross bidding)
	Neutral	• The intervention does not impact proposals
	Support	• Intervention support proposals
A4 – A 6 EU Target Model EMIR/MiFID REMIT	**Hinder**	• Intervention hinders target model or regulations
	Neutral	• The interventions is compliant (fits) with target model and regulations
	Support	• The intervention augments the target models and/or regulations

B VIU Business Models

B.1.1 The figure below illustrates some generic VIU models. While there are many variations, these generic models provide a high level view of the most common ways in which a VIU may organise itself across the value chains.



B.1.2 The Trading Agency Model, in which the trading function acts as an internal broker on behalf of the up- and downstream businesses was a fairly popular model during start-up of traded markets. This model assumes the Supply and Generation divisions are highly involved with and knowledgeable of wholesale trading. The Trading function has no direct responsibility for hedging decisions and position management and is essentially limited to offering execution services. The first Functional Separation model presented in Chapter 10 adopts a version of this model (with some additional restrictions).

B.1.3 In its pure form, the Agency model suffers from obvious deficiencies in that it fragments management of risk within the same wholesale markets. The absence of up- and downstream coordination can lead to the creation of large speculative positions accidentally. Section 10.1.10 includes an illustration of how such problems may occur.

B.1.4 With the spread of net pools and balancing markets, many companies have left this model for more portfolio oriented models. Most of the larger European players adopt a version of the Hybrid model illustrated above, in many cases with one centralised hub for all of Europe. In this model, the Trading Function is responsible for portfolio management of all wholesale positions with Generation being focussed on physical asset management. In models with formal transfer pricing, the upstream interface will typically mirror a (simplified) tolling agreement. The model is a “hybrid”, in so far that the Supply business in most companies retains responsibility for retail

margin management (and transfer prices being based on a wholesale market index). The convergence towards this type of model was driven by:

i) Desire to have a "clean" cut between physical and commercial responsibilities

ii) Real time trading and need to manage imbalances across portfolio 24/7

iii) Increasing focus on commercial exploitation of embedded optionality

iv) Integration with fuels markets and move to spread management

B.1.5 EMIR and squeeze on liquidity adds additional impetus for such models

C SSR Analysis

C.1 SSR on Supply (Before Contractual Assets)

	CEN		EON		EDF		RWE		SP		SSE		Total
	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	
No Restriction (Before Contractual Assets)													
Traded Positions													
TWH Position	5	30	6	29	27	9	6	22	3	8	6	24	**173**
% of Position	28%	69%	21%	56%	38%	16%	17%	43%	16%	39%	18%	45%	
Trading @ 2012 Churn	14	83	17	80	76	24	17	61	7	23	17	66	**486**
SSR Contribution													
TWH Position	-	-	0	-	-	-	-	-	-	-	0	-	**0**
% of Position	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Trading @ 2012 Churn	-	-	-	-	-	-	-	-	-	-	0	-	**0**
30% SSR on Supply (Before Contractual Assets)													
Traded Positions													
TWH Position	5	30	6	29	35	16	6	22	3	8	6	24	**188**
% of Position	28%	69%	21%	56%	48%	30%	17%	43%	16%	39%	18%	45%	
Trading @ 2012 Churn	14	83	17	80	97	45	17	61	7	23	17	66	**527**
SSR Contribution													
TWH Position	-	-	0	-	7	7	-	-	-	-	0	-	**15**
% of Position	0%	0%	0%	0%	10%	14%	0%	0%	0%	0%	0%	0%	
Trading @ 2012 Churn	-	-	-	-	20	20	-	-	-	-	0	-	**41**
60% SSR on Supply (Before Contractual Assets)													
Traded Positions													
TWH Position	5	30	8	31	50	32	14	30	7	13	14	31	**265**
% of Position	28%	69%	29%	60%	70%	60%	42%	60%	45%	60%	40%	60%	
Trading @ 2012 Churn	14	83	23	86	141	89	40	84	20	35	39	87	**741**
SSR Contribution													
TWH Position	-	-	2	2	23	23	8	8	4	4	8	8	**91**
% of Position	0%	0%	7%	4%	32%	44%	24%	17%	29%	21%	22%	15%	
Trading @ 2012 Churn	-	-	6	6	65	65	23	23	13	13	21	21	**256**
100% SSR on Supply (Before Contractual Assets)													
Traded Positions													
TWH Position	19	43	29	51	72	53	34	50	15	21	35	52	**473**
% of Position	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Trading @ 2012 Churn	52	120	80	143	201	148	96	140	43	59	97	146	**1,325**
SSR Contribution													
TWH Position	13	13	22	22	44	44	28	28	13	13	28	28	**299**
% of Position	70%	31%	79%	44%	62%	84%	83%	57%	84%	61%	82%	55%	
Trading @ 2012 Churn	36	37	63	63	124	124	79	79	36	36	80	80	**838**

C.2 SSR on Supply after Correction of Known Contractual Assets

	CEN		EON		EDF		RWE		SP		SSE		Total
	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	
No Restriction (Corrected for known Contractual Assets)													
Traded Positions													
TWH Position	5	19	6	29	27	9	6	22	3	8	6	19	**159**
% of Position	18%	45%	21%	56%	38%	16%	17%	43%	16%	39%	16%	37%	
Trading @ 2012 Churn	14	55	17	80	76	24	17	61	7	23	17	54	**445**
SSR Contribution													
TWH Position	-	-	0	-	-	-	-	-	-	-	0	-	**0**
% of Position	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Trading @ 2012 Churn	-	-	-	-	-	-	-	-	-	-	0	-	**0**
30% SSR on Supply (Corrected for known Contractual Assets)													
Traded Positions													
TWH Position	5	19	6	29	35	16	6	22	3	8	6	19	**174**
% of Position	18%	45%	21%	56%	48%	30%	17%	43%	16%	39%	16%	37%	
Trading @ 2012 Churn	14	55	17	80	97	45	17	61	7	23	17	54	**486**
SSR Contribution													
TWH Position	-	-	0	-	7	7	-	-	-	-	0	-	**15**
% of Position	0%	0%	0%	0%	10%	14%	0%	0%	0%	0%	0%	0%	
Trading @ 2012 Churn	-	-	-	-	20	20	-	-	-	-	0	-	**41**
60% SSR on Supply (Corrected for known Contractual Assets)													
Traded Positions													
TWH Position	11	26	8	31	50	32	14	30	7	13	18	31	**272**
% of Position	40%	60%	29%	60%	70%	60%	42%	60%	45%	60%	47%	60%	
Trading @ 2012 Churn	32	72	23	86	141	89	40	84	20	35	51	87	**760**
SSR Contribution													
TWH Position	6	6	2	2	23	23	8	8	4	4	12	12	**112**
% of Position	21%	15%	7%	4%	32%	44%	24%	17%	29%	21%	31%	23%	
Trading @ 2012 Churn	17	18	6	6	65	65	23	23	13	13	33	33	**315**
100% SSR on Supply (Corrected for known Contractual Assets)													
Traded Positions													
TWH Position	29	43	29	51	72	53	34	50	15	21	39	52	**488**
% of Position	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Trading @ 2012 Churn	80	120	80	143	201	148	96	140	43	59	109	146	**1,365**
SSR Contribution													
TWH Position	24	24	22	22	44	44	28	28	13	13	33	33	**329**
% of Position	84%	55%	79%	44%	62%	84%	83%	57%	84%	61%	84%	63%	
Trading @ 2012 Churn	67	66	63	63	124	124	79	79	36	36	92	92	**922**

C.3 SSR on Generation (Before Contractual Assets)

	CEN		EON		EDF		RWE		SP		SSE		Total
	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	Gen	Sup	
No Restriction (Before Contractual Assets)													
Traded Positions													
TWH Position	5	30	6	29	27	9	6	22	3	8	6	24	**173**
% of Position	28%	69%	21%	56%	38%	16%	17%	43%	16%	39%	18%	45%	
Trading @ 2012 Churn	14	83	17	80	76	24	17	61	7	23	17	66	**486**
SSR Contribution													
TWH Position	-	-	-	-	-	-	-	-	-	-	-	-	**-**
% of Position	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Trading @ 2012 Churn	-	-	-	-	-	-	-	-	-	-	-	-	**-**
30% SSR on Generation (Before Contractual Assets)													
Traded Positions													
TWH Position	6	30	9	29	27	16	10	22	5	8	10	28	**198**
% of Position	30%	69%	30%	56%	38%	30%	30%	43%	30%	39%	30%	53%	
Trading @ 2012 Churn	16	83	24	80	76	45	29	61	13	23	29	78	**555**
SSR Contribution													
TWH Position	-	-	2	-	-	7	4	-	2	-	4	4	**24**
% of Position	0%	0%	9%	0%	0%	14%	13%	0%	14%	0%	12%	8%	
Trading @ 2012 Churn	-	-	7	-	-	20	12	-	6	-	12	12	**69**
60% SSR on Generation (Before Contractual Assets)													
Traded Positions													
TWH Position	11	30	17	31	43	32	21	30	9	13	21	38	**295**
% of Position	60%	69%	60%	60%	60%	60%	60%	60%	60%	60%	60%	73%	
Trading @ 2012 Churn	31	83	48	86	120	89	58	84	26	35	58	107	**825**
SSR Contribution													
TWH Position	6	-	11	2	16	23	15	8	7	4	15	15	**121**
% of Position	32%	0%	39%	4%	22%	44%	43%	17%	44%	21%	42%	28%	
Trading @ 2012 Churn	17	-	31	6	44	65	41	23	19	13	41	41	**340**
100% SSR on Generation (Before Contractual Assets)													
Traded Positions													
TWH Position	19	43	29	51	72	53	34	50	15	21	35	52	**473**
% of Position	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Trading @ 2012 Churn	52	120	80	143	201	148	96	140	43	59	97	146	**1,325**
SSR Contribution													
TWH Position	13	13	22	22	44	44	28	28	13	13	28	28	**299**
% of Position	70%	31%	79%	44%	62%	84%	83%	57%	84%	61%	82%	55%	
Trading @ 2012 Churn	36	37	63	63	124	124	79	79	36	36	80	80	**838**

D Case Studies

D.1 Electricity Supply Board (ESB)

Background

D.1.1 ESB in Ireland have been subject to hard ring-fencing regulations since the launch of the Single Electricity Market (SEM) for Northern Ireland and the Republic of Ireland. These restrictions were aimed at curtailing market power (rather than stimulating liquidity) and focused on the on forward market as the SEM gross pool already embeds full separation of retail and generation physical positions.

D.1.2 As ESB's previous dominant market position is eroding, the ring-fencing obligations are being lessened (the obligations are not intended to be permanent). Whereas the Initial restrictions effectively mirrored the Full Separation model, the current (lessened) obligations is more akin the Trading Agency model.

Initial Ringfence Obligations

D.1.3 The initial ring-fence separated all power supply and generation activities completely and hence mirrors the Full Separation model. These arrangements included:

i) A requirement on ESB PG to conduct mandatory annual auctions of ESB Generation (CfDs);

ii) Setup of separate trading and commercial operations for ESB's SEM generation portfolio, its Northern Ireland operations and its supply activities within separate legal entities;

iii) Prohibition on coordinating or sharing of commercial sensitive information across the three legal entities;

iv) Completely separate business processes and IT including separate trading systems within each of the 3 entities;

v) Mandatory "garden leave" imposed on all transfers of commercial staff between the legal entities

vi) Establishment of an internal compliance function within the ESB Corporate to oversee ring-fencing obligations; and

vii) Setup of core commercial systems and reports to allow ESB Group Risk Management Function to have a one-way looking glass in which they can monitor positions across all entities (but cannot disseminate this data back to be businesses).

D.1.4 As ESB's market SEM position has eroded horizontal re-integration has been allowed and is currently under implementation:

i) Generation (ESB PG) and all Northern Ireland generation activities are now merged within a central commercial trading function; while

ii) Power supply (now Electric Ireland) remains a ring-fenced activity.

Impact on operations and liquidity

D.1.5 While we have not been able to access any public domain data on the cost of implementing and managing the ring-fence obligations, it is very clear that they are considerable. Amongst other, the ring-fence has required:

i) Establishment of separate legal entities;

ii) Separate instances of trading systems (and supporting analytical and optimisation tools);

iii) Duplication of core business processes and staff roles (i.e. three entity risk managers, heads of trading etc); and

iv) Establishment of separate compliance and risk management processes and monitoring systems.

D.1.6 In addition to these operational costs, the ring-fence has (and was intended to) prevent exploitation of synergies across the portfolio. The gradual re-integration of positions currently under way clearly demonstrates the inefficiency and in-optimal nature of this restricted environment from a commercial and risk management perspective. Furthermore, this conclusion must be appreciated in the context of the SEM market environment which explicitly is designed to accommodate stand-alone generators and suppliers. In contrast, the BETTA environment is far more risky for structurally exposed positions and similar ring-fence arrangements would present even greater challenges and complexities.

D.1.7 It is difficult to assess the impact of these obligations, which mainly sought to address market power, on SEM forward liquidity. Arguably, the single biggest impact was the mandatory auctions of Directed Contracts. However, alongside these mandatory auctions, ESB has also conducted voluntary auctions of commercial contracts[57]. It seems likely (but impossible to prove) that the ring-fence positively contributed the volumes offered through this route.

D.2 Japan

Background

D.2.1 The Japanese incumbent VIUs have generally exercised considerable market and political power. Amongst other, this power was expressed through imposition of unreasonably heavy distribution charges on outsiders, making it hard for new entrants and the resulting high cost of power that is seen as a disincentive to investing in Japan

D.2.2 Following the Fukushima incident and the nationalization of Tepco, the government was forced to allow the VIUs to raise rates to cover increased fuel costs. In turn, this lead to debates about the need to conduct a more radical overhaul of the power sector.

Reform Plans

D.2.3 In April 2012, the Prime Minister's cabinet approved a plan to split utilities' generation and transmission businesses and open the residential electricity market to competition – to be implemented over five years from 2015. Reforms were specifically intended to address the

57 These commercial contracts are normally referred to as Non-Directed Contracts (NDCs)

problem of excessive charges on external investors. Around the time of the announcement of the proposed plan, Tepco (now nationalized) also announced that it is planning to divide its power generation and transmission sectors

D.2.4 The plan includes a provision directing the government to guarantee the "stability" of electricity supplies before allowing new entrants into the market – critics suggest this provision and potential delays may make the proposals ineffectual. Nonetheless, potential competitors have started to position themselves following the 2012 debate. For example:

i) Marubeni , which operates independent power plants outside Japan, announced plans to build a floating wind farm off the coast of Fukushima

ii) SoftBank, a telecoms group, is looking to build a network of commercial-scale solar energy generating stations around the country; and

iii) Various gas companies are reported as "eyeing expansion" opportunities.

E Credit Risk Management, Collateral, and Margining

E.1 Credit Risk Mechanics

E.1.1 The **mark-to-market** of an energy forward trade (or, generally, of any derivative trade) is the value of the position considering the current price of the underlying asset. The concept of mark-to-market is perhaps best explained by an example. Suppose a seller has previously agreed to deliver to a buyer 5 MW of baseload UK power for the first season forward at a price of £ 50/ MWh. Suppose further that the current price for baseload first season is £ 54/ MWh. The difference between the agreed contract price and the current market price is £ 4, and therefore the contract is £ 4 "in-the-money" for the buyer (who has previously agreed a more favourable price than the current market price) and £ 4 "out-of-the-money" for the seller. From the point of view of the buyer, the mark-to-market of the trade is £ 87360[58], which is £ 4/ MWh times 5 MW baseload delivery times 4368 hours in one UK delivery season. From the point of view of the seller, the mark-to-market of the contract has an opposite sign (in this case, negative).

E.1.2 **Credit risk** is the risk of loss resulting from the failure of a counterparty to a contract to perform their obligations under the contract. When a forward contract for physical delivery is traded, the two parties to the deal are both potentially exposed to credit risk. This credit risk[59] has two components: settlement risk (sometimes called delivery risk or payment risk) and mark-to-market risk (sometimes called replacement risk). Settlement risk is the value of energy delivered to a counterparty for which payment has not yet been received. Mark-to-market risk is the loss that would be incurred when energy is traded for future delivery at a price fixed in advance, and one of the parties subsequently is unable or unwilling to honour the terms of the contract. The party with the positive mark-to-market value will therefore not realise that value.

E.1.3 Settlement risk is generally much easier to treat. First of all, for a power forward contract it is only the seller's risk, as it is the buyer who must pay the seller. Secondly, the amount of settlement risk is normally known in advance, as it is a function of the delivery schedule, delivery quantity, contract price, and payment terms, all of which are agreed in the contract. Mitigations for settlement risk are generally straightforward and include decreasing the payment terms (i.e. the amount of time allowed for the buyer to pay following receipt of the invoice) and increasing the invoicing frequency to collect payment more often, or requiring prepayment or some other fixed amount of collateral or guarantee from the buyer.

E.1.4 In contrast to settlement risk, the amount and direction of mark-to-market risk is not known in advance at the beginning of contract, and changes unpredictably as a function of market price movements. Mitigations are often more complex. These are discussed in more detail below.

58 Ignoring discounting effects, i.e. neglecting the "time value of money"

59 Note that here we often use credit risk when in fact we mean credit exposure. Credit exposure is the amount of potential loss, while credit risk considers both the amount and probability of loss.

E.2 Common Market Mitigations for Credit Risk

E.2.1 A number of "market" solutions to mitigate credit risk and facilitate trading are currently available in energy trading markets.

Credit Insurance: Bank Guarantees and Credit Default Swaps

E.2.2 Credit Insurance is the third-party guarantee of credit losses, against an upfront premium. We consider here two common approaches to credit insurance: bank guarantees and credit default swaps.

E.2.3 A bank guarantee is issued by a bank on behalf of a client of the bank to the client's creditor (the beneficiary). The issuing bank will guarantee to the beneficiary to indemnify credit losses associated with a particular contract, up to a pre-agreed cap. The bank's client (i.e. the party whose credit risk is insured by the bank) pays a fee to the bank for issuing the guarantee. Bank guarantees are a common credit risk mitigation tool in energy markets, especially for energy supply contracts. An energy supplier will often require a bank guarantee from a client to cover the expected settlement risk, and sometimes a portion of the potential mark-to-market risk.

E.2.4 Another form of credit insurance is the credit default swap. A CDS is a contract between a buyer and a seller which references a particular third-party company which underlies the CDS. The CDS buyer typically has credit exposure to the referenced company, in the form of bonds, trade receivables, or outstanding mark-to-market of derivatives contracts. The buyer makes periodic (e.g. monthly) payments to the seller, and in return the seller of the CDS guarantees a fixed notional payment to the buyer in case of the insolvency of the third-party company referenced by the CDS.

E.2.5 Unlike a bank guarantee, where the cost is typically paid by the party insured, the buyer (and premium payer) of a CDS is the beneficiary party. While bank guarantees are negotiated at the time the contract is agreed, a CDS is often purchased ex-post after mark-to-market risk has accumulated on the deal.

E.2.6 A CDS is a common and liquid instrument in financial markets, and is easily traded and administered. Although some energy trading market participants occasionally use CDS instruments to mitigate credit risk in energy trading markets, we cannot describe their use as widespread. Because the amount of mark-to-market is a function of market prices and therefore dynamic, while the payoff of a CDS is more often a fixed notional amount, the CDS is a somewhat mismatched mitigation for credit risk in energy trading.

E.2.7 We note finally the dependency of the mitigation on solvency of the seller of the CDS, i.e. from the point of view of the buyer, credit risk is transferred from the underlying referenced company to the seller of the CDS. In the case where many market participants buy CDS instruments from a common issuer, there is the potential for systemic risk in the market.

Portfolio Compression

E.2.8 Portfolio compression is a specific mitigation for mark-to-market risk in trading portfolios with a high volume of churn. It involves the early close-out of offsetting trades, with early cash settlement, to reduce the outstanding mark-to-market in a portfolio of trades.

E.2.9 Again, portfolio compression is best explained by an example. Consider two trades for the same underlying product and volume, e.g. 5 MW of first season baseload UK power. Suppose Party A has sold to Party B at £ 50/ MWh, and then, at a later date, Party B has sold the same contract (underlying product, delivery period, and volume) to Party A at £ 54/ MWh. Having completed the second trade, Party B has locked in a profit of £ 87360[60]. Neither Party A nor Party B has any longer a net market risk exposure to the price of first season baseload. Physical flows are also netted out: power will neither be delivered nor received. However, the trades will not be invoiced until the delivery period. Until settlement, Party B is exposed to credit risk.

E.2.10 In order to mitigate the credit risk of Party B, the two counterparties could agree to portfolio compression. This exercise would first identify these two offsetting trades in the portfolios of the companies. The two parties would then negotiate the early settlement of these trades, and calculate the settlement amount (in the above example, £ 87360 adjusted for the discounting effects to find the present value of the future payment). Party A would then make a cash settlement to Party B.

E.2.11 A multilateral portfolio compression is also possible, where more than two parties are considered when identifying trades which net out (e.g A delivers to B, B delivers to C, C delivers to A). In practice, multilateral portfolio compression considers simultaneously many participants and thousands of trades. Typically, trade books are examined to find a smaller set of trades with equivalent power flows but reduced credit risk.

E.2.12 Portfolio compression is a practical, and relatively common, mitigation for credit risk in a trading portfolio. We expect portfolio compression to become more common because EMIR mandates certain companies to attempt period portfolio compression for non-cleared trades.

E.2.13 However, we note that not all portfolios have the opportunity for compression. For example, a supply company would be expected to be purchasing energy on the wholesale market, and seldom or never sell. In this case, the company's portfolio would be "one-way", i.e. offer little or no opportunity to identify offsetting deals. The exercise of performing portfolio compression is an administrative burden to examine portfolios for offsetting deals and negotiate settlement. Although multilateral close-outs are facilitated by third parties, a large degree of back-office support is required. Once the close-out is negotiated, early settlement of trades requires sufficient cash liquidity to make these payments. Companies with poor cashflow may resist early close-out of deals in order to preserve cash.

Central Clearing and Bilateral Margining

E.2.14 Bilateral margining and central clearing involve the exchange of collateral (normally liquid collateral, especially cash) to mitigate credit risk. In case a party to a contract fails to perform, the counterparty will have access to the collateral as compensation. The exchange of collateral, either by bilateral margining or central clearing, is at present the most common way of mitigating mark-to-market risk in wholesale energy markets.

E.2.15 Central clearing is the process of exchanging cash with a central clearing party (CCP), which is a financial institution created for the purposes of holding collateral to secure a trade. Two

60 £87360 is equal to £ 4/ MWh moneyness of the contract, times 5 MW, times 4368 delivery hours in one season in the UK EFA calendar.

counterparties, having completed a deal, agree with a CCP to clear the deal. This means the CCP becomes the counterparty to both of the other parties. The CCP has no net market risk exposure, but instead bears the credit risk to both parties. To mitigate this credit risk, the CCP demands collateral.

E.2.16 Collateral posted to a CCP includes both initial margin and variation margin. Initial margin is an amount of collateral posted at the inception of the trade, when the mark-to-market of the trade is zero for all parties. The initial margin protects the CCP from future changes in the mark-to-market. Variation margin is additional collateral posted daily to the CCP, or received back from the CCP, depending on the underlying daily price movements. The total of the initial margin and variation margin posted to the CCP normally exceeds the negative mark-to-market of the deal.

E.2.17 In contrast, bilateral margining is the exchange of collateral directly between two parties without the intermediation of a CCP. The initial margin is often neglected, and in fact companies often agree a "margin threshold", and exchange collateral only for credit risk exceeding the threshold.

E.2.18 EMIR mandates compulsory clearing for certain "eligible" products when traded amongst financial counterparties and non-financial counterparties with positions above the clearing threshold. For products which are not eligible products (because they are non-standard or because central clearing is not available), EMIR mandates bilateral margining for those counterparties otherwise subject to compulsory clearing.

E.3 Margining and Cash Liquidity Risk

E.3.1 The common market practice of securing trades by requiring the posting of collateral (either bilaterally or through a central clearing party) is effective in mitigating credit risk but in turn generates cash liquidity risk. The requirement to post collateral requires companies to have sufficient cash (or alternative, acceptable financial instruments) on hand to meet calls for variation margin. Cash liquidity risk is the risk that available cash or liquid instruments should prove insufficient to meet calls for variation margin. Possible consequences of not meeting a margin call include, at best, exclusion from wholesale markets and liquidation (i.e. close out and immediate settlement) of the trades for which margin is not posted, jeopardising both the effectiveness of market price hedges and the security of physical energy flows. At worst, failure to meet a margin call is deemed as a default and results in bankruptcy, regardless of the underlying profitability of the firm.

E.3.2 Companies must therefore manage their cash liquidity risk by both monitoring carefully their portfolio of trades subject to clearing and by ensuring sufficient liquidity to meet collateral calls.

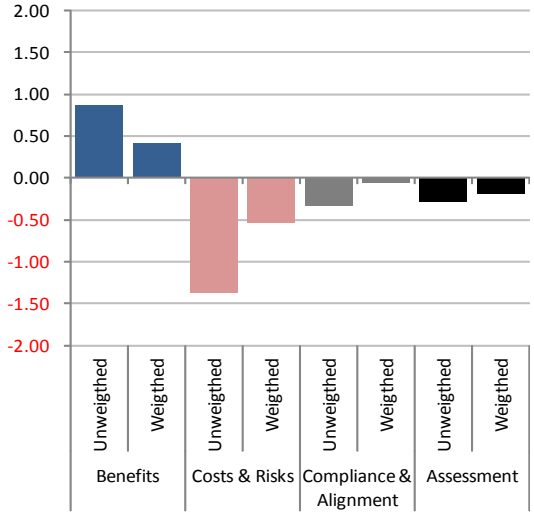
E.3.3 Companies which use clearing and bilateral margining to mitigate credit risk commonly rely on liquidity support from bank guarantees or revolving lines of credit. In both cases, companies pay a fee to a bank to reserve the right to draw credit (up to an agreed maximum) for a fixed term. As additional liquidity is required to support margining beyond cash-on-hand in the company's treasury, the guarantee or line of credit may be used to provide collateral to a counterparty. In addition to the reservation fee, client companies pay interest for the amount drawn under the guarantee.

F Assessment by Intervention Option

F.1 Partial SSR

F.1.1 Figure F-1 below summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for this intervention. The weighted figures apply the weightings of each individual criterion as defined in Section 8.5 to derive the category average. These averages are then weighted by the category weights also defined in Section 8.5 to calculate the overall score of the intervention. The un-weighted scores apply equal weights both in deriving the category averages as well as in the computation of the overall average.

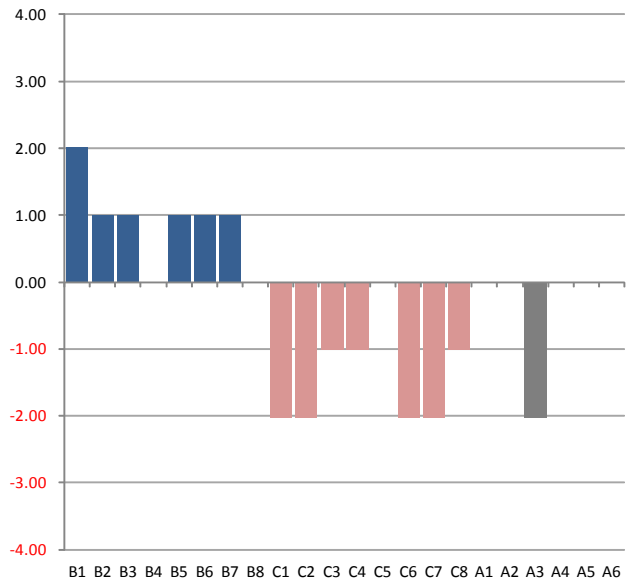
Figure F-1: *Assessment Summary*



Summary	Unweigthed	Weigthed
Benefits	0.88	0.41
Costs & Risks	-1.38	-0.54
Alignment & Compliance	-0.33	-0.06
Asessment	**-0.28**	**-0.18**

F.1.2 As illustrated the Partial SSR scores negatively overall on both an un-weighted and weighted basis based on our assessment of each individual criterion which is summarised in **Figure F-2** below:

Figure F-2: *Un-weighted Scores*



Benefits
B1: Potential direct impact on churn rates
B2: Availability and usage of channels and/or platforms
B3: Number and diversity of counterparties
B4: Scope for intermediaries
B5: Availability of particular products
B6: Availability, reliability and transparency of price and trade data
B7: Robust CfD reference Prices
B8: Efficiency of credit and collateral arrangements

Costs & Risks
C1: Operational complexity of proposed solution
C2: Impact on operations and business model
C3: Unintended unfavourable impact on financial position and ratings
C4: Unintended distortion of normal commercial behaviour
C5: Unintended liquidity impact outside scope of intervention
C6: Susceptibility to gaming
C7: One-off/Static implementation Costs
C8: Ongoing costs to participants and consumers

Alignment & Compliance
A1: EMR
A2: Cash-out reform
A3: Ofgem Minimum Liquidity proposals
A4: EU Target Model
A5: EMIR/MiFID
A6: REMIT

Benefits:

B1 **Potential direct impact on churn rates**	Assessment: **Material (2)**
Based on the analysis and churn estimates set out in Chapter 9, a 60% restriction on self-supply would increase Big Six traded volumes by around 250 TWhs, assuming that companies churn these additional positions in line with current average industry churn rates. Such an increase would represent more than an 0.5 incremental increase in churn rates, which corresponds to the "Material" rating under the assessment guidelines set out in Appendix A. However, we believe it is likely that the average churn (per MWh open position) will decrease with increasing restriction levels which may offset some the benefit of enlarging the VIUs open positions through the SSR. For a 60% restriction which applies only in the GB market, we consider that such effects most likely will not be that material.	
B2 **Availability and usage of channels and/or platforms**	Assessment: **Modest (1)**
The SSR itself does not introduce new channels nor necessarily significantly change trading behaviour. However, combined with the accompanying channel (i.e. screen based trading) and tenor restrictions, any increases in trading volumes may serve to strengthen trading on established platforms in longer dated instruments.	
B3 **Number and diversity of counterparties**	Assessment: **Modest (1)**
While the SSR does not directly address the number and diversity of counter-parties, increased hedging and trading requirements resulting from this restriction may have some limited positive impact on the market access for new and smaller players.	
B4 **Scope for intermediaries**	Assessment: **Neutral (0)**
Beyond secondary effects (increased channels, transparency of prices, etc.) we do not expect a direct impact of the participation of intermediaries in the market.	
B5 **Availability of particular products**	Assessment: **Modest (1)**
We assign a limited, but positive, score to this criterion mainly in view of the impact of the accompanying channel and tenor restrictions.	
B6 **Availability, reliability and transparency of price and trade data**	Assessment: **Modest (1)**
We consider that the channel and tenor restrictions which accompany the Partial SSR will serve to increase transparency in particular through the requirement to conduct SSR induced trading via screen based platforms.	
B7 **Robust CfD reference Prices**	Assessment: **Modest (1)**
Again, the channel and tenor restrictions together with a modest increase in trading volumes will likely support reference prices for both intermittent and in particular baseload CfDs. Here we assume that the tenor restriction obliges trading in a region of the curve which overlaps with the CfD reference price.	
B8 **Efficiency of credit and collateral arrangements**	Assessment: **Neutral (0)**
While the channel restriction forces more trading onto screen based platforms, these include (and currently would in the main be) OTC channels. Hence, we do not see any positive impact on margining and collateral management. In contrast, we do see a potential for the SSR to increase margining requirements on the subject companies as well as contributing to risk of breaching EMIR thresholds (captured under Criterion C3 below).	

Costs and Risks

C1 **Operational complexity of proposed solution**	Assessment: **Material (2)**
As set out in Chapter 9, we assume that the SSR restriction itself can be monitored via the Elexon generation and consumption accounts. However, we do not expect that this assumption holds for companies which transfer their position to a central trading function (i.e. most of the Big Six) in advance of delivery. Should these doubts prove valid, we would decrease the score further to -3 ("Important").	

Provided our assumption holds, the main operational complexity stems from controlling the accompanying channel and tenor restrictions, neither of which can be monitored via the Elexon accounts. We believe these requirements would place material compliance and reporting burdens on the subject companies.	
C2 **Impact on operations and business model**	Assessment: **Material (2)**
While the partial SSR erodes some of the benefits associated with VI business models (e.g. savings on the bid/ask spread, reduction of nominal position relative to EMIR thresholds), it does not in our view require changes to the internal organisation or the business model itself. It will however, clearly impact trading and risk management activities in the GB region at the operational level and will require a number of new business processes to support the compliance and monitoring regime.	
C3 **Unintended unfavourable impact on financial position and ratings**	Assessment: **Modest (1)**
While a Partial SSR aims to limit the ability to net up- and downstream positions internally, the fundamental VI benefits are not severely impacted. There is a limited negative financial impact as the trading efficiency of the subject companies is reduced and they are forced to accept unfavourable bid/ask spreads on a large portion of their transactions. Additionally, the additional churn associated with the Partial SSR could contribute to pushing a company above the EMIR thresholds and more generally imposes additional margining requirements. Rating agencies may note these impacts but we do not suggest that a Partial SSR in itself would expose the subject companies to the risk of a downgrade.	
C4 **Unintended distortion of normal commercial behaviour**	Assessment: **Modest (1)**
As noted in Chapter 9, we are concerned that a SSR, which breaks up the portfolio at least at delivery, could impact trading behaviours and reduce the incentives to churn positions. However, for a Partial SSR which still leaves a sizeable integrated portfolio in the GB market, we believe the impact most probably will be limited.	
C5 **One-off/Static implementation Costs**	Assessment: **Neutral (0)**
In itself the SSR does not incentivise particular products or term durations. Subject to the channel and tenor restrictions being as broad as possible, we do not see much potential for adverse liquidity effects outside the scope of the intervention itself.	
C6 **Susceptibility to gaming**	Assessment: **Material (2)**
As noted in Chapter 9, we do not believe it is practically feasible to try to adjust VIU positions for contractual assets. While the channel restriction will prevent such contracts from being treated as allowable trades under the Partial SSR, the position volumes under the SSR will ignore these contracts. Hence, companies with significant contractual assets will be able to understate their true generation position.	
C7 **One-off/Static implementation Costs**	Assessment: **Material (2)**
The initial cost of implementing a partial restriction depends critically on whether or not such a restriction can be readily monitored and controlled via the existing Elexon accounts and reporting capabilities. It this assumption proves invalid, material implementation costs could be required to modify Elexon's internal systems. Assuming that is not the case, the main costs will arise within the companies which are subject to the SSR. In this regard, we assume that the channel and tenor restrictions mainly will be monitored through obligations on the subject companies to demonstrate compliance. We suspect that these reporting and accompanying modifications to existing trading systems may not be entirely trivial as they require the tracking and reporting of a subset of the GB portfolio in trading systems which cover much wider pan-European portfolios. It would also require modifications of controls and operational business processes (to ensure trades don't accidentally breach the SSR). While we cannot provide a specific estimate of initial implementation costs, we suspect they would reach several £ million in each company.	
C8 **Ongoing costs to participants and consumers**	Assessment: **Modest (1)**
Once the central and participant monitoring systems are in place, we do not foresee material running costs.	

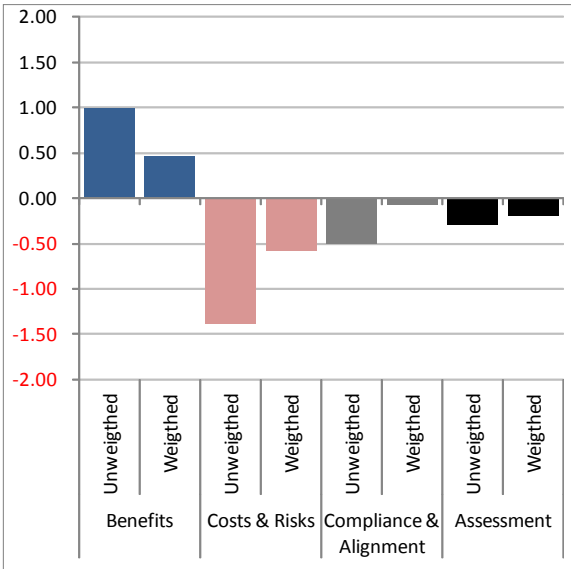
Alignment & Compliance

All Criteria
In our assessment, a Partial SSR does not conflict with or hinder the various EU and GB reform initiatives, nor financial regulations such as EMIR or REMIT. While any intervention which increases liquidity and churn also increases the risk of breaching the EMIR thresholds (addressed by C3 above), it does not hinder or prevent a company from complying with the regulation. However, we do find that a SSR potentially could conflict with Ofgem's minimum liquidity proposals, which includes a Day-Ahead gross bidding requirement. It is possible that the level of the SSR restriction under a partial intervention would still leave sufficient room to accommodate Ofgem's minimum Day-Ahead gross bidding requirement, but such a solution would nonetheless impose too widely differing and inconsistent trading requirements[61] . Of course, both SSRs and functional separation interventions would conflict directly with a more expansive package which includes mandatory auctions and, in particular, market making.

F.2 Full SSR

F.2.1 Figure F-3 below summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for the Full SSR intervention:

Figure F-3: *Assessment Summary*

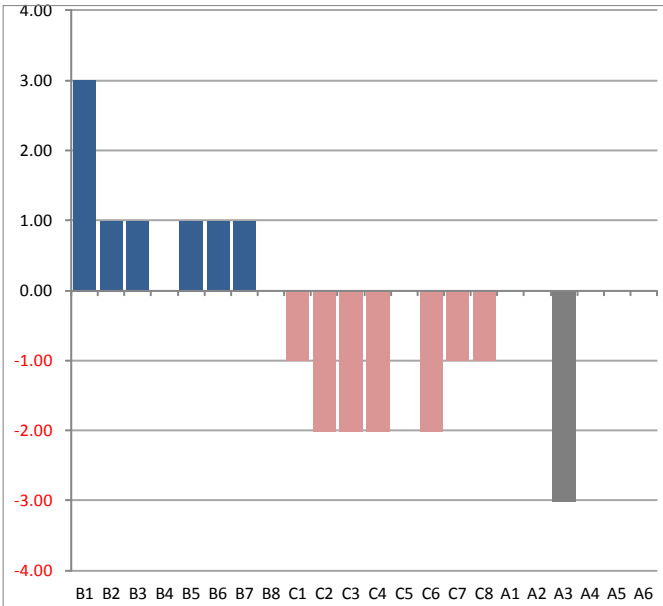


Summary	Unweigthed	Weigthed
Benefits	1.00	0.94
Costs & Risks	-1.38	-1.45
Alignment & Compliance	-0.50	-0.08
Asessment	**-0.29**	**-0.20**

F.2.2 As illustrated above, the Full SSR scores negatively overall on both an un-weighted and weighted basis and both measures are very close to the average scores achieved by the partial options. However, this similarity camouflages a number of differences in the scoring of individual criteria. Our assessment of each individual criterion is summarised **in Figure F-4 below**:

61 Under gross bidding arrangements the portfolio is kept together to enable trading on both sides of the market whereas under the SSR the requirement is to separate up- and downstream trading requirements.

Figure F-4: *Un-weighted Scores*



Benefits:

B1 **Potential direct impact on churn rates**	Assessment: **Important (3)**
The estimate set out in Chapter 9 suggested a marked increase in traded volumes under the Full SSR when compared with a partial option. At face value, this would nearly double current GB industry average churn rate (2.8 in 2012) and deliver churn at 5 or 6 times underlying generation which is not far behind the Nordic markets. However, as noted above, these estimates assume that trading behaviour and churn rates are unchanged by the SSR itself. The assumption that the generation and supply positions which have been disconnected through the SSR will be churned the same way as (the smaller) net open position of the VIU portfolio is more than doubtful. In our experience, players which are exposed structurally churn far less than portfolio players, as they are not able to use proprietary trading to disguise whether they are entering the market from a long or short position (their underlying position is known to all). Hence, we believe it is likely that the trading behaviour will change in response to a Full SSR and that this will materially diminish the estimated level of liquidity benefits. While we have upgraded the Full SSR to "Important", we do not believe a "Substantial" rating is justified.	
B2 **Availability and usage of channels and/or platforms**	Assessment: **Modest (1)**
Same rationale and score as for B2 in the Partial SSR Option	
B3 **Number and diversity of counterparties**	Assessment: **Modest (1)**
Same rationale and score as for B3 in the Partial SSR Option	
B4 **Scope for intermediaries**	Assessment: **Neutral (0)**
Same rationale and score as for B4 in the Partial SSR Option	
B5 **Availability of particular products**	Assessment: **Modest (1)**
Same rationale and score as for B5 in the Partial SSR Option	
B6 **Availability, reliability and transparency of price and trade data**	Assessment: **Modest (1)**
Same rationale and score as for B6 in the Partial SSR Option	
B7 **Robust CfD reference Prices**	Assessment: **Modest (1)**
Same rationale and score as for B7 in the Partial SSR Option	
B8 **Efficiency of credit and collateral arrangements**	Assessment: **Neutral (0)**

Same rationale and score as for B8 in the Partial SSR Option

Costs and Risks

C1 **Operational complexity of proposed solution**	Assessment: **Modest (1)**
We have scored the Full SSR one notch better than the Partial option. This reflects simplification of the monitoring and control regime both centrally (i.e. Elexon) and within the subject companies. Eliminating the need to segregate the GB market portfolio into SSR and non-SSR components, will ease the monitoring and reporting requirements associated with the SSR itself as well as the supplementary Channel and Tenor restrictions. As is the case with the Partial Option, this score assumes that the SSR restriction itself can be monitored (and hence controlled) via the Elexon generation and consumption accounts. Should this not prove correct, we would decrease the score further to a -2 "Material".	
C2 **Impact on operations and business model**	Assessment: **Material (2)**
While the requirement to completely split the (physical) trading of up- and downstream positions further erodes some of the benefits associated with VI business models (e.g. retaining the bid/ask spread in the company), it does not in our view fundamentally change the operational impacts over and above that implied by the Partial Option. Hence, the scores are the same for this criterion.	
C3 **Unintended unfavourable impact on financial position and ratings**	Assessment: **Material (2)**
The Full SSR will further expose the VIUs to trading inefficiencies and unfavourable bid/ask spreads on all up- and downstream positions. We also believe that the rating agencies are likely to view a Full SRR with concern. While this intervention only concerns the GB part of the business, this is significant across all Big Six (and dominant for SSE). Furthermore, both the participant and the agencies would be even more concerned that the intervention could push the company above the EMIR threshold.	
C4 **Unintended distortion of normal commercial behaviour**	Assessment: **Material (2)**
A Full SSR, which fully breaks up the portfolio at delivery, could impact trading behaviours and reduce the incentives to churn positions and more so than under the partial option. We therefore upgrade this criterion to "Material".	
C5 **One-off/Static implementation Costs**	Assessment: **Neutral (0)**
Same rationale as C5 for the Partial SSR.	
C6 **Susceptibility to gaming**	Assessment: **Material (2)**
While the Full SSR is simpler to monitor, we still believe it is fairly open to gaming in particular through use of contractual assets as a proxy for own generation positions. We therefore retain the "Material" rating.	
C7 **One-off/Static implementation Costs**	Assessment: **Modest (1)**
Compared with the partial option, the lesser operational complexity of the full option (refer C1 above) will likely reduce initial investments required compared to a partial SSR. We have therefore downgraded this criterion from "Material" to "Modest" for the Full SSR. We note again that this assumes the SSR can be monitored via the Elexon accounts.	
C8 **Ongoing costs to participants and consumers**	Assessment: **Modest (1)**
Same rationale as C8 for the Partial SSR.	

Alignment & Compliance

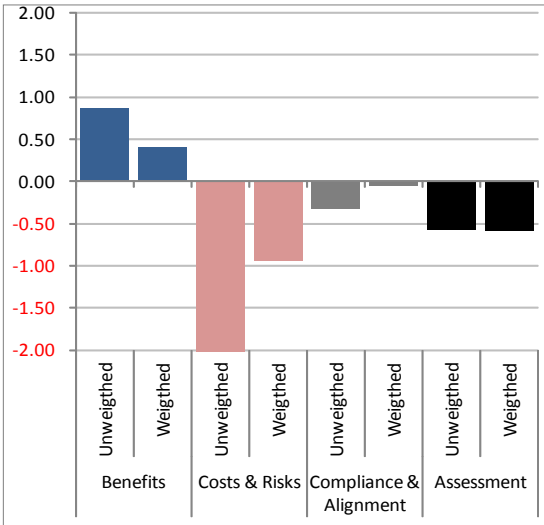
All Criteria
In our assessment, a Full SSR does not conflict with or hinder the various EU and GB reform initiatives, nor financial regulations such as EMIR or REMIT. While increasing the SSR to 100% may further increase the risk that the affected participants may breach the EMIR thresholds (addressed by C3 above), it does not prevent compliance with the regulation itself. In contrast to the partial option, however, a Full SSR will not in any circumstances be consistent with a

minimum Day-Ahead gross bidding requirement. Hence, we judge this option to conflict with and hinder Ofgem's minimum liquidity proposals. Compared with the Partial Option, we therefore decrease the score to -3.

F.3 Functional Separation – Agency Model

F.3.1 Figure F-5 below summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for this intervention:

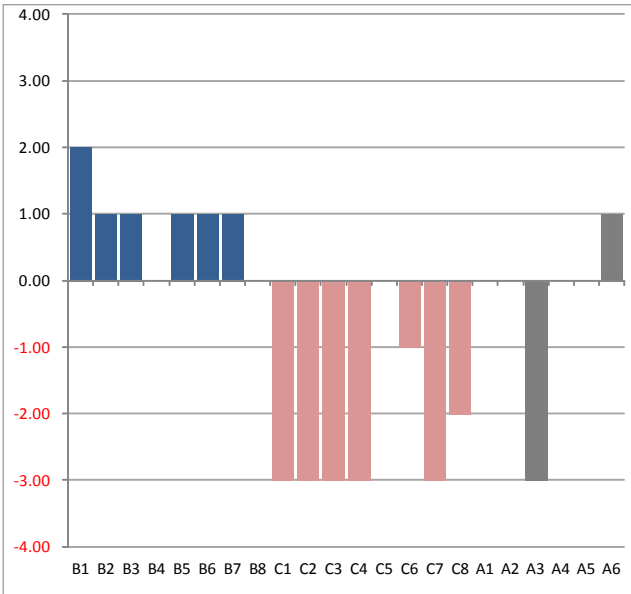
Figure F-5: *Assessment Summary*



Summary	Unweigthed	Weigthed
Benefits	0.88	0.41
Costs & Risks	-2.25	-0.94
Alignment & Compliance	-0.33	-0.06
Asessment	**-0.57**	**-0.58**

F.3.2 The figure above summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for this intervention. As illustrated, we evaluate the Agency Model negatively overall on both an un-weighted and weighted basis and more so than the pure SSR options based on our assessment of each individual criterion which is summarised in Figure F-6 below:

Figure F-6: *Un-weighted Scores*



Benefits
B1: Potential direct impact on churn rates
B2: Availability and usage of channels and/or platforms
B3: Number and diversity of counterparties
B4: Scope for intermediaries
B5: Availability of particular products
B6: Availability, reliability and transparency of price and trade data
B7: Robust CfD reference Prices
B8: Efficiency of credit and collateral arrangements

Costs & Risks
C1: Operational complexity of proposed solution
C2: Impact on operations and business model
C3: Unintended unfavourable impact on financial position and ratings
C4: Unintended distortion of normal commercial behaviour
C5: Unintended liquidity impact outside scope of intervention
C6: Susceptibility to gaming
C7: One-off/Static implementation Costs
C8: Ongoing costs to participants and consumers

Alignment & Compliance
A1: EMR
A2: Cash-out reform
A3: Ofgem Minimum Liquidity proposals
A4: EU Target Model
A5: EMIR/MiFID
A6: REMIT

Benefits:

B1 **Potential direct impact on churn rates**	Assessment: **Material (2)**
While the Agency Model embeds a Full SSR, we believe this option is likely to deliver a somewhat smaller contribution to trading volumes and churn and hence, by comparison, reduce the positive impact of the Full SSR. With the delegation of all commercial and trading decision making to the up- and downstream businesses, respectively, it is in our experience likely that such decisions will become highly focussed on (one-directional) simple hedging activities. The fact that these decisions are transacted through a central trading function does not, in our view, change this picture. Under the (ring-fenced) Trading Agency model, this function has no visibility of the underlying generation and consumption forecasts and no way of knowing (in advance) what trading orders the up- and downstream businesses are likely to be and, in particular, when such orders will hit the trading books. Hence, the central trading function will not be in a position to churn the underlying asset and customer positions.	
B2 **Availability and usage of channels and/or platforms**	Assessment: **Modest (1)**
Same rationale and score as for B2 in the SSR Options	
B3 **Number and diversity of counterparties**	Assessment: **Modest (1)**
Same rationale and score as for B3 in the SSR Options	
B4 **Scope for intermediaries**	Assessment: **Neutral (0)**
Same rationale and score as for B4 in the SSR Options	
B5 **Availability of particular products**	Assessment: **Modest (1)**
Same rationale and score as for B5 in the SSR Options	
B6 **Availability, reliability and transparency of price and trade data**	Assessment: **Modest (1)**
Same rationale and score as for B6 in the SSR Options	
B7 **Robust CfD reference Prices**	Assessment: **Modest (1)**
Same rationale and score as for B7 in the SSR Options	
B8 **Efficiency of credit and collateral arrangements**	Assessment: **Neutral (0)**
Same rationale and score as for B8 in the SSR Options	

Costs and Risks

C1 **Operational complexity of proposed solution**	Assessment: **Important (3)**
We have scored this criterion above both SSR options. While the SSR options broadly leave the internal organisation and most business processes unchanged, the Agency model requires more fundamental changes to the internal business model of the VIUs. As discussed in Appendix B, many European VIUs operate commercial hubs which concentrate and consolidate all trading and commercial decisions as well as all optimisation activities. Even those VIUs which continue to operate with regional optimisation units typically only have one such unit for the particular region (e.g. GB). Overall, this type of model would therefore require some substantial re-engineering of processes, systems and organisation to set up the new local up- and downstream optimisation functions, equip these functions to act on their own and create the interface to the central Trading Hub. Furthermore, as explained above, this model would also require participants to implement a new compliance function as well as develop specific risk management processes to enable the "one-way looking glass". It is in our view a complex solution for the participants to implement.	
C2 **Impact on operations and business model**	Assessment: **Important (3)**
In line with our comments above, the model marks a clear departure from the business model that VIUs would pursue if left to their own devices which seriously begins to erode the benefits associated with VI. In addition to changes to operational systems and processes, it would force a subject company to change its internal organisation, roles, and responsibilities for part of its business. The end result would essentially be	

separate, and distinctly different, business models for the GB and the rest of Europe, respectively.	
C3 **Unintended unfavourable impact on financial position and ratings**	Assessment: **Important (3)**
Even with the ability of Group Risk Management to oversee positions across both the up- and downstream, this model will clearly hinder effectively position management not just at delivery but further out the curve. While margining risks can still be managed and offset at group level, we believe it possible and even probable that the Rating Agencies will be quite concerned about such an intervention. In particular, they are likely to be concerned about imposition of a business model which inherent is less competitive in a BETTA as well as EU Target model (as currently defined). We believe this type of model, in and of itself, could put genuine pressure on ratings performance.	
C4 **Unintended distortion of normal commercial behaviour**	Assessment: **Important (3)**
As discussed under B1 above, all our experience suggests that portfolio players typically will churn a smaller net open position more than directionally exposed players with large open generation or supply positions. Participants who are structurally long or short cannot disguise their position in the market by buying and selling, and they can adjust their exposure in the market by the timing decisions of their hedging activities, rather than trading in and out of a position. In all likelihood, the commercial and trading decision making in the separated up- and downstream optimization functions will become highly focused on (one-directional) simple hedging activities.	
C5 **One-off/Static implementation Costs**	Assessment: **Neutral (0)**
Assuming channel and tenor restrictions remain in place, same score and rationale as set out in C5 for the Partial SSR.	
C6 **Susceptibility to gaming**	Assessment: **Modest (1)**
The establishment of a proper compliance function and strict controls on the interface between both optimisation functions as well as with the central Trading Hub should serve to mitigate and reduce the potential for gaming. Hence, on this criterion, we score the Agency model better that the stand-alone SSR options.	
C7 **One-off/Static implementation Costs**	Assessment: **Important (3)**
As explained above, this option will require re-engineering of, and changes to, existing systems and core business processes. It will also entail some duplication of capabilities across each of the two separate optimisation functions. These functions will, for example, need to be able to capture and record their internal trades with the central Trading Hub as well as maintain separate position and risk reporting functionality. While the centrally incurred costs broadly are the same as under the SSR options, participants subject to this intervention will be faced with significant investments. While we cannot provide a specific estimate of initial participant implementation costs, we suspect they would reach several £ million.	
C8 **Ongoing costs to participants and consumers**	Assessment: **Material (2)**
In contrast to the SSR options, this intervention does impose ongoing incremental costs on the participants. These costs arise both through duplication of systems and processes as well as through having to man two separate optimisation functions as well as a new compliance functions.	

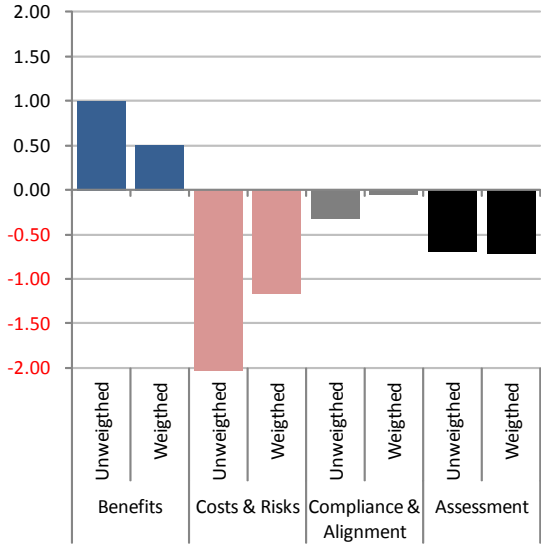
Alignment & Compliance

All Criteria
We conclude that this intervention neither materially augments nor hinders the application of the reforms and regulations set out in the Analytical Framework with two exceptions: i) The agency model, which delegate spot and delivery management to the new separate optimization functions, is not consistent with the 30% Day-Ahead gross-bidding requirement included within Ofgem's Minimum Liquidity Proposals as defined in Section 13.2. ii) REMIT requires separate reporting for all generation and upstream activities, a requirement that this intervention supports by separating these activities from the rest of the portfolio (in the GB only though). We attribute a modest benefit to this feature.

F.4 Functional Separation – Full Separation Model

F.4.1 Figure F-7 below summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for this intervention:

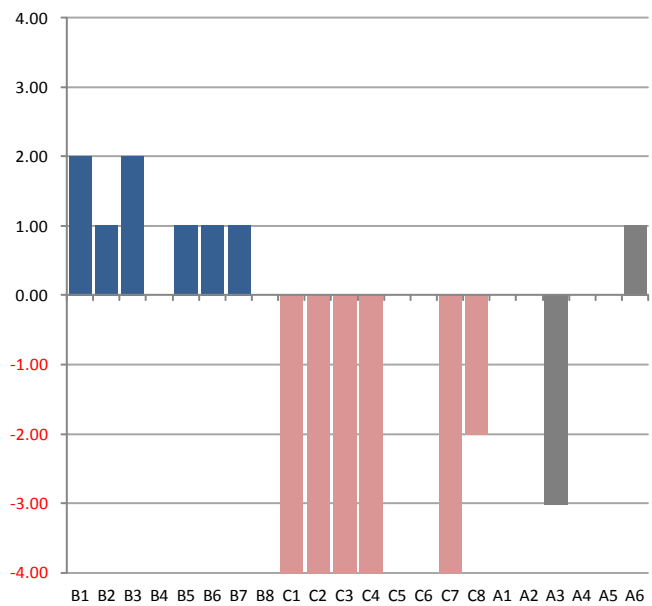
Figure F-7: *Assessment Summary*



Summary	Unweigthed	Weigthed
Benefits	1.00	1.00
Costs & Risks	-2.75	-2.90
Alignment & Compliance	-0.33	-0.06
Asessment	**-0.69**	**-0.72**

F.4.2 Figure F-7 above summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for this intervention. As illustrated, the Agency Model scores negatively overall on both an un-weighted and weighted basis and more so than the pure SSR options based on our assessment of each individual criterion which is summarised Figure F-8 below:

Figure F-8: *Un-weighted Scores*



Benefits

B1: Potential direct impact on churn rates
B2: Availability and usage of channels and/or platforms
B3: Number and diversity of counterparties
B4: Scope for intermediaries
B5: Availability of particular products
B6: Availability, reliability and transparency of price and trade data
B7: Robust CfD reference Prices
B8: Efficiency of credit and collateral arrangements

Costs & Risks

C1: Operational complexity of proposed solution
C2: Impact on operations and business model
C3: Unintended unfavourable impact on financial position and ratings
C4: Unintended distortion of normal commercial behaviour
C5: Unintended liquidity impact outside scope of intervention
C6: Susceptibility to gaming
C7: One-off/Static implementation Costs
C8: Ongoing costs to participants and consumers

Alignment & Compliance

A1: EMR
A2: Cash-out reform
A3: Ofgem Minimum Liquidity proposals
A4: EU Target Model
A5: EMIR/MiFID
A6: REMIT

Benefits:

B1 **Potential direct impact on churn rates**	Assessment: **Material (2)**
We downgrade the direct impact on liquidity and churn relative to the stand-alone Full SSR option based on the same rationale we applied to the assessment of this criterion for the Agency model. With the delegation of all commercial and trading decision making to the up- and downstream businesses, respectively, it is in our experience likely that such decisions will become highly focussed on (one-directional) simple hedging activities. While the Full Separation model creates large open generation and supply positions within the VIU which previously did not exist, in our view the churn of each MWh of open position will likely fall considerably. Hence, the benefit of separating up- and downstream positions will be somewhat eroded.	
B2 **Availability and usage of channels and/or platforms**	Assessment: **Modest (1)**
Same rationale as for the Agency model	
B3 **Number and diversity of counterparties**	Assessment: **Material (3)**
We have upgraded our assessment of this criterion by one notch compared to the Agency model since it create two entirely separate new GB trading functions, both of which will need to sell and buy large underlying asset and sales positions.	
B4 **Scope for intermediaries**	Assessment: **Neutral (0)**
Our assessments are identical to the SSR and Agency options, mainly motivated by the imposition of supplementary channel and tenor.	
B5 **Availability of particular products**	Assessment: **Modest (1)**
As above	
B6 **Availability, reliability and transparency of price and trade data**	Assessment: **Modest (1)**
As above	
B7 **Robust CfD reference Prices**	Assessment: **Modest (1)**
As above	
B8 **Efficiency of credit and collateral arrangements**	Assessment: **Neutral (0)**
As above	

Costs and Risks

C1 **Operational complexity of proposed solution**	Assessment: **Substantial (-4)**
We have scored this criterion above the Agency Model, since the latter "just" requires ensuring that local GB Optimisation functions do not communicate asset and sales positions to central trading hub. In contrast, the Full Separation Model will require that two new trading entities for the GB region are extracted from the central hub. This will add very considerable operational complexity to the overall VIU operations as well as investments. These new trading functions will require their own systems (instances of the main VIU trading system), back-office and middle office processes, separate and additional staff and so on. For settlement and compliance purposes, we also assume that this option will require the new trading companies to be set up in separate legal entities, something that adds material costs and reporting complexity. Splitting the external market interface into three legal entities will arguably also complicate group wide credit risk and margining management.	
C2 **Impact on operations and business model**	Assessment: **Substantial (-4)**
The Full Separation Model is a complete departure from the typical VIU business model. Even more so than under the Agency Model, the end result would essentially be separate, and distinctly different, business models for the GB and the rest of Europe. In addition to changes to operational systems and processes, it would force the subject companies to	

radically change their internal organisation, roles and responsibilities not just within the new GB business areas, but equally with respect to the interface to the central functions and group functions such as risk management.
Finally, this model will place some real and concerning constraints on the ability to manage collateral and margining (as well as EMIR thresholds). While in- and outgoing cash collateral will continue to be consolidated at group level, the ability to actively manage such calls, for example through selective choice of counter-parties to exploit netting benefits, will be restricted. Since the two GB trading functions must act independently of one another, they cannot be allowed to see the total GB or group credit position. Hence, utilising group wide cross-netting agreements effectively will become an issue.

C3	**Unintended unfavourable impact on financial position and ratings**	Assessment: **Substantial (-4)**

This model would significantly erode VI benefits by (re-) introducing a business model which is far more geared towards gross pools (e.g. SEM) . In our view, rating agencies will worry about the impact on competitiveness in the BETTA as well as EU Target model (as currently defined). Rating agency credit assessments will normally include and give material weight to company structure and competitive fit. In addition, agencies are likely to be concerned about the trading and operational inefficiencies introduced by this model as well as the risk of further regulatory interventions in other parts of their business. For VIUs with a substantial business in the GB, this type of model could in our assessment put companies at risk of a (1 notch) downgrade.

C4	**Unintended distortion of normal commercial behaviour**	Assessment: **Substantial (-4)**

As discussed above, this model will fundamentally change the way in which the subject companies operate within the GB and introduce a partial business model at odds with both the GB BETTA market as well as other parts of the VIU business. As the subject companies try to manage the consequences of such a change, the scope for unforeseen and unintended changes in commercial behaviour is in our view very significant. In particular, we believe it is highly likely that the new GB trading functions will churn their (one-directional) asset and sales positions far less than the previous integrated operation.

C5	**One-off/Static implementation Costs**	Assessment: **Neutral (0)**

Assuming channel and tenor restrictions remain in place, same score and rationale as set out in the preceding interventions.

C6	**Susceptibility to gaming**	Assessment: **Neutral (0)**

While we consider the potential for unintended consequence very significant, such consequences are most likely to result from allowable changes in commercial and trading behaviour, as opposed to gaming. Indeed, the complete separation of all trading activities and market access under this model will further serve to reduce the scope for gaming (subject to a compliance requirement outlined in Section 10.1.16). We therefore score this option as “Neutral”.

C7	**One-off/Static implementation Costs**	Assessment: **Substantial (-4)**

As explained in B1 above, this option will require substantial re-engineering and duplication of existing systems and core business processes. In addition to the requirements listed under the Agency model, the Full Separation model requires separate trading floors with all what this entails in terms of systems and accompanying business processes. Our experience from companies which have operate under similar ring-fencing obligations (refer for example the ESB Case Study in Appendix D) suggests that this is not a cheap exercise. While we cannot provide a specific estimate of initial participant implementation costs, we suspect they would be in the order of 10s of £ millions.

C8	**Ongoing costs to participants and consumers**	Assessment: **Material (-2)**

The process and staff duplication implied by the model does in our view entail material ongoing costs on the participants.

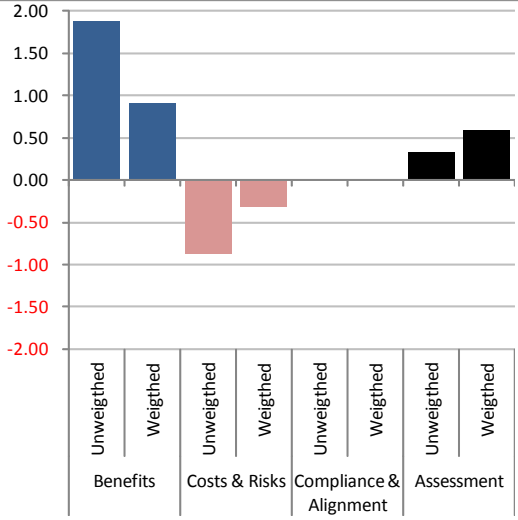
Alignment & Compliance

All Criteria
In line with our assessment of these criteria for the Agency model, we conclude that the Full Separation model is inconsistent with Ofgem's Minimum Liquidity Proposals while being modestly supporting to the REMIT obligations.

F.5 Mandatory Auctions

F.5.1 F-9 below summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for this intervention.

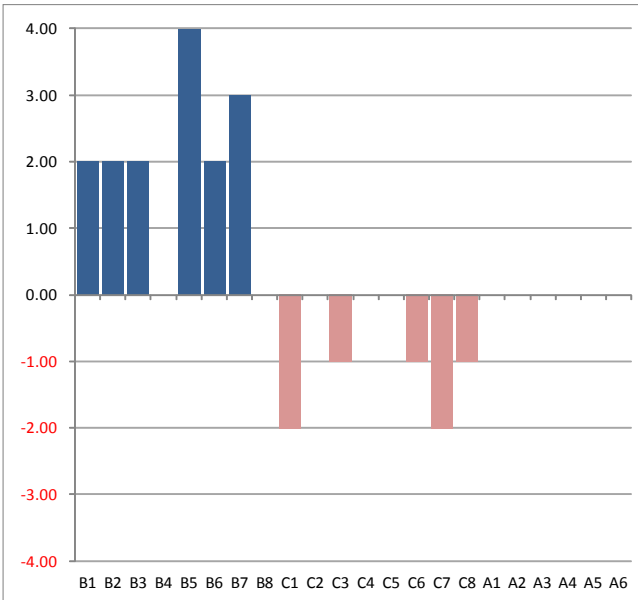
Figure F-9: *Assessment Summary*



Summary	Unweighted	Weighted
Benefits	1.88	1.82
Costs & Risks	-0.88	-0.80
Alignment & Compliance	0.00	0.00
Asessment	**0.33**	**0.59**

F.5.2 As illustrated, the Mandatory Auction intervention scores positively overall on both an un-weighted and weighted basis based on our assessment of each individual criterion which is summarised in Figure F-10 below:

Figure F-10: Un-weighted Scores



Benefits
B1: Potential direct impact on churn rates
B2: Availability and usage of channels and/or platforms
B3: Number and diversity of counterparties
B4: Scope for intermediaries
B5: Availability of particular products
B6: Availability, reliability and transparency of price and trade data
B7: Robust CfD reference Prices
B8: Efficiency of credit and collateral arrangements

Costs & Risks
C1: Operational complexity of proposed solution
C2: Impact on operations and business model
C3: Unintended unfavourable impact on financial position and ratings
C4: Unintended distortion of normal commercial behaviour
C5: Unintended liquidity impact outside scope of intervention
C6: Susceptibility to gaming
C7: One-off/Static implementation Costs
C8: Ongoing costs to participants and consumers

Alignment & Compliance
A1: EMR
A2: Cash-out reform
A3: Ofgem Minimum Liquidity proposals
A4: EU Target Model
A5: EMIR/MiFID
A6: REMIT

Benefits:

B1 **Potential direct impact on churn rates**	Assessment: **Material (2)**
In comparison with mandatory market making, which has the potential for nearly unlimited volumes to be drawn by market participants, we note the volume of power subject to mandatory auctioning is finite and determined in advance. We anticipate that auction volumes will be re-traded in the secondary market, either OTC or on exchanges. We therefore expect that the mandatory auction intervention will have a modestly positive impact on churn rates.	
B2 **Availability and usage of channels and/or platforms**	Assessment: **Material (2)**
By definition, a mandatory auction creates a new channel to market which we anticipate will be popular with both buyers and sellers. As volumes acquired in the auction will be re-sold in the secondary market, we do not anticipate that such an intervention will fragment liquidity across multiple channels or otherwise be detrimental to existing OTC and exchanged-based trading.	
B3 **Number and diversity of counterparties**	Assessment: **Material (2)**
We anticipate the auction to be popular with independent generators, financial participants, and perhaps large energy consumers acting through nominated suppliers, as they move their contract tenders to coincide with the timing of auctions and ensure they get transparency in price and liquidity in terms of volume they require. On the other hand, it is possible that the smallest independent suppliers may be excluded from the auction because of their inability to pre-qualify on the basis of insufficient credit, their reluctance to post a bond of sufficient size, or their preference to avoid the cash liquidity risk of bringing volumes to clearing.	
B4 **Scope for intermediaries**	Assessment: **Neutral (0)**
Beyond secondary effects (increased channels, transparency of prices, etc.), we do not expect a direct impact on the participation of intermediaries in the market.	
B5 **Availability of particular products**	Assessment: **Substantial (4)**
There is the obvious scope to mandate and direct the particular products desired in the auction in terms of tenor and shape, and the volumes provided. Furthermore, we expect these products to be traded in secondary markets.	
B6 **Availability, reliability and transparency of price and trade data**	Assessment: **Material (2)**
Auction clearing prices will be publicly available and will provide transparent and robust reference prices for the auctioned products. However, clearing prices from a discrete auction will by definition be visible only at the time of each auction rather than on a continuous basis.	
B7 **Robust CfD reference Prices**	Assessment**: Important (3)**
Published auction results can produce a benchmark for the pricing of other transactions, including a CfD with reference price being linked to auction outcomes. If linked directly to the auction result, the CfD reference price is obviously observed only as frequently as the auction occurs, rather than on a relatively continuous basis. A direct linkage between the auction clearing price and the CfD reference price also introduces legal risk into the CfD contracts, as they will require an adjustment if the auction, for whatever reason, is either temporarily or permanently stopped. If, on the other hand, the CfD reference price refers to a product traded in the auction but references instead an OTC price or exchange closing price rather than the auction clearing price, we expect a modest to substantial benefit to the transparency of CfD reference prices.	
B8 **Efficiency of credit and collateral arrangements**	Assessment: **Neutral (0)**
We do not foresee the Mandatory Auction providing any particular benefit in terms of improving efficiency of credit and collateral arrangements.	

Costs and Risks

C1 **Operational complexity of proposed solution**	Assessment: **Material (-2)**
We consider the operational complexity of proposed solution to be material. On the level of the entire market, we would need to consider the design of the auction, the acquisition/ construction of the auction platform, the appointment of the auction trustee, the preparation of pre-qualification contracts and documents, etc. Individual participants would need to first qualify to participate and then prepare and execute their bidding strategy for each auction.	
C2 **Impact on operations and business model**	Assessment: **Neutral (0)**
The mandatory auction intervention sits alongside existing market channels and does not fundamentally change the way that the existing market operates. In our view there is a low risk of unintended consequences and no requirement to change participants' business models.	
C3 **Unintended unfavourable impact on financial position and ratings**	Assessment: **Modest (-1)**
As with all interventions that mandate participation or action, there is the risk in the context of EMIR that a company has a level of churn beyond that which it would prefer, thus causing the company to exceed the clearing threshold when otherwise it would remain under. To the extent that auction products are cleared, there would be a requirement for a company to have sufficient cash liquidity to support the collateralisation of the mandatory volumes, and no clear escape from mandatory participation in the market in times of constrained liquidity. For the Big Six, the level of mandated participation in the market is capped at the volumes they are required to bring to auction. We therefore rate the unintended impact on financial position as neutral to modest.	
C4 **Unintended distortion of normal commercial behaviour**	Assessment: **Neutral (0)**
We do not foresee unintended consequences on participants' commercial behaviour, beyond the scope of the intervention.	
C5 **One-off/Static implementation Costs**	Assessment: **Neutral (0)**
We do not foresee unintended unfavourable consequences on liquidity.	
C6 **Susceptibility to gaming**	Assessment: **Modest (-1)**
Even with careful design as recommended in section 11, gaming potential cannot be eliminated, hence there will be a modest cost associated with monitoring the auction.	
C7 **One-off/Static implementation Costs**	Assessment: **Material (-2)**
We estimate an initial cost of implementing a mandatory auction in the range of £3 to 4 million, based on the costs of similar programmes elsewhere. These costs include designing the auction, tendering for a platform and trustees, auction system development and testing, drafting the legal documents, producing documentation of the detailed auction rules and a bidder manual, conducting bidder seminars and mock auctions, and communicating with mandated and voluntary participants.	
C8 **Ongoing costs to participants and consumers**	Assessment: **Modest (-1)**
We foresee the ongoing costs to provide a high quality auction would include platform hosting and maintenance, software license fees, providing the personnel who run the auction, ongoing training of bidders, technical support, and providing the results to the relevant parties. Participants will face internal costs for monthly auctions to monitor the auction process and submit/ update bids.	

Alignment & Compliance

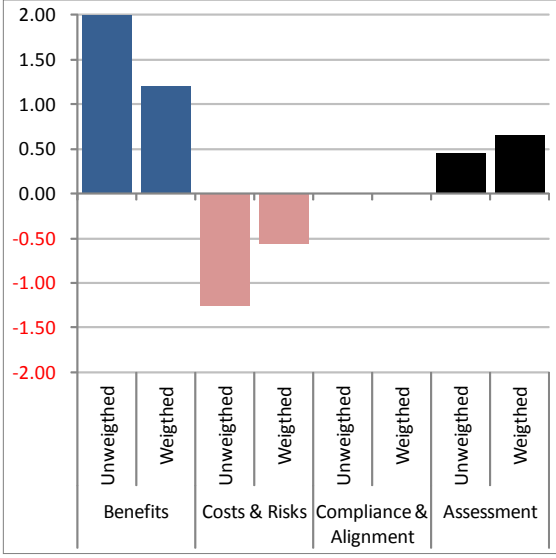
All Criteria
We have considered the interaction between the Mandatory Auction intervention and current market reform and financial regulation initiatives. To the extent that a Mandatory Auction directs liquidity toward a product which is the reference for the baseload CfD, the intervention would be supportive of EMR, but as this considered above under "Benefits" we neglect it here to avoid double counting. Although the additional transactions required by the Big Six may push them closer to the EMIR threshold, the

Mandatory Auction intervention in no way contradicts or violates the application of the EMIR regulation. With respect to the other regulations and reforms, we do not consider Mandatory Auctions to either augment or hinder their application.

F.6 Mandatory Market Making

F.6.1 Figure F-11 below summarises the un-weighted and the weighted scores for each of the three assessment categories as well as the overall score for this intervention.

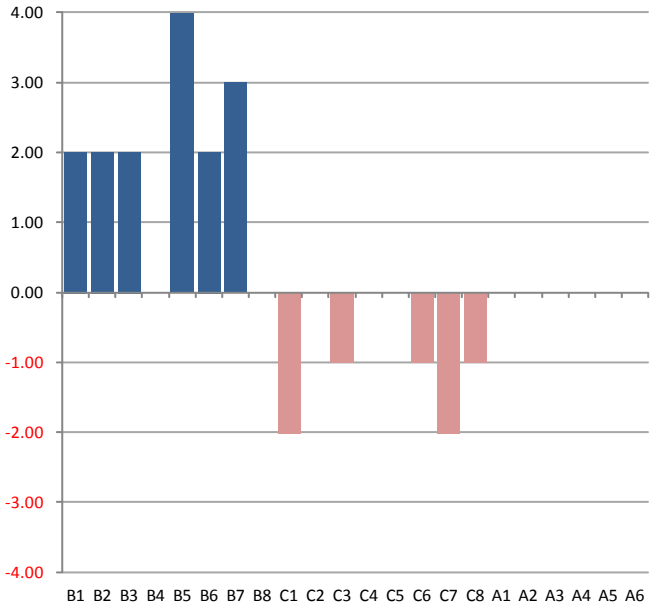
Figure F-11: *Assessment Summary*



Summary	Unweigthed	Weigthed
Benefits	2.63	2.40
Costs & Risks	-1.25	-1.40
Alignment & Compliance	0.00	0.00
Asessment	**0.46**	**0.64**

F.6.2 As illustrated, the Mandatory Market Marking intervention scores positively overall on both an un-weighted and weighted basis based on our assessment of each individual criterion which is summarised in Figure F-12 below:

Figure F-12: *Un-weighted Scores*



Benefits
B1: Potential direct impact on churn rates
B2: Availability and usage of channels and/or platforms
B3: Number and diversity of counterparties
B4: Scope for intermediaries
B5: Availability of particular products
B6: Availability, reliability and transparency of price and trade data
B7: Robust CfD reference Prices
B8: Efficiency of credit and collateral arrangements

Costs & Risks
C1: Operational complexity of proposed solution
C2: Impact on operations and business model
C3: Unintended unfavourable impact on financial position and ratings
C4: Unintended distortion of normal commercial behaviour
C5: Unintended liquidity impact outside scope of intervention
C6: Susceptibility to gaming
C7: One-off/Static implementation Costs
C8: Ongoing costs to participants and consumers

Alignment & Compliance
A1: EMR
A2: Cash-out reform
A3: Ofgem Minimum Liquidity proposals
A4: EU Target Model
A5: EMIR/MiFID
A6: REMIT

Benefits:

B1 **Potential direct impact on churn rates**	Assessment: **Substantial (4)**
With a mandatory market making intervention, market participants will be able to purchase and/or sell as much volume as they require (although market makers can adjust their prices in response, subject to restrictions on the bid-ask spread). This contrasts with mandatory auctions, where (minimum) volumes for mandatory participants are determined in advance. Market making assures a channel in the secondary market and thus the certainty for participants that any open position can be closed. We therefore rate the mandatory market making intervention as having a substantial benefit with respect to churn rates.	
B2 **Availability and usage of channels and/or platforms**	Assessment: **Important (3)**
Mandatory market making does not create a new channel to market, but instead increases the intensity of use of an existing channel (namely futures trading on exchanges).	
B3 **Number and diversity of counterparties**	Assessment: **Important (3)**
We expect mandatory market making to attract independent suppliers and generators by assuring the availability of hedging products. Additionally, we expect financial participants (or other non-physical participants, such as foreign utilities with neither customers nor generation in the GB market) to participate because the presence of market makers will give assurance that open positions entered speculatively can always be closed. Accessing to market makers will be less complex than an auction for small players as participants will merely respond to prices rather than devise their own bidding strategy.	
B4 **Scope for intermediaries**	Assessment: **Neutral (0)**
Beyond secondary effects (increased channels, transparency of prices, etc.), we do not expect a direct impact on the participation of intermediaries in the market.	
B5 **Availability of particular products**	Assessment: **Important (3)**
As for mandatory auctions, there is the potential to mandate and direct the particular products desired. A lack of price transparency to enable market makers to set their bid and ask prices may cause participants to resist a requirement to make a market in long-dated products or complex shapes.	
B6 **Availability, reliability and transparency of price and trade data**	Assessment: **Substantial (4)**
Transparent price information for the products in which markets are made will be continuously available. Even in the event that no trades are made, the published bid and ask prices across all market makers can be averaged to give an indication of the market assessment of the price level.	
B7 **Robust CfD reference Prices**	Assessment**: Substantial (4)**
CfD contracts can reference a traded price for a product for which market making is mandated. We expect market making will enhance liquidity of the product to ensure a robust and transparent price.	
B8 **Efficiency of credit and collateral arrangements**	Assessment: **Neutral (0)**
We do not foresee the mandatory market making intervention providing any particular benefit in terms of improving efficiency of credit and collateral arrangements.	

Costs and Risks

C1 **Operational complexity of proposed solution**	Assessment: **Modest (-1)**
There is a requirement for a small supervision function to monitor market making rules such as maximum bid-ask spreads. This function could be performed, for example, by the exchange hosting the market makers.	
C2 **Impact on operations and business model**	Assessment: **Modest (-1)**
Mandatory market makers will need to ensure their desk is covered during business hours. Bid and ask prices must be adjusted up and down as the market moves, and bought and sold volumes must be replaced in the market. Beyond these tasks, no additional efforts are required for the market makers or other	

participants.	
C3 **Impact on operations and business model**	Assessment: **Important (-3)**
The participation of mandated market makers in the market is not capped, as they are required to replace any volumes purchased or sold. This has the potential to generate a high level of churn in the portfolio of a mandated market maker. To assess the impact, we note first of all that we recommend the market making activity be conducted on an exchange. The net open position for each product is therefore subject to daily margining. We also note that by an appropriate choice of bid and ask prices for each product, it is well within the control of each market maker to keep their net open position close to zero if they so wish. For example, if they find far more buyers than sellers, they can raise their offer price (to discourage buyers) and simultaneously raise their bid price (to attract sellers and also to keep within the required bid-ask spread). Therefore, although there would be a requirement for a company to have sufficient cash liquidity to support the collateralisation of the resulting trades, and no clear escape from mandatory participation in the market in times of constrained liquidity, the burden is manageable through active balancing of bid and ask prices to ensure relatively equal volumes of buys and sells. As with all interventions that mandate participation or action, there is the risk in the context of EMIR that a company has a level of churn beyond that which it would prefer, thus causing it to exceed the EMIR clearing threshold when otherwise it would remain under. We note that the detailed technical application of the clearing threshold to portfolios is not yet tested. However, it seems reasonable to us that for exchange trades, only the net position in each product (as opposed to the history of buys and sells) is considered to determine a company's position relative to the threshold. We contrast this with OTC trading, where we believe that the gross position, rather than the net position, will be considered unless steps are proactively taken to close out and settle offsetting trades. With this observation, we conclude that the risk of mandatory market making in the context of the EMIR threshold, while non-trivial, is not unduly burdensome.	
C4 **Unintended distortion of normal commercial behaviour**	Assessment: **Neutral (0)**
We do not foresee unintended consequences on participants' commercial behaviour, beyond the scope of the intervention. All of the Big Six are already actively engaged in trading GB power.	
C5 **One-off/Static implementation Costs**	Assessment: **Neutral (0)**
We do not foresee unintended unfavourable consequences on market liquidity.	
C6 **Susceptibility to gaming**	Assessment: **Neutral (0)**
We do not see potential for gaming the intervention. Market making is an established practice on many exchanges.	
C7 **One-off/Static implementation Costs**	Assessment: **Material (-2)**
We do not assume here that there would be costs to incentivise market makers, as these would be more than just material costs. Our design assumption is that market makers are required, rather than incentivised, to participate. However, we do anticipate a tender to choose an exchange or broker platform to host the market making activity and monitor compliance with market making rules.	
C8 **Ongoing costs to participants and consumers**	Assessment: **Modest (-1)**
Costs related to manning the market making desk are assumed to be small. Typically, companies large enough to be considered for mandated market making would already have established UK power trading desks.	

Alignment & Compliance

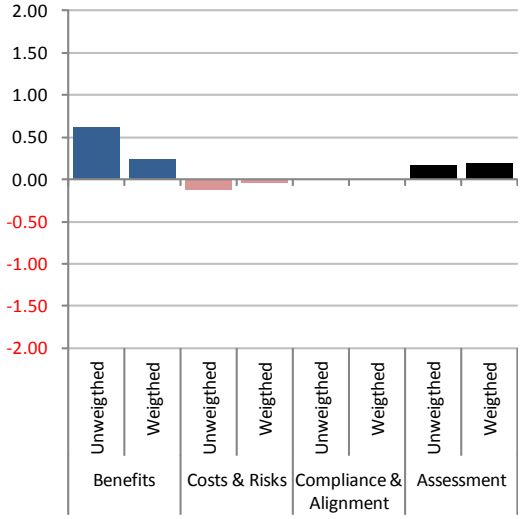
All Criteria
We have reviewed the interaction between the Mandatory Market Making intervention and current market reform and financial regulation initiatives. Just as for the Mandatory Auction intervention discussed in the chapter above, we find that the Mandatory Market Making intervention could help direct

and reinforce liquidity in the product which is referenced by the baseload CfD, but we score this support above in the "Benefits" section of the Analytical Framework. Similarly, additional churn in the portfolios of the Big Six which results directly from market making could have a detrimental impact with respect to the EMIR clearing threshold, but the intervention does not in itself contradict the application of the EMIR regulation. We judge Mandatory Market Making to neither augment nor hinder other current reforms and regulations.

F.7 Supplementary Options

Minimum Day-Ahead Trading Requirement

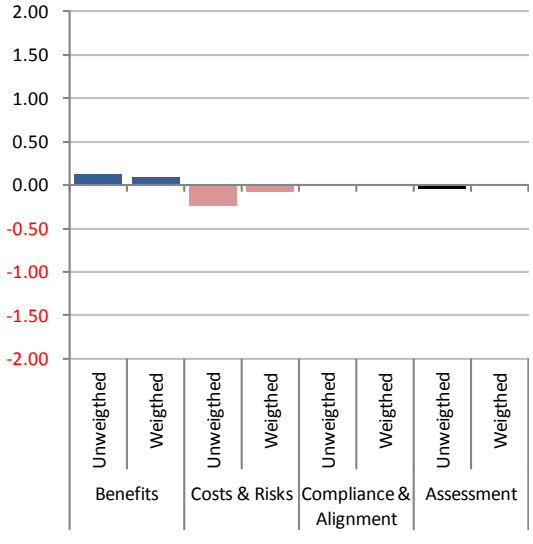
Figure F-13: *Assessment Summary*



Summary	Unweigthed	Weigthed
Benefits	0.63	0.47
Costs & Risks	-0.13	-0.10
Alignment & Compliance	0.00	0.00
Asessment	**0.17**	**0.19**

Fair and Reasonable Terms

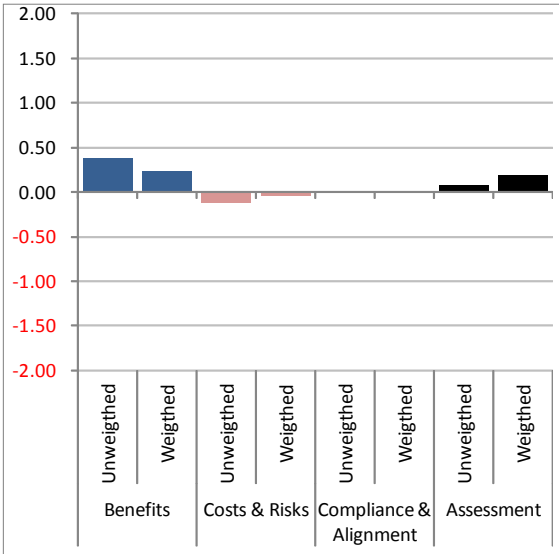
Figure F-1427: *Assessment Summary*



Summary	Unweigthed	Weigthed
Benefits	0.13	0.18
Costs & Risks	-0.25	-0.20
Alignment & Compliance	0.00	0.00
Asessment	**-0.04**	**0.01**

CfD Reference Prices

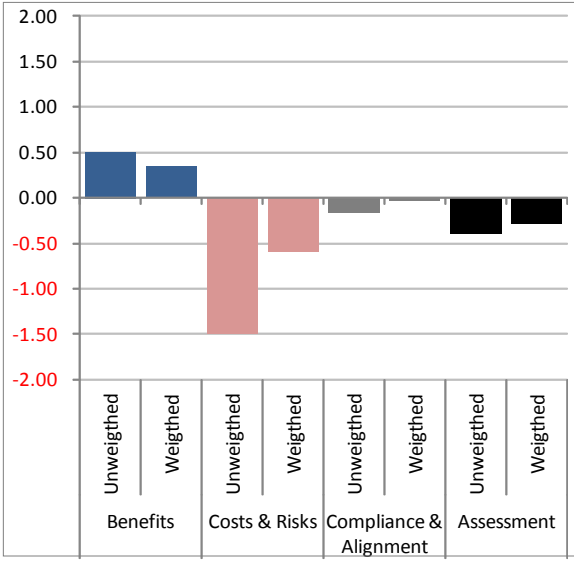
Figure F-15: *Assessment Summary*



Summary	Unweigthed	Weigthed
Benefits	0.38	0.46
Costs & Risks	-0.13	-0.10
Alignment & Compliance	0.00	0.00
Asessment	**0.08**	**0.19**

Credit Interventions

Figure F-15: *Assessment Summary*

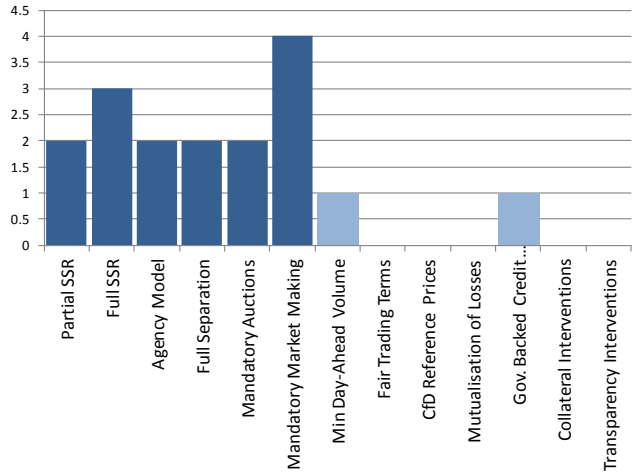


Summary	Unweigthed	Weigthed
Benefits	0.50	0.70
Costs & Risks	-1.50	-1.50
Alignment & Compliance	-0.17	-0.03
Asessment	**-0.39**	**-0.28**

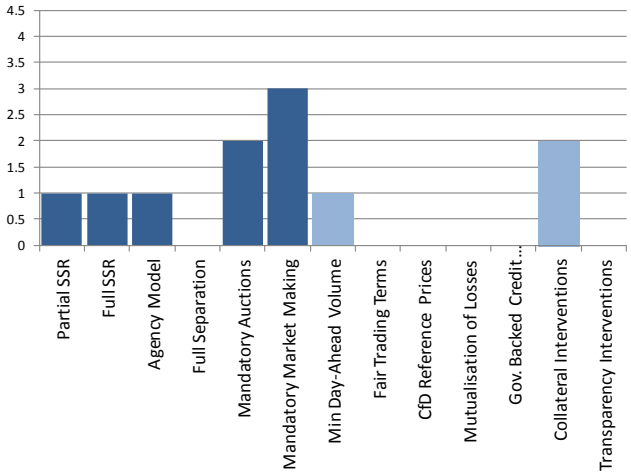
G Assessment by Criteria

G.1 Benefit Criteria (Un-weighted)

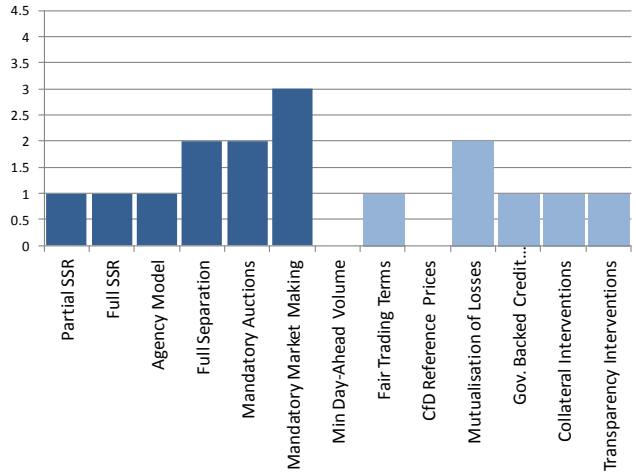
B1: Potential direct impact on churn rates



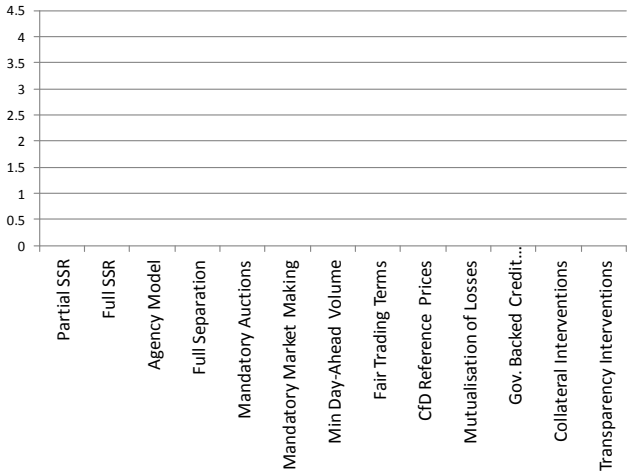
B2: Availability and usage of channels and/or platforms



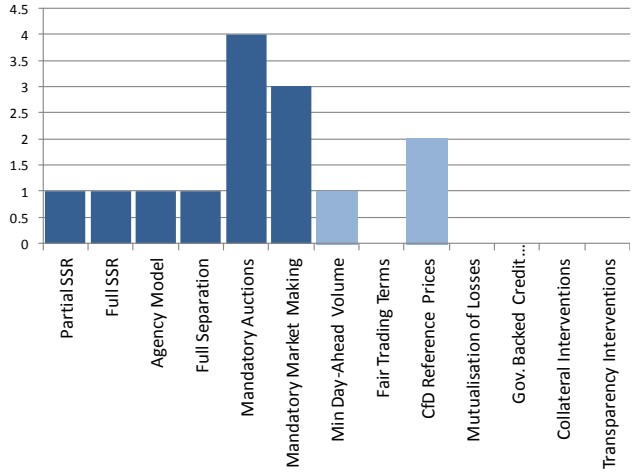
B3: Number and diversity of counterparties



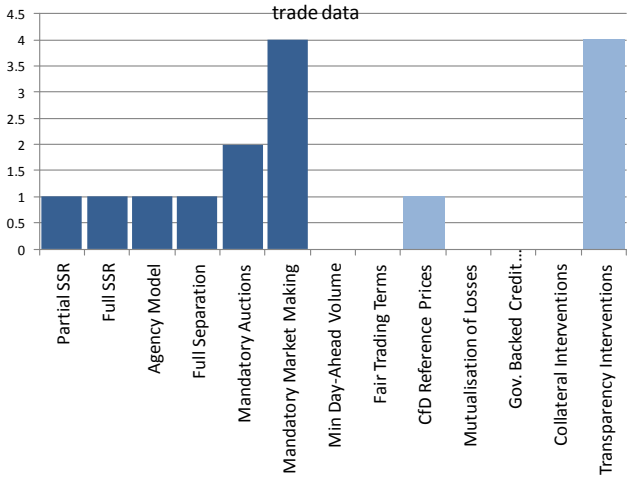
B4: Scope for intermediaries

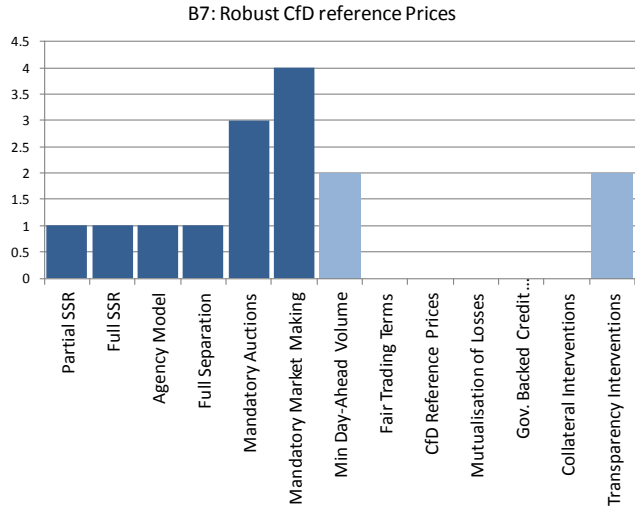


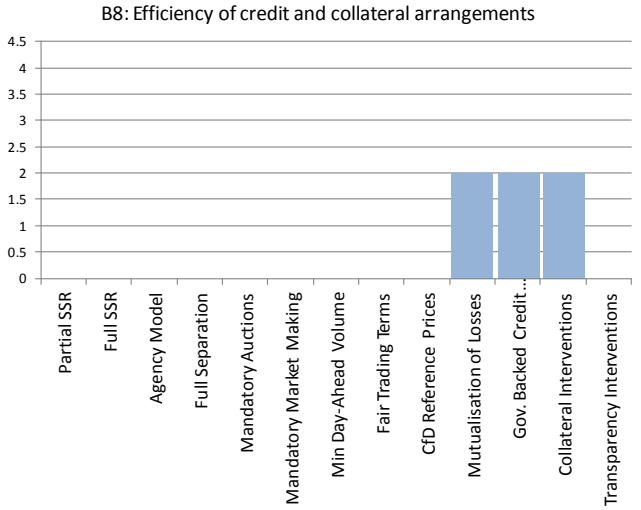
B5: Availability of particular products



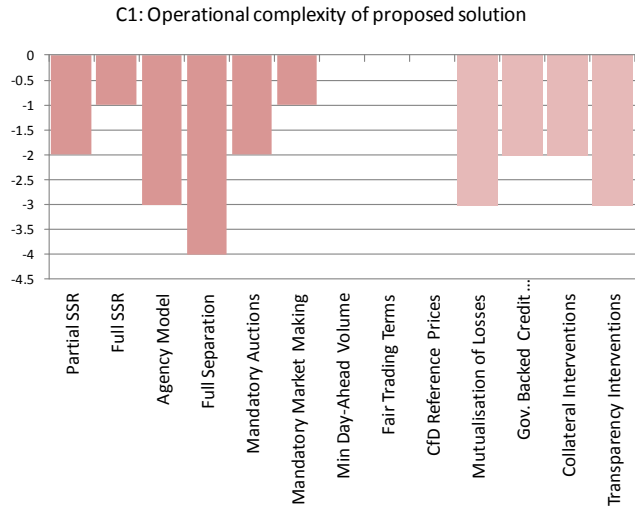
B6: Availability, reliability and transparency of price and trade data

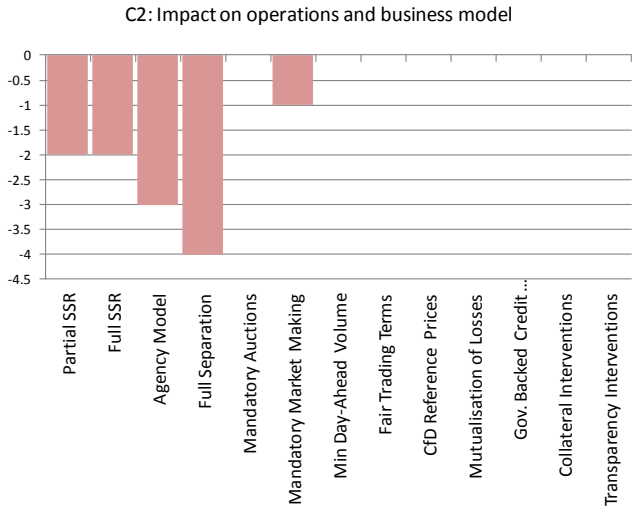


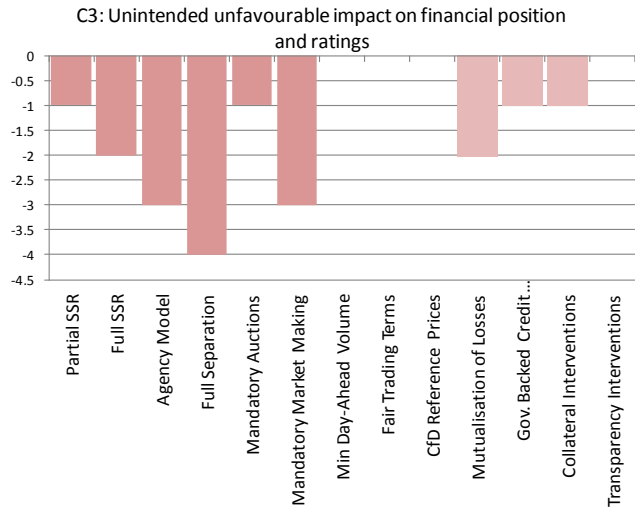


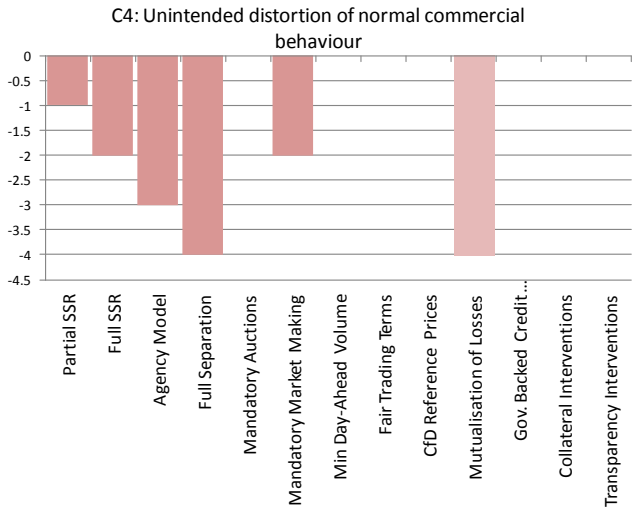


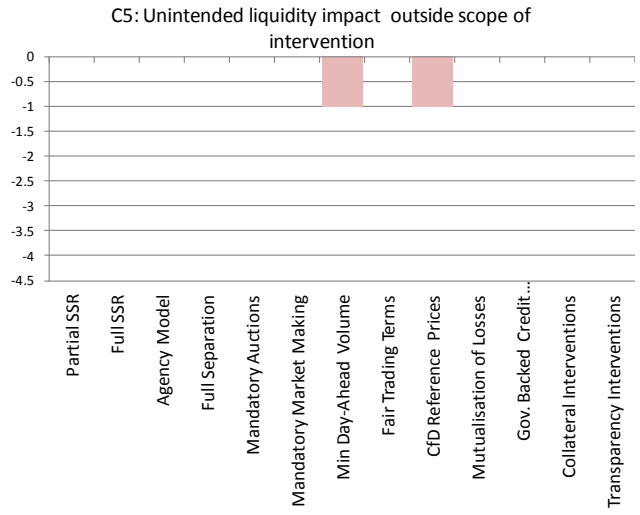
G.2 Cost & Risk Criteria (Un-weighted)

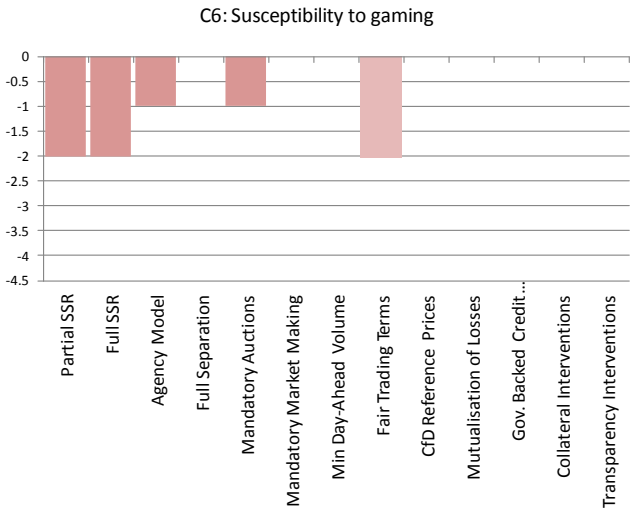


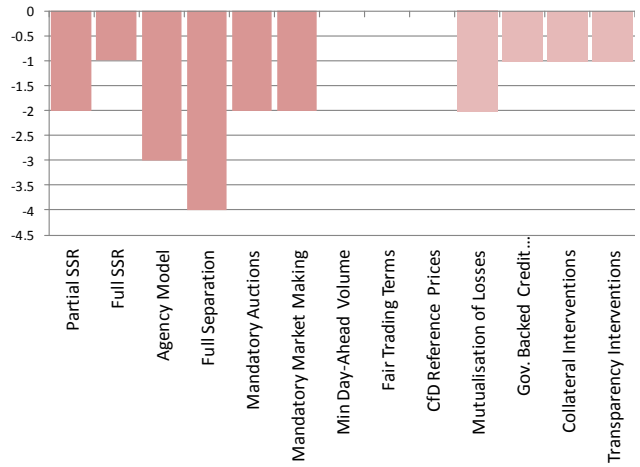


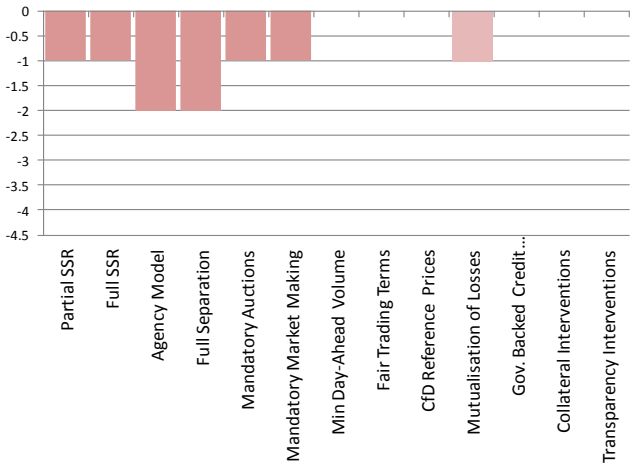




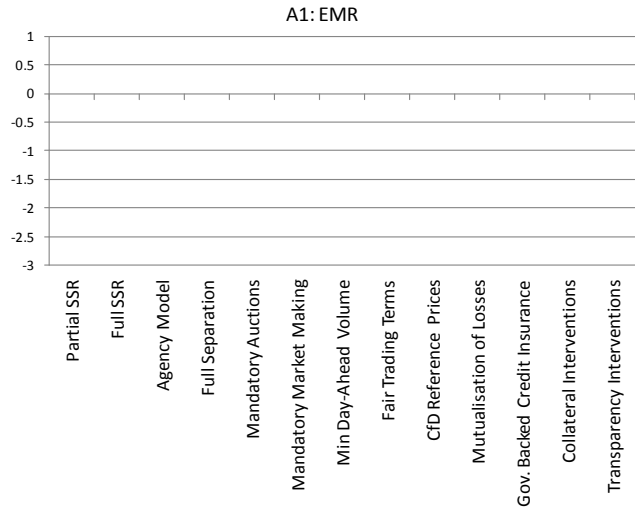


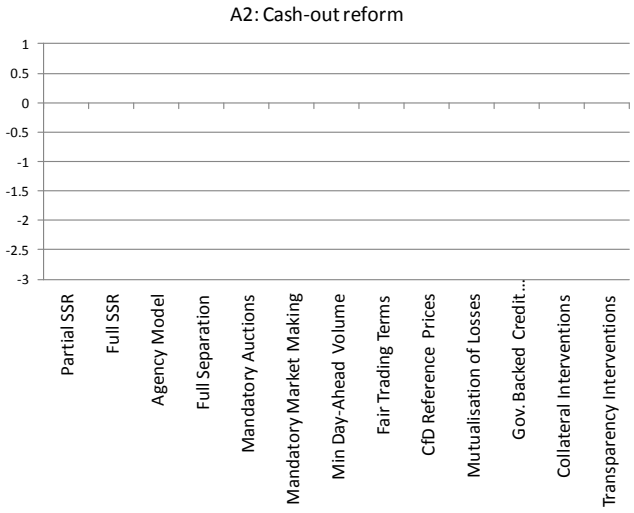


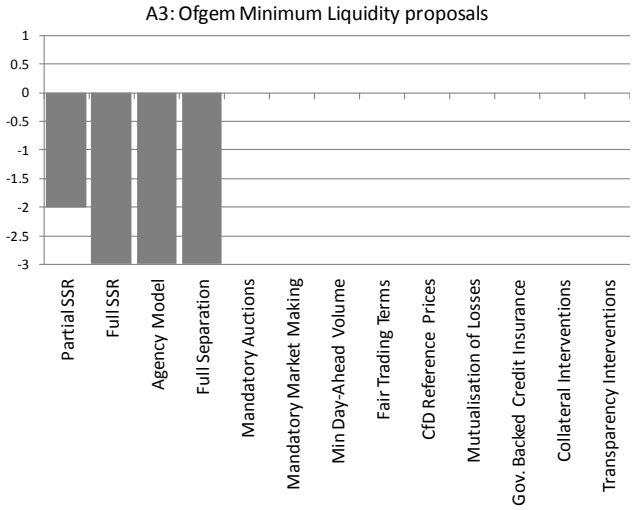


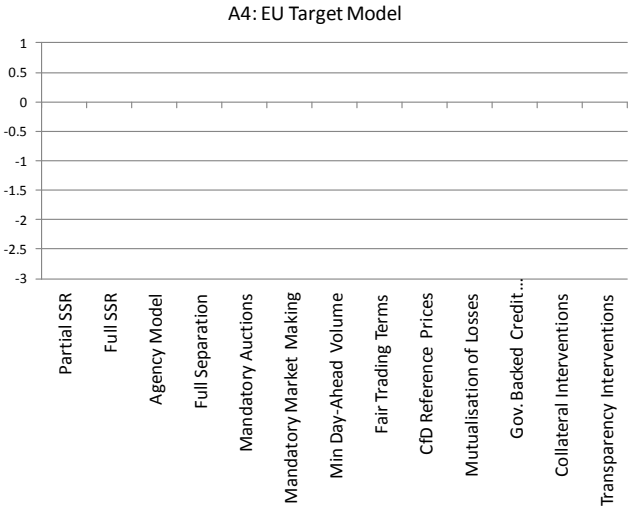


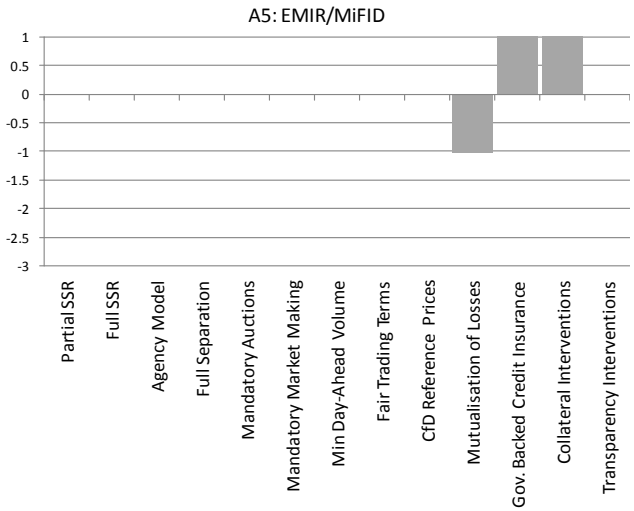
G.3 Alignment & Compliance (Un-weighted)

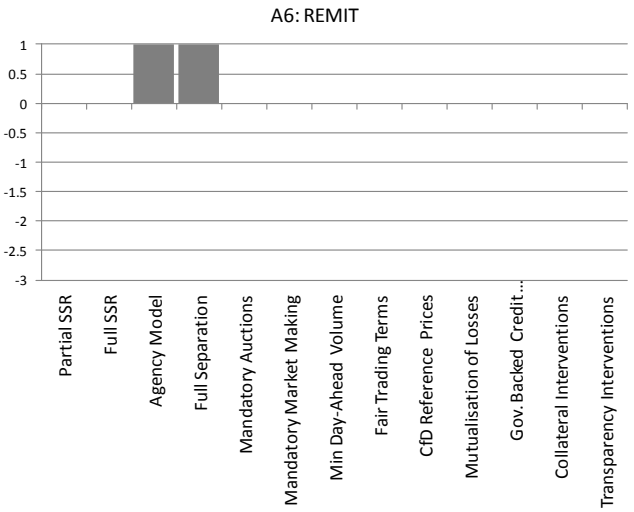





A3: Ofgem Minimum Liquidity proposals
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
Partial SSR
Full SSR
Agency Model
Full Separation
Mandatory Auctions
Mandatory Market Making
Min Day-Ahead Volume
Fair Trading Terms
CfD Reference Prices
Mutualisation of Losses
Gov. Backed Credit Insurance
Collateral Interventions
Transparency Interventions


A4: EU Target Model
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
Partial SSR
Full SSR
Agency Model
Full Separation
Mandatory Auctions
Mandatory Market Making
Min Day-Ahead Volume
Fair Trading Terms
CfD Reference Prices
Mutualisation of Losses
Gov. Backed Credit...
Collateral Interventions
Transparency Interventions


A5: EMIR/MiFID
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
Partial SSR
Full SSR
Agency Model
Full Separation
Mandatory Auctions
Mandatory Market Making
Min Day-Ahead Volume
Fair Trading Terms
CfD Reference Prices
Mutualisation of Losses
Gov. Backed Credit Insurance
Collateral Interventions
Transparency Interventions


A6: REMIT
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
Partial SSR
Full SSR
Agency Model
Full Separation
Mandatory Auctions
Mandatory Market Making
Min Day-Ahead Volume
Fair Trading Terms
CfD Reference Prices
Mutualisation of Losses
Gov. Backed Credit...
Collateral Interventions
Transparency Interventions