REVIEW OF ELECTRICITY TRADING ARRANGEMENTS:

WORKING PAPER ON TRADING INSIDE AND OUTSIDE THE POOL

MARCH 1998

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1 INTRODUCTION

1.1 On 23 October 1997[1], the Minister for Science, Energy and Industry announced that he had asked the Director General of Electricity Supply ('the DGES') to consider how a review of electricity trading arrangements ('the Review') might be undertaken. On 5 November 1997[2], OFFER issued a consultation paper setting out initial views on the objectives, scope and process of the Review and inviting the views of others. These views were taken into account in drawing up advice to the Minister and proposed Terms of Reference for the Review. The Minister agreed the proposed Terms of Reference and, on 28 January 1998, OFFER published the advice on the Terms of Reference[3] that the DGES had presented to the Minister. The DGES invited comments on the Terms of Reference and published a report of the consultation on the Terms of Reference[4].

Process and Timetable

1.2 The Minister has indicated that he wishes to receive a report by early July 1998, in order to consider what, if any, changes in legislation are required, consistent with the timetable for possible legislation following the government's review of utility regulation.

1.3 The government have instigated a number of reviews with implications for the energy sector, including energy sources for power stations, new and renewable energy policy and utility regulation. The reviews will, together, help to deliver the government's energy policy of secure, diverse and sustainable supplies of energy at competitive prices. There is close liaison between these reviews.

1.4 To achieve openness and transparency the Review process will include the publication of background, working and consultation papers, explanatory workshops to ensure interested parties are familiar with key issues, public seminars to examine and debate options for change and interim conclusions, and the placing of all third party contributions in the public domain.

[1] Minister's speech to Pool AGM, 23 October 1997.
[2] Review of Electricity Trading Arrangements - A Consultation Paper, OFFER, November 1997.
[3] Review of Electricity Trading Arrangements: Advice on Terms of Reference, OFFER, January 1998.
[4] Review of Electricity Trading Arrangements: Report of Consultation on Terms of Reference, March 1998

Background Papers and Explanatory Workshop

1.5 On 18th February 1998 OFFER published two background papers. The first focused on the present trading arrangements in England and Wales and the second covered electricity trading arrangements in other countries. A workshop to discuss the background papers was held on 23rd February 1998.

Organisation of the Working Paper on Possible Alternative Trading Arrangements in England and Wales

1.6 This working paper explores possible changes to trading arrangements within the present Pool and alternative arrangements if the present requirement to trade within the Pool were relaxed.

1.7 Chapter 2 summarises experience in the Pool to date and identifies and analyses some reasons for the perceived problems with the present trading arrangements. Chapter 3 summarises relevant aspects of electricity trading arrangements in other countries to determine whether lessons can be drawn from these arrangements that can help identify potential improvements to the trading arrangements in England and Wales.

1.8 Chapter 4 discusses some central features of market trading arrangements which merit further consideration and Chapter 5 examines further building blocks. Chapter 6 sets out four potential models for revised trading arrangements. Chapter 7 considers the advantages and disadvantages of trading outside the Pool. Chapter 8 considers possible reform to the regulation and governance of the Pool.

1.9 Chapter 9 gives a preliminary assessment of the potential models for revised trading arrangements against the objectives and further considerations listed in the Terms of Reference. Chapter 10 outlines the next steps in the Review.

Consultation

1.10 If you wish to make comments or submissions relating to this background paper, it would be helpful to receive them by 8 May 1998. Responses should be addressed to:

Dr. Eileen Marshall CBE
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Hagley House
Hagley Road
Edgbaston
Birmingham B16 8QG

1.11 Responses will be placed in OFFER's library.

PROFESSOR S C LITTLECHILD
Director General of Electricity Supply
March 1998

2 ENGLAND AND WALES EXPERIENCE TO DATE

2.1 This Chapter discusses the experience of the present trading arrangements, including the achievements and the concerns that continue to be expressed about them. It summarises the key characteristics of the trading arrangements so that they can be compared with those prevailing in other markets and considers to what extent they meet the objectives for trading arrangements included in the Report of Consultation on Terms of Reference[5].

Achievements and Concerns

2.2 In his initial consultation paper on the Review[6], the DGES noted that in many respects the present trading arrangements have worked satisfactorily. They have enabled generating plant to compete in terms of offers to run, and have enabled plant to be ranked and scheduled in order to meet expected demand. The quality and security of supplies have been maintained. Prices have been set on a half-hourly basis, which have underpinned trading between generators and suppliers. Access to the Pool has assisted new generators in entering the market and the arrangements have allowed competition in supply to be introduced.

2.3 Nonetheless, there have been criticisms of the electricity market. Customers often complain that prices are too high and variable (referring at different times to System Marginal Prices, Capacity and Unscheduled Availability Payments or Uplift); that they cannot participate directly in the Pool (except to a very limited extent); and that the Pool does not respond to their concerns. They and others have variously criticised a lack of competition in generation leading to the perceived or actual abuse of market power, the arrangements for bidding and price setting, the compulsory membership of the Pool and the slow pace of exploration and implementation of needed reforms. It has also been argued that the complexity and opacity of the price setting process has inhibited the development of derivatives markets and reduced liquidity in the contracts market. Some have argued that the Pool operates in favour of nuclear and gas fired generation, at the expense of coal.

2.4 The trading arrangements have evolved in a number of ways since privatisation. Some of the early concerns that were expressed about the Pool's operation - with respect to the details of the Capacity

[5] Review of Electricity Trading Arrangements: Report of Consultation on Terms of Reference, OFFER, March 1998

[6] Review of Electricity Trading Arrangements: A Consultation Paper, OFFER, 5 November 1997

Payments mechanism, transmission constraint payments and price spikes – have to some extent been overcome. Some functions have been transferred to the National Grid Company (NGC). The Pool has acted to make more information available and to give customer representatives more involvement in its operation.

2.5 Despite these developments, problems with, and criticisms of, the present trading arrangements have persisted. There has been little, if any, fundamental change. For example, in December 1996, the DGES again urged the Pool to resolve long-standing issues with regard to transmission losses, demand side bidding, constraint payments and Capacity Payments. Pool prices are still a source of complaint.

2.6 Not all of the criticisms about the functioning of the market relate directly to the trading arrangements. Some are related to structural or policy decisions. For example, the decision to split the non-nuclear generation assets of the Central Electricity Generating Board (CEGB) between only two companies affected the extent and initial development of competition in generation. Government objectives with regard to the coal industry have affected prices and the development of the contracts market. In particular, the Vesting contracts led to artificially low Pool prices initially, followed by significant increases. The creation of the franchise, to be removed in stages, and the initial and subsequent coal-related contracts, have increased prices to customers, restricted competition and reduced the liquidity of the contracts market.

2.7 Various actions have been, and are being, taken to deal with these other issues. OFFER has kept the position in the generation market under review to ensure that the interests of customers and competitors are protected. OFFER obtained undertakings from National Power and PowerGen in February 1994 with regard to annual average Pool prices and plant divestment. The DGES has issued guidelines on the type of contractual arrangements between the major generators and the Public Electricity Suppliers (PESs) that would be likely to need further investigation. On two occasions, most recently in October 1997, he has appointed an independent assessor to report to him on the decisions of National Power and PowerGen to close generating capacity. The supply market is being opened to full competition from autumn 1998. OFFER has published the outline of its eight-part review of PESs which includes trading arrangements in Scotland.

Developments in the Electricity Market

2.8 OFFER, the Pool and the licensed companies are continuing to develop the trading arrangements to prepare for the phased introduction of competition for 22 million domestic customers from the autumn of 1998. This has involved one of the largest and most complex IT-based change programmes in the world and has required the co-operation of the whole industry. These changes have particular implications for the settlement process as well as other trading arrangements.

2.9 The Pool, in carrying forward its own review of the present trading arrangements, is committing considerable time and effort to considering the merits of Pool reform. It is planning to identify a new set of objectives for the trading arrangements by March 1998 and will then consider how the present trading arrangements meet those objectives. This process may then go forward to consider whether alternative arrangements could better meet those objectives.

2.10 The Government is conducting a review of energy sources for power generation that will encompass the topics of fuel diversity, sustainable development and the role of coal. The provision of system stability, frequency control, flexible response to demand or generation variations and ancillary services may all be relevant. All of these issues may have implications for the trading arrangements.

2.11 To summarise, there are many factors which help to explain some of the problems associated with the Pool, and these are being dealt with in various ways. However, there remain limitations that seem mainly attributable to the Pool and where there appears scope for improvement. To assess this it seems helpful to examine trading arrangements in markets for other commodities and in electricity markets elsewhere in the world.

2.12 The remainder of this chapter considers what, if any, characteristics of electricity differentiate it from other traded commodities. It then discusses the characteristics of the present trading arrangements, before examining the extent to which these characteristics meet the objectives outlined in the Report of Consultation on Terms of Reference for the Review.

Changing Characteristics of Electricity Markets

2.13 The Pool is evidently very different from other markets. How far is this the result of historical accident - for example, the nature of the industry before Vesting and the process of privatisation – and how far is it because “electricity is different”? The answer to this question will

determine how far it is reasonable to envisage putting in place trading arrangements similar to those in other competitive markets, and how far there must be industry–specific restrictions on those arrangements.

2.14 Electricity markets share much in common with other commodity markets. Underlying any electricity market is a basic requirement for the physical delivery of electricity to final customers. As with other markets, production facilities (power stations) have to be programmed and scheduled to meet the anticipated demand for the product and, with competition amongst production facilities, the pattern of production from specific facilities will be heavily influenced by costs, and by what individual market participants regard as profitable.

2.15 In some respects electricity does differ from other commodity markets. The storage of significant quantities of electricity is both difficult and costly, other than in systems with large amounts of hydro capacity. The timescales over which significant changes in supply or demand for electricity can take place are extremely short, typically of the order of a few seconds. The system needs to be balanced as between supply and demand over similarly short time scales in order to maintain the security and stability of electricity supplies. In consequence, the cost and price of electricity can, and usually does, vary significantly within a day.

2.16 When the present trading arrangements were established in England and Wales, these often-cited special characteristics of electricity were deemed to justify a central co-ordinating role for NGC to secure required standards of supply. In effect, the judgement taken at that time was that there was likely to be a discrepancy between what individual operators would choose to supply, given normal profit incentives and the working of the price mechanism, that supply which the public interest requires.

2.17 However, these characteristics of electricity can now be seen to be more a question of degree of difference from other markets, rather than features that make electricity unique. With regard to the timescales for significant supply/demand changes, electricity is profoundly different from commodities such as metals or grains. But it is less different from gas, where very large supply and demand changes can take place over several hours. Although electricity is difficult and costly to store directly (compared to gas, for example), storage may effectively be achieved by operating some thermal plant at part load, from which state output can be increased rapidly, and via the use of fast response peaking plant and rapid load reduction by some customers.

2.18 Trading arrangements for electricity have to accommodate the characteristics of electricity with regard to timescales and storage. But

within this constraint, a large number of options exist for the design of trading arrangements going beyond the range of options that were available or appropriate at Vesting.

2.19 The Pool in England and Wales was the first mechanism of its kind. This meant that in its creation, and in the rules associated with it, there was little to draw on by way of guidance from other countries. Instead, it was developed in a process that gave considerable weight to the then existing arrangements.

2.20 Reflecting its origins in the CEGB, the Pool was designed to deal with the special characteristics of electricity by what is essentially a form of central planning. Each day, on a day ahead basis, generators are required to provide details with regard to the price at which they are prepared to make generation available. NGC, on behalf of the Pool, provides an estimate of system demand, calculates the most efficient schedule of generation, instructs generators accordingly by means of central despatch, determines the Pool prices, then issues further more detailed instructions to balance the system on the day.

2.21 The arguments for this kind of system are strongest when the generation stations are under a single ownership, with a common motivation, subject to the direction of the "planning authority" and content to work within its timescales, and where the demand side is relatively passive. The situation is different when the generating stations are under an increasingly large number of different ownerships, with different and sometimes conflicting motivations, each wishing to organise its own affairs as far as possible to reflect its own changing circumstances and its own preferred timescales. For example, before Vesting one organisation (the CEGB) accounted for over 90 per cent of the electricity supplied into England and Wales. In the first year after Vesting, two companies accounted for about three quarters of the market and three other companies for almost all the remaining generation. Now, the largest two companies account for only 40 per cent, five other companies for the next 43 per cent and some fourteen others for the remaining 17 per cent.

2.22 The arguments in favour of a type of central planning are further weakened when the demand side is increasingly active in sending and responding to price signals about cost differences. The development of a competitive gas market interacting with the competitive electricity market means that generators, suppliers, traders and large customers need to react continuously to changing market conditions and this also militates against some aspects of the existing system.

2.23 In these new circumstances, which characterise other markets generally, it is increasingly unlikely that transmitting cost and demand

information to the centre and waiting for directions will be the most efficient form of organisation. It becomes increasingly necessary to find efficient ways of transmitting relevant information to market participants, typically, but not only, by means of price signals in markets, so that they can organise their own affairs and react quickly to changing circumstances. This is not inconsistent with retaining to a central authority a well defined function of central despatch in order to balance the system in real time. The System Operator (at present NGC) will typically have better information on the aggregate picture of generation and demand than will individual market participants. At some point close to real time, it is not feasible to transfer the relevant information quickly enough to the relevant participants for them to respond and at this point it is therefore more efficient for the System Operator to act directly to match supply and demand.

2.24 The next step is therefore to look at some of the main characteristics of other competitive markets, to see how they differ from the Pool, to see in what respects changes might be made to the Pool arrangements to secure more of the benefits of competitive markets.

Characteristics of Markets

2.25 Ten main characteristics of organised markets (e.g. for commodities or securities) are described below and compared with the Pool. In later chapters these characteristics are also used to analyse the arrangements in various other countries and the illustrative models identified later in this paper.

2.26 **Optional vs. compulsory -** Market participants typically have a choice whether to use an organised market or, instead, to make other (often bilateral) arrangements or in some cases to use a rival market; in contrast, trading through the Pool is largely compulsory.

2.27 **Two-sided market -** Prices in markets are typically determined by the interaction of buyers and sellers; in contrast, only sellers (generators) submit offers into the Pool since the demand from the buyers' side is estimated.

2.28 **Firm bids and offers** - In most markets, bids and offers made are firm, in the sense that once accepted they must be honoured or penalties paid; this is not the case with offers into the Pool.

2.29 **Simple bids and offers** - In most markets, bids and offers are characterised by a few simple parameters such as price and quantity for a specified commodity or contract; in the Pool, offers are required to be relatively complex with a view to reflecting generator cost functions.

2.30 **Method of price determination -** In most markets, prices are determined by one party accepting another party's offer, hence the phrase "pay as bid"; in the Pool, all generators selected to run are paid the System Marginal Price (SMP), regardless of what they offer.

2.31 **Market timing -** In other markets, participants typically develop and modify their positions over time until delivery; in the Pool their positions are established at a single specified point in time on the day ahead, then these positions are "frozen", with few possible modifications in real time.

2.32 **Treatment of imbalances -** In other markets, participants who take or supply more or less than they have contracted for are paid or charged individually, perhaps at some price determined in a balancing market, or perhaps at a penal rate (and there may be an accompanying warning); in the Pool the costs of meeting imbalances are spread across all market participants.

2.33 **Comprehensive prices -** Prices in other markets are considered sufficient to balance supply and demand and ensure sufficient capacity and output over time; in the Pool, extra elements are added (Capacity and Unscheduled Availability Payments) to address these issues.

2.34 **Governance** - Other organised markets are increasingly looking to arrangements (including independent "for-profit" Market Operators) to provide incentives to efficiency and flexibility to meet changing circumstances; the Pool is governed by trading members in a way that is resistant to change.

2.35 **Separation of functions -** In other markets, the Market Operator is typically independent of the System Operator responsible for ensuring or regulating the physical delivery, which in turn is independent of the owner(s) of the transport or delivery system(s); in the England and Wales electricity market, there is not the same extent of separation between the Market Operator and the System Operator.

Characteristics of the Present Trading Arrangements

2.36 The above categorisation indicates some major differences between the Pool and other organised markets. To summarise, the present trading arrangements can be described as a **"compulsory, one-sided, non-firm market in which complex offers are used to set market prices on a marginal, ex ante basis with the costs of imbalances averaged and an additional Capacity Payment levied. It is governed by its members and the functions of the Market Operator and System Operator are not fully separated**". To understand better this

description of the trading arrangements, each component will be considered in turn:

2.37 **Compulsory** – All licensed generators must sell most of their output directly into the Pool and all licensed suppliers (including customers acting as second-tier suppliers) must purchase most electricity from the Pool. Consequently, with very few exceptions, trading outside the Pool is not an option for customers, suppliers or generators (although market participants can limit Pool price exposure through entering into CfDs).

2.38 **One-sided market** - Suppliers do not bid to take a particular quantity of electricity (or different quantities at different prices, as would be the case if a demand curve was submitted to the market). Instead, a single forecast of national demand is made on the day ahead by NGC on behalf of the Pool. This (D-1) forecast of demand is independent of Pool prices in as much as demand is forecast before any assessment is made of Pool prices for day D, and no re-calculation of demand is made following the publication of Pool prices[7].

2.39 **Non-firm** – Generators submit offers into the market on a non-firm basis. If a generator's offer is accepted at the day-ahead stage (D-1), its plant will be included in the Unconstrained Schedule, with an expectation that, in the absence of transmission constraints, the plant will generate on day D. If the plant fails to generate on day D, however, either because of a technical failure, or because of a commercial decision taken by the plant owner, the plant will not receive Pool payments. However, other than this loss of revenue, the generator is not exposed to any additional market risk, either in terms of exposure to some "cash-out" price for imbalances, or a financial penalty for failure to generate. Furthermore, a generator can become available and generate after the Unconstrained Schedule has been finalised.

2.40 **Complex offers –** The offer for each generation unit contains five main parameters, representative of the way that engineers characterise the cost curve of thermal stations with additional parameters relating to technical limitations on the operation of the unit (dynamic constraints).

2.41 **Based on marginal prices** – The price of the most expensive (or marginal) unit scheduled to meet forecast demand in each half-hour sets the price for energy. This price is known as the System Marginal

[7] NGC's demand forecast is based on a sophisticated process, which takes into account a broad range of factors, such as weather and TV-related demand peaks. It also makes extensive use of historical demand information and, in this way, includes some element of price response (to the extent that demand was responsive to price in the past). Nonetheless, NGC's forecast for a particular day will not explicitly consider the impact of prices, even though a broad range of out-turn prices is possible depending on the bidding behaviour of generators.

Price (SMP). It is the price paid to generators and by suppliers for energy in the relevant half hour. A generator may, for example, submit a very low price offer to the Pool (even a zero offer) but would still receive the marginal price for generation based on the offer price of the most expensive generating set scheduled to meet demand.

2.42 **Ex ante prices** – The principal indicator of price in the wholesale electricity market is the half-hourly Pool Purchase Price (PPP, the sum of SMP and Capacity Payments). PPP values are calculated the day before the day of trading and are made available to Pool members electronically by 16:00 on D-1[8]. Because market participants know the half-hourly PPP values before the day of trading, the market is said be an *ex ante* market. Generators whose offers are such that they appear in the Unconstrained Schedule on (D-1) know that, in the absence of constraints, they will generate on day D[9]. They also know at the day-ahead stage the price, PPP, that they will receive for their output in each half hour on day D. This "frozen" position can only be changed by generators altering their availability offers.

2.43 **Averaged costs of imbalances** – The Unconstrained Schedule is published by 16:00 on D-1, at which time half hourly prices for day D are also published. NGC, acting as System Operator, is responsible for the scheduling and despatch of generation on the day, D, to meet actual demand. In practice, the despatch of plant on the day may not match that anticipated at the day-ahead stage due to a number of factors. First, from time to time constraints exist on the transmission network that may prevent a generating set from operating. Another plant then has to be despatched, even though its offer price may have been above that of the marginal plant appearing in the Unconstrained Schedule. Second, it is impossible to forecast demand at the day-ahead stage with complete accuracy and differences inevitably arise between actual and forecast demand. And third, generator failures may result in plant that appeared in the Unconstrained Schedule no longer being available to generate on the day.

2.44 These differences between the despatch of plant on the day and the Unconstrained Schedule lead to additional costs. For example, if a transmission constraint prevented a low cost generator from producing power, a higher cost plant would be required to make good the shortfall. If demand were to be higher than forecast, additional generating plant would be required to operate. And if a generating plant suffered a technical failure, an alternative plant would need to be despatched, possibly at very short notice and at high cost. Collectively

[8] They are also published in the Financial Times on the trading day, D.

[9] In practice, there is additional uncertainty as to whether or not the generator will actually run, caused by factors such as uncertainty in demand but this does not substantially change the point being made here.

these costs are associated with mismatches, or imbalances, between the day-ahead Unconstrained Schedule and actual plant operation on the day. When generating plant are called on to remedy imbalances, they are paid their offer price (rather than the marginal price, as is the case in the day-ahead energy market).

2.45 There are a number of possible ways of recovering the costs of imbalances. In the trading arrangements in England and Wales, all of the costs of the imbalances (excluding constraints), irrespective of their cause, are aggregated into Energy Uplift[10] and this is averaged over all suppliers on a per-unit basis. Suppliers pay the Pool Selling Price (PSP), made up of the PPP plus Energy Uplift, for all demand taken.

2.46 **Capacity Payments –** In addition to SMP, generators also receive Capacity Payments, which increase prices during some higher demand periods. They are designed to provide an incentive to generators to make plant available both over the long term and at times of high demand. Suppliers additionally pay Unscheduled Availability Payments, which are Capacity Payments made to generating units which were available but which were not included in the Unconstrained Schedule.

2.47 **Governed by its members -** The Pool is underpinned by a multilateral contract, known as the Pooling and Settlement Agreement (PSA), entered into by generators and suppliers. It defines the market trading rules and procedures that control the competitive bidding process between generators which sets the price paid for electricity for each half-hour period of the day. It does not, however, act as a market maker, buying or selling electricity. Since generators and suppliers have equal voting rights under the PSA, it has often proved difficult for the Pool to respond quickly to changing circumstances.

2.48 **Separation of functions** - In England and Wales, NGC is the transmission asset owner, who builds, operates and maintains the transmission grid. NGC is also the System Operator who schedules and despatches generation and ancillary services (e.g. reserve, reactive power, voltage support, frequency support and black start). The Pool is the Market Operator who receives offers or bids from market participants, calculates prices and disseminates information, but important parts of these functions are carried out by NGC on behalf of the Pool. The Settlement System Administrator, who balances the quantity and financial amounts between market participants is Energy Settlements and Information Services (ESIS), a subsidiary of NGC.

[10] Aggregated constraint costs are recovered from suppliers via Transmission Services Use of System Charges.

Further Assessment of the Present Arrangements

2.49 In the light of the above discussion, the adequacy of the present arrangements against the Review objectives, and more particularly against the criticisms, might be reassessed as follows.

2.50 Part of the concerns of customers with respect to price may be attributable to other factors such as market power in generation, rather than to the Pool itself. But in the transition to a competitive electricity market there is likely to be scope for greater efficiency and hence for lower prices from changing the present "central planning" role of the Pool to arrangements more akin to those for a competitive market. Such trading arrangements could also provide greater choice in when to trade and in organising generation and supply.

2.51 The non-firm nature of generator offers presently removes costs and risks associated with plant failure from the generators and transfers the costs and risks to suppliers and customers. The lack of firm demand bids similarly fails to face suppliers and customers with the costs and risks of demand changes. Overall, the non-firm nature of the market fails to satisfy the objective of enabling costs and risks to be reduced and shared efficiently.

2.52 The present setting of system marginal prices probably reduces transparency in the operation of the pricing mechanism and the market generally. The complexity of the mechanism for calculating SMP is such that it is frequently difficult to identify the way in which prices are set, and how offers from generating plant influence SMP.

2.53 The ex ante nature of the market seems inconsistent with the objective of enabling demand to be met efficiently and economically. If prices better reflected the supply and demand position on the day, rather than an assessment made at the day-ahead stage, costs overall would likely be lower. The failure to allocate costs reduces incentives to minimise them. In addition, the absence of full demand side participation in the market is inconsistent with this objective. The averaging of the costs of imbalances over all suppliers is inconsistent with the objective of reducing costs and risks and sharing them efficiently.

2.54 Problems with regard to the governance of the Pool have emphasised the difficulty that the Pool has in responding to changing circumstances, and in facilitating competition.

2.55 Government energy policy is to deliver diverse, secure, sustainable supplies of energy at competitive prices. There have been most complaints about the price setting mechanism in the Pool and about whether the prices paid by consumers for electricity are competitive.

2.56 The increasing use of gas for electricity generation has led, over the past two or three years, to growing concern that interruptions in gas supply may put security of supply at risk, particularly in harsh winters and if the Pool price is low. The concern is that at such times gas generators may decide to stop generating rather than switch to relatively expensive back-up fuel and that this could compromise system security, particularly during the winter months. The Pool responded to pressure from Government by implementing a scheme which, initially, provided added financial incentives to generators to despatch at times of system stress and, later, imposed penalty payments on those that withdraw their availability. This change dealt with perceived deficiencies in the Pool pricing mechanism which has not responded readily to the growing interaction between the gas and electricity markets.

2.57 The Government has become concerned that the fuel mix in generation has the potential of becoming too heavily weighted towards gas. As a result the review of energy sources for power stations is investigating fuel diversity, sustainable development and the role of coal. The review will also consider the growing dependence on gas and the increasingly important issue of security of supply, particularly, the likelihood and impact of interruption of gas supplies. Against this background it is reasonable to ask whether the present Pool trading system operates in a way which favours some fuel sources over others. That is part of the Terms of Reference for this Review.

2.58 To summarise, the present trading arrangements seem not to meet in full the Review objectives. The next chapter considers whether arrangements in other competitive electricity markets provide useful pointers for improvements.

3 ELECTRICITY TRADING ARRANGEMENTS IN OTHER COUNTRIES

3.1 This Chapter considers the arrangements for trading electricity in other countries. It draws on the International background paper recently published by OFFER[11].

3.2 In any electricity market, the design is influenced by a set of objectives such as those specified for this review, by the special characteristics of electricity, and by a number of other features, such as the historical, political and technological context.

3.3 The markets that are reported on in this Chapter have all implemented pool mechanisms in one form or another. The markets are: Scandinavia, especially Norway; Australia, especially Victoria and the new National Market[12]; New Zealand; Argentina; and California, USA. These markets are representative of international experience, but they are not the only markets outside the UK where electricity trading and pool mechanisms apply. All of these markets have implemented new trading arrangements since the establishment of the Pool, so experience is relatively limited. In some, especially California, the new arrangements remain to be fully implemented.

3.4 A number of responses to earlier consultations have said that the market prices obtained in other countries should be a key aspect of the Review. Electricity prices are subject to many influences, of which the design of the market is only one. To draw inferences from short term price trends that one set of trading arrangements is more or less efficient than another can therefore be misleading.

3.5 In reviewing the markets studied, this chapter focuses on the series of design issues identified in Chapter 2, and discusses how each has been tackled. It also considers the objectives for the present Review and looks at market designs in the countries studied to see what lessons emerge.

Characteristics of Present Trading Arrangements

3.6 Reforms to all of the markets studied have common structural features. These include:

[11] Background Paper 2 : Electricity Trading Arrangements in Other Countries OFFER February 1998

[12] Despite its name, at the moment this market is effectively comprised of Victoria, New South Wales, the Australian Capital Territory and South Australia; it is intended that it will eventually be expanded to cover Queensland and Tasmania as well.

- the unbundling of the principal activities in the electricity supply sector between generation, transmission, distribution and supply;

- the establishment of two central roles, that of System Operator and Market Operator;

- the creation of a pool for the trading of wholesale electricity;

- the establishment of a sector specific regulator (except in New Zealand).

3.7 All the markets studied had other markets around the pool. In some, like Scandinavia and Argentina, these include a significant proportion of physical trades. In others, and in Scandinavia, financial markets also play an important role in allowing participants to manage the trading risks involved.

3.8 All the markets studied have competition in generation and some competition in supply. The effectiveness of that competition can nevertheless be debated; in the markets studied there is significant concentration of ownership of generation assets. In addition, in most of the markets studied there are complaints from time to time about market power issues and how these relate to market design features.

Optional versus Compulsory Pools

3.9 All the markets studied have a pool mechanism. In Victoria it is compulsory to trade through the pool. In all the other markets the pool is optional and trading outside the pool (TOP) is also permitted - that is, there are bilateral contracted trades that need not be bid into the pool.

3.10 In Scandinavia and Argentina, trading outside the pool is important in terms of volume, accounting for about 80 per cent of trades in Scandinavia (of which about half is in fact production by suppliers for their own use) and about 50 per cent in Argentina (although in practice, all generation is registered in the pool regardless of whether it is covered by bilateral contracts). Trading outside the pool is possible in New Zealand, but thus far most trades have in fact been through the pool. Trading outside the pool will be permitted, indeed encouraged, in California, but at this stage it is too early to say what proportion of market trades will be covered by it.

3.11 Key issues in trading outside the pool have been to ensure that bilateral arrangements do not preclude maintaining system stability, and that all system participants, whether or not trading through the pool, pay an appropriate share of system costs. There is no consensus yet on what such costs ought to be, or who should bear what

proportion of them, although in all the markets studied trading outside the pool is accompanied by some form of cost recovery designed to share costs amongst all participants. For example, in Norway, constraint fees apply to trades outside the pool when the transmission system is constrained, and a similar approach is applied in New Zealand and Argentina (using nodal prices) and envisaged for California.

3.12 Experience in other markets thus indicates that TOP is possible and need not be detrimental to system stability or result in appropriate system costs being incurred by those trading within the pool. TOP may be able to improve choice and allow costs and risks to be reduced and shared more efficiently. The appropriate conditions need careful consideration, however, including the potential effects on competition and different customer groups. It may also be that other changes to develop trading arrangements within a pool could secure many of the advantages of TOP.

One or Two Sided Markets

3.13 All the pools studied involve offers by generators and, in general, most markets have a more explicit role for the demand side than in the England and Wales Pool, but the details vary in each market. In Scandinavia, New Zealand and California participants bid in demand just as they bid in supply, and the market price is set at the intersection of the demand and supply curves revealed by aggregating and stacking the bids. However, in New Zealand, these are ex ante market prices which are purely indicative and the scheduled demand bids are not firm. In Victoria and Argentina demand is estimated by the Market Operator. In Victoria demand reduction bids, similar in concept to those used in England and Wales, are permitted; these are explicit bids to reduce consumption at or above the bid price. Where such bids have been accepted, some difficulties have been experienced in terms of response times by consumers.

3.14 The experience in other countries suggests that, providing that associated issues such as the design of bidding formats are appropriate, it is possible to accommodate the demand side within the bidding process.

Firmness of Bids and Offers

3.15 Bids which are firm require the bidder to meet the physical commitment to generate or to purchase electricity which accompanies them, or to be exposed to the financial consequences of failing to meet that commitment.

3.16 In Scandinavia and in California, bids used to set ex ante prices are firm, and participants are exposed to the consequences, in terms of the prices in the balancing market, of any failure to meet the obligations implied in an accepted bid. In Australia, bid volumes may be changed at any time prior to acceptance but once accepted both price and volume are firm. New Zealand operates an ex post market (as well as an ex ante market) in which bids are firm in the sense that they cannot be altered more than two hours prior to the trading period.

3.17 There are thus variations between systems, but in general, in all the markets studied, bids are treated as firmer than in England & Wales.

Simple or Complex Bids and Offers

3.18 In most of the markets studied, the bid formats are simpler than in England & Wales. In Scandinavia, simple bids are required, and to give generators flexibility these do not have to relate to defined groups of generating sets unless there are system constraints. In Victoria, simple bids are required, and the close to real time market operation requires self-commitment (that is, the generator must ensure that it is "warm" and ready to run) for all but those able to respond quickly to the System Operator[13]. In New Zealand, simple bids are required, and self-commitment is permitted. In California, simple bids are required, and there is an iteration process designed in part to allow generators to understand likely scheduling and adjust their bids in relation to their plant dynamics accordingly.

3.19 Only in Argentina are payments for start up and capital recovery made. This is because bids are only in terms of fuel prices from which the Market Operator calculates avoidable costs using standard parameters. In such a model, other costs are not implicitly taken into account and need to dealt with explicitly.

3.20 In markets requiring simple bids, some allowance may be made for ramp rates: the rates at which generating stations can change the level of their output. In Victoria and in the Australian National Market, and in New Zealand, ramp rates are taken into account in setting the despatch schedule but only within the scheduling period itself (namely five minutes or half an hour) rather than over the whole day. Ramp rates are implicitly included in the Norwegian balancing market since participating plant must be able to adjust their scheduled level of output within 15 minutes.

[13] In practice, Victoria is not quite so simple, as it also permits generators to bid for output reduction.

3.21 The greater simplicity of bidding formats in other countries seems to lead to more transparent price setting processes, which can help to promote competition, not least in the associated financial markets.

3.22 There is a direct relationship between what sorts of bids are permitted and how risks are allocated amongst market participants. In markets such as England & Wales, relatively complex bids attempt to cater for differences in plant operating characteristics and require the Market Operator to solve for the System Marginal Price by optimising over the day as a whole, rather than for each trading period separately. (This also involves taking account of System Operator considerations.) Systems that have simpler bid formats do not recognise such operating characteristics explicitly and hence each generator has to make allowances for them in its bid. This can increase generator risk, in that each bid now has to reflect price estimates to cover start up and no load costs, rather than treating such costs as separate items to be optimised by the Market Operator. In such cases, some markets have other procedures to help the generator manage the risk exposure inherent in these simple bids, such as self commitment.

Market Timing

3.23 Setting prices in energy markets can be done in three main ways: ex ante, in real time or ex post. Ex ante prices are set some time before the trading period and then 'frozen' until and during that period. Real time prices are essentially ex ante, but are set very close to the trading period, so close that different considerations to normal ex ante prices apply. Ex post prices are set after the trading period.

3.24 In the markets studied, there are considerable differences in terms of how prices are set. In Scandinavia prices are set ex ante and a balancing market, using bids from participants willing and able to adjust their positions at short notice, determines the prices at which actual deviations from the ex ante schedules are settled. A similar approach is planned for California. In New Zealand, prices are set ex post and in Victoria and the Australian National Market they are set close to real time. In Argentina, the prices are set ex ante, but in a very different process that is akin to centrally administered prices. The real time markets in Victoria and the Australian National Market, which occur in systems that are dominated by thermal plant, indicate that price setting much closer to real time could be feasible in this country and need not discriminate against particular slower response types of plant.

Methods of Price Determination

3.25 In all the markets studied, there is a mechanism for arriving at the price used in the pool. Although there are several options, in each the approach is to determine the System Marginal Price (SMP), essentially the price of the most expensive generating set scheduled to run (ex ante) or actually running (ex post), and then pay or charge that SMP, with appropriate amendments, to all participants. In some cases, the SMP is determined by juxtaposing the expected level against the aggregate schedule of generator bids; in other cases by juxtaposing the schedules of generator and supplier bids to find the market clearing prices. No markets pay each participant its bid or offer rather than the SMP for the majority of trades within the pool. However, there is scope for suppliers accepting generators' bids in trading outside the Pool and for accepting bid prices in some balancing markets.

3.26 The price setting processes in other markets thus show a wide range of variation. The existing process in England & Wales is clearly not the only one that can be made to work.

Treatment of Imbalances

3.27 In any electricity market, there has to be a process to ensure that prices are reflective of actual events on the day, as well as those anticipated. In markets where prices are set ex ante, some form of additional or separate balancing market is required to cope with differences between the amounts of output and demand that actually occur, and the amounts in the schedule used to set the ex ante prices. These balancing markets differ markedly in character; for example, in England & Wales, such markets are a combination of the purchase and use of ancillary services by the System Operator, plus the management of transmission congestion through constraining plant on or off the system.

3.28 The markets studied all have processes to handle the financial consequences of on the day balancing. In Scandinavia, there is a formal on the day market used by the System Operator to obtain quick response load and generation offers when required. In Victoria and in the Australian National Market, the close to real time nature of the market means that the pool becomes the balancing market as well – any deviations from the virtually real time schedule used to set SMP are handled through ancillary services. In New Zealand, the market is ex post, so the primary market is also the balancing market. In Argentina, the System Operator uses the prices established in the ex ante market to prioritise sets called on to balance the system. In California, the System Operator will use bids in a balancing market, based upon the last bids used to set the SMP, to match actual supply

and demand. In addition, it will be required to resort to the use of ancillary services if these are cheaper than the available bids in the balancing market.

3.29 In general, whilst the nature of the balancing markets varies, there seems to be a greater reliance on the use of short term markets for balancing purposes than in England & Wales. In Scandinavia and California, there is a formal and separate balancing market and in Australia and New Zealand the market design means that the primary market carries out the balancing function as well.

Comprehensive Prices and Capacity Payments

3.30 Capacity payments are generally not a feature of the markets studied. In some of these markets, short term price increases have occurred (and indeed would be expected) when demand is close to available capacity, although the short duration of such price spikes has not generally meant significant increases in average prices over an extended period.

3.31 Only Argentina has a system similar in some respects to that in England & Wales. Paragraph 3.19 above explains the special circumstances obtaining in that market.

3.32 Concerns have been expressed as to the incentives for the system to provide sufficient capacity to meet demand in markets without capacity payments. In Victoria, suppliers are required to purchase electricity so long as the Pool price is below a specified level. This Value of Lost Load (VoLL) has been set at a level designed to encourage users to shed load when capacity limits are approached. In addition the Market Operator has taken on the so-called Reserve Trader role, contracting for little used capacity to ensure that it is available if needed. In Norway and New Zealand, with heavy reliance on hydro capacity, droughts have led to calls for more explicit arrangements to ensure capacity is available, but so far no changes have been made to the present approach of not making capacity payments in either market.

3.33 Most of the markets studied appear to have considerable amounts of capacity or energy in relation to demand (assuming normal rainfall in the cases of hydro-dominated New Zealand and Norway). They have also been operating for only a relatively short period of time. Thus, the new arrangements have not yet been tested over the longer term, in terms of their ability to ensure that capacity is available when required. However, there is no evidence to conclude that capacity payments are necessary to maintain reserves at desired levels, or to encourage investment in new capacity when needed, and the need to meet

demand efficiently and economically can be through mechanisms other than capacity payments.

3.34 The value of electricity varies across the grid. The two principal components causing such variations are transmission losses – energy is consumed in transmitting power over the grid, and the greater the electrical distance transmitted the greater the transmission losses – and transmission constraints, which on occasion mean that bids cannot be accepted in true order of bid/offer price, as some generating stations which are in merit are unable, because of such constraints, to deliver some or all of their offered output. Similarly, demand is not served at the same price across the system for the same reasons – demand in some locations, due to losses and constraints, will be more expensive to serve than demand at other locations.

3.35 Systems vary in terms of whether or not they recognise locational differences in pricing, and if so how this is done. All the markets surveyed had some recognition of locational factors in the prices that they set.

3.36 There are various forms of locational pricing. The most extensive, such as the system in New Zealand, involves the use of nodal spot pricing, where a different price is calculated for each node on the transmission system, a node being an injection or an offtake connection point. The nodal prices are based on a dynamic calculation of optimum power flows given known line loss factors and transmission constraints. More limited and simpler approaches, such as that used in Norway when constraints are binding, and in California and the inter-state market in Australia, tend to average the nodal prices within zones; such zones are empirically defined primarily on the basis that the distortions introduced by the averaging process within them are minimal. An alternative but essentially similar approach, as used in Argentina, is to define a central reference point, and to price all trades in terms of the transmission costs to and from that central point[14].

Financial Contracts

3.36 Financial contracts for electricity do not involve any physical commitment to deliver, and are devices to ensure price certainty and to provide a hedge against risk. Contracts for Differences (CfDs) can be used to manage pool price exposure, but other instruments are also used in both mandatory and voluntary markets.

3.37 All the markets studied, except for Argentina, had active financial contracts or markets. These are in at least one of two forms: bilateral contracts, essentially one-off arrangements between the contracting

[14] This is essentially the approach presently used in the gas market in Great Britain.

parties, and exchange traded futures contracts, where standard terms are offered to all participants.

3.38 Scandinavia has active financial markets. Nord Pool runs a futures market, which has standard contract offerings, and a forward market which does not require margin payments for longer term contracts, thus easing cashflow problems. Scandinavia also has a very active bilateral or Over The Counter (OTC) market, which provides risk hedging against exposure to constraint prices and acts as an alternative to the markets run by Nord Pool. Australia has an increasingly active CfD market, and a developing futures market. In New Zealand, ECNZ offers long term financial contracts at annual auctions, and recently the Futures and Options Exchange has begun offering a futures contract. The market in California was designed to encourage a variety of market trades to develop; at this early stage prior to the start of the new market arrangements two futures products are being offered by NYMEX, with increasingly significant volumes being traded, and OTC trading has also become established.

3.39 Financial markets are an important adjunct to pooled trading. The experience elsewhere suggests that as such parallel markets develop, they improve liquidity, increase the range of choice open to customers and allow better management of risks. More generally, financial markets that are transparent, at least in terms of the bids and offers in the market at any point in time and the trades that have been conducted, offer important information to all system participants, whether or not they actually effect trades in such markets, by providing information on the prices being paid in essentially bilateral transactions.

Transparency

3.40 In most of the markets studied, arrangements are in place to provide market participants, and in some cases the general public, with information about the market. This is designed both to enable participants to manage their own positions better, and to encourage self-policing. Transparency is related to several features, such as the complexity of the market arrangements, concerns as to commercial sensitivity, the auditability of market arrangements, and timely access to data.

3.41 In Scandinavia, futures and forwards markets are based on screen trading and information is available as to the state of the market in terms of the anonymous screen bids and offers posted at any point in time. In the spot market, prices and volumes are available, but not information on individual bid/offer prices or volumes. The situation is similar in New Zealand. In Victoria and in the Australian National

Market, a significant amount of data is made available, including all bid/offer data and actual output by generating station. In Argentina, extensive information on fuel costs, daily despatch and prices is made available. In California, information disclosure rules remain to be finalised.

3.42 In all the markets studied, an associated issue is the availability of indicative price forecasts. On the assumption that the provision of data on bids and offers may not be sufficient for participants, especially the smaller ones, effectively to manage their positions, forecast price data is often provided by the Market Operator. In Scandinavia, the ex ante prices set by Nord Pool are in effect a forecast; in Australia, the Market Operator publishes day-ahead price forecasts and demand and system reliability forecasts going forward several months; in New Zealand NZEM publishes day-ahead price forecasts, and in Argentina CAMESSA publishes forecasts of load schedules. In California, the iterative price setting process is designed to meet the need for price forecasts.

3.43 In most of the markets studied, some explicit form of audit of the price setting process is undertaken, in part to provide comfort to participants that the arrangements for setting SMP are being properly observed. Such audits occur in Australia, New Zealand and California. In all those markets, the price setting process relies on simpler bid formats than in England & Wales, but a process audit is still believed to be necessary.

3.44 The range of information disclosed in England & Wales is already significant. Experience elsewhere is that, if the market design is changed, then appropriate forecasts of short term forward prices are made available, in one form or another. This can be by way of quotations in forward and futures markets, however, as much as by formal forecasts issued, typically without any responsibility for accuracy, by central authorities such as the System or Market Operator. Arrangements to allow participants to understand the prices they are likely to face in the pool maintain transparency and allow better co-ordination of activities and management of risk.

Structure, Ownership and Separation of Functions

3.45 In Scandinavia Nord Pool is the Market Operator. Nord Pool is jointly owned by the Norwegian and Swedish grid companies, both of which are state owned companies; Nord Pool is therefore ultimately controlled by the governments of the two states and its Board of Directors is appointed by the two states. Each grid company also acts as the System Operators in its country.

3.46 In Victoria, Australia the System Operator and Market Operator roles were combined in VPX, the Victorian Power Exchange. The grid assets are owned by a separate company, Power Net Victoria, PNV, which was recently privatised and has changed its name to GPD PowerNet. VPX is a state owned company, operated at arms length. Its Board is a mixture of representatives of various elements of the industry and independents, the latter included to create a structure which would lead to swifter decision making and would avoid the problems of voting majorities within different blocks. The state regulator, the Office of the Regulator General (ORG), has to approve all proposed rule changes before they can be enforced[15]. In the new National Market in Australia, the National Electricity Market Management Company (NEMMCO), will perform much the same role as VPX.

3.47 In New Zealand, the Market Operator is the New Zealand Electricity Market (NZEM), although it has contracted out the actual operation of the market to the Electricity Market Company (EMCO), which is jointly owned by the transmission assets owner, Transpower, the two largest generators, ECNZ and Contact and effectively ESANZ, the trade association for suppliers and distributors. This structure is presently under review. The System Operator function is carried out by Transpower.

3.48 In Argentina, both Market and System Operator functions are carried out by Compañía Administradora del Mercado Mayorista Eléctrico Sociedad Anónima (CAMMESA). This company is owned in equal shares by the government and four trade associations representing different elements of the industry, including one that represents multiple grid asset owners. The Secretary of Energy has to approve all proposals for rule changes.

3.49 In California, one of the design principles for the new market was that the Market and System Operator functions would be separated. The Market Operator function is run by the power exchange, called PX. Other markets are envisioned, and these will be run by Scheduling Co-ordinators. Both PX and the System Operator are independent from multiple grid asset owners, and each is a non-profit making corporation. The legislation establishing them requires that a majority of Board appointments have to be persons who are not affiliated with the main companies in the industry. There will be an Oversight Board whose members are appointed by the state legislature and the regulator, and the Californian Public Utilities Commission (CPUC) will have a monitoring role.

[15] This applies to rules developed and implemented at state level; the ORG does nor have such powers in relation to rules and codes developed at the national level, which is the responsibility of NECA.

Market Operator Governance

3.50 A common theme of governance arrangements for the Market Operator is that such arrangements should involve a significant degree of self-regulation. Much as other markets such as the Stock Exchange administer their own affairs, so the Market Operator is expected to do likewise. Nevertheless, there is usually some degree of regulatory oversight to mediate between participants.

3.51 All of the markets studied have a non-profit body as the Market Operator[16]. Unlike the Pool in England & Wales, which is established by a multi-lateral contract, each Market Operator is constituted in some form. In Scandinavia and Australia the body is state owned, whereas in New Zealand, Argentina and California it is owned by market participants. The differences in ownership are important, in that the state in Scandinavia and Australia appoints all or most of the Board members and thus has a direct influence over governance arrangements in those countries. In other countries Board members are appointed by the shareholders, the majority of whom are market participants.

3.52 The non-profit nature of each Market Operator's constitution raises issues of whether or not commercial incentives can be imposed on it; in practice, if such incentives are apparent, for example in the execution of the Reserve Trader role in Victoria, then they are assumed to be for the benefit of all market participants.

3.53 Once a market is established, the key duties of the Board of the Market Operator are to ensure that there is an appropriate mechanism for resolving disputes, to monitor the conduct of participants and to allow for the market rules to be updated and changed where necessary.

3.54 In one way or another, all the Boards studied have dispute resolution procedures. There is some debate in the countries concerned as to the effectiveness and fairness of these procedures and what role the regulator should play in them. In countries that have existing tensions between state and federal jurisdictions, such as Australia and the USA, similar tensions between state and federal regulators are also possible.

3.55 Conduct monitoring is sometimes the responsibility of the Market Operator and sometimes of the regulator. To aid self-policing some pools, such as in Australia, publish comprehensive amounts of data on bids and offers. Some markets have oversight bodies; for example New Zealand has a Market Surveillance Committee and California will have

[16] Initially in New Zealand, EMCO attempted to be a for-profit body, but market participants were unwilling to absorb the additional costs of market transactions necessary for it to earn a profit.

the compliance units, market monitoring committees and the Oversight Board already discussed[17].

3.56 The role of the Board in amending rules differs in the markets studied. Two related factors appear to be important: the processes for amending the rules, and how much scope these give for those disadvantaged by a proposed change to object to it; and how the industry participates in the change process. There is a natural tension here between the desire to bring about rule changes when necessary and the need to allow affected participants to be able to appeal against proposed changes; the more appeals and challenges are allowed, the slower will be the change process.

3.57 In terms of process a number of the markets studied have some form of two-tier structure, with the Board of the Market Operator setting policy and hearing appeals and then a sub-committee or other body composed of system participants developing proposals for rule changes. This is the case in Scandinavia, which has a market advisory board and two product development sub-groups, Victoria, which has a Pool Consultative Committee (PCC) and New Zealand which has a Rules Committee and working groups of industry participants.

3.58 The composition of the Board itself varies, although all have industry representation. In those countries where the Board is owned by the participants, not surprisingly most of the members are from within the industry. In Scandinavia and Victoria (and the National Market in Australia), the governments appoint Board members and each has made a number of independent appointments. Board composition is related to the procedures by which market rules are changed; in some markets, the emphasis is on consensus with the need for different voting blocks each to agree on proposed changes – this is the case in New Zealand and effectively in Argentina. In Victoria and Scandinavia, voting rules reflect the involvement of independent board members and place less emphasis on voting blocks.

3.59 Finally the powers and duties of the sector regulator also have to be considered. In some markets, such as Victoria, the regulator has the final right of approval of all proposed rule changes; in Argentina the Secretary for Energy has the same right, and the Oversight Board will play this role in California; such arrangements provide another element of control over market governance. In Scandinavia and New Zealand, there is no such direct regulatory oversight, although general competition law still applies and could be used were a rule change to be seen to be anti-competitive. In both these markets many of the generation assets remain in the public sector, and it is a matter for

[17] This structure was set up in part to meet the conflicting requirements of state and federal regulators.

debate how far the governments involved intervene. It is probably true to say, however, that such ownership acts as an implicit, and possibly explicit, constraint upon the ability of the dominant generators to abuse the undoubted market power that they enjoy.

3.60 In summary, all the markets studied have Market Operators that have been established as some form of corporate body. They all have Boards, not all of which are necessarily fully representative of industry participants. Boards concentrate on policy issues and the resolution of disputes. Whatever the representation at Board level, subsidiary boards, committees or groups are usually established to act as the primary forum for the discussion and development of rule changes, and these subsidiary bodies tend to have a greater industry representation than the main Board. In some cases, whatever emerges from the rule change process then has to be approved by the regulator.

3.61 The governance arrangements in most of the markets studied appear to make rule changes generally easier to identify, promulgate and implement than in England & Wales.

System Operator Governance

3.62 Governance of the System Operator does not appear to be as contentious an issue as governance of the Market Operator in the markets studied. Nevertheless, in those markets where the System Operator and the transmission assets are in common ownership, there are concerns as to whether or not the former can act in an independent manner. As with the Market Operator, there are also issues of the appropriateness of commercial incentives on a body that may be part of a larger corporation.

3.63 Ownership arrangements vary, as does the role of different market participants in governance of the System Operator. In Australia and Argentina, the System Operator is part of the same body as the Market Operator, and its governance is common with that of the latter. In Scandinavia and New Zealand the System Operator is also the owner of the transmission assets, as in England & Wales. In California, the System Operator is established as a separate independent body, primarily because of concerns over leaving this role with the multiple vertically-integrated transmission asset owners.

3.64 A conclusion that emerges is that arrangements other than the System Operator being owned by the transmission assets owner are clearly possible. Indeed, in Australia and in California, the two were put in separate ownership specifically to address concerns over the potential incentives were the two to be in common ownership.

Comparisons of Other Markets Against the Review Objectives

3.65 All the markets studied had a variety of features, some similar to those in England & Wales, many quite different. Many of the features in those markets can be seen as contributing to the fulfilment of similar objectives to those of the Review. For example:

- meeting the needs of customers with respect to price, choice, quality and security of supply often involves some form of active demand side participation and transparent price setting, together with some form of TOP and/or active financial markets, but does not seem to need capacity payments;
- demand seems to be met efficiently and economically by a variety of means, including demand side participation in the bidding process (including more explicit demand reduction bids), TOP and associated financial markets;
- costs and risks seem to be reduced and shared efficiently by having simpler market structures, and by making bids firmer;
- greater transparency in the operation of the pricing mechanism and the market generally appears to come from simpler bidding formats and price setting processes;
- enhancing the ability to respond to changing circumstances in future is done in all the markets studied by establishing the pool as a corporate entity of some sort, and then devoting considerable attention to its governance arrangements. Included in those arrangements in most markets are features designed to ensure equality of treatment between participants whilst limiting the ability of small groups of them to delay necessary reforms;
- the promotion of competition in electricity markets, including by facilitating ease of entry into and exit from such markets, is done in many ways, although in every market studied there are still some concerns about competition in generation;
- avoiding discrimination against particular energy sources does not appear to be an explicit feature in any of the markets studied, although simply promoting effective price discovery in the market might be seen as achieving that;
- compatibility with government policies to achieve diverse, sustainable supplies of energy at competitive prices and with wider government policy, including on environmental and social issues depends on the circumstances and policies of each government. In other markets, the nature and degree of government involvement varies, but typically seems to be envisaged to modulate proposed

changes in constitution rather than to influence directly the way the market operates.

4 CENTRAL FEATURES OF MARKET TRADING ARRANGEMENTS

4.1 This Chapter examines in more detail three central features of market trading arrangements:

- whether the market includes both sides (i.e. buyers and sellers) or includes only one side of the market explicitly;
- whether the offers and bids in the market are relatively simple or relatively complex; and
- whether offers and bids are firm (i.e. committing the offerer or bidder to the financial consequences of its offer or bid) or not.

One or Two Sided Markets

4.2 In normal commodity markets, prices are set by interactions between buyers and sellers, with individual prices in each case determined by one party accepting an offer or bid made by another. This is not the case in the Pool.

4.3 Participation by suppliers, in the sense of making bids into the market, is extremely limited under existing arrangements in the Pool. There is limited participation in that demand reduction bids can be made, and these are treated as a form of negative generation and may set SMP. Most demand is not bid into the Pool, however, but instead is forecast by NGC on the Pool's behalf.

4.4 The DGES has long pressed the Pool to consider greater involvement by the demand side. The steps in this direction, however, which began in 1993, have only been focused on demand reduction bids, and the present scheme for demand side bidding has been widely criticised. A number of enhancements to the existing scheme, including penalties on demand side bidders for failing to self despatch and expanding the use of demand side bids in setting prices, are due to be introduced later this year.

4.5 Considerations of demand side bidding are split into two parts. The main issue is whether or not demand side bids, rather than demand forecasts, should be used in the determination of prices. A second issue is the role that demand reduction bids can usefully play.

Demand Side Participation

4.6 In a number of the countries whose markets were described in Chapter 3, full demand side bidding is used in setting pool prices. That is, market clearing prices are set by the intersection of supply and demand curves.

4.7 There are a number of arguments in favour of involving both the suppliers and the demand side in the price setting process. In most respects, suppliers (i.e. buyers of electricity) know their own requirements and those of their customers better than does the System Operator. They will, over time, generate generation and the demand side in the price setting process. In most respects, better demand forecasts than a central body, particularly since they will have commercial responsibility for such forecasts. The present demand forecasting arrangements do not take particular account of the price elasticity of demand, and as a result may make Pool prices more extreme than they would otherwise be. Demand bidding would lead to more demand responsiveness which would enable the System Operator to despatch the system at lower cost in the short term and lead to more economical ways of dealing with reserve needs in the longer term. Demand bidding would also lead to greater flexibility in pricing by suppliers.

4.8 An argument against involving the demand side is that this would be tantamount to a series of disaggregated demand forecasts which may be no better, or indeed worse, than a central forecast. This is because suppliers may be poor at forecasting as compared to NGC (although bodies such as the System Operator might offer a forecasting service to those prepared to pay for it). A second argument is that suppliers are effectively reliant on customers whose demand is liable to variation that is at least in part random, and hence may be reluctant to commit to buying specific quantities of power.

4.9 Those who favour the bidding of demand say that this will improve the basis on which prices are set, increase the efficiency of suppliers and hence lead to lower Pool prices. Those against say that the inherent uncertainty in the demand side, in terms of suppliers bidding on behalf of many customers whose aggregate demand is subject to some random fluctuation, will lead to conservative bidding at the margin, which will probably push up prices.

Discussion

4.10 The one sided nature of the Pool is a hangover from the central planning procedures of the CEGB. It is difficult to see how proper markets can

develop, either for electricity or the associated financial derivatives, as long as this persists.

4.11 It seems likely that suppliers will increasingly understand better than the System Operator the demand characteristics of their customers. They should also increasingly have a better ability and incentive to influence the levels of customer demand.

4.12 The System Operator will still need a degree of forecasting ability to keep the system in balance. But forecasting is not the only issue. It is for suppliers, on behalf of customers, to judge when and how to commit to prices offered on the market as these develop over time, and to modify their demand as they see fit.

4.13 The argument that suppliers will be reluctant to commit to purchasing electricity with firm bids seems short-sighted. Those who do not commit early will pay whatever price results in the balancing market. The system will still work whatever the attitudes of suppliers to risk. Suppliers who are unduly risk-averse, however, may lose business to those who understand better the requirements of their customers and who introduce incentives both in their prices and their terms of trade that allow greater predictability of customer response. It is also likely that, as in other areas, financial markets will develop products designed to reduce the risks faced by suppliers enabling them to cope with the circumstances that participants in other markets face as a matter of course.

Demand Reduction Bidding

4.14 The arguments in favour of demand reduction bids[18] include the enhanced ability of the System Operator to call on such bids for reserves when the demand/supply balance is tight, and the enhanced ability of customers to control their power costs. The principal argument against is that some customers, probably most at present, either cannot act in time to reduce demand when price rises, or are price inelastic in the short term. Such arguments do not negate the principle of demand reduction bidding, although they suggest that its participants may be limited initially to certain customer classes. As smart metering costs fall, more and more customers will be able, should they choose, to take advantage of demand side bidding and of demand side reductions at times of high prices.

Discussion

4.15 Demand reduction bids expand the range of options available to the System Operator and to customers. They can perform a valuable role in

[18] These can be in the day-ahead market, in a balancing market, or in both.

the market place, with prospects for increasing efficiency and reducing prices.

4.16 Experience to date, however, suggests that the benefits may be limited and there may be scope for abuse. It is for consideration whether a prerequisite for demand reduction bids should be that the demand side is bid firm into the market in the first place.

Firmness of Bids

4.17 In most commercial markets, offers and bids are firm, in that failure to honour either is penalised[19]. This is not the case in the Pool. Generators can redeclare their availability on the day without penalty, after prices have been set based on their previous bids and availability. The demand side in the Pool is not firm, and cannot be in the sense that its requirements are forecast rather than bid.

4.18 Offers and bids can be made firmer. This would mean that those offering and bidding would be exposed, in one way or another, to the commercial and financial consequences of not meeting the commitments implied in their bids. If, for example, a generator produced less than the output that it had offered in a day-ahead market, then it would need to make up for the shortfall in the balancing market, at whatever price obtained in that market, or the shortfall could be deemed to have been purchased on its behalf.

4.19 The implications of firm offers and bids need to be evaluated in conjunction with other changes that may be made. For example, if offers and bids were firm, but voluntary in the sense that TOP was also permitted, the situation could arise where the System Operator did not have enough offers and bids on the table, at any price, to match output and demand. In these circumstances, rules would have to define the powers of the System Operator, for example in terms of ordering more generation or curtailing supply if the imbalance was an excess of demand. The rules would also have to specify how the costs involved would fall on different system participants.

4.20 The main argument in favour of firm offers and bids is that it imposes responsibility on bidders to deal with the consequences of any failure on their part to provide or receive supply. This lowers the costs for the majority of market participants and makes it riskier, and probably more costly, to try to disturb or mislead the market. An argument against firm bids is that they will increase the risk exposure of participants and this may increase overall costs of the system.

[19] In some markets the penalty is simply to be exposed to the spot price for any failure; in others, penal charges are imposed.

Discussion

4.21 In different commodity markets, rules vary as to whether and how offers and bids can be placed and withdrawn. In most markets, however, there is a presumption that an offer or bid once accepted is firm; and cannot be withdrawn once a counterparty has agreed to buy or sell, depending on which side the offer or bid is made, at the price in the offer or bid.

4.22 The argument that electricity is different, because generators and suppliers are unable to control or forecast their supply or demand, is not persuasive. Participants in all markets face such a situation. The question is whether the risks and responsibilities should be placed on the generators and suppliers, who are best able to deal with them, or on other market participants. The latter is likely to be more costly, and blunts incentives to manage and reduce risks.

Complexity or Simplicity in Offer and Bid Formats

4.23 In most markets, bids and offers take a relatively simple form, often a single price for a standardised commodity. This is not the case in the Pool. Essentially, each generator has to submit an offer for each unit which includes a number of different elements. This allows it, should it so choose, to reflect the engineering cost profile that the generator faces in starting up and operating that unit, although there is no requirement on generators to bid their costs. All these elements are then used by the System Operator to determine the scheduling of plant over the day. Generation schedules and prices in any one trading period depend on what happens in all the other periods of the day. This also means that some of the risks faced by generators in terms of the costs of getting plant ready for despatch are effectively managed by the Market Operator rather than by the generators themselves (as discussed briefly in Chapter 3).

4.24 In comparison with other electricity markets, this is a relatively complex offer format. It was developed for a number of reasons, not least that the system in England & Wales evolved from an engineering–determined CEGB merit order approach, and the same software has been used in both old the CEGB merit order and the present Pool marginal bid systems.

4.25 Nearly all those markets that have evolved since the Pool was created have tended to adopt a simpler offer approach. The exception is Argentina, which has a complex offer structure for reasons discussed earlier associated with generators being required to make fuel price bids. In some of these other markets, system and plant dynamics have encouraged simplicity; for example, in predominantly hydro systems the various start up and no load costs associated with thermal plants are

of less relevance. In other systems, however, such as Victoria and California, simpler offer formats have been introduced even though thermal plant predominates.

4.26 Arguments in favour of the complex offer format approach adopted in England & Wales Pool include: it allows the Market Operator properly to optimise the system taking all known engineering cost parameters into account; and that it reduces despatch risks for generators and consequently reduces prices to customers as otherwise a higher return would be expected on the basis of a higher perceived level of risk.

4.27 Arguments against complex offers, and in favour of simpler offer formats, include: that it gives each generator better incentives to manage its despatch risks which is important since generators are probably going to be better at managing such risks than any central body; imposing despatch risks more directly on generators encourages them to submit offers that are more reflective of actual marginal or incremental costs, and hence reduces the potential to distort the market; simpler offers make the price setting process more transparent; and simpler offers make it easier to include both sides of the market.

Discussion

4.28 The present arrangements derive from a central planning system within CEGB. They were developed at a time when engineering considerations were given great weight, and short timescales necessitated minimal change to the then existing software and merit order despatch procedures. As discussed in Chapter 2, as the market develops, this is increasingly unlikely to be an efficient method of co-ordination. In a properly functioning market, having a central body forecast and manage certain sorts of risk on behalf of participants ignores the better knowledge they increasingly have and negates one of the principal advantages of any market, that it provides both the incentive and the channel for innovative arrangements.

4.29 Experience to date indicates that portfolio generators do not use the flexibility inherent in the existing offer formats to reflect accurately their underlying costs. Markets elsewhere have shown that simpler offer formats do indeed work. It is sometimes argued that simple offers only work in markets such as Scandinavia and New Zealand, that are predominantly hydro based and therefore have significant quantities of low cost fast response capacity available. Recent experience in Victoria and the National Market in Australia, however, shows that simple offers also work in systems that are dominated by thermal plant.

4.30 The present arrangements by which SMPs are set in the Pool have been criticised by many as opaque, making it difficult to understand how that

process works. Providing greater transparency in the process by simpler bids has obvious advantages.

Concluding Observations

4.31 This Chapter has presented arguments for electricity trading arrangements that embody three key features:

- both sides of the market
- firm offers and bids
- relatively simple offer and bid formats.

The case for these will of course be subject to further analysis and debate, but at this stage it seems sensible to focus mainly on models that embody them. More detailed contributions from interested parties about the potential implications would be helpful. The next Chapter looks at some features where the arguments are less clear cut.

5 FURTHER BUILDING BLOCKS

5.1 This Chapter examines some further elements of trading arrangements that are capable of being handled in a variety of ways, and where the best way forward is less clear cut.

5.2 These elements are: whether the systems should be ex ante, real time or ex post; the method of price determination, in particular whether it should be at System Marginal Price or paid as bid; comprehensive prices and capacity payments; and the treatment of imbalances and constraint payments.

Ex Ante Systems

5.3 As described in Chapter 2, Pool prices at present are set ex ante, a day ahead, with a requirement on generators to bid, but with no commitment to be despatched in accordance with bids. A series of procedures is then used to cope with deviations on the day from the schedules used to set the ex ante price. The costs of deviations are averaged and are reflected in Uplift and Transmission Services Use of System charges paid by all suppliers.

5.4 Ex ante markets require some such procedures or a balancing market of some sort. The timing of the ex ante market can vary, extending before and during the day ahead, up until 'real time'. It is also possible to dispense with ex ante prices and to set prices only ex post.

5.5 The general arguments in favour of ex ante markets like the Pool are that they provide indicative price disclosure in advance of the day, and thus allow system participants to respond to short term price signals if they wish to do so. Arguments against the Pool type of ex ante market are that the resulting prices are not really set firm; even if bidders were committed to their bids, as proposed in the previous Chapter, ex ante prices could still be modified by the addition of whatever balancing charges are imposed to reflect what happens on the day.

5.6 There are different ways of calculating such charges, including in a balancing market. If the balancing market relies on exactly the same bid information as that used to set ex ante prices, then complexity can be reduced, but at the expense of less up to date information. In some systems, the balancing market is run separately, and may require separate bids.

Real Time Systems

5.7 Systems such as that in Victoria and in the National Market in Australia set prices very close to real time, by accepting or rejecting

bids very close to the trading period to which they relate. They can also be called ex ante markets, but by setting prices very close to actual despatch different issues to other ex ante markets are raised, and they should be considered separately. An argument in favour of such systems is that they in effect combine the ex ante and the balancing market and hence avoid the need for separate arrangements, yet they still allow participants to adjust their positions in the light of anticipated events. Another argument is that they reduce the need for demand forecasting because there is less time for demand to change in the short period between price setting and station despatch. Some suggest that real time price setting increases risks of bidding other than at avoidable cost (because there is no time to adjust if an above cost bid is not called), and hence helps to mitigate market power in systems where that is a concern.

5.8 Arguments against real time price setting are that it is difficult to operate in systems that have constraints in transmission capacity, that it offers very little scope for dynamic adjustments to positions in the light of evolving prices, and that it relies on extensive investments in real time control and communication equipment. To overcome some of these real or perceived problems, real time markets normally incorporate some form of indicative price and/or load forecasting before the event to assist participants to anticipate price movements.

Ex Post Systems

5.9 Systems that rely solely on ex post price setting avoid the need for a balancing market because the price is set after the event on the basis of combining actual demand and output with scheduled generator bids submitted before the event. An argument in favour of such systems is that they require less complexity, because the need for a separate balancing market is avoided. Another argument is that they do away with the problems inherent in forecasting demand, because actual demand is used instead of a forecast. Arguments against ex post pricing include that it is unsatisfactory to set prices after the event, that whilst ex post systems often offer forecasts in advance these are less robust than ex ante prices, and that ex post pricing eliminates options for an enhanced role for the demand side.

Discussion

5.10 The method by which the Pool treats bids and then sets prices is a critical part of the Review. Experience elsewhere suggests that a variety of approaches can be adopted, and choosing between them is likely to be a key focus of further work.

5.11 The arguments for ex post pricing alone rather than some combination of ex ante pricing and ex post balancing do not seem particularly strong, if an underlying aim is to move towards a more competitive market-orientated system of trading arrangements involving buyers and sellers. Far from actively involving both sides of the market in price determination, this method simply notifies buyers after the event of the price that they have to pay. Whilst the principle of ex post pricing would have to be applied to the imbalances of those parties whose actual position on the day is not that scheduled or contracted, that is very different from having all physical trades priced in such a process.

5.12 Financial markets could provide products that would help participants avoid some of the risk of exposure to ex post prices and would thus allow them to trade in secondary markets that set prices. The prices in those markets, however, are essentially set by reference to anticipated prices in the primary ex post market. As such, reliance on the financial markets in this way does not seem to overcome some of the fundamental issues surrounding ex post markets.

5.13 The arguments for real time pricing need further evaluation. There may be a case for extending the day ahead market to a matter of hours ahead. Whether the time is yet ripe for, say, a five-minute ahead market is more debatable. The views of NGC and market participants will be particularly helpful here. In any event, some form of ex ante market and some form of balancing market seem likely to be required and discussion can usefully focus on the forms of these.

5.14 If the principal focus is on ex ante markets, then a key element distinguishing different versions of them will be the way in which the balancing market works, its relationships with the ex ante market, and the role of the System Operator in executing and managing trades in it. Greater efficiency will result where prices paid in the balancing markets are related to the actions of those active in that market, rather than averaged over all participants, and where the balancing market is designed to enable services in it to be traded on behalf of all participants.

Methods of Price Determination

5.15 In the Pool and in other electricity markets, generators are paid, and suppliers pay, the SMP[20], perhaps with some adjustments, which in the Pool are Capacity and Uplift payments. Those who support the use of SMP argue that it is consistent with an efficient allocation of resources (particularly that electricity should not be over- or under-priced at the margin), that it does not discriminate between generators and suppliers,

[20] This is correct, as far as is known, for the ex ante market. Some balancing markets operate on a pay as bid basis.

and that prices at about this level would in practice emerge in a competitive market, since no one would be knowingly undersold or overpaid.

5.16 SMP can lead in a compulsory pool to some generators bidding very low, or even at zero, to ensure that they are despatched. On the same basis, if demand side bids were required, some suppliers might bid very high to secure supplies, knowing that they would only have to pay SMP.

5.17 Some have argued that participants should only pay or be paid their bids or offers, rather than a payment based on the SMP. If such a 'pay-as-bid' basis were introduced, generators are likely to change their bidding practices. Each generator would have to make forecasts of Pool prices, and pitch its offers accordingly. Equally, if the demand side had to bid, suppliers would also be making similar forecasts to drive their bidding strategies.

5.18 There are a number of arguments in favour of 'pay-as-bid'. First, in one form or another, it is the norm in other markets and actively involves all market participants. Second, it may reduce the influence of major portfolio generators in setting Pool prices, insofar as the price of the marginal set does not determine the price to other generators. Third, it would necessitate sharper bids by all concerned and would increase competitiveness. Fourth, those plants which are relatively inflexible, or those generators without portfolios, would be encouraged to bid somewhat below their expectations of the Pool price to ensure that they remained running, thus leading to lower prices. Fifth, it would discourage bidding at or close to zero to ensure despatch, which could lead to more economic despatch decisions. Last, the approach might also be less sensitive to the anomalies of existing software and might avoid unintended price spikes.

5.19 There are also arguments against pay-as-bid. Some argue that, far from increasing competition and reducing market power, pay-as-bid would do the opposite: it would increase the ability of portfolio generators with price setting plant to influence the system. Bids would not be expected to be cost reflective (subject to the proviso that variable or incremental costs would probably act as a floor) since they now need to reflect expectations of Pool prices. It is further argued that pay-as-bid would reduce only the prices received by inflexible and non-portfolio generators. This would in turn reduce returns for such participants and limit the likelihood of new entry, and possibly increase the premature closure of existing plant. Another argument is that the compression of bids around the anticipated average market price that would result from the bidding process would make the price setting process more complex, and would increase the possibility of

sub-optimal despatch decisions. The approach would also increase risks in the market generally for all participants, and that might lead to an overall increase in prices over time to substantiate the returns needed for new investment.

5.20 The OFFER report on Trading Outside the Pool in July 1994 concluded that within the context of the Pool, the arguments in favour of pay-as-bid were not compelling, and that the arguments against carried substantial weight. It is for consideration how far circumstances have changed and whether these conclusions would remain valid with different arrangements.

5.21 Another method of price setting, involving bilateral transactions, deserves consideration. The price setting process does not necessarily require the calculation of some form of intersection of the supply and demand schedules in the trading period, but instead it could utilise a process of matching offers and bids over a period of time. That is, the market could be open for say a month or a year ahead, and participants could file bids and offers until accepted by other participants or until modified over time. Pay-as-bid would be inherent in such arrangements. An issue raised by such a process is how far bilateral agreements can be made independently of implications for the system as a whole. Similar issues are raised by trading outside the pool. A model including this type of price setting process is discussed in Chapter 6.

Comprehensive Prices and Capacity Payments

5.22 In most organised markets, a single price remunerates the seller for all costs of production. This is not the case in the Pool. The existing arrangements require additional payments above System Marginal Price to be made to all generators who declare themselves available. In summary, generators who run receive a capacity payment and those who do not, but who are available to run, receive an Unscheduled Availability (USAV) payment which is very similar[21].

5.23 Capacity payments were introduced into the pricing structure in the Pool because of concerns that without them Pool prices would not lead to sufficient capacity being available to meet demand. It was argued that if prices were set on the basis of marginal costs, then plant which runs infrequently might not recover sufficient of its fixed costs to make it worthwhile for its owner to continue to make it available. This might be true even if the capital costs of this plant were 'sunk' and incremental costs of maintaining the plant on the system were low. Moreover, revenue expectations in such a market might discourage new

[21] In the remainder of this section, the terms capacity and capacity payments are used and should be taken to include reference to USAV and USAV payments as well.

investment. It was argued that by making payments explicitly to reward capacity being available on the system, whether or not it is called to run, such little used capacity would receive sufficient revenue to cover its fixed costs. Arguments in favour of capacity payments are therefore based on the assumption that they are important in maintaining system security.

5.24 Arguments against capacity payments include that they require an external authority to pronounce upon the value of capacity. This will vary from one customer to another, and which ought, as far as is possible, to be determined by the market rather than being imposed on it. The possibility of changes in the principle or the calculation of capacity payments can also cause uncertainty. Energy plus capacity bids are more complex and lead to more opaque price setting processes. They may be used to exercise market power.

5.25 The main issue to be addressed is whether capacity payments are appropriate in a reformed market. A secondary issue, if they are, is whether any changes should be made to the ways in which they are calculated. Experience in England & Wales suggests that the extent of capacity payments are subject to influence by the larger generators (for example by closure decisions) and that they are able to adjust other elements of the total price to compensate for variations in capacity payments. It is thus not clear that capacity payments in practice play the role once attributed to them.

5.26 As noted in Chapter 3, there are a variety of ways in which concerns as to the provision of capacity can be addressed in competitive market systems. None of these mechanisms has yet been in place, in their present form, for more than a decade. Nevertheless, it is hard to conclude that capacity payments are the only means of ensuring that capacity will be available when required or that they are necessarily the most efficient way of achieving this. Instead, the market could be expected to provide sufficient signals for the retention of existing capacity or for the investment in new capacity. If such signals are considered insufficient, there are other arrangements that can be contemplated. For example, in Victoria VPX can contract for capacity to be made available as part of its reserve trader role, and in some US power pools suppliers are required to meet specified reserve margin requirements.

5.27 At this stage, it does not appear that the revised trading arrangements need to have a capacity payment element; it is an option that can be included or excluded. The need for such an element may also vary amongst trading models, for example in terms of how efficiently they deal with issues such as the management of reserve margins.

The Treatment of Imbalances and Transmission Constraints

5.28 There may be imbalances between what generators and suppliers bid to provide or take, and what they actually provide or take. In a market requiring firm bidding, these imbalances will need to be identified and dealt with. The costs of some of these imbalances will need to be established in a balancing market, and the costs of the imbalances charged to the parties in question, rather than spread over market participants or suppliers as a whole. The ways in which this is best done are for consideration.

5.29 Not all potential imbalances reflect imperfect foresight. It may be that transmission constraints prevent certain buyers and sellers from providing or taking their preferred quantities, at least from their preferred trading partners. One question is how and when such constraints are best identified and communicated to the parties involved; another is how far compensation payments should be made. The rest of this section focuses on this latter point.

5.30 The existing trading arrangements in the Pool include payments to generators who are constrained on or off the system. In effect, this implies that there are existing firm transmission rights for all participants, or at least for all generators; the right to convey electricity over the transmission network is treated as firm, and if the electricity cannot be carried, a compensation payment is made. These rights are enjoyed by existing participants, and all new entrants once a connection agreement has been obtained from NGC.

5.31 In the past, there has been criticism that constraint payments have influenced the bidding of some generation plant, especially if the bidders believe that on the day they will be constrained. Some have therefore argued that such payments should be abolished.

5.32 Some argue that it may be difficult or inappropriate not to remunerate generators who are constrained on, because they provide services to relieve system difficulties, and otherwise such services may not continue to be provided. Concerns that bids from generators anticipating being constrained-on might be excessive may be better met by a combination of strengthening competition, new investments in the transmission system, regulatory oversight and by NGC striking contracts under appropriate incentive schemes, as it is able to do now.

5.33 There are arguments in favour of abandoning constrained-off payments. They may distort bidding behaviour, as well as the price signals as to where and how much to generate, and where to locate new plant and where and when to close existing plant. Making such payments may also dilute the economic signals to reinforce or expand the

transmission system. Arguments against abandoning such payments are that the generator has little control over transmission investment[22] and should not be penalised if, through no fault of its own, it cannot run on the day[23], and that existing property rights are being removed without compensation.

5.34 Constrained-on plant plays a useful role in allowing the System Operator greater flexibility in balancing load and demand. There are other options, not necessarily mutually exclusive, such as contracting for such capacity, or including it in some form of daily balancing market.

5.35 The existing system recognises certain rights of existing users and provides remuneration, in terms of constrained-off payments, if such rights cannot be exercised. That said, there may be arguments in favour of amending constrained-off payments, to reduce costs and give better signals in relation to new investment on the system.

5.36 There may be scope for enabling generators and suppliers to choose between firm and non-firm transmission rights at differing rates, linked to retaining or foregoing any rights to constrained-off compensation.

5.37 The effective treatment of transmission rights and constraint payments potentially applies to all of the market models under consideration and needs to be assessed in relation to each of them.

Other Features

5.38 The models described in the next Chapter variously illustrate different approaches to these features described in this chapter. A number of other features remain to be addressed in the later stages of the Review. These include whether or not prices should incorporate locational aspects, how imbalances on the day other than those due to capacity constraints are treated, and the approach to ancillary services.

[22] Unless the opportunity costs are very high, in which case the generator might find it economic to invest in enhancements to the transmission system.

[23] The discussion here assumes constrained-off means no running; it can mean running at partial load at an output below that which was bid. The arguments remain the same in the latter case; only the economic magnitude of the impact changes.

6 POTENTIAL MODELS FOR ALTERNATIVE TRADING ARRANGEMENTS

6.1 The previous two chapters discussed the building blocks of electricity trading arrangements and the various approaches to each issue which can be adopted. By taking different combinations of these building blocks, it is possible to construct a multitude of alternative trading models. This Chapter presents four of these combinations in order to illustrate the potential for designing alternatives to the present trading arrangements in England and Wales.

6.2 The four models described here are chosen for illustrative purposes. They do not necessarily reflect the views or preferences of OFFER as to the final form of trading arrangements that might be developed for the electricity market in England and Wales. Rather, by drawing together the issues discussed in the previous Chapters and describing how alternative trading models might operate in practice, it is hoped to facilitate discussion amongst participants in the review process.

Summary of the Four Models

6.3 The four models represent a spectrum of possibilities, ranging from developments of the present Pool (Model 1) to alternatives that are increasingly aligned with arrangements in other commodity and financial markets (Model 4). These models have only been developed in outline and many of the details remain to be specified if it seems appropriate to do so.

6.4 For ease of comparison with the alternative models, the present Pool trading arrangements are summarised in Figure 1. The Pool consists of a non-firm day-ahead market in which only generators, and a very limited number of demand side bidders, participate. Generators submit complex offers comprising start-up, no-load and incremental prices as well as dynamic parameters associated, for example, with maximum rates of change of output. On the day, the System Operator adjusts generation to meet demand in real time to derive ex post prices reflecting the actual supply and demand situation on the day.

6.5 Model 1 is based on the so-called “day-ahead ex-post market” developed by the Pool. It has a day-ahead market that is similar to that embodied in the present Pool. The principal differences from the present Pool are the incorporation of full demand side participation in the market; firm offers and bids from generators and suppliers (and potentially customers); the absence of capacity payments; and the fact that the day-ahead schedule used for establishing prices incorporates transmission constraints. The System Operator balances the system in

real time on the day using any offers and bids from the day-ahead market that had not previously been accepted.

6.6 Model 2 incorporates all of the new features of Model 1. The demand side is included, offers and bids are firm, there are no capacity payments, and the schedule established in the day-ahead market incorporates transmission constraints. Model 2 has two further features. The generator offers are simple and do not include any technical information or start-up and no-load prices. In addition, Model 2 incorporates a separate on-the-day balancing market, which is used by the System Operator to balance supply and demand on the day. The offers and bids made into the balancing market need not be related to the offers and bids in the day-ahead market, but, as in that market, the offers and bids are firm and simple in structure. Only the System Operator can accept bids and offers in the balancing market (in other words, the System Operator is the counter-party to all trades).

6.7 Model 3 is a development of Model 2 incorporating two changes. First, the day-ahead market is simpler and more transparent as no account is taken at this stage of transmission constraints. This enables generator offers to be aggregated in strict price order. Second, in the on-the-day balancing market, trades amongst all parties are permitted enabling, for example, generators to trade with suppliers directly and generators to trade with other generators (or suppliers with suppliers). These two developments in Model 3, compared with Model 2, are intended to facilitate the participation of financial traders in both the day-ahead and the balancing market. The System Operator makes adjustments via the balancing market to deal with transmission constraints.

6.8 Model 4 extends the ideas developed in Model 3 of encouraging participation in the market. Model 4 seeks to apply methods used in traditional commodity markets, such as futures and options contracts, to wholesale electricity trading. Model 4 again incorporates full demand side participation, firm offers and bids specified simply by prices and quantities, and no capacity payments. However, Model 4 does not have a single day-ahead market. Instead it incorporates a transparent exchange-based forward electricity market, which is open for a defined period (such as a year) before the day on which physical delivery takes place. Participants buy and sell electricity at prices they themselves determine when a contract is struck. A second market, termed the options market, provides participants with the ability to manage the risks associated with their actual generation or demand in a given half hour being different from that established in the forward market. The market is termed an “options market”, as what is traded in

the market will be the right to take or sell physical delivery of electricity on the day, if required[24].

[24] A "call" option would, for example give the purchaser the right (but not the obligation) to purchase electricity at a pre-arranged price in exchange for a fee (the option fee). A "put" option would give the purchaser the right to sell electricity, or reduce a previously agreed commitment, again in exchange for an option fee.

Figure 1: Present arrangements

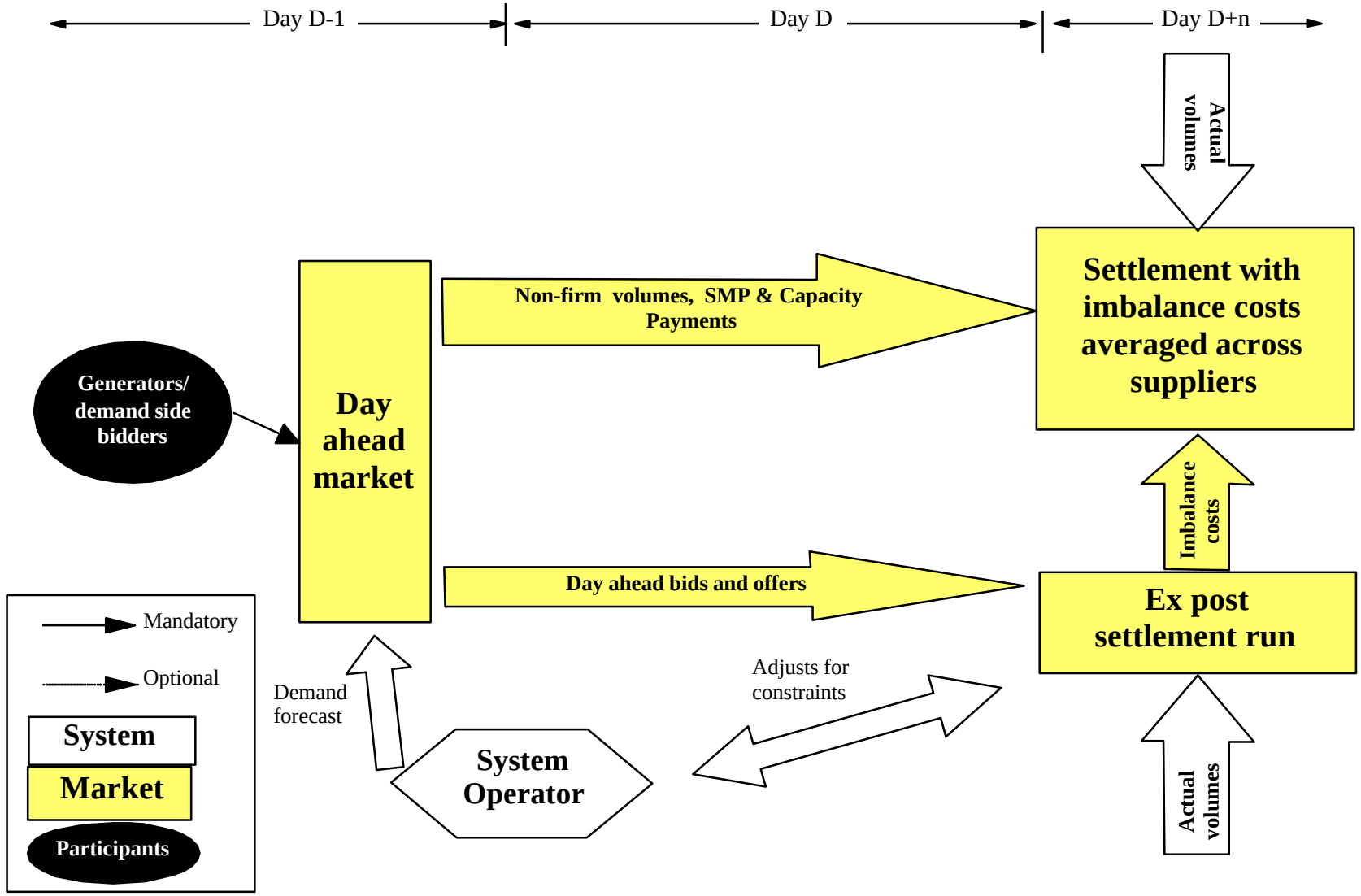
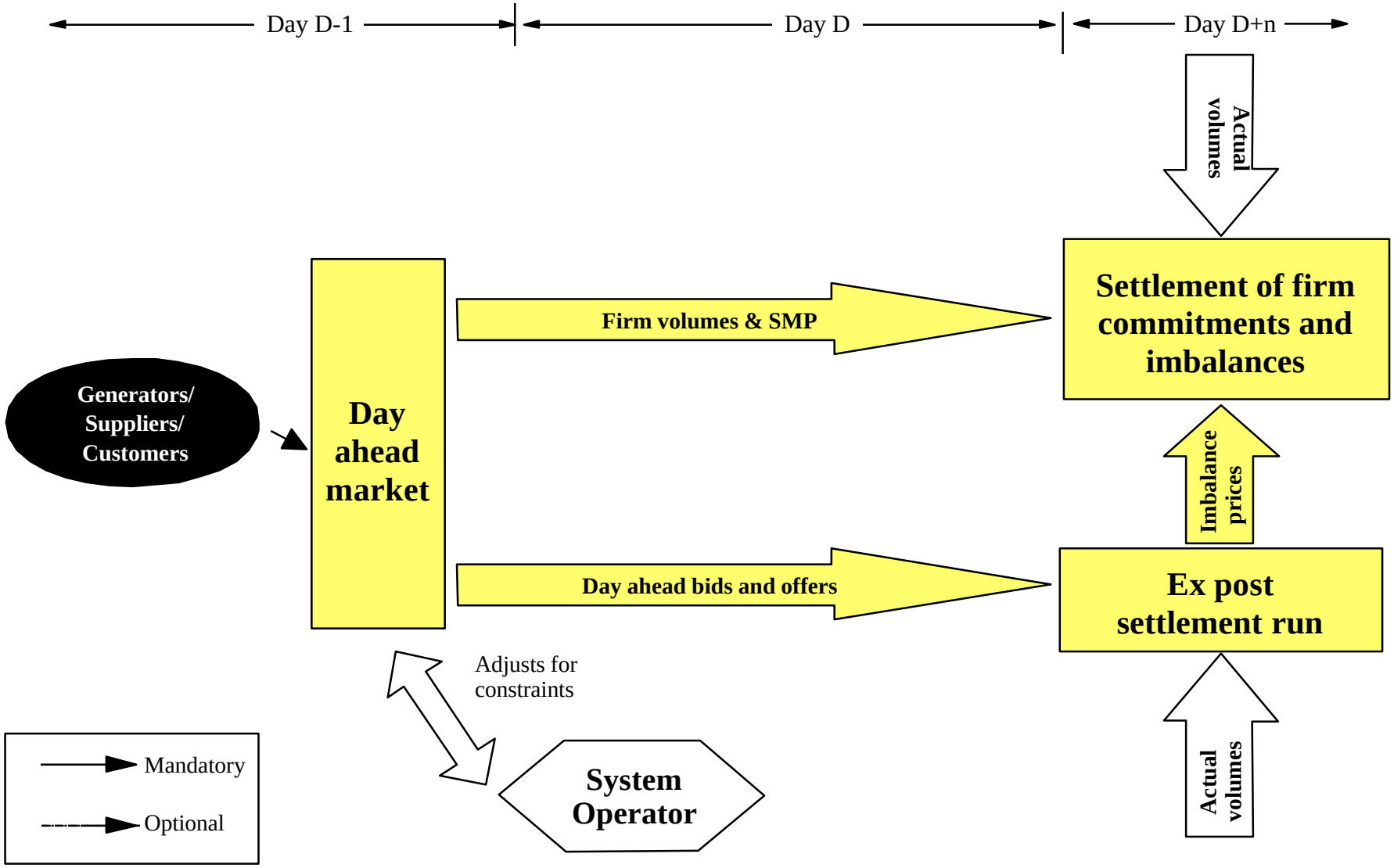


Figure 2: Model 1



6.9 The four alternative models are portrayed diagrammatically in Figures 2 to 5. A somewhat more detailed description of each of them follows.

Model 1

6.10 This trading model is based upon the so-called "day-ahead ex-post market" identified by the Pool for longer-term development[25]. The description given here is an interpretation of one form of the model set out in the Pool sub-group's report and has not been endorsed by the Pool itself. Figure 2 represents the trading arrangements under Model 1.

6.11 As in the present trading arrangements, this model consists of a day-ahead market together with a process administered by the System Operator to derive ex post prices reflecting the actual supply and demand situation on the day.

6.12 Unlike the present arrangements, the day-ahead market is a market in which suppliers and customers as well as generators can participate. Generators submit offers for each of their generating units in the same format as at present. The offers are therefore complex in nature. The offers specify where the electricity will be generated. Suppliers (and customers) bid simple price/volume curves for each half-hour of the following day. These bids also specify the grid supply point at which the demand will be taken.

6.13 Prices in the day-ahead market are calculated, for each half-hour, on the basis of the intersection of the aggregate generation offers and demand bids. Prices are thus set on a market-clearing basis. There are no capacity payments, but, as in other models discussed in this chapter, suppliers and customers are able to reflect their own value of lost load within their demand bids.

6.14 Under the present arrangements, the day-ahead (price-setting) generation schedule ignores any transmission constraints which would arise from accepting offers in strict price order. In contrast, the day-ahead schedule in Model 1 would take account of transmission constraints. The precise way in which this would be achieved, and its implication for prices, requires further consideration.

6.15 Also unlike the present arrangements, accepted bids and offers in the day-ahead market are firm. This means that deviations from the volumes established at the day-ahead stage are settled at ex post market prices.

[25] "Day-ahead and ex-post markets" scheme as set out in the Final Report from the Demand-Side Sub-Group (D109/787)

6.16 On the day itself, the System Operator adjusts generation to meet demand in real time on the basis of the bids and offers submitted but not accepted at the day-ahead stage. It is assumed that the System Operator is given a commercial incentive to minimise the costs of balancing the network, as is the case under the present arrangements.

6.17 After the event, ex post prices are calculated for each half-hour, on a market-clearing basis, using the actual (metered) output produced by generating plant and their offer prices from the day-ahead market.

6.18 The ex post prices are used to settle any differences between scheduled generation and consumption levels established at the day-ahead stage and actual metered quantities. For example, if a generator had an offer of 500 MWh accepted in the day-ahead market for a particular half-hour but, in the event, only generated 400 MWh on the day, he would be exposed to the ex post price for the relevant half-hour for his 100 MWh shortfall. Similarly, a supplier or customer whose metered demand was higher than its day-ahead commitment would pay the ex post price for the extra consumption.

6.19 In this model, it is necessary to identify the reasons for the change in a generator's output from the scheduled day-ahead quantity. The settlement procedures would need to distinguish between changes in output requested by the System Operator and other deviations from the firm day-ahead position. Thus, imbalances caused by a generator simply responding to the System Operator's instructions, following changes in demand levels or constraints on the transmission system, would be treated differently to those resulting from failure of the generator's plant on the day.

Advantages and Disadvantages of Model 1

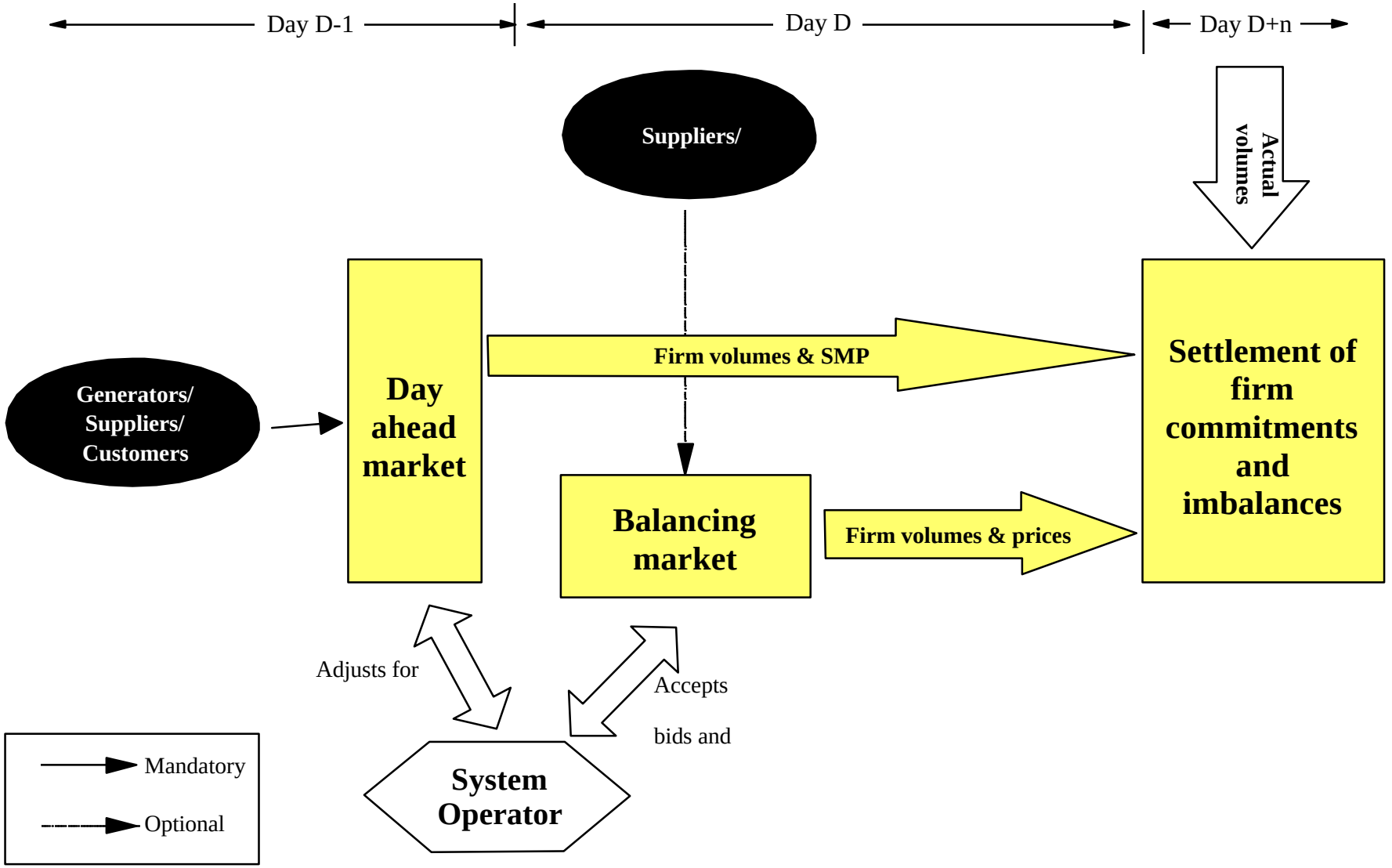
6.20 The trading arrangements for Model 1 offer two main advantages over the present Pool. First, the inclusion of the demand side, via bids from suppliers and those customers that choose to participate directly in the market, overcomes one of the objections to present arrangements, namely that they are one-sided. Second, the fact that all bids and offers are firm improves the allocation of costs associated with changes from market positions established at the day-ahead stage.

6.21 A principal disadvantage of this model is the reduced transparency in price setting that it is likely to accompany the combination of complex generator offers and a day-ahead market which allows for transmission constraints.

Model 2

6.22 This trading model consists of a day-ahead (D-1) market similar to that in Model 1. In addition, it has a balancing market that operates during the trading day. This is used to determine ex post prices instead of the administered process envisaged in Model 1 (see Figure 3). Model 2, like Model 1, incorporates demand side participation in price determination and firm offers and bids from generators and suppliers (or customers).

Figure 3: Model 2



6.23 Unlike Model 1, generators' offers to the day-ahead market have a simple format and do not include any technical information or start-up or no-load prices. Generators can submit sets of prices and volumes for each of their generating units that can vary by half-hour (as can the bids of suppliers or customers). As for Model 1, the offers specify where the electricity will be generated and the bids where the demand will be taken.

6.24 On the basis of simple offers and bids presented to the Market Operator, generators and suppliers (and customers) establish firm positions for each half-hour of the following day. As in Model 1, market prices are set on a market-clearing basis by the intersection of the aggregate offers and bids for each half-hour, taking into account transmission constraints. However, the pricing mechanism is more transparent and easier to understand than that in Model 1 because of the simpler format of generators' offers. There are no capacity payments, but, as in Model 1, suppliers and customers are able to reflect their own value of lost load within their demand bids.

6.25 On day D itself, the balancing market facilitates the matching of actual supply and demand by the System Operator. Generators, suppliers and customers can submit bids and offers into this market. Balancing market bids and offers can be posted, modified or withdrawn by participants at any time. The prices associated with the offers and bids in the balancing market need not be the same as those submitted in the day-ahead market.

6.26 The System Operator accepts bids and offers from the balancing market to match generation to expected demand, taking into account transmission constraints. Accepted bids and offers become firm and are settled at the prices specified by the respective participants. Thus, in the balancing market, participants are "paid as bid" rather than at a common market-clearing price. Only the System Operator can accept bids and offers in the balancing market (in other words, the System Operator is the counter-party to all trades).

6.27 At some point close to real time, known as "gate closure", it will not be feasible for the System Operator to continue using the balancing market to match generation to demand. From this point onwards, the System Operator can act directly to match supply and demand, as in Model 1.

6.28 Imbalance charges are imposed on generators whose metered output is less than their day-ahead commitments and suppliers (or customers) whose metered demand is higher than their day-ahead commitments. Conversely, generators that produced more and suppliers whose demand is less than their day-ahead commitments would receive

imbalance payments, albeit at prices prevailing in the balancing market which would not necessarily be attractive. These imbalance charges and payments might be set at the volume-weighted average price of the accepted offers and bids in the balancing market.

6.29 Thus, if, for each half-hour on day D, a generator produced the same amount of electricity as was accepted by the Market Operator at the day-ahead stage (D-1), the generator would have no exposure to imbalance charges in this model. Similarly, a supplier or customer whose demand on the day was exactly as the bid accepted in the market at the day-ahead stage would not be exposed to imbalance charges.

6.30 Balancing market offers, like those in the day-ahead market, have to specify the generating unit to which they relate. Similarly, balancing market bids must specify the grid supply point at which the demand will be taken. This enables the System Operator to refine the half-hourly schedule of generation and demand produced at the day-ahead stage in the light of events on the day.

Advantages and Disadvantages of Model 2

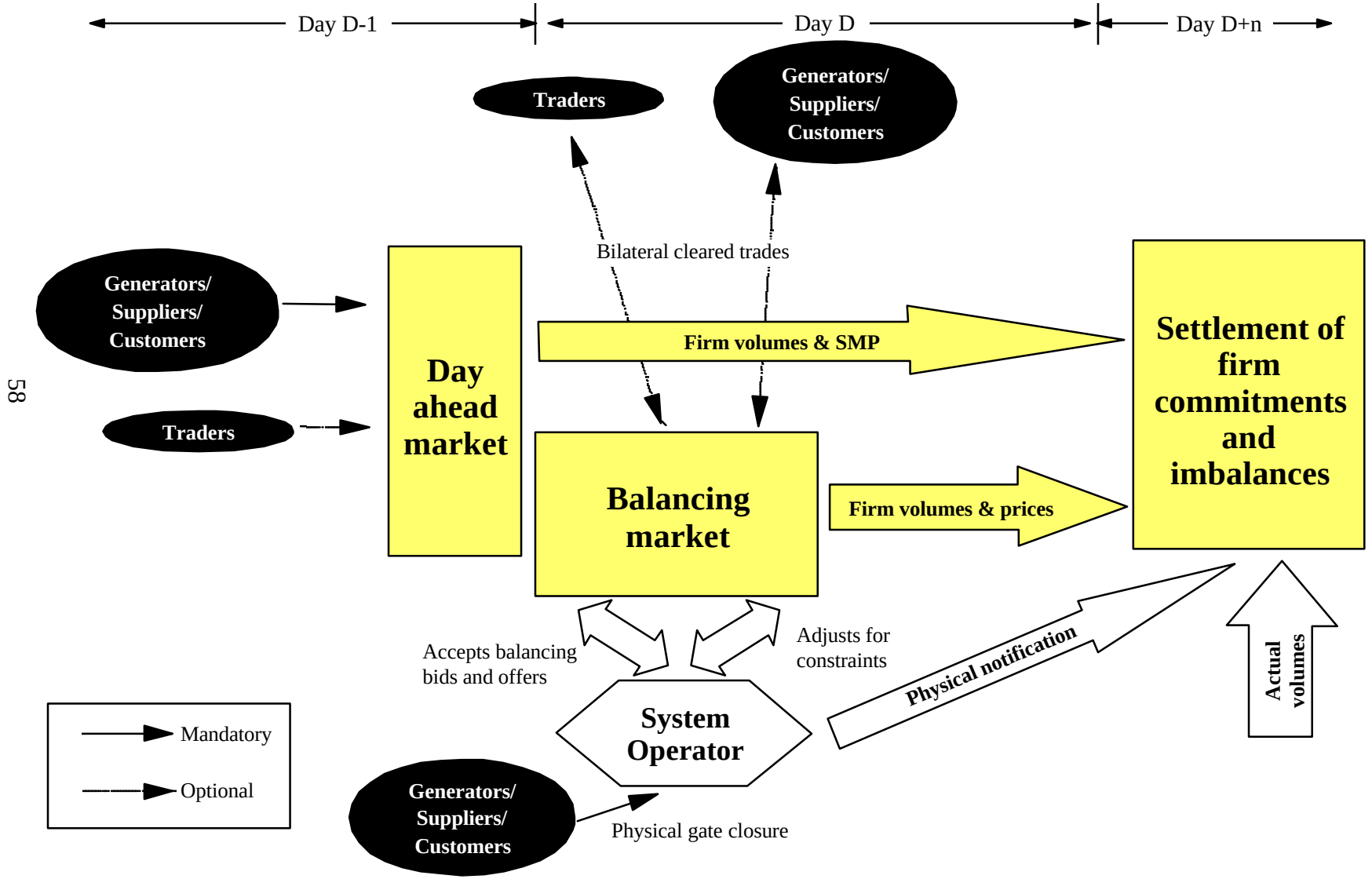
6.31 Model 2 has two principal advantages over Model 1. First, the simplicity of generators' offers increases the transparency of the market and allocates the costs and risks associated with despatch to the parties best placed to manage them. Second, the establishment of a balancing market improves the on-the-day price signals, giving generators, suppliers and customers the opportunity to revise bids and offers for adjustments to the firm positions established at the day-ahead stage.

6.32 Since Model 2 takes account of transmission constraints in the day-ahead market, the same issues with regard to how this might be achieved in practice, and its implications for prices, apply to this model as to Model 1.

Model 3

6.33 Like Model 2, this trading model consists of a firm day-ahead market together with an on the day balancing market (see Figure 4). As for Models 1 and 2, there are market-clearing prices in the day-ahead market based on simple price/volume bids and offers. There are also imbalance charges and payments that could be based on the average prices obtaining in the balancing market.

Figure 4: Model 3



6.34 The features of the day-ahead market in this model are similar to those of the Nord Pool spot market in Scandinavia. The design of the balancing market in this trading model is consistent with recent developments in Australia, Alberta and California where the electricity markets aim to set prices as close as possible to real time.

6.35 Model 3 differs from Model 2 in two main respects. First, the day-ahead market is simpler and more transparent as no account is taken of transmission constraints. This enables generator offers to be aggregated in strict price order with no modifications being required to deal with transmission constraints. Moreover, there is no obligation on generators to submit separate offers for each of their generating sets or on suppliers to bid by grid supply point. Effectively, generators, suppliers and customers construct supply and demand curves stating the volumes of power they wish to buy or sell power at given price levels in the day-ahead spot market. Consequently, the day-ahead schedule relates to the output of each generator rather than each generating unit.

6.36 Since market participants only have overall physical commitments rather than commitments at specific locations (as in Models 1 and 2), it will be easier for financial traders to participate in this market. The simpler and more transparent pricing mechanism incorporated in this model may also encourage the involvement of financial traders.

6.37 Second, in the on-the-day balancing market, trades amongst all parties are permitted enabling, for example, generators to trade with suppliers directly and for generators to trade with other generators (or suppliers with suppliers). Allowing bilateral trades on the day provides market participants with greater scope to adjust their positions and hence avoid imbalance charges. The System Operator can also participate in the market.

6.38 Model 3, like Model 2, incorporates the concept of gate closure. In addition, at some point before gate closure, the System Operator will need to be informed of the output commitments of each generating unit and the demand commitments at each grid supply point so that it can make adjustments via the balancing market to alleviate transmission constraints[26]. Up to this point, bids (offers) in the balancing market will not need to specify a grid supply point (generating unit).

6.39 Participants can continue to trade bilaterally on the balancing market after this point (until gate closure) but trades must be verified by the

[26] This issue does not arise in Models 1 and 2 in which offers are specific to a generating unit and bids to a grid supply point in the day-ahead market (and the balancing market, for Model 2). Thus, from the publication of the day-ahead schedule onwards, the System Operator is aware of each generating unit's output commitments and the demand commitments at each grid supply point.

System Operator to ensure that they do not violate any transmission constraints.

Advantages and Disadvantages of Model 3

6.40 An advantage of Model 3 over Models 1 and 2 is that market players have the opportunity to try to rectify expected generation or demand shortfalls themselves rather than remain exposed to the ex post imbalance charges set by The System Operator. A second advantage is that financial traders will be better able to participate directly in the day-ahead market and the balancing market (before gate closure), thereby improving liquidity.

6.41 A potential disadvantage of this model is that the settlement process would be more complex. In addition to deviations between day-ahead and actual positions, there could also be deviations between the output or demand commitments notified to the System Operator prior to gate closure and day-ahead positions.

Model 4

6.42 Model 4 seeks to apply methods used in traditional commodity markets, such as futures and options contracts, to wholesale electricity trading. As well as drawing on experiences gained from other commodity and financial markets, Model 4 shares many design features with the Finnish power exchange El-Ex[27]. In some respects, Model 4 can also be regarded as an extension to the ex ante market of the trading principles incorporated in the balancing market of Model 3 in the sense that bilateral trades are envisaged over a significant period of time. An important difference is that there are penalties for imbalances, hence participants themselves contract for load-following "options" in a separate market. Figure 5 represents the trading arrangements under Model 4.

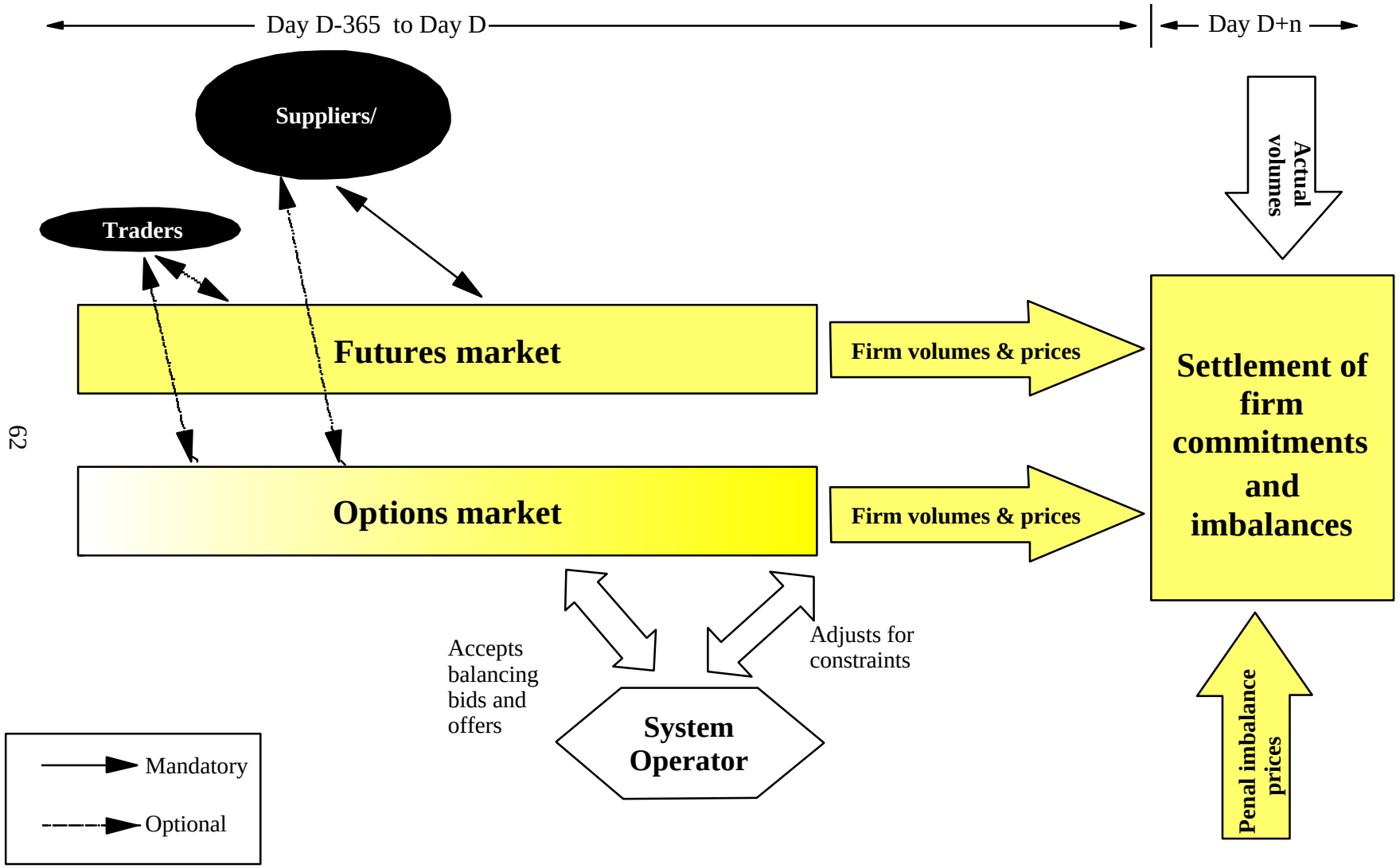
6.43 Model 4 comprises two markets. The first is a forward electricity market, which is open not just on the day-ahead but for a defined period (for example, up to one year ahead) before the day on which delivery takes place. Implicit in this forward market, as in the balancing markets of Models 2 and 3, is the presumption that trades will mature into physical delivery of electricity. The expiry of contracts will be as close as possible to the actual period traded.

6.44 In this forward market, trades take place on a bilateral basis at prices agreed between the buyer and the seller. The forward market is

[27] This market was mentioned in OFFER's background paper on electricity trading arrangements in other countries. El-Ex does not separate spot and futures trading, and its contracts are settled physically rather than for cash. Contract lengths extend from one hour to a season, and deals are allowed up to two hours before delivery.

transparent. All trades between sellers and buyers of electricity (and all bids and offers to buy or produce) are conducted through an exchange. The prices at which transactions take place are available for all market participants to see (although market participants would not necessarily be aware of the identity of the counter-parties to individual trades). Prices in the market are based on the bilateral matching of offers from generators and bids from suppliers and customers.

Figure 5: Model 4



6.45 The market operates with a clearinghouse interposed between sellers and buyers. In effect, although trades are agreed bilaterally, sellers of electricity sell to the clearinghouse and buyers purchase from the clearinghouse, which receives a fee for providing the service. This is known as a "cleared market". It ensures that market participants are not exposed to counter-party risk (other than to the clearinghouse).

6.46 The second market is a so-called "options" market. It provides participants with the ability to manage the risks associated with their actual generation or demand in a given half-hour being different from that established in the forward market. This is particularly important as generators and suppliers are exposed to penalty payments for any deviations from their forward market positions.

6.47 "Call" options would give the purchaser the right (but not the obligation) to call for generation (if issued by a generator) or a demand reduction (if issued by a supplier or customer). Conversely, "put" options would give the purchaser the right to call for an output reduction (generators) or an increase in demand (suppliers or customers).

6.48 For example, a supplier may have covered his expected demand for every half-hour in a given month through trades in the forward market. These trades may have been entered into months or even years earlier. If, in the event, the supplier's demand were greater than had previously been expected, it would call on options that it had secured in the options market to cover the extra demand. The counter-party to the supplier's "call" option would be any party that could provide an increase in generation, or a reduction in demand, at short notice. It could therefore include suppliers and customers as well as generators with flexible plant.

6.49 The options market would be transparent with respect to the prices at which deals were struck between the buyers and sellers of the options. It would be run by the same body as that running the forward market and would also operate as an exchange-based cleared market.

6.50 If, in a given half-hour, the actual output or demand of a generator or supplier (or customer) is different from that which had been secured in both the forward and options markets, the market participant would be exposed to some penalty related to the size of the mismatch. This penalty price for electricity could be set at some fixed rate or could be based on some multiple of prices in the options market for the previous month or in the corresponding month in the preceding year.

6.51 Although it would be expected that market participants would balance their own positions via participation in the options market, the System

Operator would need to ensure that aggregate generation and demand remained in balance in real time. The System Operator would do this by participating in the options market itself, purchasing call options to enable it to meet potential supply shortfalls and put options to avoid potential generation surpluses. It is for consideration whether the System Operator could rely on suitable options being available in the market or would need to be given residual powers to instruct generation or to contract separately to be able to do so.

6.52 The System Operator would also participate in the options market as a means of managing transmission constraints. If, on the basis of trades entered into in both the forward and options markets, the System Operator anticipated that a constraint would exist, it would exercise call and put options to change the pattern of physical delivery of power, thereby alleviating the constraint. These options would be written with generators, suppliers and customers, which would ensure the maximum participation by market participants in the alleviation of constraints. This would be expected to reduce the overall costs of constraints.

6.53 It is assumed that all trades for physical delivery of electricity take place via the exchange, at least in the early stages of operation of the market. As for the other models, it is envisaged that financial contracts and derivative instruments would develop around the exchange. However, in this model, such contracts would be cash-settled against the transparent prices in the forward and options markets.

6.54 The effectiveness of Model 4 may depend on the conditions for efficient operation common to forward and options markets. Principal among these is the inability of the participants on either side of the generation and supply markets to influence price setting in them. How far this will hold is a question for all the models; it is particularly important for Model 4.

6.55 Tenders could be invited from suitably qualified bodies for the operation of the forward and options markets. Invitations to tender need not be restricted to those with experience of operating electricity markets, but could include bodies with experience gained in other commodity or financial markets.

6.56 The tender documents would specify a minimum set of features that would have to be incorporated within the design of the markets. Flexibility could be given to the tender respondents with regard to the specific proposal that they may wish to make. This would ensure that maximum advantage was gained from relevant experience in other markets and would allow innovative approaches to be considered. The

criteria against which the successful market operator was chosen would need careful consideration.

6.57 There would need to be incentives to operate efficiently and in the interests of all parties trading on the exchanges. It is for consideration whether the body chosen to run the forward and options markets should operate on a for-profit or a not-for-profit basis. Fees might be related to the number of transactions in the two markets so as to encourage the maximum level of market liquidity, but other considerations might be relevant also.

6.58 It is for consideration how far the operators of each market should be subject to financial regulation via the Financial Services Authority (FSA), along with other bodies responsible for running financial exchanges, and regulation by OFFER. Given the nature of the market operator's business and the fact that, at least in the early stages of operation of the market, it would be expected to have a monopoly position, it is anticipated that the markets would operate with a licence, which would be for a limited period, before renewal or re-award.

Advantages and Disadvantages of Model 4

6.59 Model 4 draws on experience in commodity and financial markets to minimise differences between electricity and other markets. This could be helpful it in itself, and the familiarity of the Model 4 trading arrangements to financial traders could encourage their participation in the market, resulting in greater liquidity, improved transparency and enhanced efficiency.

6.60 On the other hand, some present industry participants may argue that Model 4 represents too great a change from the present arrangements and that it relies too heavily on market measures to secure the reliable delivery of electricity.

Comparing the Models against the Present Trading Arrangements

6.61 Table 1 sets out the key characteristics of the four models, and compares them with the present Pool.

TABLE 1: KEY CHARACTERISTICS OF THE FOUR MODELS

CHARACTERISTICS	PRESENT POOL	MODEL 1	MODEL 2	MODEL 3	MODEL 4[(1)]
Day-ahead market	Yes	Yes	Yes	Yes	Forward market[1]
Full demand side	No	Yes	Yes	Yes	Yes
Simple generator offers	No	No	Yes	Yes	Yes
Firm bids and offers	No	Yes	Yes	Yes	Yes
Location specific[(2)]	Yes	Yes	Yes	No	No
Transmission constraints	No	Yes	Yes	No	No
Financial traders can	Difficult	Difficult	Difficult	Yes	Yes
Bilaterally agreed	No	No	No	No	Yes
On the day market	No	No	Yes	Yes	Options market[1]
Full demand side			Yes	Yes	Yes
Simple, firm bids and offers			Yes	Yes	Yes
Participants trade bilaterally			No	Yes	Yes
System Operator can			Yes	Yes	Yes
Financial traders can			No	Yes	Yes
Imbalance charges	No	Yes	Yes	Yes	Yes

Notes:
(1) Rather than having discrete day-ahead and on the day markets, Model 4 envisages continuous trading on the futures and options exchanges. Such trading could extend from a year ahead of the delivery date to on the day itself.
(2) Location specific implies generator offers specify where the electricity will be generated and supplier (or customer) bids specify at which grid supply point demand will be taken

6.62 By fully including the demand side in the price setting process (via bids from suppliers and those customers that choose to participate directly in the market), all four models overcome one of the most commonly raised objections to present arrangements, namely that they are one-sided. Furthermore, compared to the present arrangements, the fact that all bids and offers are firm improves the allocation of costs associated with changes from market positions established in advance of the day itself.

6.63 In Models 2, 3 and 4, the simplicity of generators' offers helps increase the transparency of the market and allocates the costs and risks associated with despatch to the parties best placed to manage them.

6.64 Models 2, 3 and 4 give market participants greater commercial flexibility to adjust their positions closer to real time than under the present arrangements. In particular, Models 3 and 4 allow players to continue trading bilaterally in order to respond to developments on the day.

6.65 All the models could be more conducive to the development of liquid financial markets than the present arrangements. In Models 2 and 3, the use of simpler bids and the setting of prices independently in each half-hour should enable financial traders to understand better how prices re being set and hence to develop derivatives markets. The design of Model 4 draws on existing commodity and financial markets and the underlying conditions for the efficient operation of this.

6.66 Other issues identified in the preceding chapters – such as constraint payments, treatment of reserve, and locational pricing – have not been considered explicitly in these models. The basic structures described could be used to support a number of different options with regard to these issues and these will need to be considered in taking this review forward.

7 TRADING OUTSIDE THE POOL

The Present Position

7.1 For most participants in the electricity market in England and Wales, involvement in the Pool trading arrangements is compulsory. However, there are limited exceptions to this compulsory participation in the Pool.

7.2 An exempt generator is a generator who does not require a generation licence, and hence has no licence obligation to join the Pool. Exemption is granted to the operators of power stations which, in general terms, export less than 50 MW of electricity if their capacity is less than 100 MW, or 10 MW if it is greater. At present exempt generators are not required to bid into the Pool and therefore have the option to trade outside the Pool.

7.3 The principle of trading outside the Pool applies equally to the output of stations of licensed generators which, if viewed in isolation, would not cause the generator to need a licence.

7.4 Since 1 April 1993 only the net electricity flows of licensed generators with on-site demand have to be traded through the Pool. Customers who are supplied by on-site generation are, to that extent, able to trade outside the Pool.

TOP - What Is It?

7.5 TOP as a possible development of present arrangements is generally understood to mean a more fundamental change than would be associated with extensions to arrangements presently available to small generators and suppliers. In this report, as in OFFER's July 1994 Report on Trading outside the Pool, TOP is assumed to involve a reform of present arrangements to allow any generator and supplier, wherever situated, to enter into a bilateral contract for the sale of electricity and to require the System Operator to despatch that contract.

7.6 TOP can be described as arrangements that are **"voluntary, bilateral, firm, and pay as bid".** To understand better this description of TOP, each component will be described in turn.

7.7 **Voluntary –** Any generator, supplier, or customer[28] has the option to trade outside the Pool. These trades can replace or supplement Pool trades.

[28] In practice, it is likely that some minimum size of customer would need to be specified for TOP arrangements as they are described here.

7.8 **Bilateral –** The trade outside the Pool consists of a contract between a single generator and a single supplier or customer. It would be expected that the financial terms of the contract would be confidential between the two parties to the contract, unless a more formal market developed (see below). The System Operator is notified of the physical terms of the contract prior to the despatch of the contract.

7.9 **Firm –** The contract terms would impose firm commitments on the counter-parties with regard to generation and demand, at least at the day-ahead stage otherwise proper account cannot be taken of TOP contract volumes in determining the demand to be met by the residual Pool. If either party failed to meet the physical terms of the contract, it would be exposed to some cash out price for any imbalances. Under present arrangements, the cash out price for imbalances might be based on Pool prices.

7.10 **Pay as bid –** The price paid by the supplier (or customer) and received by the generator would be as agreed in the contract. In that sense, it would be similar to the "pay as bid" proposal. Prices for TOP contracts might emerge through bilateral discussions, or there might be some more formal market on which bids and offers could be registered.

7.11 Under such arrangements plant required to meet a bilateral contract outside the Pool might have preference of despatch over plant bidding into the Pool, although what degree and level of preference is an important point to be considered in the review. The contract is settled bilaterally without revenue flowing through the Pool. A key feature of such trading outside the Pool is thus that the output that is contracted need not be offered into the day-ahead market to be despatched. However, the System Operator needs to be notified of the physical terms of contracts so that likely flows on the system can be checked for transmission constraints.

Previous Analysis

7.12 TOP has been addressed on previous occasions[29]. In July 1994 the Director General of Electricity Supply published a "Report on Trading Outside the Pool". This Report was a response to the Minster for Energy's request that the DGES look further into the possibility of trading outside the Pool. The DGES consulted widely on the issues involved.

7.13 The July 1994 Report concluded that allowing trading outside the Pool could have potential benefits to those involved, and arrangements could be made to maintain co-ordinated control of the system.

[29] Report on Trading Outside the Pool OFFER July 1994; and a subsequent determination in December 1996

However, there was little tangible evidence of the possible gains and the arrangements would be time-consuming and costly to implement. The Report further noted that there were several potential detriments to competition and new entry, both from a thinner and less transparent market and from placing new entrants and smaller competitors at a disadvantage in securing rights to despatch. The DGES gave these detriments particular weight in view of market power on both sides of the market at that time and the possibility that significant change could have adverse effects on market stability.

7.14 In concluding that a sufficient case had not been made for trading outside the Pool, the DGES left open the possibility that he would consider the matter again if circumstances warranted it: in particular, in the event of a change in market conditions, a lack of progress in Pool reforms, the identification of more tangible benefits from trading outside the Pool, or less wide-ranging or costly arrangements to effect it.

7.15 There have been a number of developments since July 1994. Competition has developed further in generation and supply, though there is still far to go. Within the England and Wales market, there has been progress in some areas of Pool reform, such as information disclosure, but some of the wider changes anticipated in 1994, such as the simplification of bids, have not been introduced. In many respects there has been a lack of progress in the Pool. As discussed in Chapter 3, competitive electricity markets have been introduced or are being developed elsewhere that permit TOP. Although no clear consensus on the desirability of TOP has yet emerged, more experience is now available on the procedures and arrangements for TOP.

7.16 Any discussion of the pros and cons of TOP depends on the type of Pool arrangements against which it is being evaluated. This chapter focuses mainly on the case for TOP with the present trading arrangements in place.

Potential Benefits of TOP with Present Arrangements

7.17 Supporters identify a number of potential advantages of permitting TOP. First, it provides greater choice for generators, suppliers and customers. This would enable generators and customers to develop more efficient or less uncertain patterns of running plant and pricing electricity, and may encourage them to develop mutually satisfactory and more flexible contract structures as a result.

7.18 Second, if trading through the Pool were optional it could be expected that innovative trading arrangements would develop outside the Pool between willing buyers and sellers. It is not possible to envisage at this

stage precisely what form such arrangements might take. However, the development of an active market for trades outside the Pool could uncover new ways of trading electricity which would improve efficiency and thereby enhance the development of competition in generation and supply.

7.19 Third, trading outside the Pool might enable users to reduce some Pool charges which are in excess of the costs they impose on the system, and avoid those levied for services which they do not need. This does not imply that generators and customers trading outside the Pool should avoid all Pool or Transmission Services Use of System charges. Parties to TOP agreements would still receive benefits from services provided by the Pool and the grid.

7.20 The existence of TOP would increase the need to price Pool and transmission services in a satisfactory and transparent way which better reflects costs, and might therefore be expected to lead to greater efficiency. And although the difficulties associated with pricing Pool related services in a satisfactory way should not be underestimated, this does not, of itself, mean that efforts should not be made to resolve the problem.

7.21 Fourth, permitting trading outside the Pool could encourage the Pool itself to develop more efficient trading arrangements which better served the needs of Pool members and of customers more generally. In effect, TOP would act as a competitive threat to the Pool, which would be expected to respond with its own innovative measures to facilitate electricity trading. Whilst reforms to governance might enable the Pool to respond to necessary change in the future, the existence of one or more separate markets could sharpen such a response.

Potential Disadvantages of TOP with Present Arrangements

7.22 Several objections have been raised with regard to TOP. First, there is the concern that it could lead to a thin and weak Pool. In most systems, the spot market has an importance beyond its role in setting prices on the day. It also acts as a residual market, in the sense that any non-contracted capacity can always be sold into the spot market, providing bids are at or below SMP. Furthermore, it acts as a reference point for the contract market; the spot market prices provide an alternative to the contract prices on offer. Hence, it is important that there is sufficient liquidity in the Pool for Pool prices to be a reliable indicator of market conditions. Since TOP might reduce Pool liquidity, its introduction could reduce the extent to which Pool prices act as an indicator of market prices.

7.23 Second, and related to the first concern, TOP has the potential for reducing transparency in the market. Because all transactions taking place outside the Pool would be on the basis of bilateral negotiations between parties, it would not be possible to determine the prices and other terms under which such arrangements have been made. This contrasts with the present situation in which nearly all electricity is traded inside the Pool at published prices.

7.24 In practice, this loss of transparency may be less than it at first appears. Under present trading arrangements most electricity trades are hedged by bilateral contracts for differences (CfDs). These serve to reduce the risk facing both generators and suppliers (or customers) by effectively substituting a fixed contract price for an uncertain Pool price. Such contracts not only reduce risks for generators and suppliers, they also influence the way that generators bid into the Pool. They therefore have an influence on Pool prices, as well as being influenced by them.

7.25 The terms contained in CfDs are not published and they frequently contain confidentiality clauses specifically preventing the parties to the contract from discussing the contract terms with third parties. Lack of transparency with regard to contracts therefore characterises present trading arrangements, as indeed it does most markets, and allowing trading outside the Pool is unlikely to exacerbate the situation. Indeed, transparency might even be improved by TOP if price reporters become better established in a market in which the existence of several different types of contract (TOP contracts, CfDs and EFAs) increases the need for efficient price discovery on the part of contracting parties.

7.26 Third, and again this is related to the first concern, if TOP became the dominant form of trading, and the residual Pool was weak, new entrants might be discouraged and existing smaller players put at a disadvantage. If the market rested mainly on bilateral contracts, then new entrants would not have the alternative of a liquid spot market into which they would be able to sell any non-contracted output, and they might face difficulties finding customers with whom to contract. Existing smaller generators, especially those without plant portfolios, might find contract negotiations more difficult.

7.27 A fourth concern about trading outside the Pool concerns the potential that it provides for discrimination amongst customers. One source of this might be Pool and transmission charges. If TOP contracts did not include an appropriate share of such costs, such customers would gain an advantage at the expense of others. The suppliers who continued to purchase electricity from the Pool would have to pick up a disproportionate level of charges and would pass these charges on to their own customers. To the extent that trading arrangements

facilitated discrimination, this would be to the detriment of a fully competitive supply market.

7.28 A fifth concern is how TOP is made consistent with transmission constraints and the need to balance the system. Some of the other models discussed raise similar issues, and identify ways of dealing with the problem.

Observation

7.29 The arguments for and against TOP depend on the trading arrangements within the Pool against which they are compared. It will therefore be appropriate to examine the extent to which alternatives to present trading arrangements affect these arguments. They may be able to accommodate TOP more easily and overcome some of the objections to TOP that exist under present arrangements. Alternatively, they might be able to offer some of the advantages of TOP that are not presently available in the market or reduce the disadvantages of the Pool that lead some participants to argue for TOP.

8 REGULATION AND GOVERNANCE

8.1 This Chapter considers issues relating to the role, structure and governance of system participants, with particular reference to the Market Operator and the System Operator.

8.2 The main topics that it explores are the following:

- whether there is scope for improved governance arrangements of the Pool as Market Operator, and if so of what kind;
- whether there are tensions in the multiple roles of NGC, and if so how they might be alleviated;
- whether others should be given a greater role in the governance of the System Operator function;
- whether the existing arrangements in relation to commercial incentives are appropriate;
- whether there is scope for greater information disclosure in the Pool; and
- whether there is scope for new or revised powers for the DGES.

Market Operator Governance

8.3 The Market Operator, presently the Pool in England & Wales, runs the market for the provision of wholesale power. It contracts out a number of associated services, all to NGC, including:

- the forecasting of demand, the construction of the Unconstrained Schedule and the running of the programme that calculates SMP;
- the purchase of ancillary services;
- the settlement process;
- the management of settlement funds.

8.4 Governance arrangements in the Pool have been criticised on a number of grounds. In particular, it is claimed that the existing arrangements, which require significant voting majorities, and have complex and extended appeals processes for those believing themselves disadvantaged, delay the introduction of necessary reforms. It is also claimed that the Pool, being a multilateral contract rather than an

independent organisation, is not constituted in a way easily to allow participation by those other than parties to that contract.

8.5 A number of proposals, not all mutually exclusive, have been made to reform Pool governance arrangements, including: making the Pool a properly constituted legal entity; changing the voting rules to allow for simpler majorities; reducing the length and the complexity of the appeals process; changing the composition of the Pool's governing body; and giving the DGES more direct control over Pool matters.

8.6 The Pool could be reconstituted as some form of corporate body, such as a non-profit making company – for example, it could be a company limited by guarantee. It would then have a Memorandum and Articles of Association that could be drafted so as to take due account of some of the governance criticisms that have been levelled. Such an approach need not cut directly against the Pooling and Settlement Agreement (PSA), which could continue in a suitably modified form, but governance arrangements could then be more consistent with normal commercial arrangements rather than being enshrined in contract. Due care would need to be taken in terms of how those arrangements could themselves be changed in the future. Such an approach could provide a broader body of opinion to be included in Pool governance in the future.

8.7 The Pool voting rules could be changed to allow for simpler majorities in the event of decisions that were not unanimous. Care has to be taken here to balance the desire to effect reform with the need to protect those adversely affected. The arrangements would need to consider, for example, whether all parties would have equal voting weight or would allowances be made for the fact that some have greater commercial interests than others Because of such concerns, whilst there may be a case to change the voting rules, this should not be done in isolation; if the rules were changed, this may need to be accompanied by parallel arrangements such as a greater role for independent Board or Pool members and/or some form of regulatory oversight and approval of proposed rule changes.

8.8 The appeals process could be reduced in its length and complexity. Under existing arrangements, the process is extended, particularly during the internal Pool processes requiring resolutions to be referred to various Pool meetings for voting purposes, before reaching the stage at which an appeal can be made. This is in part a consequence of the existing voting rules and there is a case for changing these processes to allow for greater speed.

8.9 The representation on whatever is the governing body of the Pool could be amended to increase the participation by parties presently excluded

and to provide arrangements to break voting deadlocks. At present, representation is limited to Pool members, who have to be parties to the PSA, although the DGES, NGC, the Pool Auditor and (more recently) two consumer representatives have observer status. Representation could be increased in a number of ways: for example, increasing the number of participants who have some form of interest, but who are presently not represented; changing the role of observers and giving them greater rights to participate; changing the voting balance amongst those who are presently represented; and including participants who deliberately have no interest and who are thus seen as independent.

8.10 The powers of the DGES in relation to the Pool could be amended in a number of ways. These are discussed more fully at the end of this Chapter. They would probably require the activity of running the Pool to be licensed, so that the normal procedures for the DGES to amend licence conditions could apply.

8.11 This introduces the possibility that the licensed activity of running a pool could be put out to tender. A number of candidates could be envisaged for this activity, including the present Pool, but also other Pool organisations around the world and operators of financial and other markets. The franchise would need to be for a defined period within a defined framework of obligations and procedures. The operator might be a non-profit or a for-profit body. In other organised markets for-profit arrangements have been adopted, within a suitable framework, as a means of providing incentives to improve service and expand activities and to overcome inertia and other restraints against change.

Observations

8.12 The slow pace of past change, when seen in the light of a number of concerns as to specific aspects of the Pool's operations, is in important part a result of somewhat cumbersome governance arrangements. Whatever their initial purpose it has become clear that they have delayed reform and have not met the interests of non-members who have a legitimate interest in Pool affairs.

8.13 Future trading arrangements need a revised and more flexible governance, one that will allow and indeed initiate further amendment as the market continues to evolve and develop.

8.14 The ideas discussed above are in most cases inter-related and governance arrangements need to be considered in the round. Depending on the trading arrangements adopted, a possibility might be a Pool constituted in some corporate form, with a suitable Memorandum and Articles of Association, with membership of the

Board widely drawn and some form of independent representation. At the same time, the powers of the DGES in relation to the Pool need to be considered, for example by requiring it to be a licensee. The possibility of limited term tenders or franchises to operate a Pool should also be considered.

Potential Tensions in the System Operator Role

8.15 NGC runs the System Operator function of the market in England & Wales. It also owns the transmission assets. In any system, the role of the System Operator involves the despatch of plant according to pre-agreed criteria. Depending upon the processes involved, this can give it considerable influence over Pool prices. The despatch schedules are usually used to set the final prices in the spot or balancing market[30] (as opposed to the ex ante market). Ensuring that the System Operator has appropriate incentives and that it follows despatch criteria is important in terms of the overall effectiveness of the market arrangements. Therefore, two issues need to be considered: whether or not the System Operator has appropriate incentives to act in the interests of the system as a whole, and how compliance with any pre-agreed criteria is monitored.

8.16 A System Operator might have conflicting incentives in a number of respects, especially if it were, in addition:

- an owner of generation plant;
- a supplier or distributor;
- a trader in the market;
- owner of the transmission system.

8.17 NGC is not an owner of generation plant or engaged in supply or distribution. It can trade, in certain circumstances, in the market and it is part of the organisation that also owns the transmission assets.

8.18 At the moment, NGC cannot undertake the normal buying and selling of power in the market. Those purchases that NGC does undertake are in accordance with incentive schemes to reduce the costs of certain forms of ancillary services. Such trades ought not to encourage NGC to act perversely; if such trades are effective, both NGC and the market at large benefit.

8.19 Adverse incentives may exist if the System Operator is not neutral in terms of particular decisions that it may take. One example here

[30] Whilst the Market Operator sets ex ante, or even ex post prices, the actions taken by the System Operator in scheduling plant for despatch on the day impact the final prices paid by and to participants.

would be the trade-off between different ways of resolving system constraints, and another would be the provision of equipment to provide reactive power. In the former case, if the System Operator is also the transmission asset owner, then it may not be indifferent, at the corporate level, to a choice between locational decisions regarding new generation and investment in transmission assets. In the latter case, it may not be indifferent to reactive power assets being provided by the transmission system asset owner or by third parties. Against this it might be argued that there are advantages of co-ordination and knowledge if the System Operator is part of the same organisation as the transmission network owner.

8.20 There are a number of ways of dealing with such issues. Asset ownership and system operation could be separated, as has happened in Australia, Argentina and California. There could be a formal obligation on the System Operator to act in a neutral manner, and there could be rules, more or less prescriptive, on how the System Operator might act in certain defined circumstances and/or some form of regulatory oversight of its actions.

8.21 Monitoring of the System Operator can take a number of forms. It could involve rules which define how it should act in specific circumstances, for example requirements to schedule plant according to a merit order based on bids, to optimise over one trading period or a day, and to deal with constraints in a least cost manner. Monitoring of its decisions against these rules can have one or more of a number of forms: there can be a specific audit of its actions, undertaken by an experienced independent party; there can be self-policing by the market which would rely primarily on the provision of information to participants to enable them to judge whether or not *prima facie* the System Operator had followed the rules; there could be some form of market surveillance committee charged with ensuring compliance; and there could be some form of routine report by the System Operator on its compliance with market and system rules.

System Operator Governance

8.22 Under existing governance arrangements, participants in the England & Wales system have no direct control over the management of the System Operator. They have indirect control, in that they participate in the processes by which the Pool rules are established, including rules that the System Operator has to follow.

8.23 A key issue is whether or not to separate the System Operator from the transmission asset owner. Arguments in favour of such a separation are that it would end or reduce the main outstanding sources of conflict and tension, that it would allow separate and appropriate governance

arrangements to be introduced to the System Operator role, that it would create better arms length relationships and would help to ensure that the system was operated to the general benefit of all rather than potentially to the particular benefit of the transmission asset owner. Arguments against such a separation include that the existing arrangements seem to work well and have not generally been criticised, that there is some scope for cost savings in the existing combination, that the scope for the System Operator to act in a non-neutral manner is minimal given the need to adhere to the rules, that recent changes such as the Transmission Services Incentives Scheme work well and minimise perverse incentives, that the System Operator can more readily call upon technical expertise from the asset owner if both are in common ownership, that the costs of separation might be significant, and that separation might make co-ordination more difficult and conflict more likely.

8.24 If the System Operator function were separated from the transmission asset owner, then it could be constituted as a legal entity with a separate licence requirement. Whether ownership should be by industry participants generally, with associated arrangements as to voting rights and the composition of the board, or by an independent System Operator acting within a defined contractual framework, and whether there should be time limited franchises, are matters for further consideration.

Commercial Incentives

8.25 The System Operator has to take certain decisions that have commercial implications for the market. For example, it has to obtain ancillary services to help balance the system and, if existing arrangements were to change, it may have a more specific role in contracting for little used capacity. Given that it operates in a monopoly role, and that it has more and better information on certain aspects of system operation than any other single participant, there is an issue of whether or not it should be able to benefit commercially from any trading activity that it undertakes.

8.26 The System Operator could work within defined incentive arrangements that encourage it to trade in ways that benefit the market as a whole. In recent years the Pool and OFFER have sought to address some of the concerns over the observed increases in the costs of Uplift components by increasing the incentives on NGC to manage such costs. These revised arrangements have led to decreases in the charges to which they relate.

Observations on System Operator Issues

8.27 The existing arrangements in relation to commercial incentives and powers of intervention have not seemed a major problem. Changes may be contemplated, however, if reforms to other elements of the Pool necessitate associated revisions to these areas. In particular, there may be tensions between the independent System Operator role and the interests of a commercially orientated transmission asset owner. There are a number of ways of resolving these tensions including more independent governance arrangements for the System Operator. The extent of any regulatory oversight of such an entity, and how such oversight might be achieved, would need to be considered. This might allow the tendering of this function at periodic intervals. Whatever the ownership of the System Operator, it is for consideration whether there is also merit in revised monitoring arrangements.

Information Disclosure

8.28 In centralised markets such as the Pool, there are typically concerns as to how much information should be disclosed to market participants and others. Arguments in favour of greater disclosure are that it allows participants to understand better the options that they face in managing their positions and exposures, that it encourages self-policing, and that it encourages new entrants. Arguments against are that it can be costly to provide information, that it can be commercially sensitive, that it may encourage gaming and that volumes of data, may not necessarily constitute relevant information, hence may be of little practical use to most participants.

8.29 At the moment the Pool provides a significant amount of information. SMPs for the next day are published in advance, and all details of all bids submitted by generators are published after the event. The Pool deals with disclosure issues through its Transparency Reporting Implementation Group (TRIG). It is for consideration whether the existing arrangements to review the need for any further information disclosure are generally satisfactory.

8.30 One area that may still be an issue for some participants is the lack of disclosure of operational plant information. Some of the concerns expressed in this area may be alleviated if ex ante bids become firm, as suggested in Chapter 4.

8.31 Another area that may require improvement is the transparency of the price setting process. As described earlier in this report, the bid format is relatively complex and requires optimisation over the whole day rather than separately in each trading period. This means that it is

usually difficult to see how SMP was set in an individual period without access to the full system optimisation model.

8.32 Greater transparency in price setting can be achieved in a number of ways. If the bid format is less complex, and requires simpler bids, then optimisation can be on a period by period basis, which of itself could lead to a more transparent price setting process.

8.33 Whether or not bids are made simpler, the price setting process could be subjected to an independent process audit, as is presently the case in Australia, New Zealand and California. Whether or not such an audit is necessary in England and Wales depends upon the costs involved, the degree of concern at existing arrangements and whether other changes make the process sufficiently transparent without the need for an audit.

8.34 The existing arrangements do include audit arrangements, although these are at present confined to whether or not NGC has properly taken information into account, not whether the price setting processes work as they should. On this latter point, it has been suggested that the existing software that sets SMP, GOAL, is probably unauditable from a process perspective and this is one reason why its replacement, SUPERGOAL, is being developed.

Observations

8.35 In general, the need to change existing information disclosure arrangements is less pressing than other issues of Pool reform. The position will need to be kept under review because other changes to existing arrangements may require greater or less disclosure in order to be fully effective[31], and because there may be a need for some form of independent audit of the price setting process if that process resulting from the Review is not particularly transparent.

The Role of the DGES

8.36 The DGES already has a defined role in the governance of both the Pool as Market Operator and the NGC as System Operator.

8.37 In the case of the Pool, he has rights to: attend meetings as an observer; require Pool members to examine particular issues; approve proposed changes to the Pool rules; approve some types of change to the PSA; and, on certain matters, act as an appeal body against decisions by Pool Members in General Meeting. In addition, he has powers to refer certain matters to the Monopolies & Mergers Commission.

[31] For example, if TOP was introduced, there may be a need for some specific disclosure of certain information by parties contracting under TOP to ensure that the residual pool worked effectively.

8.38 The DGES has a more explicit role in relation to the System Operator function performed by NGC. This is because the company's transmission licence *inter alia* addresses its activities as System Operator, and this gives the DGES regulatory oversight of them, and the power to obtain information on them from NGC, and the power to take steps to change NGC's licence in relevant aspects.

8.39 Given the relative lack of progress on proposals for reform, which is in part a consequence of existing governance arrangements, the DGES could be given wider powers to refer issues to the Pool. Arguments in favour are principally that the Pool, composed as it is of a variety of interest groups, needs a strong external and independent body to force the pace of necessary change. Arguments against are that the independence and appellate roles of the DGES would be compromised, that it would give too much power to the regulator over the market and that, if change is required, improvements to Pool governance such as those discussed earlier offer better results and these, if implemented, would give much less weight to proposals for a wider role for the DGES .

8.40 Some suggest that the DGES could be given wider appeal powers, for example the restrictions on what sorts of appeal can be referred to him being lifted. Arguments in favour relate to the need to ensure equity amongst Pool Members, and the need to ensure that the rules do not discourage new entry or the development of innovative competitive arrangements. Arguments against are that the existing arrangements work well, and that the DGES would face a conflict of interest in relation to his other Pool roles, especially if any of these, such as the ability to refer issues to the Pool, were enhanced.

8.41 The Pool could be required to hold a licence, issued by the DGES. The terms of the licence would help define both the role of the Pool and the powers and duties of the DGES in relation to it. By putting suitable powers in the licence, for example requiring it to change arrangements if the DGES thought such change appropriate, some of the criticisms that the Pool is slow to change can be addressed. In addition, holding a licence with such provisions might then encourage the Pool to amend its own governance arrangements accordingly, so that it did not have to have change forced on it by the DGES, but could anticipate and even lead the debate.

8.42 Some suggest that the DGES could be given powers to intervene, in some manner, in relation to Pool prices. At the moment, the DGES has no formal duty to monitor Pool prices, although he does this to help fulfil his role of controlling potential abuses of market power. Arguments in favour of greater intervention powers are that the regulator needs to have the ability to intervene in relation to Pool

prices to deal with abuse of market power. Arguments against are that this would create excessive regulatory intrusion and hence stifle development of the market, that existing provisions under competition law are being strengthened, that it would be very difficult and perhaps a poor precedent for the regulator to exercise control over Pool prices, and that in practice the DGES already monitors prices and acts whenever he believes that there is evidence of abuse of market power.

8.43 A number of the above points can also be made in relation to the System Operator function, although, as discussed earlier, it is already licensed by the DGES.

Observations

8.44 There are disadvantages in extending the powers of the DGES over market prices. However, if internal Pool governance remains unchanged, there may be a case for strengthening the powers of the DGES, perhaps by requiring the Pool to be licensed and thereby providing the DGES with powers to initiate licence amendments . It is for consideration whether internal Pool governance arrangements can be reformed or designed to preclude the need for this.

8.45 There may be a case for amending the existing powers of the DGES in relation to the System Operator, for example by requiring separate licences for the functions of transmission and system operation. Again, this can best be considered in parallel with other proposals for reform.

9 PRELIMINARY ASSESSMENT AGAINST OBJECTIVES AND FURTHER CONSIDERATIONS

9.1 This Chapter is a preliminary assessment of whether the alternative arrangements offer advantages over the present trading arrangements, and the respects in which the four alternative trading arrangement models described in Chapter 6 might meet the objectives and further considerations of the Review.

9.2 The objectives of the Review, outlined in OFFER's Report of Consultation on Terms of Reference, are to consider whether, and if so what, changes in the electricity trading arrangements will best:

- meet the needs of customers with respect to price, choice, quality and security of supply;
- enable demand to be met efficiently and economically;
- enable costs and risks to be reduced and shared efficiently;
- provide for transparency in the operation of the pricing mechanism and the market generally;
- enhance the ability to respond flexibly to changing circumstances in future;
- promote competition in electricity markets, including by facilitating ease of entry and exit from such markets;
- avoid discrimination against particular energy sources; and
- be compatible with government policies to achieve diverse, sustainable supplies of energy at competitive prices and with wider government policy, including on environmental and social issues.

Present Arrangements

9.3 Chapter 2 noted that part of the concerns about the Pool may be attributable to other factors, but nevertheless the present trading arrangements seem not to meet in full the Review objectives. In summary, quality and security of supply have been maintained. But there should be scope for greater efficiency in trading, lower prices and greater choice. The non-firm nature of the market is not conducive to reducing costs and risks, price setting is not transparent, and not best conducive to meeting demand efficiently and economically. The Pool has difficulty in responding to changing circumstances and facilitating competition. The Government has become concerned about fuel mix and whether the present system favours some fuel sources over others.

9.4 The alternative models of trading arrangements outlined in Chapter 6 seem to offer some advantages over the present trading arrangements

with regard to meeting those Review objectives where concern has been expressed, and do not appear to be less effective in meeting the other Review objectives.

Objectives for which the Alternative Trading Arrangements May Offer Advantages

9.5 Generally speaking, all four models appear to offer advantages on the first three objectives, with respect to prices, choice and costs and risks being reduced and shared efficiently.

9.6 The incorporation of demand side participation implies greater choice for customers. Under Models 2 and 3, suppliers and customers are able to bid into the balancing market, and under Model 4 into the options market, to be paid for reducing their demand and this provides a further element of choice. Moreover, Models 2, 3 and 4 involve a more transparent pricing mechanism. This could facilitate greater entry into generation and supply than under the present arrangements, and hence lead to greater choice.

9.7 Further choice would be available to customers if TOP were incorporated into the alternative trading arrangements.

9.8 The fact that all four models involve full demand side participation means that they should result in demand being met more efficiently and economically.

9.9 All four models incorporate firm bids and offers and the use of imbalance charges for deviations (penal prices in the case of Model 4), and hence they enable the costs of matching supply and demand to be allocated more precisely to those market participants who cause the costs. They also imply a more efficient sharing of risk. In Models 2, 3 and 4, the use of simple bids and offers further serves to allocate risks associated with despatch to the parties best placed to manage them.

9.10 Models 2, 3 and 4 also provide greater transparency in the operation of the pricing mechanism and the market more generally. The pricing mechanism is more transparent because the simple format of generators' offers and suppliers' bids means that prices are set independently in each half-hour and that it is more straightforward to determine how prices are set.

9.11 This simplicity may also serve to restrict the market power of dominant companies insofar as it is easier for the DGES and other market participants to identify any attempt on their part to abuse their position.

9.12 It cannot be claimed that different trading arrangements will overcome any problems of market power. Moreover, the extent to which efficient financial markets develop is likely to depend on, amongst other things, the extent to which market power in generation and supply is reduced. But other factors are also relevant. The alternative trading arrangements will promote competition in the electricity market to the extent that they facilitate the development of financial markets around the trading arrangements. In so far as the complexity and opacity of the present pricing mechanism inhibited the development of financial markets, Models 2, 3 and 4 should all encourage such markets since their pricing mechanisms are simpler and more transparent. The development of financial markets will, in themselves, provide more choice and increase competition. They should also lead to more efficient risk sharing.

9.13 One of the general features of the alternative models is that they move, to various extents, towards pricing electricity in real time through the use of on the day markets, which become increasingly central to the operation of the market in Models 3 and 4. Such a development enhances the value of plant that can respond flexibly to changing circumstances. Part-loaded thermal units (fired either by coal or fuel oil), open cycle gas turbines (fired either by gas oil or gas) and pumped storage units are all capable of adjusting their output rapidly. Acknowledging the value to the system of all these different types of plant should help to secure their continued availability, avoid any discrimination against particular energy sources and hence help to achieve diverse supplies of energy.

9.14 The more efficient allocation of costs and risks embodied within all four alternative models should also help to reduce prices to customers. Since all four models incorporate full demand side participation, suppliers on behalf of their customers and customers themselves will be able to specify more explicitly how their demand will vary with price and this should provide them with a greater degree of control over their electricity purchase costs. Thus, all four models should be more compatible with government policies on competitive prices than the present arrangements.

Objectives for which the Alternative Trading Arrangements are Generally Similar to the Present Arrangements

9.15 As far as some of the objectives are concerned, the models of alternative trading arrangements appear to offer neither advantages nor disadvantages over the present arrangements.

9.16 None of the four models directly preclude changes to the arrangements for market governance. Indeed, under Model 4, some change would be required since it does not incorporate a Pool but instead relies on exchange-based markets. Possible changes in governance are discussed separately.

9.17 Some argue that the present trading arrangements discriminate against particular energy sources (notably coal-fired plant). To the extent that this reflects a concern that flexible coal-fired plant are not adequately remunerated under present arrangements, revised charging systems could be envisaged, if appropriate, in these models. Another concern is that generating units are able to submit offers which are lower than their fuel contract costs, or even zero, because the Pool prices paid to generators are set on a system marginal basis. Since Models 1, 2 and 3 continue to rely on system marginal prices in the day-ahead market, they will not overcome the objections that have been made in this respect. Model 4 does not involve system marginal pricing since it incorporates the bilateral matching of bids and offers and this might, therefore, be considered an advantage of this model.

9.18 It is clearly important that any alternative arrangements maintain quality and security of supply. All the models envisage the System Operator continuing to act to alleviate transmission constraints and to match generation and demand in real time. They also anticipate that contracts for Ancillary Services will be retained. Consequently, none of the models could be expected to reduce quality of supply.

9.19 Some may argue that the alternative trading arrangements could adversely affect security of supply, since none of the models incorporate Capacity Payments. However, other commodity markets, and most other competitive electricity markets, do not include explicit payments to ensure that there is sufficient capacity available. Instead, it is expected that sellers (generators) will submit offers which enable them to recover their fixed as well as their variable costs and this will lead to prices that are sufficient to ensure that supply (generation) and demand are balanced. So far, there is no compelling evidence from overseas markets that Capacity Payments are required to achieve security of supply.

Further Considerations

9.20 In addition to the objectives listed above, the Review will consider the implications of any changes to the trading arrangements for:

- the role of NGC with respect to trading inside and outside the Pool;
- the development of competition in generation and supply;
- trading arrangements in Scotland;

- the development of contracts markets (including for physical delivery, contracts for differences and futures contracts);
- interactions between electricity and gas;
- legislation on competition and utility regulation in Great Britain and the European community; and
- other government policy initiatives including on energy sources for power stations and generator emissions.

9.21 The following sections discuss the alternative trading arrangements in the light of each of these considerations.

The Role of NGC

9.22 Under the present trading arrangements, NGC carries out a variety of functions including System Operator, Settlement System Administrator (SSA) and Ancillary Services Provider (ASP), as well as being the owner of the transmission assets[32]. The alternative trading models continue to require all these roles to be fulfilled. Thus, consideration of the desirability of any changes to the role of NGC, in particular the possible separation of functions, can to some extent be carried out independently from discussions of these alternative arrangements.

9.23 The alternative models of trading arrangements do, however, imply that changes would have to take place in the manner in which the functions of System Operator and SSA are carried out.

9.24 Since all the models incorporate full demand side participation, the way in which the System Operator ensures that supply and demand is matched in real time would change if any of the models were to be implemented. Under Models 2, 3 and 4, the System Operator would also trade on its own account in either the on the day balancing market (Models 2 and 3) or the options market (Model 4). The inclusion of TOP might further change the way in which the System Operator operates, although whether this was the case would depend on the details of the way TOP was implemented.

9.25 To some extent, the use of firm bids and offers, which is a feature of all the models, could make the System Operator's task of matching supply and demand in real time easier. Imbalance charges should provide generators and suppliers with stronger incentives to meet their generation and demand commitments. Under the present arrangements where generator offers are non-firm and hence there are no imbalance charges.

[32] It also undertakes some of the activities of the Market Operator on behalf of the Pool.

9.26 The introduction of firm bids and offers would require the SSA to settle imbalance charges (Models 1, 2 and 3) or penalty charges (Model 4). Under Model 1, the SSA would have to be able to identify which deviations should attract imbalance charges and this would require close co-operation between the SSA and the System Operator. Under Model 3, the SSA would have to settle deviations between physical gate closure nominations and day-ahead commitments (taking into account any prior balancing market trades). It would also settle deviations between metered volumes and physical gate closure nominations (taking into account any later balancing market trades).

Competition in Generation and Supply

9.27 As noted, revised trading arrangements would not remove market power. But all the alternative trading models incorporate features that may help to reduce the market power of generators. This could encourage competition in both generation and supply. On the other hand, some of the alternative trading models, especially Model 4, rely more upon efficient financial markets. These, in turn, depend on the inability of any participant to influence market outcomes.

9.28 The use of firm offers would expose generators to the costs of non-performance. This would reduce their ability to influence prices or returns by bidding and subsequently withdrawing plant, with a view to other of their plant being constrained-on.

9.29 The removal of Capacity Payments should reduce the ability of generators to influence prices, at least with respect to that component.

9.30 Models 2, 3 and 4 all increase the transparency of the pricing mechanism and this could be expected to increase competition in generation and supply. Potential new generators and suppliers would have more confidence under these arrangements of understanding how the market operates and of being able to trade effectively. Any abuses of market power might be more readily identified and dealt with. This approach to dealing with market power issues could be more similar to that in financial markets.

9.31 The incorporation of full demand side participation could enhance competition in supply. The need for suppliers to submit demand bids means that the management of demand via interruptible contracts and other means would become a more important part of suppliers' strategies. Suppliers would be better able to compete on grounds other than cost and service.

Trading Arrangements in Scotland

9.32 None of the alternative trading arrangements should reduce the ability of the Scottish generators to participate in the England and Wales market or preclude the development of revised trading arrangements in Scotland or in Great Britain as a whole. To the extent that improved arrangements were identified and implemented in England and Wales, this would offer the prospect of better revised arrangements in Scotland.

The Development of Contracts Markets

9.33 Simpler and more transparent trading arrangements, such as those incorporated in Models 2, 3 and 4, should facilitate the introduction of futures contracts and the further development of contracts for differences and electricity forwards agreements. There could, of course, be transitional issues relating to the treatment of contracts that have already been signed.

9.34 Models 3 and 4 allow financial traders to participate directly in the market (until gate closure in Model 3 and its equivalent in Model 4). If they did so, this could be expected to increase the range and liquidity of financial contracts available to other market participants.

Interactions between Electricity and Gas

9.35 The use of firm offers by generators in all the models would reduce the potential for exploiting differences between the gas and electricity markets resulting simply from differences between the trading arrangements in the two markets. For example, the flexibility mechanism in gas is an on the day market with firm nominations (offers and bids) from shippers. In contrast, under the present trading arrangements, generators can simply choose to stop generating and sell on their gas into the gas market since their offers are non-firm. This problem is overcome if generator offers are firm.

9.36 Generators whose gas supplies have been interrupted or who have chosen to sell on their gas may be able to continue generating using a back-up fuel. Under the present trading arrangements, there is generally no opportunity for them to adjust their bids to reflect the cost of the substitute fuel. Models 2, 3 and 4 would allow a market-based solution since the generators could submit balancing market bids (or options market bids in the case of Model 4) with prices related to the costs of their substitute fuel.

9.37 Models 3 and 4 offer the further advantage that generators and suppliers can adjust their day-ahead positions on the day by trading on the balancing or options market. This should result in more effective price discovery in the electricity market and further improve the efficiency of interactions between the gas and electricity markets.

Legislation on Competition and Utility Regulation

9.38 The four models of alternative trading arrangements can be considered as representing a continuum from a system (Model 1) which is in many respects similar to the present arrangements (although with important improvements) to one which is much closer to financial markets (Model 4). Consequently, in moving from Model 1 to Model 4, it may be more appropriate for financial sector regulation to be incorporated in the regulation of the electricity market increases. This may facilitate dealing with market abuse. For example, many financial services regulators already have the power to impose penalties on companies which transgress trading rules.

9.39 A new Competition Bill is presently before parliament and the Government is preparing a Green Paper on regulation. It will be necessary to consider whether either would have implications for electricity trading arrangements but it seems unlikely that they would affect the case for change or its general direction. Some of the possible reforms, such as the licensing of the Market Operator and the separate licensing of the System Operator, would require legislation.

9.40 If the design and implementation of alternative trading arrangements were seen to address many of the concerns that have been expressed about the present arrangements, this could strengthen the arguments for introducing competition in electricity markets throughout Europe, and influence the manner in which this is done.

Other Government Policy Initiatives

9.41 Government policy in energy sources is at present under review. At this stage there is no presumption that alternative trading arrangements would be consistent with government policy initiatives.

9.42 Greater competition will increase the demand for low cost plant, particularly those with low running costs. One way of reducing running costs, irrespective of movements in fuel costs, is to increase the efficiency of plant. More efficient plant require less fuel input to produce the same level of output and hence result in lower emissions. It can therefore be argued that, insofar as all the alternative trading arrangements are likely to encourage competition in generation, they

support the government's policy initiatives with regard to the control of generator emissions.

9.43 TOP would enable customers and suppliers to express their preferences with regard to fuel choice and the environment by contracting directly with individual generating plant. This greater degree of choice could support government policy initiatives.

Summary

9.44 The discussions above suggest that all the alternative trading arrangements could have some advantages over the present arrangements in terms of the objectives and further considerations of the Review.

9.45 The models have only been developed in outline form and there remain many details to be resolved. Moreover, at present, there are several important issues that these models do not address explicitly. These include constraint payments, treatment of reserve, and locational pricing. In most instances, the models could accommodate a variety of different options with regard to these issues. This is also true of governance arrangements.

9.46 The four models described here are by no means the only models that could be constructed which might offer advantages over the present trading arrangements. It is hoped that the discussion of these models will stimulate debate amongst participants in the review process and thus assist in the process of identifying changes to the present trading arrangements that will fulfil the Review objectives.

10 NEXT STEPS

10.1 The process of this Review is a transparent one. So far, objectives for the Review have been proposed, against which the trading arrangements in England and Wales should be assessed. These have now been confirmed taking account of further views received.

10.2 OFFER background papers have been published and the first explanatory workshop held on the matters raised in them.

10.3 The present working paper contains a preliminary identification of problems with existing trading arrangements and lessons from experience in other countries. It has begun to identify building blocks to be used in the process of developing revised trading arrangements. These building blocks have been combined into a number of models of possible alternative trading arrangements. There is a preliminary assessment of the models against the objectives and further considerations of the Review. There is also a discussion of governance issues.

10.4 The workshop on 30 March will be an opportunity to explain these models of the trading arrangements. Papers submitted by interested third parties will be published and discussed at the workshop on 14 April.

10.5 The next steps in the Review process are as follows. It is recognised that much more work is required to analyse and assess these and other possible alternative arrangements. Views are therefore sought from all interested parties about all aspects of this working paper, particularly about the implications of the different possible arrangements and other possibilities that should be considered, and about the assessments of these alternatives. Views are sought both in writing and at the forthcoming seminars.

10.6 The two day seminar on 15 and 16 April will provide an opportunity for all interested parties to raise questions about the ideas in the working papers and third party papers, to express their own views, and to debate the issues. The seminars will aim systematically to work through the issues in the Review, in broadly the order they are dealt with in the working papers. Comments on these papers, workshops and seminars are invited by 8 May.

10.7 These two steps in the process will provide a better understanding of the options for change and their implications, of the views of interested parties about the aspects of particular concern to them, and of the weight they place on the various objectives and other considerations.

10.8 The next steps are to identify any further key issues, and any additional trading arrangements meriting consideration, to analyse more thoroughly the implications, advantages and disadvantages of the stronger options, and to assess them against the objectives and further considerations in the Review. It is recognised that the interests of different parties may not coincide. The aim will be to identify improvements that meet all the objectives as far as possible. Insofar as there are conflicting interests that cannot be resolved satisfactorily through the design of trading arrangements, they will need to be reflected in the proposals put forward for further discussion.

10.9 Interim conclusions will be published in early June. This will allow further debate amongst all interested parties at a second two-day seminar on June 15 and 16. In the light of this, and further comments received by the end of June, conclusions and recommendations will be put to the Minister for Science, Energy and Industry in July. The advice will note the various views expressed and any conflicts between objectives or interested parties, where judgements have to be made. This report will be published. It will then be for the Government to decide how to take the Report forward.