A note from ILEX to Slough Heat and Power

11 November 2002

1. INTRODUCTION AND SUMMARY

1.1 This paper reviews the extent to which imbalance prices are reflective of the costs imposed on the system by licence exemptible generators (LEGs). We have approached this question by addressing a number of issues:

- What would constitute a cost-reflective imbalance price regime?
- Are existing arrangements cost-reflective?
- To what extent might cost-reflective imbalance prices for LEGs differ from those for other types of participant?
- Will the prices under BSC modification P78 be cost-reflective?
- What might be the impact on LEGs of imbalance prices that are not cost-reflective (as distinct from the impact on other types of market participant)?

1.2 We begin with the perspective that for a single settlement period, there is a single value for energy, which would be discovered in a real-time spot market. In addition, there are factors associated with the predictability of power delivery or off-take that influence the costs of operating the system.

1.3 Within the NETA arrangements, there are risks in ceding control to the system operator in the Balancing Mechanism – as a consequence, power in the Balancing Mechanism may attract a different price. These risks are not fundamental to electricity markets, and could be removed or reduced under alternative balancing arrangements.

1.4 Our conclusions are summarised as follows:

- we have identified four types of 'imbalance' – contractual and predictive imbalance, in the same or the reverse direction as the net system imbalance;
- of these four categories of imbalance, the existing arrangements could be considered to be cost-reflective (in intent, if not in application) for perhaps one whereas the P78 rules could be considered cost-reflective for perhaps two;
- ideally, we would separate imbalance charges into a single imbalance price for contractual imbalances, with a supplementary charge for inaccurate predictions (or even a payment for accurate predictions) of output or off-take;
- if cost-reflective imbalance prices were in operation (assuming that they can be defined), the 'ideal' price calculations would be common to LEGs and other participants;

- however, given imbalance prices that are not cost-reflective, LEGs in particular are disadvantaged compared with other market participants[1]; and
- given dual imbalance prices, there may be scope to introduce measures (such as modification P95) to redress this balance, if it can be shown that the measures deliver net economic benefits.

[1] Within the broad category of LEG, there are different groupings, depending on the degree of predictability of export and the ownership – some are independently operated whereas others are operated within a larger portfolio of supply and/or generation. The most severe impact of a lack of cost-reflectivity in imbalance prices will be faced by independently owned and operated LEGs with intermittent exports.

2. COST-REFLECTIVE IMBALANCE PRICES

Principles of cost-reflectivity

2.1 We propose a number of background points relating to cost-reflective imbalance pricing:

- participants should face the balancing costs that their actions impose on the system (in so far as these costs can be measured); and
- given the existing system of cashflow, some balancing costs are recovered twice (through BSUoS and through imbalance payments), so some further smear-back (or top-up) mechanism for imbalance revenue is required, and is not necessarily inconsistent with the principles of cost-reflectivity.

2.2 Due to the complexities associated with attributing balancing actions to specific causes, it is unlikely that there is a 'correct' solution to this problem in practice. Therefore, one aim should be to deliver a solution that is not discriminatory in its application. A further aim should be to avoid incentivising perverse behaviour.

The value of energy

2.3 As a starting point, there can only be a single value for **energy** at a point in time in respect of each half-hour period as a whole. However, there are other factors that may confer additional or reduced value to the delivery or offtake of energy.

Value-adding factors – influenced by the NETA balancing arrangements

2.4 Factors that can confer additional value for the delivery of energy include:

- location [not relevant for the purposes of this discussion]; and
- ceding control to NGC (both due to the risks to the plant owner and the value of control to the system operator[2]).

2.5 Generators face risks when NGC takes control of a BM Unit, in particular associated with the recovery of start-up and no-load costs, given 'simple' offers and bids to the BM. Within the present NETA arrangements, there are also increased imbalance (and non-delivery) risks associated with the delivery of a detailed production profile from a specified BM Unit at short notice, and risks associated with leaving production capacity unsold in the earlier markets and available for the Balancing Mechanism.

2.6 As a consequence of these risks, we would expect users trading in the Balancing Mechanism[3] to attain premium prices (high offer prices, low bid prices) compared

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[2] The value of control to the system operator increases for BM Units with greater flexibility.

with the prevailing wholesale market price. Note that these risks are not fundamental to electricity markets, and, given alternative balancing arrangements, this risk premium could be lower or zero.

Value-reducing factors

2.7 Conversely, users can impose costs (beyond the energy value) on the system

- *collectively,* if the system as a whole is long or short – i.e., the sum of expected generation does not equal the demand forecast, forcing NGC to buy or sell energy[4];
- *individually,* if NGC has inaccurate predictions[5] about users' delivery or consumption volumes, forcing it to balance the system in a more costly way (e.g. using more flexible plant) than if it had accurate predictions at an earlier stage; and
- *collectively,* if the detailed profile of delivery (within-half-hour) is difficult to accommodate (for example with rapid ramp rates) [within-half-hour effects are ignored for the purposes of this discussion].

2.8 Given the NETA balancing arrangements, we have seen that net system imbalances (whereby the system as a whole is out of balance) will cause NGC to pay a premium for control over individual BM Units to balance the system.

2.9 The types of cost that could be incurred through NGC holding inaccurate predictions include:

- NGC paying reserve and other option fees to secure plant to react to unexpected events[6] (whether actually required or not);
- NGC calling on flexible (premium priced) plant to react to sudden and unexpected events (note that there may be a succession of such events, and NGC may take actions that, with hindsight, prove to be unnecessary); and
- NGC calling on plant at a specific location (e.g. to maintain local voltage levels); [not discussed further within this note].

2.10 Some of these costs may be attributed to individual participants, and others may not. Some relate to actual events, others relate to NGC's anticipation of events that do not materialise[7].

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3 This is also true, to a lesser extent, of users trading PGBTs – Pre-gate BM Unit Transactions.

4 Under the NETA arrangements, participants typically face additional risks and thus demand a premium for ceding control within the Balancing Mechanism. This is not inevitable cost – alternative arrangements, such as central dispatch, might not deliver this premium.

5 Forecasts or notifications.

6 It may be argued that these costs are largely driven by contingencies against the largest credible loss – i.e. that LEGs do not contribute to these costs.

Control and predictability

2.11 Predictability of delivery can be achieved either by NGC making its own predictions or by the user notifying NGC of its intentions through physical notifications.

2.12 For most generators, large or small (and large consumers including directly connected sites), NGC cannot predict behaviour[8]. In theory, NGC needs accurate predictions on the pattern of output from all generation (and demand) - this information has value in that it reduces the costs of system balancing.

2.13 NGC makes predictions of demand for the system as a whole, and it has no need for predictions by individual suppliers except to the extent that they would deliver a more accurate total forecast. In the event, NGC can predict total demand more accurately than the bottom-up forecasts of suppliers[9], and predictions from suppliers have little value to NGC – we understand that the physical notifications of demand (which are net of almost all distributed generation) are not used by NGC in its balancing operations[10]. As an aside, there appears to be little sense in requiring suppliers to undergo costly forecasting and trading activities that deliver no net benefit to the system as a whole.

Types of imbalance

2.14 We can identify two forms of imbalance:

- 'contractual' imbalance – whereby the production/consumption level of the participant does not meet some predetermined contract level (or, for a non-physical player, where the net contract position is non-zero); and
- 'predictive' imbalance – whereby the delivery or off-take does not match the level notified to (or expected by) NGC in advance, independent of the contract level.

2.15 Either type of imbalance has the potential to cause system costs, in different ways. At the system-wide level, net contractual imbalances may incur costs (due to the risk of operating in the Balancing Mechanism) – however, these costs will be minimised if NGC has accurate information in advance.

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7 At present, there are (imperfect) arrangements to identify some balancing actions relating to transport and/or 'system' balancing, as opposed to energy balancing, and to exclude these from imbalance price calculations.

8 Strictly, while NGC could predict the behaviour of generators, the outcomes are likely to be less accurate than information on provided by the generator itself.

9 Even without incentives to balance their contractual and physical position, suppliers would make demand forecasts to support their contracting strategy and limit exposure to 'spot' prices. However, they would not need to continue fine-tuning their individual forecasts until close to real-time.

10 Source: discussion with NGC staff.

2.16 Note that NGC does not have access to the individual contractual position of parties, only their physical notifications. However, in aggregate, NGC is faced with a system imbalance that equates to the aggregate of participants' individual contract imbalances (as anticipated at gate closure). For example, if suppliers contract with generators for volumes of X MWh above their expected demand, generators balance these sales with generation FPNs (and demand is as expected), then the system in total will be in surplus by X MWh.

2.17 For contractual imbalances, NGC is aware of only the **net** system imbalance – any offsetting contractual imbalances are immaterial to system balancing, and are not seen by the system operator.

2.18 Predictive imbalances by individual participants may potentially incur balancing costs. For example, NGC may respond to a generation problem by buying replacement energy for a period of time – in the event, the output of the original generator may be affected less than NGC expected, and NGC will then be faced with a surplus.

2.19 Note that predictive imbalances may not be accompanied by contractual imbalances. For example, NGC may have estimated the volume on behalf of the party concerned. Alternatively, a participant could set a contract position that differs from its FPN as a hedge against exposure to one of the imbalance prices – for example, a supplier buying more than its expected volume to avoid system buy price, or a generator selling less than its expected generation, as a hedge against imbalance shortfall arising from variable on-site demand.

2.20 The cost of predictive imbalances is exacerbated when within-half-hour effects are considered. For example, faced with an instantaneous reduction in generation, NGC will need to call on extremely flexible plant – the market for such plant is limited and it attracts premium prices[11].

2.21 There is a second distinction, between those imbalances (contractual or predictive) that are in the same direction as the net system imbalance (exacerbating the overall system imbalance) and those that are in the reverse direction. These are explored below.

System-direction imbalances

2.22 Contractual imbalances in the same direction as the net system imbalance are likely to add to balancing costs. As discussed above (paragraph 2.6), NGC will incur transaction costs in resolving system imbalances, and (given existing balancing arrangements) is likely to pay a premium within the Balancing Mechanism for control, over and above the wholesale market price.

2.23 Note that, in total, the transaction costs incurred by NGC and its counterparties dealing with net system imbalance are likely to be lower than those that might be

[11] Typically, within half-hour effects are attributed to system- rather then energy-balancing costs, and not recovered through imbalance charges.

incurred if all participants attempt to trade out their own positions bilaterally, particularly if this is done close to real time.

2.24 Predictive imbalances in the same direction as the system imbalance are likely to increase balancing costs, as NGC is likely to call on more flexible plant to deal with unanticipated problems.

Reverse imbalances

2.25 We have seen that NGC has no view of contractual imbalances by individual participants. In its high-level energy balancing activities, it responds only to the net energy (contractual) balance of the system as a whole[12]. Therefore, where offsetting contractual imbalances are caused by a mis-notified contract, no balancing cost is imposed on the system.

2.26 In support of this point, NGC has recorded in its submission to BSC modification P78, "the System Operator can normally avoid taking any action to correct errors [in the context of energy or contractual imbalances, which may be accompanied by predictive imbalances] that tend to reduce the system imbalance, no additional costs are imposed and thus [under proposal P78] the 'commodity' or 'market' price will reflect the cost of production."

2.27 Therefore, it seems reasonable that there should be the opportunity for offsetting contractual imbalances to be settled at some neutral price. This could be achieved through a single (system-wide) cashout price. As a second-best solution, ex-post trading has the potential to deliver similar outcomes[13] – it would tend to deliver a price applicable to the net system imbalance (i.e. the system buy price (SBP) if the system is short and the system sell price (SSP) if the system is long).

2.28 It is feasible that a predictive imbalance in the opposite direction to the gross system imbalance may impose balancing costs. For example, a demand site may trip off, causing NGC to trade out a surplus of power for (say) a three hour period. Elsewhere, total demand may exceed NGC's expected levels, causing it to respond by buying additional energy in the Balancing Mechanism. Therefore, NGC might have incurred costs in responding to predictive imbalances in both directions, although it would not be possible to attribute costs to individual participants.

2.29 However, as noted above (paragraph 2.26), NGC can usually avoid acting to correct errors in the reverse direction to system imbalance. Ofgem itself appears to have acknowledged this point – for example, in its one year review of NETA

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12 Inaccurate information can increase the balancing costs further.

13 Ex-post trading would increase transaction costs compared with central settlement, as it would require participants to estimate their imbalance exposure (perhaps with incomplete meter data) and bilaterally find trading partners. It might also permit the exercise of a form of market power in a 'market' with very limited liquidity – in particular, smaller participants are likely to be disadvantaged by such arrangements.

(before its approval of P78), it said "As noted above, imbalance prices are cost-reflective in the sense that they are based on the prices of the balancing actions that NGC takes. However, concerns have been raised that imbalance prices do not appropriately target the costs of electricity balancing in that they also include some system balancing costs. This criticism has been particularly levelled at the calculation of the imbalance price for participants who are out of balance in the opposite direction to the overall system balance e.g. are short when the system is long because fewer electricity balancing actions are likely to be taken in this direction."

Summary

2.30 The four different types of imbalance may impose costs on the system in different ways. In addition to the energy value of imbalance volumes, costs are imposed by requiring NGC to take action to resolve net system imbalances (this relates to a risk premium that is itself related to the balancing arrangements), and by inaccurate predictions of the pattern of demand or generation.

2.31 There is a relationship between 'contractual' and 'predictive' imbalances. Where parties contract in accordance with their expected (or notified) volumes, they will be equal. In practice it is not straightforward to separate the costs associated with each (in the absence of some form of ex-post schedule), and there is a risk of double-counting the associated costs.

2.32 Cost-reflective imbalance prices would separately consider the contractual and predictive imbalances. We have explained the logic behind our preference for a single energy (contractual) imbalance price to reflect the real-time energy value. There can only be a single value for energy in each half-hour – dual imbalance prices for contractual imbalances cannot reflect this, and will cause market participants to incur costs without a net economic benefit.

2.33 There would be a supplemental value for accurate predictions of generation or (some) demand – this could take the form of a payment for accurate information or a charge for inaccurate information.

2.34 There is a plausible case that any such supplementary charge should not apply to those parties from which NGC does not require information, e.g. suppliers and LEGs[14].

[14] In designing balancing arrangements, there is sometimes a conflict between economic efficiency and the perception of equity or symmetry.

3. COST-REFLECTIVITY OF PRESENT IMBALANCE ARRANGEMENTS

3.1 There is considerable evidence to suggest that the existing imbalance arrangements are not cost-reflective. We examine four indicators here[15]:

- imbalance price penalties;
- gross and net imbalances;
- UKPX traded volumes; and
- offsetting imbalances.

3.2 We have conducted data analysis to review the cost-reflectivity of imbalance prices and its materiality. One key source of data is the system-wide S0142 settlement report. This source is available only to BSC Parties and their agents, and consequently unavailable to most LEGs. We have processed the data on behalf of Slough Energy Supplies Ltd, a BSC Party.

3.3 Various modification proposals to date, including the move to one-hour gate closure and the reduction the Balancing Reserve Level to 5MWh in July 2002, have made little apparent difference to the average imbalance price spread, which exceeds the value of the power. In particular, it is hard to justify the extreme system buy prices (approximately double the value of the power) in the context of a system that has been 1GW long.

3.4 Figure 1 below compares monthly average imbalance prices with prices in the UKPX, between July 2001[16] and October 2002. It also records the imbalance penalties, defined as the difference between the imbalance prices and the UKPX price[17]. The spread between SBP and SSP is consistently large, and in most months is in excess of 100% of the value of the power (as measured by UKPX reference prices). This is hard to understand in the context of a system with an excess of generation capacity, a considerable amount of part-loaded plant and no evidence of significant system stress.

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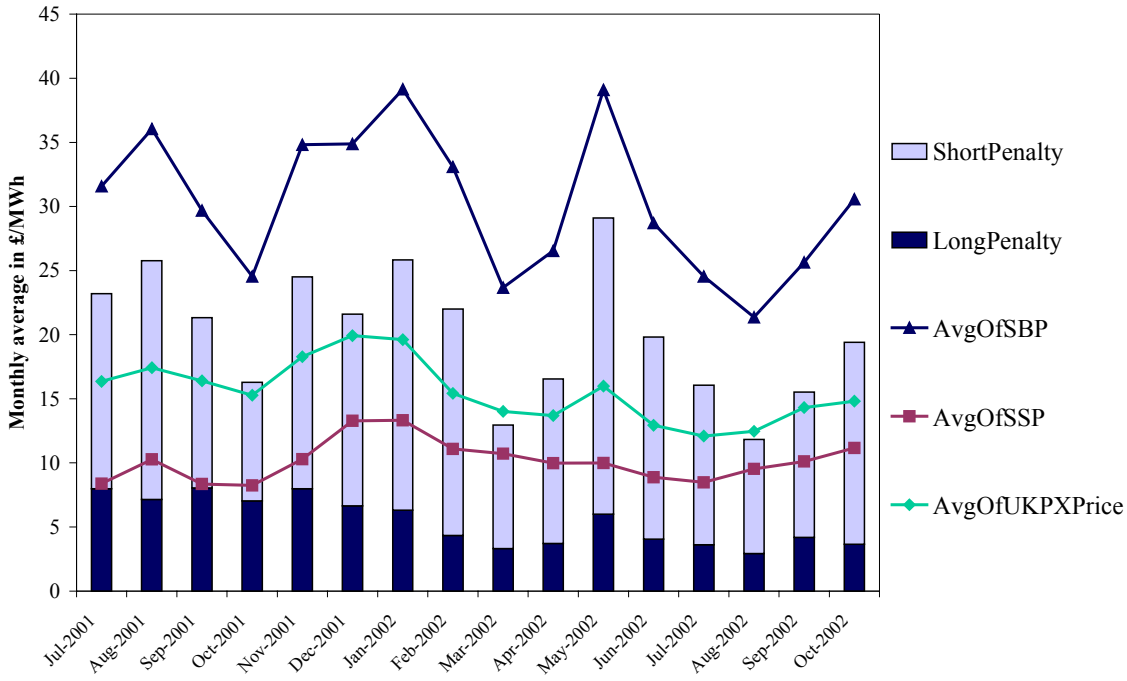
15 We have conducted more in depth analysis on behalf of other clients. Other indicators of the non-cost-reflective nature of imbalance charges could include the cost of NGC's balancing actions against imbalance payments, and the size of the beer fund.

16 From previous work, we have determined that 1 July 2001 is a good starting point for imbalance analysis – before then the prices and volumes were far less stable.

17 We have chosen to use the UKPX Reference Price Data (RPD) as the measure of the market price, as it is the only readily available half-hourly price from bilateral trading. The prices are a volume-weighted average based on trades conducted on the UKPX up to two days in advance. Initially, just individual half-hourly products were included in the prices, more recently the price of some four-hourly blocks has been included in the calculations in a simple way.

Figure 1 – Monthly average imbalance and UKPX prices, 1 July '01 –14 October '02



Source: Elexon and UKPX

3.5 Over the period considered, the average UKPX reference price was £15.60, the average SBP was £10.09 (a penalty of 35% below the UKPX price), and the average SBP was £30.22 (a penalty of 94% above the UKPX price). The average imbalance spread has been 129% of the value of the power.

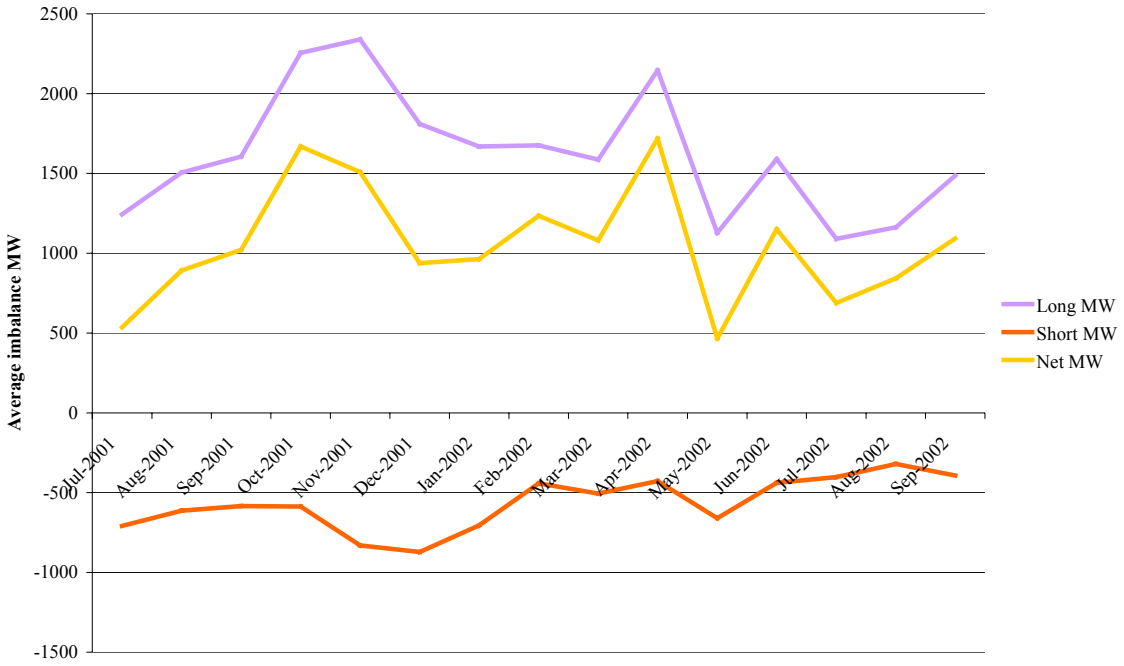
3.6 Over the period from 19 July 2002[18] to 14 October 2002, the equivalent SSP and SBP penalties were 26% and 83% respectively of the UKPX value, with the average imbalance spread at 110%. Considering the patterns shown in Figure 1, there is little evidence of any systematic reduction in these penalties as a result of the rule changes in July 2002.

3.7 It is worth remembering that in the design phase of NETA, Ofgem initially considered setting dual imbalance prices on the basis of a forward price plus or minus a specified percentage (an indicator of the difficulty in finding a cost-reflective basis for setting prices). The numbers discussed at the time were plus or minus 5% or 10%, compared to the 50% and above that we have seen to date.

3.8 Figure 2 below shows the average imbalance volumes across the system. The chart shows gross surplus, gross shortfall and net imbalance volumes, expressed as average monthly values in MW.

[18] On 19 July 2002, the Balancing Reserve Level reduced to 5MWh – earlier in that month, gate closure changed to one hour.

Figure 2 – Monthly average imbalance volumes, 1 July '01 – 16 September '02



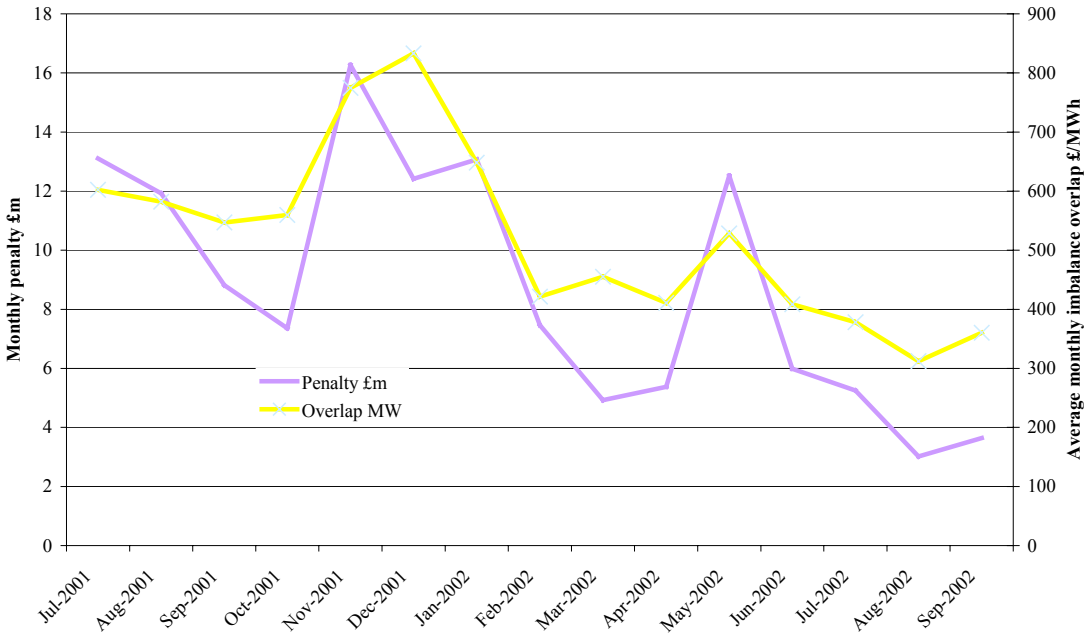
Source: Elexon and ILEX analysis

3.9 The chart shows that the system, on average, has remained in net surplus throughout the period, with little discernable trend. This is a natural response to the asymmetric imbalance penalties – participants have deliberately chosen exposure to the SSP over the more costly and more volatile SBP. The gross imbalance surpluses and (separately) shortfalls have fallen since winter 2001.

3.10 We have considered the total penalty applied to offsetting contractual imbalances. This is calculated by multiplying the overlapping imbalance volume in each half hour by the difference between SBP and SSP.

3.11 Figure 3 shows the overlapping imbalances, both in volume terms and as a financial penalty. Over the period considered, the imbalance penalty from offsetting imbalances has totalled £131m, or £0.36/MWh. Both the volume offsetting imbalances and the financial penalty have fallen over the period considered.

Figure 3 – Offsetting imbalances, 1 July '01 – 16 September '02

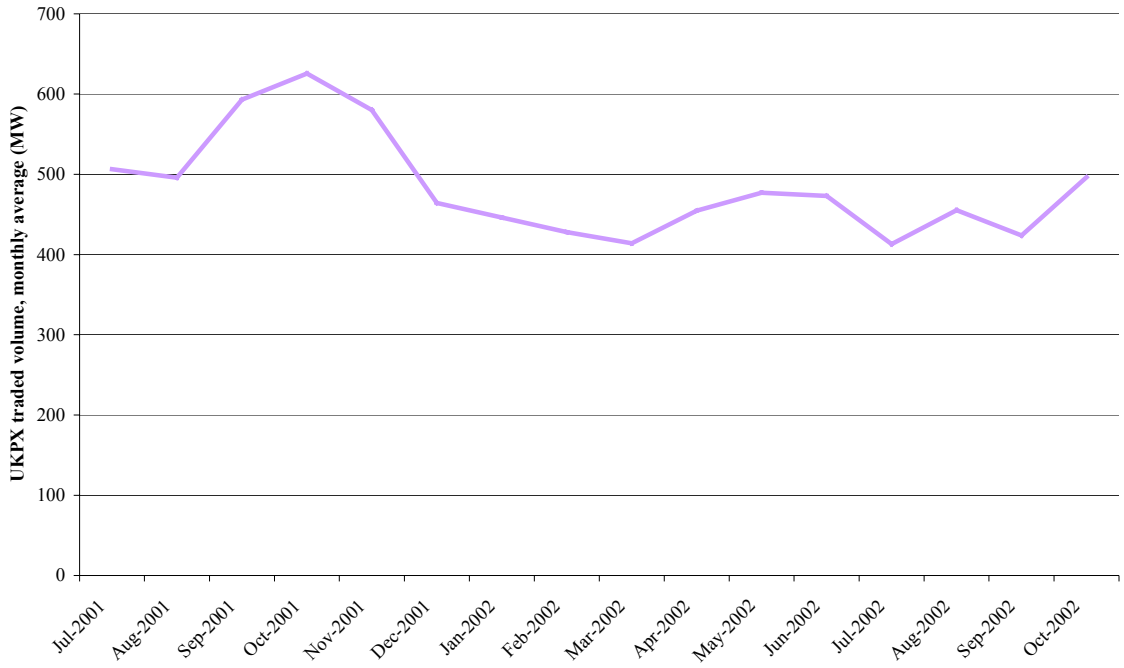


Source: Elexon and ILEX analysis

3.12 Offsetting imbalances have fallen since July 2002, with the introduction of one-hour gate closure. Over the period, participants will have improved their demand forecasting and contract notification procedures. However, reductions in offsetting imbalances delivers no net benefit in terms of reduced system-balancing costs.

3.13 Another potential reason for reduced offsetting imbalance could be an increase in trading in the short term markets. However, this is demonstrably untrue. Figure 4 shows UKPX traded volumes – these have decreased over the period shown, confirming that short-term liquidity remains low.

Figure 4 – UKPX traded volumes, 1 July 2001 – 14 October 2002



Source: UKPX

3.14 The extreme imbalance price spreads, and the sometimes extreme levels of System Buy Price have created other perverse effects, including:

- an increase in part-loaded plant as compared to operations in the Pool, one consequence of which is higher emissions;
- the market has typically been long rather than balanced, potentially creating a new set of problems for the System Operator;
- incentives to over-maintain existing plant (generation and demand) and to over-design new plant to avoid unforeseen outages (although the low prices in the forward market have a counter-effect);
- expenditure on forecasting, trading and consolidation capabilities that do not deliver any economic value (but rather help to mitigate the new risks unnecessarily created by the NETA design); and
- uninformed decision-making in short-term time frames because of the unpredictability of the non-cost-reflective imbalance prices (and the delay in publishing accurate imbalance price data).

3.15 We conclude that the imbalance prices are not cost-reflective at present, even with the move to one-hour gate closure and the reduction in the Balancing Reserve Level in July 2002.

4. COST-REFLECTIVITY FOR LEGs

4.1 We note that users of all types have the potential to cause balancing costs, whether small generation, large generation or demand. We have proposed that balancing costs have two aspects:

- those relating to the value of the energy, reflecting the price NGC pays for control in order to resolve net system imbalance; and
- those relating to the inaccuracy of predictions of generation or demand.

4.2 A key difference between types of parties is the way in which NGC forms its expectations of their behaviour.

Information requirements from LEGs

4.3 For smaller generators, physical notifications are not required, and this continues to be NGC's position[19]. This appears to be because the value of such predictions is outweighed by the cost of processing the information – it is cheaper for NGC to anticipate likely outcomes at an aggregate level than to take detailed PN data from each of a large number of small generators individually. The output of the small generators will be less variable in total than if individual generators are considered in isolation (or, alternatively when netted off against a backdrop of variable demand and other generation).

4.4 This explains why NGC does not require predictions on small generation output – it is not simply that the actions of small generators do not influence system costs, but rather that the cost of dealing with such information would be more costly than simply responding to 'net' events (e.g. the result of synchronisation and de-synchronisation of small generators taken with other system events) as they occur.

4.5 In the interests of cost-reflectivity, there is an argument to suggest that LEGs impose lower predictive balancing costs on the system than larger participants. NGC plans contingencies against the failure of larger generators, but the diversity of small generation means that no specific contingencies are required in the event of their failure.

4.6 For example, the system is planned around a single instantaneous generation failure of 1320MW – this drives the cost of providing standing reserve. Reserve option fees are included in system buy price (in addition to being recovered from

[19] For example, in the work of the Grid Code Review Panel, which is concerned with information requirements from distributed generators, NGC is reported as stating that it will only need limited information from a limited number of embedded generators to augment the net demand figures from the GSP – target GSPs are where the embedded generation capacity is >= 20% of the Super-grid transformer capacity. For these GSPs (~10% of the total), NGC will only need information from Medium power stations (capacity 50-100MW).

BSUoS, from which LEGs are typically exempt). It is arguable that LEGs should not be exposed to this element of imbalance prices. [A counter-argument is that the logic concludes that only the very largest generator should be exposed to this charge – if this generator were to reduce capacity then the next largest generator should pay, and so on. Typically, the conclusion to this debate is that all parties, irrespective of size, benefit from the stability of the system being maintained, and that all should pay.]

4.7 It is true that a small predictive imbalance (e.g. unexpected plant failure from an LEG), in isolation, is likely to be cheaper to resolve, per MWh, than a large predictive imbalance. However, this does not mean that small generators should be shielded from imbalance charges - a small imbalance on top of a large one should be charged at the marginal cost - i.e. the marginal cost[20] associated with the combined volume, allowing for both imbalances.

4.8 Cost-reflective imbalance prices would include an element for the cost of predictive imbalances. These costs are extremely difficult to attribute, and this is true in particular for small generators whose output is estimated only indirectly within NGC's net demand forecasts.

4.9 A cost-reflective imbalance regime based on a single imbalance price would significantly reduce the disadvantages faced by LEGs.

4.10 In the absence of a cost-reflective single imbalance price, there is scope to consider arrangements to ameliorate the position of those most disadvantaged by the present arrangements. While this may seem 'unfair', it may improve economic efficiency, given dual imbalance prices.

[20] In practice, with pay-as-bid BM pricing and average imbalance pricing, the effect should be broadly similar to marginal cost imbalance pricing.

5. COST-REFLECTIVITY UNDER P78

5.1 The impact of P78 is to separate treatment of contractual imbalances in the same direction as net system imbalance from imbalances in the reverse direction. The imbalance regime, now and under P78, deals only with contractual (energy) imbalances, irrespective of whether these are accompanied by predictive imbalances[21].

5.2 P78 may be summarised as follows:

- a single 'main' energy imbalance price is calculated for contractual imbalances in the same overall direction as the system as a whole, using similar calculations to today – this forms the system sell price (SSP) if the system is long and the system buy price (SBP) if the system is short;
- compared with today, more Balancing Mechanism actions will be removed from the imbalance price calculations[22];
- contractual imbalances in the reverse direction are to be settled at a 'market price' – this will form the SBP if the system is long, or the SSP if the system is short;
- the reverse price will be constrained so that the SBP is never below the SSP – for example, if the system is long and the market price is below the 'main' price (SSP), then the 'reverse' price (SBP) will be set to equal SSP;
- the market price will be determined from bilateral and exchange-based trades conducted before gate closure (up to two days out, although the exact specifications have not yet been finalised)[23]; and
- there remains no opportunity for offsetting imbalances to be matched and settled at a common price, as would be the case with a single imbalance price.

Quantitative analysis – impact of P78 on imbalance prices

5.3 We have performed some simple analysis of imbalance prices, by applying a simplified version of the P78 pricing rules to a series of historic data. For each half hour from July 2001, we have replaced the 'reverse' imbalance price with the

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21 The BSC has provision for 'information imbalance' charges, for deviations of metered output from expected volumes (in turn, expected volumes are final physical notification volumes adjusted for Balancing Mechanism acceptances). The calculations are based on total MWh over the half-hour period. The charge is set to zero; NGC prefers to rely on obligations within the Grid Code to provide accurate information, and does not wish users to take commercial decisions on self-balancing their portfolio.

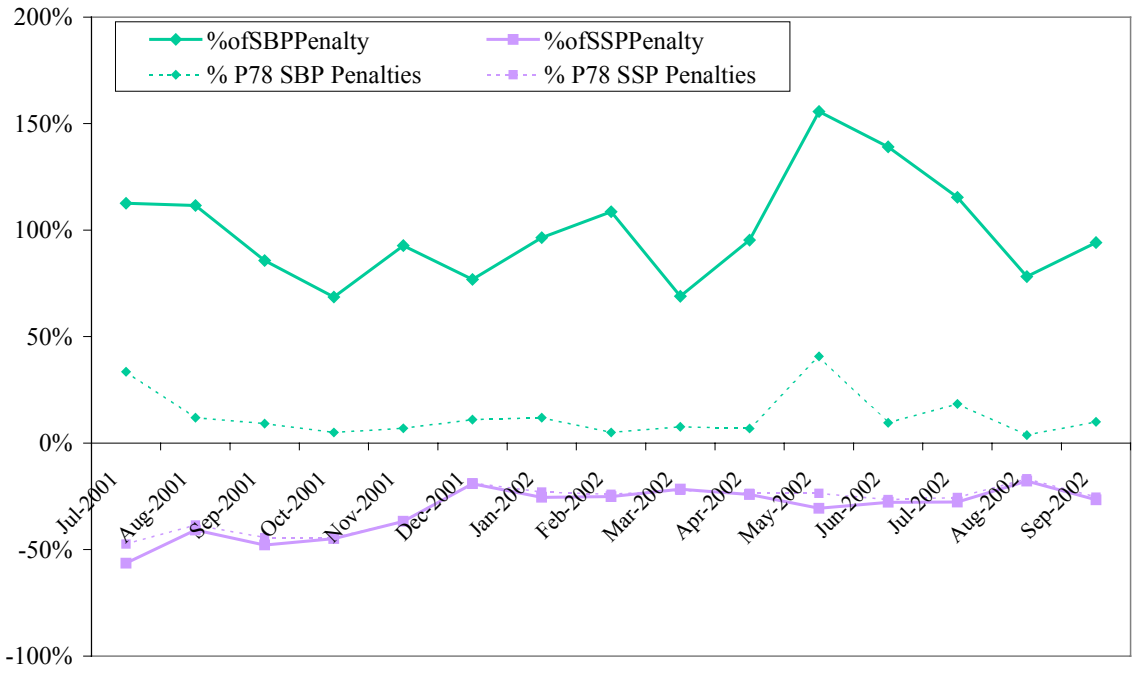
22 However, NGC's balancing actions, in both directions, will be included under P78 as a single action at one price..

23 Elexon is currently tendering for the provision of market price data.

half-hourly UKPX reference price. The resulting prices are compared with the original imbalance prices.

5.4 The resulting figures have been used to calculate an average penalty associated with energy surplus and energy shortfall, expressed as a percentage of the UKPX price[24]. Figure 5 illustrates the findings.

Figure 5 – Historic imbalance penalties, actual and under P78 rules, as a percentage of UKPX reference prices in each half hour, 1 July '01 – 16 September '02



Source: ILEX analysis of Elexon settlement data and UKPX reference price data

5.5 In practice this is not an accurate representation of the imbalance prices under P78. Gate closure moved to 1 hour in July 2002, from 3½ hours. The rules for 'trade tagging' (excluding system-related trades from imbalance price calculations) have changed (Balancing Reserve Level moved from 180MWh to 5MWh in July 2002, and will in effect change to zero with P78). Further, the behaviour of participants will change with P78 – the incentives to go long will be less marked.

5.6 With these caveats, the results show that the imbalance prices would become far less onerous – in particular, the average penalty for shortfall drops from around 100% of the wholesale value of the power to around 13%. The average penalty for surplus remains unchanged at around 30% of the wholesale value of the power – this is as expected since the system has usually (in 90% of periods between July

[24] For example, assume UKPX price at £18/MWh, SBP at £36/MWh and SSP at £9/MWh. The SSP penalty is calculated as (SSP-UKPX)/UKPX, (9-18)/18 = -0.5, or -50%. The SBP penalty is (SBP-UKPX)/UKPX, (36-18)/18 = 1, or +100%.

2001 and 16 September 2002) been in surplus, so normally the SSP is unchanged using our simple calculations.

Conclusions

5.7 The P78 arrangements represent a significant improvement over the existing arrangements – the penal aspects of imbalance prices will be markedly reduced. However, there remain concerns that the market prices will not represent the real-time value of energy, as:

- trades are likely to have taken place some time before delivery (the power exchanges trade from around two days forward until 1½-2 hours before delivery);
- the 'market' prices are likely to include trades relating to longer periods than a single half-hour, and the resulting values may not be representative of any half-hour; and
- the power exchanges are rather illiquid (trading around 2% of physical volumes), with trades conducted within very wide price ranges for each individual half-hour.

5.8 The main combinations of imbalance are illustrated in Table 1 below, for the case where the system as a whole is in surplus, under both the present arrangements and P78.

Table 1 – Cost-reflectivity of imbalance charges, for different categories of imbalance, when system is in net surplus

Imbalance type	'Ideal' charge	Present	P78
Contractual only – long	Price reflects value obtained by NGC for net energy surplus (but without flexibility premium)	(√)	(√)[1]
Contractual only – short	As previous row	X	(√)
Predictive only – long	Charge reflects 'flexibility' premium paid by NGC (if this can be separated from the real-time energy value)	X	X
Predictive only – short	Charge reflects any 'flexibility' premium paid by NGC in resolving reverse-direction predictive imbalances – may be zero	X	X
Predictive and contractual – both long	Price reflects value obtained by NGC for surplus energy (BM bid price, **with** flexibility charge – beware of double-counting)	√	√

Imbalance type	'Ideal' charge	Present	P78
Predictive and contractual – both short	Price reflects value obtained by NGC for surplus energy (BM bid price, **with** flexibility premium – beware of double-counting)	X	X[1]
Predictive (long) and contractual (short)	Charge should reflect the short-term actions that NGC needs to take, faced with inaccurate predictions – not easy to define	X	X
Predictive (short) and contractual (long)	Charge should reflect the short-term actions that NGC needs to take, faced with inaccurate predictions – not easy to define	X	X

Key:
√ Rules are reasonably cost-reflective
(√) Rules are partly cost-reflective
X Rules are not cost-reflective

Notes:
1 P78 represents an improvement over the present arrangements.

5.9 We conclude that, under P78, imbalance prices will continue to be non-cost-reflective (albeit significantly improved from present arrangements), mainly because there will be no opportunity to net out offsetting contractual imbalances.

5.10 Further, P78 does not recognise the issue of predictive imbalances, whereby costs are imposed on the system as a result of NGC having imperfect information. In practice, this latter aspect is extremely hard to quantify.

5.11 A cost-reflective imbalance price regime would start from the premise that there is a single value for energy in each half-hour, recognising that energy balancing costs relate to overall system balance for the half-hour as a whole not to the contractual positions of individual participants.

6. IMPACT OF NON-COST-REFLECTIVE IMBALANCE PRICES ON LEGs

6.1 We have concluded that under P78 imbalances will continue to be non-cost-reflective, mainly because there is no opportunity to net out offsetting contractual imbalances. Given this, there are three specific issues that suggest that the imbalance price regime will continue to operate to the disadvantage of LEGs.

6.2 Firstly, small participants face disproportionate costs in attempting to accurately predict their output and contract at this level to avoid imbalances. There is no benefit from small participants incurring such costs – the value of any resulting information to NGC is low, or zero.

6.3 Secondly, LEGs are unable to manage imbalance risks. In order to manage imbalance risk, parties must have access to liquid markets close to real time. For a variety of reasons, this is not true for LEGs:

- most LEGs are not BSC Parties, and are therefore excluded from trading in GTMAs or power exchanges (by contrast, under the Pool, anyone was eligible to trade EFAs); and
- for those LEGs that are BSC parties, the liquidity in trading small lot sizes close to real time is extremely limited.

6.4 It is unlikely that LEGs facing their own imbalance exposure would be able to perform the required trades, and they are likely to take inefficient dispatch decisions as a consequence (for example, withholding exports, rather than receiving a non-cost-reflective spill price). As a consequence, LEGs are unable to manage imbalance risks directly, and most adopt the option of passing their imbalance risk to another party, typically a supplier.

6.5 This constitutes a self-perpetuating circle. Most LEGs, for sound commercial reasons, choose to avoid the cost of becoming a BSC Party. As a result, there is very a limited market for small parcels of power in the mainstream markets. One potential future development would be an increase in short-term liquidity, encouraging more LEGs to become BSC Parties and manage their own imbalance risk. However, this would appear to be a high-cost solution. A better outcome would be imbalance arrangements that do not require each participant to balance its contractual position in advance (while recognising the value of accurate information to NGC). This approach would allow non-BSC Parties to manage imbalances without the cost of real-time trading.

6.6 A third issue is that small (non-BSC) generators contribute (via their suppliers) to imbalance receipts, but are excluded from the redistribution of those receipts. Although the sums involved are currently small, they have been large in the past (due to contract notification errors).

6.7 In conclusion, LEGs (particularly those with intermittent output under independent operation) will continue to be at a disadvantage under the P78 proposals, compared with other types of market participant.

7. CONCLUSIONS

Contractual (energy) imbalance price

- A cost-reflective imbalance regime would have a single price for contractual (energy) imbalances, in recognition that there is a single value for energy at any time.

Predictive 'imbalance' charge (or payment)

- There would be some additional value for accurate predictions of generation and some demand – either a payment for accurate information or a charge of inaccurate information;
- the value of accurate predictions is extremely difficult to gauge, especially given that the costs incurred will relate to within-half-hour patterns of demand or generation; and
- NGC uses predictions (in the form physical notifications) from large generators in its system balancing, but does not use the physical notifications of suppliers and does not require specific information on behalf of LEGs – therefore, there is a case that LEGs and suppliers should not be subjected to any 'predictive' charges (or payments), or incentivised to incur real-time forecasting and trading costs which have no corresponding economic benefit;

Position of LEGs given imbalance arrangements that are not cost-reflective

- LEGs will continue to be disadvantaged under P78, due to
  - the inability of participants to net off matching imbalances;
  - their exclusion (as non-BSC Parties) from the NETA markets; and
  - the illiquidity of the short-term markets for those LEGs that choose to become full-blown BSC Parties, rendering them unable to manage imbalance risks;
- as a consequence, it can be argued that there is scope for separate measures to redress this disadvantage.

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