



**Integrated Single Electricity Market
(I-SEM)**

**Energy Trading Arrangements
Detailed Design**

Markets Decision Paper

SEM-15-065

11 September 2015

EXECUTIVE SUMMARY

The European Union (EU) is building an internal market for electricity and gas to help deliver energy supplies that are affordable, secure and sustainable. This is underpinned by the implementation of the European Electricity Target Model (EU Target Model) arising from the EU's Third Energy Package. Specifically, the EU Target Model is a set of harmonised arrangements for the cross-border trading of wholesale energy and balancing services across Member States. In this context, the SEM Committee committed to implementing the Integrated Single Electricity Market (I-SEM) that will go-live in Q4 2017, replacing the current Single Electricity Market (SEM) arrangements.

The CACM Regulation came into force on 14 August and Article 83 imposes obligations on Northern Ireland and Ireland in the period from now until December 2017 to implement preparatory transitional arrangements leading to full implementation and full compliance by 2017. Both DETI and DCENR have now consulted on their proposals with respect to updating/amending national legislation to permit the replacement of the SEM in line with this commitment.

Following extensive consultation over 2014, the SEM Committee published the Decision Paper on the High Level Design (HLD) for the I-SEM in keeping with its statutory objectives. Namely, the SEM Committee HLD Decision seeks to maximise benefits for consumers in the short and long-term, while ensuring security of supply and meeting environmental requirements.

Subsequently, the Detailed Design Phase of the I-SEM commenced and a number of workstreams were established including the Energy Trading Arrangements (ETA) workstream. The Building Blocks Consultation Paper was published on 11 February 2015 following three Rules Liaison Group (RLG) meetings with representatives from industry. Another three RLG Meetings were also held to discuss proposals for the detailed market design, and this process has culminated in the publication of the I-SEM ETA Markets Consultation paper of 22nd April 2015. Thirty one responses were made to the ETA Markets Consultation. The RAs subsequently held a further RLG meeting on 1st July 2015 to discuss specific aspects of the Balancing Market design, focusing on the Imbalance Pricing Options and the treatment of generators' start-up costs.

This document summarises the responses made to the ETA Detailed Design Consultation Paper, sets out the SEM Committee's response to issues raised in comments received, and presents the SEM Committee's decision on the main elements of ETA market design consulted on. The proposals as set out aim to be in keeping with the EU Target Model, associated Network Codes and the HLD, while also being cognisant of current SEM arrangements. The SEM Committee considers that it is appropriate to move directly to a Decision Paper on the main aspects of the ETA detailed design at this stage as the matters consulted upon have been widely discussed with participants at RLG meetings and bilaterally since Autumn 2014. Further, the decisions set out in this paper represent one stage in the decision-making process for the ETA detailed design.

The RAs intend to work with market participants and the TSO's to further develop key aspects of the detailed design within the framework set out in this paper.

System Operation in the I-SEM

The issues raised in the Consultation Paper concerned the timing of early actions by the TSO, the monitoring of contingency reserve and reporting requirements of early actions. It is evident from the responses that participant concerns centered on the first of these issues, with comments covering the objective function that the TSOs should be seeking to achieve in dispatch, the impact of early TSO actions on the effective functioning of the ex-ante markets, and the potential need for transitional arrangements, such as a longer Balancing Market(BM) Gate Closure.

Regarding the objective function of the TSO, the SEM Committee has considered three approaches: (1) that the TSO should only take energy actions after Balancing gate closure, (2) that the TSO would more actively seek to minimise energy balancing costs through taking actions after the closure of the Day Ahead Market (DAM) but while the Intra-day Market (IDM) is in operation, and (3) a middle ground approach under which the TSOs could intervene to address expected energy imbalances prior to BM gate closure. The SEM Committee considers that the two options under which the TSO can take early energy actions to differing degrees both fail to provide clarity to participants regarding the timing and nature of TSO interventions, and that this would be detrimental to the efficient operation of the ex-ante markets as the mechanisms through which parties should trade into balance.

The SEM Committee has decided to proceed with an option under which the ex-ante markets are left to resolve the energy supply/demand balance, with participants' physical notifications at gate closure representing their ex-ante market position. The TSOs will then seek to minimise the cost of dispatching the system given these Final Physical Notifications (FPNs). The TSOs should not take any action prior to gate closure unless it is for reasons of system security, for priority dispatch or for other statutory requirements. The SEM Committee considers that this approach provides greatest clarity to all market players.

To encourage transparency in the market and to provide clarity, the SEM Committee has decided that the TSO actions in the market should be documented in a Balancing Market Principles Statement. This will be a TSO document approved by the RAs. The development of the document will incorporate the establishment of an industry group.

The paper also considers the potential impact of non-energy actions taken by the TSO on ex-ante markets. The SEM Committee considers that a general framework needs to be developed to minimize the impact, as far as possible, of non-energy actions on the IDM. This general framework will be set out in the Balancing Market Principles Statement.

Finally, the SEM Committee has considered whether an earlier Balancing Market gate closure may be required. The SEM Committee considers that a one hour gate closure timeframe remains valid for the I-SEM, but notes the concerns expressed regarding the transition between SEM and I-SEM. Consideration will be given to this issue closer to go-live when the functionality of the IDM is more clearly defined, although if any earlier gate closure is adopted on a transitional basis this would be for no more than twelve months, and gate closure would be no more than four hours ex-ante.

Ex-ante Markets

With regard to the DAM and IDM, the detailed design is largely decided at an EU level. The DAM is now operational across a number of European markets while the IDM remains under development. That said, the European cross-border IDM solution (referred to as XBID) may not be in place for the I-SEM Go-Live in Q3 2017.

The Consultation Paper set out a number of options which could be implemented in the event that the EU-wide IDM, XBID, is not in place for the I-SEM, including whether the IDM could operate for the I-SEM alone, whether interim arrangements could couple I-SEM and GB for the IDM, or whether an interim regional auction would be feasible. Most respondents rejected the first option, and the SEM Committee agrees that such an approach would not deliver intra-day cross border coupling as required by the CACM. The remaining options are considered valid, but the SEM Committee considers that a decision on whether an interim solution is required, and which option should be adopted, should be made once the identity of the NEMO is established and when the IDM's XBID functionality is clearer. The SEM Committee sees merit in intra-day auctions in principle, but again considers that a decision to implement them is contingent on XBID functionality, and thus a decision on this should be held back until later this year. The SEM Committee will request that the NEMO, once designated, and the TSOs bring forward a recommendation to the SEM Committee on the most appropriate solution for an interim intraday solution.

Physical Notifications

The Consultation Paper set out three options in respect of how physical notifications (PNs) from participants should be linked to their ex-ante trades, namely whether:

- PNs should be linked to ex-ante trades at all times;
- PNs should be linked to ex-ante trades at gate closure only; or
- PNs should need only reflect the best estimates of the intended generation or demand of the participant.

Participants generally felt that linking PNs to ex-ante trades at all times would potentially reduce ex-ante market liquidity as a result of differences between a unit's traded position and its technical capabilities. There was support for both the remaining options. The SEM Committee considers that a fully de-linked solution could allow vertically integrated or contracted parties to absent themselves from the ex-ante traded markets, and would thus be detrimental to liquidity and that Option 2, with a requirement that a unit's PNs are linked to its ex-ante trades at gate closure, coupled with a requirement to submit a best estimate of their FPN, should be adopted. With regard to the timing and granularity of PNs, the SEM Committee considers that initial PNs should be submitted by 13:30, and that participants should have discretion as to the frequency of updating them prior to gate closure. The SEM

Committee does not consider that wind and non-dispatchable demand should be required to submit PNs, although they should be allowed to do so if they so wish.

The paper also discussed the potential for the inclusion of an information imbalance charge, for which the SEM Committee considers provision should be included in the I-SEM design, although it should initially be set to zero.

Form of Offers and Bids

The Consultation Paper considered three alternative approaches to the format in which participants declare their incremental offers and decremental bids:

- (a) simple MWh blocks;
- (b) a 'Relative MW' approach, whereby the prices are specified relative to the PN level; and
- (c) an 'Absolute MW' approach, whereby the prices are specified by reference to the unit's MW output or consumption.

It also explored three options for the treatment of costs that do not vary by output, i.e. start up and no load costs. These were:

- explicit start-up contracts between the TSOs and participants outside the BM;
- the use of multiple block bids; and
- the bidding of explicit start-up costs.

The SEM Committee considers that the Absolute MW approach should be adopted, on the basis that it is less likely that a participant will need to change bids and offers to reflect underlying costs each time it changes its PN. Additionally, under this approach, participants will be able to submit both incremental and decremental cost curves in order that they can reflect any sunk costs without the need for rebidding following the acceptance of an offer or bid.

Regarding start-up costs, the key issue is how best to balance the ability for participants to recover their start costs while also providing sufficient flexibility to the TSOs to balance the system. The SEM Committee considers that the market systems need the functionality to accommodate explicit start-up costs and no load costs. However, for energy actions it is anticipated that these fixed costs will be implicitly included within bids and offers, while for re-dispatch actions explicit start-up costs and no load costs will be bid, with the costs recovered through side

payments. Consideration will be required in the detailed rules drafting and implementation phase as to whether an additional uplift mechanism is required to reflect fixed costs where early non-energy actions are used for energy balancing or whether TSO systems can accommodate simple bids and offers.

Interaction between the Balancing Market and the Intraday Market

The Consultation Paper discussed the concurrent operation of the IDM and BM, and in particular the potential detrimental impact on IDM liquidity, and undermining of the purpose of the IDM in allowing participants to trade into balance when early actions are taken by the TSO.

The Consultation Paper considered how a participant can subsequently trade once the TSOs have accepted an offer or bid from them, and the IDM is still open. A number of options were consulted on:

- (a) 'Freeze' PNs whereby a participant could not update their PNs further to any IDM trading;
- (b) 'Additive' PNs whereby any IDM trade following an earlier bid-offer acceptance would add to the bid-offer acceptance quantity; and
- (c) 'Substitutive' PNs whereby any IDM trade following an earlier bid-offer acceptance would replace the corresponding quantity of the bid-offer acceptance.

Where the bid-offer acceptance is more expensive than the imbalance price, such that a premium (or discount) is paid above (or below) the imbalance price, a further option under the Substitutive approach was to allow the participant to retain the premium (or discount).

The Consultation Paper also discussed "Trading in Opposite Direction", whereby a participant buys or sells in the IDM, resulting in a PN change in the opposite direction to an earlier acceptance, thus increasing the quantity on which a potentially high offer price or low bid price is paid. Options considered were to: (1) rely on local market power mitigation measures; (2) prohibit such PN changes; and (3) allow such PN changes but limit the quantity to which any premium or discount is applied.

There was unanimity that freezing PNs would be unduly restrictive. A number of participants argued in favour of Additive PNs primarily on the basis of the perceived complexity of the Substitutive PNs, but a majority favoured the Substitutive

approach on the grounds that it best limited the distortion of IDM trading. The SEM Committee does not agree that the Substitutive approach would be overly complex and agrees that it would minimise the distortion of IDM trading, and hence considers that this approach should be implemented.

Under the Substitutive approach, the majority of respondents favoured the IDM replacing the bid-offer acceptance price in full, primarily on the grounds that allowing participants to retain the premium would be complex. The SEM Committee has decided that the bid offer acceptance should be replaced in full.

As regards “Trading in the Opposite Direction”, the SEM Committee considers it prudent to make provision to limit the premium/discount. Any decision whether or not to make use of this can be taken in the context of the overall market power mitigation strategy and any local market power measures.

Treatment of System Services

In order to maintain system Operational Security, the TSOs pay market participants to provide system services such as frequency and voltage stability and the SEM Committee is not proposing any changes to the current operation.

The consultation responses focused on three areas; minimising constraints on IDM behaviour for units deployed for reserve, market power issues relating to system services and the possible approaches to scheduling plant before BM opening. The SEM Committee considers that early TSO actions should be minimised, and that the TSOs should take system actions as late as possible. The approach to minimising the impact of such trades is discussed in the IDM/BM interaction section. There are clearly circumstances where market power could be exerted in the delivery of system services. There is no desire to limit legitimate commercial behaviour. However, local market power mitigation measures may be employed as and when required. Regarding plant scheduled before BM opening, the SEM Committee has decided on an approach that uses offer prices from the day before rather than separate contracts. However, such starts should be infrequent, and only occur when there is a compelling requirement for them.

Imbalance Pricing

As stipulated in the HLD, non-energy actions shall be pay as bid and energy balancing actions shall be pay as cleared based on a single marginal price. The Consultation Paper considered four approaches to achieve this in I-SEM. Both Flagging and Tagging (Option 1) and setting price on the unconstrained unit from actual dispatch (Option 4) take the TSO actions in dispatch as their starting point. Two options based on an ex-post stack (simple or including plant dynamics) were also consulted on. Responses on the preferred option were mixed, with no clear single preference, although there was a slight preference expressed for Option 1.

The SEM Committee sees merit in both dispatch based approaches, but on balance believes that Flagging and Tagging is the most appropriate approach to delivering an imbalance price that reflects the costs incurred by the TSO in energy balancing the system. The SEM Committee anticipates that the I-SEM arrangements can draw on the GB experience. However, it notes that there will be differences between the GB approach, and that developed in I-SEM, that will reflect the characteristics of the I-SEM, which is a more constrained system than GB, and that there will therefore be a number of implementation challenges. A working group will be established, to consider the detailed implementation of Flagging and Tagging including the setting of key parameters and the classification of energy and non-energy actions. The SEM Committee considers that the arrangements should, insofar as possible be automated and minimise the scope for any TSO subjectivity. Any possible back up arrangements should also fall within the scope of this working group's work.

Regarding the definition of the marginal price, the SEM Committee undertook to consider whether imbalance prices should, in some manner, be less sharp than if price were to be set solely on the marginal increment required to provide energy balancing. There was a significant level of response on this issue, with a majority of participants favouring some form of averaging approach, particularly in a transitional period. The SEM Committee considers that marginal prices that reflect only the incremental cost of meeting imbalances are appropriate and provides the best reflection of the actual costs of balancing. However, it notes participant concerns regarding the transition to I-SEM and considers that the issue of price averaging should be considered by the working group as part of its consideration of other imbalance pricing parameters.

Imbalance Settlement

Participants in the I-SEM potentially will have transactions in:

- the DAM depending on the results from the EUPHEMIA algorithm;
- the IDM depending on their trading activity in this timeframe; and
- the BM depending on the level to which the TSOs moves participants from their ex-ante positions (with the imbalance price being paid for any remaining energy produced or consumed).

Imbalance settlement ensures that participants get paid or pay the correct amount for the electricity consumed or produced. The paper outlines a number of examples in this context, taking account of the proposals discussed in the paper and also the Building Blocks Consultation Paper. Other topics discussed here include curtailment, constrained renewable generation without a PN, uninstructed imbalances and ex-ante trading periods of different duration to the Imbalance Settlement Period (ISP).

Although Physical Notifications must be linked to ex-ante contract quantities at gate closure, certain tolerances will be allowed and so the high-level algebra in the Consultation Paper will be finalised to remove any incentive for participants to bias their FPNs within these allowed tolerances.

The detailed settlement algebra will be finalised the during implementation phase and will reflect the forthcoming guidelines on system operation in I-SEM.

The SEM Committee considers that cash out and post-processing is the optimal way to implement the decision on compensation for curtailment in I-SEM from 2018. A generator in a curtailment event will be cashed out at the imbalance price. Subsequently, a post- processing stage will recoup any extra revenues earned by the generator where the prices in the ex-ante markets were higher than the balancing market prices, and will “make whole” any losses made by the generator where prices in the ex-ante markets were lower than the balancing market prices.

The price-taker option in the Balancing Market for wind with priority dispatch, as outlined in the Markets Consultation Paper, will be implemented in I-SEM. A deemed decremental bid of zero will be used in the case where price-taking wind generators with firm access, but without a physical notification, is constrained down.

Wind with priority dispatch will have the option to become price-making for part, or all, of its output. However, any wind units taking this option will be required to:

- follow dispatch instructions from the TSO;
- have exactly the same systems and interfaces required by any conventional unit;
- give up priority dispatch for the portion of their output that was price making; and
- submit a physical notification in the same manner as all other generation and be balance responsible for any deviations from it.

The Discount for Over Generation (DOG) and Premium for Under Generation (PUG) will be retained in the I-SEM systems. The values of the parameters will continue to be set annually by the Regulatory Authorities after consultation.

The treatment of uninstructed imbalances in I-SEM will retain the functionality in SEM and thus the tolerance bands for frequency following will also be retained.

Participants will be able to include different pricing within undo offers, or within re-declared bid-offers that would undo previous bid-offer acceptances, in order to recover any costs incurred due to cancelled or partially cancelled dispatch instructions from the TSO.

The SEM Committee has decided that the refined proposal, introduced in the Markets Consultation Paper, will be implemented for multiple bid-offer acceptances and for the acceptance of undo offers. This refined proposal is as follows:

- A unit which had an incremental offer accepted will receive the maximum of its offer price and the imbalance price for any incremental volumes above its PN, and will receive its offer price for any incremental volumes below its PN; and
- A unit which had a decremental bid accepted will pay back the minimum of its bid price and the imbalance price for any decremental volumes below its PN, and will pay back its bid price for any decremental volumes above its PN.

The trading period duration for the DAM will be 1 hour at I-SEM go-live, although it is possible that a shorter trading period duration could be introduced in the future. For the borders where 15 minute products are currently not implemented, including the

I-SEM-GB border, it is up to the involved Local Implementation Projects to decide on the implementation of 15 minute products.

The Imbalance Settlement Period (ISP) duration in I-SEM will be 30 minutes at go-live although it is possible that this will move to 15 minutes in future as the European Network Code on Electricity Balancing progresses. Therefore the I-SEM systems should include the functionality to move to ISPs of 15 minutes.

The SEM Committee considers that the I-SEM systems should include the functionality to implement consultation Option (iii), which will calculate imbalances on an hourly (or half-hourly) basis. Whether or not this functionality will be used will be dependent on whether or not the granularity of products available in the ex-ante markets allows participants to manage their exposure to imbalance prices. The SEM Committee wishes to emphasise that such functionality will be utilised only in the event that there is no route for participants to manage their exposure to imbalance prices through the ex-ante markets. Functionality to recover any consequent revenue shortfall should also be included.

Other Issues

The Decision Paper also covers a number of areas that, while not directly related, have an impact on the market design (some of these areas will be addressed outside of this workstream). These are:

- **Global Aggregation** – The SEM Committee considers that an approach based on fixing the estimated cost (Option 3a) or fixing the estimated volume (Option 3b) is capable of implementation. Of these, the cost based approach is considered preferable as it avoids the potential complexities associated with the development of the volume-based option.
- **Local Market Power** – The Market Power workstream is underway and the SEM Committee considers that this is the most appropriate forum for detailed consideration of local market power matters. It considers it prudent that the TSO systems being procured provide for a wide range of ex-ante market power mitigation measures to be adopted should they be determined to be required by the Market Power workstream.
- **Metering** – The SEM Committee is of the view that it is appropriate to deal with metering in the I-SEM with a similar process as was adopted for SEM, meaning that it is proposed that the four Meter Data Providers will work together under the governance of the RAs and develop the required approach. High impact issues identified will be subject to full consultation.

- **Instruction Profiling** – The SEM Committee considers that the finer detail of the instruction profiling regime is dealt with in the implementation phase.
- **Demand Side Units** - The SEM Committee intends that the implementation of I-SEM will permit the participation of DSUs on an equal footing with generation in all instances where this is appropriate. Both the approach to facilitating demand reduction involving the Supplier buying the reducible demand and the approach involving the DSU buying the reducible demand should be considered in implementation. DSUs should not be required to seek and reach agreement with the Suppliers of all customers included in any DSU.

Finally, this Decision Paper provides a basis for the detailed market rules development that will commence following the publication of this paper. Appendix A of this Decision Paper contains a list of issues to be addressed in the implementation phase arising from this paper. The implementation of this detailed design will then be the subject of decisions to be taken in line with the amending legislation proposed in each SEM jurisdiction.

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1 INTRODUCTION

1.1 THE ETA DETAILED DESIGN PHASE

The Energy Trading Arrangements (ETA) Detailed Design Phase is the first stage of Phase 3, the ‘Detailed Design and Implementation Phase’ of the I-SEM project. The objective of the ETA Detailed Design Phase is to develop a set of detailed energy trading market rules that are consistent with the High Level Design of the I-SEM.

Within the ETA Detailed Design there is a requirement firstly, to establish the workings of the Energy Trading Arrangements at a high level to enable procurement of the market systems. Following on from this, the detailed legal drafting of the market rules must be completed. These detailed legal rules in the current SEM take the form of the Trading and Settlement Code.

The overall I-SEM ETA Detailed Design Phase has been split into two distinct parts namely the Building Blocks and Markets. The Markets part looks in detail at the workings of the various aspects of the market with a particular focus on the balancing market and imbalance settlement.

1.2 I-SEM Markets

The SEM Committee published a Consultation Paper on I-SEM Markets on 23rd April 2015. The consultation period ended on 5th June 2015. Responses were received from the following interested parties. The non-confidential responses received were published on 26th June 2015.

- AES
- Aughinish Alumina
- BG Energy
- Bord na Mona
- Brookfield Renewables
- Coillte Teoranta
- Demand Response Aggregators of Ireland (DRAI)
- Electricity Association of Ireland
- EirGrid

- Electric Ireland
- Electrорoute
- Energia
- EnerNoc
- ESB Generation and Wholesale markets
- ESB Networks
- Gaelectric
- Gas Networks Ireland
- Grange Back Up Power
- Indaver
- Invis Energy
- Irish Wind Energy Association
- Irish Wind Farmers Association
- Mitsubishi
- Moyle Interconnector Limited
- Power NI
- Power Procurement Business
- Pre Pay power
- SSE
- Tynagh Energy

The purpose of this Decision Paper is to set out at a high level the issues under consideration, a summary of the comments from respondents, the SEM Committee views on these issues and the SEM Committee decision.

The key markets topics for discussion in this paper are as follows:

- System operation in I-SEM
- Ex-Ante Markets
- Physical Notifications
- Form of Bids Offers and Acceptances
- Interactions between BM and IDM
- Treatment of System Services
- Imbalance Pricing
- Imbalance Settlement
- Global Aggregation

- Local Market Power
- Metering
- Instruction Profiling
- Units under test

Markets Paper Process

The Regulatory Authorities (RAs) held five days of Rules Liaison Group (RLG) meetings in the first quarter of 2015. Presentations were circulated before each RLG meeting. Following the workshops, the RAs sought comment from interested parties on the detail of the workshops and observations on the overall process. Eleven non-confidential responses were received from interested parties and these were published on 23rd April 2015. The RAs held an additional RLG meeting on imbalance pricing on 1st July 2015. All information presented at the RLGs and all responses received are available on the All-Island Project website here: http://www.allislandproject.org/en/wholesale_overview.aspx?page=2&article=fa63b4b9-60f1-494e-a28e-fb70b295140c

Markets Decision Paper

A significant number of respondents to the Markets Consultation Paper were strong in their view that the issues under consideration required that the SEM Committee publish a draft decision before a final decision is made. In particular, many respondents were of the view that a draft decision is required given the large number of options in the markets and building blocks papers that need to be brought together in the ultimate decision.

The SEM Committee has given consideration to the request from respondents on moving to a draft decision before making a final decision and can understand why respondents would seek this. However, the SEM Committee is of the view that the process for developing the I-SEM is best served by making a decision on the detailed design of the energy trading arrangements now and are confident that not publishing a draft decision does not compromise the integrity and robustness of the detailed design process. The SEM Committee has set out its rationale for this position below.

Firstly, there has been considerable pre-consultation engagement with the industry on the detailed design of the ETA. For the Building Blocks Paper, the RAs published

three briefing papers and held three days of workshops. Following on from that there was a circa two week consultation period for interested parties and fifteen responses were received. For the Markets Consultation Paper, there were five days of workshops with industry participants and a short consultation period was available for interested parties after the meetings. Eleven responses were received following the markets RLGs.

The discussion at the RLG meetings and the subsequent comments were significant in the development of the Consultation Papers. In particular, there are many areas that industry feedback aided and influenced the development of the papers. Also, industry participants were very much involved in the development of the concepts and options in the Consultation Paper.

Secondly, this detailed design phase is just one phase of the I-SEM ETA development. The HLD phase spanned a twelve month period in 2013 and 2014 and this resulted in the high level design being published. This detailed design phase commenced in September 2014 and will finish in September 2015; this is a further year of refinement of the detailed design. The market rules drafting phase will commence in September 2015 and will run until September 2016; this represents a further year of engagement with industry on the development of the I-SEM. The implementation of the ETA detailed design will then be the subject of decisions to be taken in line with the amending legislation proposed in each SEM jurisdiction.

Thirdly, given that the implementation date for I-SEM has been set through EU legislation, the SEM Committee is of the view that the additional four to five months required for a draft decision would be much better spent in the detailed rules drafting phase as this phase will give interested parties more engagement on the detailed rules. There are many areas that still require refinement in the detailed rules phase.

Finally, the SEM Committee is of the view that the final proposals in this Decision Paper in general, represent the consensus view of respondents to the Consultation Paper and that none of the proposals in the Decision Paper will be particularly unexpected. This, in many ways, is indicative of the level of pre-consultation engagement that took place on the issues.

2 SYSTEM OPERATION IN THE I-SEM

2.1 INTRODUCTION

The characteristics of the electricity system in Ireland and Northern Ireland are such that local constraints and reserve requirements are proportionately greater than those in Great Britain (GB) and mainland Europe. This is mainly due to the island nature of the system, the relatively high levels of DC interconnection compared to other EU zones, the high and increasing penetration of variable generation, the system demand (generator capacities are typically large compared to peak demand), and the location of generation in relation to demand. The Day Ahead Market (DAM) is unconstrained and the schedule it produces will not take account of transmission constraints and other system constraints (although participants may self-constrain to, for example, provide services under DS3 contracts). The Intraday Market (IDM) is also unconstrained. As a result it is likely that the TSOs will need to take both energy actions to balance supply and demand, and non-energy actions to ensure all constraints on the system are respected, in order to maintain a secure electricity system while the Intraday Market (IDM) is still open. These actions will not be limited to the IDM timeframe as some will also be taken in the last hour and in real time operation. There may also be rare occasions where actions are taken before the results of the DAM are published.

2.2 SUMMARY OF RESPONSES RECEIVED

There were a number of general comments made in response to the issues raised in the Consultation Paper. It was highlighted that there was a lack of clarity as to how the TSOs will undertake their dispatch obligations in the I-SEM and specifically as to what the TSOs' objective function is. Some respondents expressed concern regarding the level of discussion of early TSO actions in the consultation. A number of respondents suggested that there is a need for more detail on the issues consulted on to be set out, and for further analysis to be undertaken, before any decisions are taken.

Most respondents welcomed the proposals being put forward to minimise early actions but stated that further analysis of how the TSOs will manage the system in I-

SEM needs to be considered before defining a mechanism to minimise these actions. A number of respondents stated that the appointment of an independent expert to carry out a review of the TSOs' approach with reference to international benchmarks and the I-SEM's overarching philosophy should be considered.

Respondents also commented that the design proposals in the Consultation Paper are primarily focused on the implications of said proposals for TSO operations without consideration of the impacts that these operations may have on market participants. One respondent stated that an industry seminar, led by the TSOs, to explain system operation in I-SEM should be facilitated, while another respondent questioned whether the concurrent operation of the IDM and BM was transitional in nature and argued that, if it was enduring, a re-evaluation of the proposed market design is needed. A number of respondents called for further industry engagement. They suggested that the industry consultation to determine the detail of any proposals to minimise early actions should, in the interest of impartiality, be led by the RAs rather than the TSOs. Another respondent noted that this should be progressed as a separate workstream as it is not critical that this is codified at this stage of the I-SEM project.

The majority of respondents acknowledged that early actions will need to be taken by the TSOs to maintain system security prior to the IDM gate closure but stated that these actions should be minimised to the greatest extent possible. Specifically a large majority of respondents stated that if early actions are to be taken by the TSOs they should be limited to unit commitment decisions only as the majority of units on the system will have the capability to ramp across their registered capacity within the last hour should the TSOs need them to do so. The majority of respondents cited liquidity issues and price formation in the IDM and BM as the primary areas that could be impacted by early TSO actions in I-SEM. Concerns were expressed that the impact on price formation may lead to:

- a) a reduced signal in the BM for participants to be balance responsible; and,
- b) unintended consequences on participants with respect to the provision of flexibility products (i.e. certain DS3 products).

One respondent noted that early commitment decisions should be excluded from price formation in the BM with another noting that non-energy actions will need to set the imbalance price given the high number of constraints on the system. Another suggested that consideration should be given to mandating the TSOs to sell electricity associated with early actions into the IDM to create liquidity and

potentially mitigate any adverse effects of these early TSO actions. However, not all respondents were adverse to early TSO actions. One questioned why, as long as the IDM liquidity was not impacted, there would be a need to minimise early balancing actions if they were to the benefit of the consumer.

One respondent sought clarification regarding the nature of concerns surrounding the timing of gate closure and whether they are transitional or enduring. It suggested that if the concerns are transitional in nature then consideration should be given to the implementation of an earlier gate closure (e.g. four hours) at the I-SEM market start. It made this suggestion on the basis that it would eliminate the need for parallel opening of the IDM and BM. This respondent also argued that if the need for a longer gate closure remained after the initial bedding-in period of I-SEM then this would indicate that the system management issues are not, in fact, transitional but are fundamental in nature. To support these views on the implementation of an earlier gate closure period at the start of the I-SEM this respondent noted that GB transitioned to one hour gate closure after first implementing a four hour gate closure.

The TSOs also raised the issue of transitional arrangements. They suggested that the step change from the current SEM intraday gate closures to one hour gate closure for the I-SEM would be a significant change for market participants and that a transitional operational arrangement, aligned to the market design, may be required. A number of transitional arrangements were suggested including an evolution of operational policy.

On the issue of reporting, the majority of respondents noted that transparency of TSO actions is very important, supported the concept of a Balancing Principles Document, and argued that full disclosure of early actions taken by the TSOs on a regular basis should be facilitated through publically available reports. Respondents did not comment specifically on the issue of the monitoring of contingency reserve.

2.3 SEM COMMITTEE RESPONSE

The SEM Committee notes the concerns from respondents around the role of the TSOs in the I-SEM. These concerns primarily relate to two issues: the level of non-energy actions by the TSOs; and the extent to which the TSOs will take early energy actions.

It should be recognised that any electricity market will inevitably involve actions being taken by the TSOs before one hour ahead of real time. The key difference between market designs is in how these early actions appear to the market. The GB market, for example, has one hour ahead gate closure, but National Grid can, and does, take actions before this time, whether it is to re-dispatch units, to position reserves or to narrow the forecast supply/demand balance. Indeed, re-dispatch from ex-ante traded positions is a necessary feature of all electricity markets.

The decision to operate the BM and IDM in parallel has been discussed in the HLD Decision Papers and in the Markets Consultation Paper. The Balancing Market in I-SEM will include the re-dispatch market (non-energy actions) and the energy balancing market (energy actions). The SEM Committee remains of the view that the parallel operation of the IDM and the Balancing Market is the most appropriate market design, and that the focus should be on limiting any negative impacts of the overlap.

Objective Function

A large number of respondents sought clarity on the objective function of the TSOs. This issue was discussed at the Markets RLG meetings and centres on determining what objective the TSOs should seek to meet when dispatching the system.

The SEM Committee recognises that this is a complex issue and that participants in the market require clarification on it prior to commencing commercial trading in I-SEM.

At the RLGs, a number of approaches were discussed in relation to the objective function of the TSO in dispatch (see SEM-15-024e):

1. At one end of the spectrum some parties considered that the market should be allowed to resolve energy supply/demand imbalances up to gate closure, one hour before the start of the relevant settlement period, and that the TSOs should only intervene prior to gate closure to address a security issue or to accommodate priority dispatch.
2. At the opposite end of the spectrum lies an option under which the TSOs would be much more active, taking Balancing Market energy actions after the end of the DAM and seeking to minimise the cost of production based on PNs as they are submitted by the market.

3. The third option discussed represented a middle ground whereby the TSOs would leave the market to resolve the supply/demand balance at the DAM stage but would, at a certain point ahead of gate closure, seek to begin intervening to address any expected energy imbalance.

The SEM Committee recognises that industry participants need clarity on the role and actions of the TSOs in developing their trading strategies in the market, and that the TSOs must be able to ensure the secure operation of the system. The SEM Committee also recognises that the changes being implemented for I-SEM are significant for all involved in the industry.

The TSOs currently operate the system on the basis that participants submit their costs many hours before real time and the central systems determine the commitment and operation of each generator. The I-SEM represents a significant departure from this approach. Participants will determine their own commercial positions in the ex-ante markets and submit these as physical notifications to the TSOs, updating them at any time up to gate closure. It should be recognised here that the changes involved for the TSOs have not been implemented in a single step in comparable markets – the GB market, for example, moved to four hour gate closure before then moving to one hour.

The SEM Committee wishes to clarify the issues concerning early energy actions by the TSOs in order to both allow the TSOs to operate a secure system and give market participants certainty on the issues surrounding their participation in the market. Central to this is the nature of the actions that the TSOs will take while the IDM is still open, and the potential for these actions to affect market outcomes.

- The second and third options described above would be likely to limit the clarity provided to market participants trading in the IDM, as they would not know what actions the TSOs would be taking while the IDM remained open. The second option, in particular, is inconsistent with the principle of allowing participants to trade into balance ex-ante as it involves the TSOs taking actions before trading in the IDM is given as much time as possible to resolve potential energy imbalances. The SEM Committee considers that this option is inconsistent with the spirit of the I-SEM HLD.
- The third option may appear to have merit on the basis that it represents a middle ground between the other two options. However, the SEM Committee is

of the view that, while early TSO actions may be more limited than under the second option, it would be too difficult to precisely define the basis under which the TSO would take early actions. This approach would, as with the second option, create uncertainty and impact the dynamics of the IDM.

Therefore, the SEM Committee has decided to proceed with the first option, under which the ex-ante markets are left to resolve the energy supply/demand balance, with participants' physical notifications at gate closure representing their ex-ante market position. The TSOs will then seek to minimise the cost of dispatching the system given these FPNs. The TSOs should not take any action prior to gate closure unless it is for reasons of system security, for priority dispatch or for other statutory requirements. More specifically, if the expected supply/demand imbalance at any time up to gate closure is less than the available margin of plant the TSOs have at their disposal (online plant plus offline plant that can still be started before real-time, with some allowance made for reliability) then no action should be taken (unless for system security e.g. reserves, for priority dispatch or for other statutory requirements).

Balancing Market Principles Statement

The SEM Committee notes the comments from one respondent that the framework surrounding TSO actions and the principles of the Balancing Market can be addressed in a separate workstream which can continue after the publication of the ETA detailed design decision. The SEM Committee sees this as the most appropriate course of action at this stage and will oversee the development of a Balancing Market Principles Statement. This statement will be a TSO document which will be approved by the RAs. The purpose of the document will be to provide clarity and transparency to all players in the market on how the TSO will operate the system, The development of the document will incorporate the establishment of an industry group. This industry group will ensure that the document developed by the TSOs will be robust and that it will provide the necessary clarity to the industry. Given the importance of this issue the SEM Committee sees merit in the RAs chairing the group for the development of the initial document.

Ahead of the establishment of this working group, the SEM Committee believes it necessary to provide guidance to, and to set out the broad scope of such a group. The SEM Committee will also produce a Terms of Reference outlining what should be included in the Balancing Markets Principles Statement.

The SEM Committee has decided that the approach outlined above is the only approach that can provide sufficient clarity to all parties in the market, as:

- Balance Responsible Parties (BRPs) will know that the TSOs will not be taking energy actions in the Balancing Market which could affect the dynamics in the IDM unless necessary for system security e.g. reserves, for priority dispatch or for other statutory requirements. Consequently, the DAM and IDM will be the key market places for participants to trade into balance;
- Participants will understand the dynamics across the market places and be clear that the DAM and IDM are the key market places for them to trade in before IDM gate closure. In particular, participants providing flexible services will focus on competing in the IDM while it is open in the knowledge that the TSOs will not start plants for energy reasons in the BM before IDM gate closure (unless necessary for system security e.g. reserves, for priority dispatch or for other statutory requirements); and,
- The TSOs will have certainty over what is expected of them. In particular, the control centre will have clarity that they will only be taking actions before gate closure for reasons of system security, for priority dispatch, or for other statutory requirements, and won't be expected to take energy actions based on unclear criteria.

The SEM Committee is of the view that the above guidance is sufficient at this stage and forms a solid foundation for the development of a Balancing Market Principles Statement. The industry group that will be formed as part of this development will be given a scope of work wide enough to take the above guidance and consider any related issues arising. It should also be noted that this guidance by the SEM Committee places a significant reliance on a well-functioning DAM and IDM. In particular, significant reliance will be placed on the IDM for Balance Responsible Parties seeking to trade into balance. The ex-ante markets are discussed further in Chapter 3.

Non Energy Actions

Respondents to the Consultation Paper expressed significant concerns regarding the actions to be taken by the TSOs in the I-SEM, and the potential effect of these actions on the proper functioning of the market as a whole. Up to this point this chapter has dealt with energy balancing actions and sought to address participant

concerns regarding how such actions, if taken before IDM gate closure by the TSOs, could affect the functioning of the IDM and the operation of the Balancing Market itself.

The non-energy actions to be taken by the TSOs in I-SEM must also be considered. The re-dispatch of units due to non-energy reasons currently represents a significant cost to consumers and will likely continue to do so in I-SEM. The total constraints payment for 2014 was €176m, just under 9% of Energy Payments¹. The all-island system is a relatively small, constrained system and whilst the transmission grid is constantly being reinforced it is likely that out-of-merit units will continue to be dispatched up to maintain system security for the foreseeable future. Additionally, reserves will continue to be carried on a number of units and these in-merit units will have to be dispatched down. There will also be a continuing need to re-dispatch units to facilitate priority dispatch.

The TSOs will use the same mechanism in I-SEM both to re-dispatch units to resolve non-energy issues and to take energy balancing actions. The extent and timing of the non-energy actions taken could potentially affect the functioning of the IDM and the energy balance. Indeed, while the immediate purpose of an action taken by the TSOs before IDM gate closure may be to resolve a non-energy issue, said action may also consequentially assist in balancing supply and demand. As conditions change closer to real time a unit which had a bid-offer accepted early for a non-energy reason may come into merit in the IDM and/or the relevant bid-offer acceptance may come into merit in the Balancing Market.

As discussed in the previous section, the SEM Committee is of the view that the TSOs should not take any energy balancing actions prior to IDM gate closure except under the circumstances set out earlier in this section. A general framework will also be introduced for non-energy actions that will seek to minimise, as far as possible, the effect of such actions on the operation of the IDM and the energy balance. This framework should be included within the Balancing Market Principles Statement that will be developed.

One aspect of this general framework will concern the dispatching down of units for the provision of reserves. In their response to the consultation the TSOs stated that once a unit is committed it can generally be positioned to provide a particular level

¹ Source: SEMO Annual Market Value.

of reserve within its operating range relatively quickly, meaning that there would unlikely be a need for the TSOs to take actions to move a committed unit up or down while the IDM is still open. The SEM Committee concurs with this and is of the view that, in general, it should not be necessary for the TSOs to issue dispatch instructions to units to move down for the provision of reserves before the closure of the IDM. This provides the appropriate signal for parties to continue to trade in the IDM until gate closure.

Another aspect of this general framework will concern the commitment of out-of-merit units to resolve system constraints. The SEM Committee's initial view is that the TSOs should wait until as late as possible to commit such units, giving the IDM the greatest possible opportunity to commit the unit if conditions change closer to real time, such that the unit potentially would become "in-merit". However, the TSOs should continue to commit units to resolve system constraints with the objective of minimising costs. This issue will need consideration as part of the development of the framework for non-energy actions.

Additionally, the approach taken to the commitment of units for non-energy reasons will differ between the SEM and the I-SEM as increased reliance is placed upon the operation of the ex-ante traded markets. In the SEM, the TSOs currently seek to minimise the cost of production across an optimisation time horizon comprising the full day. The unconstrained market schedule and energy market clearing price is not calculated until D+4 and there is no clear distinction made between energy and non-energy actions at the time at which the TSOs are dispatching the system. Therefore the objective function of the TSOs, for every action they take, is to minimise the cost of production whilst respecting all the constraints on the system and maintaining system security.

The unconstrained market schedule in SEM is currently optimised with perfect foresight, with units starting in the schedule at their Minimum Stable Generation, so the Notice to Synchronise (NTS) time of a unit does not have any impact on whether the unit is scheduled or not. Thus, there is no incentive on units in the existing market to reduce their NTS times. In contrast, under I-SEM units will not get a volume through the Balancing Market, either through an energy or non-energy action, if long NTS times prevent them from actually being dispatched in reality. While cost minimisation will remain a key objective of the TSOs in I-SEM in terms of choosing which non-energy actions to take in order to resolve constraints, there will

be new incentives in I-SEM for more flexible plants to enter the market and for existing plants to reduce their NTS times.

Prior to the implementation of I-SEM, the general framework for TSO non-energy actions will be clarified and its interaction with the TSO incentive scheme will be considered.

Transitional Arrangements

The SEM Committee recognises that the guidance provided on system operation in this section represents a major change from current practice for the TSOs and for market participants. The guidance also places significant reliance on the efficient operation of the ex-ante markets, and participants' commercial and risk management procedures will need to change significantly. In light of this the SEM Committee is open to the concept of including transitional arrangements at I-SEM go-live and in particular considers that an earlier Balancing Market gate closure may be appropriate on a transitional basis. The SEM Committee considers that:

- The decision on whether or not to adopt an earlier gate closure on a transitional basis should not be made at this time but is best considered closer to I-SEM go-live when there will be greater understanding of the functionality of the ex-ante markets, for example the use of sophisticated matching to allow bids and offers to be aggregated within the IDM. This will also allow further consideration of any interactions with the EU regulations;
- If an earlier gate closure is implemented on a transitional basis then it should be no earlier than four hours before real time; and,
- If an earlier gate closure is implemented on a transitional basis then it should be supplemented with a clearly defined glide path describing how the gate closure will move to one hour before real time. In particular, gate closure should move to one hour within twelve months of I-SEM go-live.

The SEM Committee is of the view that the implementation of an initial gate closure that is earlier than one hour is more appropriate as a transitional solution than alternative transitional arrangements that might, for example, seek to relax certain parameters on early energy actions while keeping one hour gate closure. The SEM Committee considers that any such potential ambiguity would be detrimental to the overall functioning of the market.

The SEM Committee considers that a clear distinction needs to be drawn between actions taken by the TSOs for system reasons (re-dispatch) and energy balancing actions. System actions (the re-dispatch market) will be taken by the TSOs in timeframes when the IDM is operating, and these two activities will run in parallel. The intention of the market design is that energy balancing actions will not be taken by the TSOs in parallel with the operation of the IDM except under the circumstances highlighted earlier in this section, and as developed in the Balancing Market Principles Statement and framework for non-energy actions, i.e. they will be limited to the post-balancing gate closure timeframe as far as possible.

As discussed elsewhere in this document this is a necessary feature of the market. The concept of the parallel operation of the balancing market/re-dispatch market has been discussed previously and is a feature of many markets although few markets will be as transparent as I-SEM with respect to how re-dispatch actions are procured.

2.4 SEM COMMITTEE DECISION

The SEM Committee decision is that the most appropriate next step to fully develop the framework for system operation in I-SEM is to establish an industry group which will contribute to the development of a Balancing Market Principles Statement. This statement will be a TSO document which will be approved by the RAs. Given the importance of this issue the SEM Committee has decided that the RAs will chair this group.

The SEM Committee has provided initial guidance for the group in this chapter. For the avoidance of doubt, however, the SEM Committee has decided that the definitive approach to system operation by the TSOs in I-SEM will be enshrined in the Balancing Market Principles Statement. Thus, while the principles set out in this Decision Paper reflect the intent of the SEM Committee's decision, further work will be needed to ensure that these principles are appropriately captured to provide clarity to participants regarding the nature and timing of TSO actions while not unduly constraining the TSOs ability to act as required to secure the system.

Insofar as it is possible, the ex-ante markets should be left to resolve the energy supply/demand balance. Participants' physical notifications at gate closure will represent the position they have achieved in the ex-ante markets. The TSOs will then seek to minimise the cost of balancing the system given the PNs at gate closure. The

TSOs should not take any action prior to gate closure unless it is for reasons of system security e.g. reserves, for priority dispatch or for other statutory requirements.

The SEM Committee has decided that a framework for non-energy actions will be developed for I-SEM implementation. This framework will be developed to ensure that costs for non-energy actions are economically incurred, and to investigate ways in which improved signals can be delivered to plant to become more flexible, for example by improving Notice to Sync times. This framework should be incorporated within the Balancing Market Principles Statement.

The SEM Committee has decided that transitional arrangements, in particular comprising an earlier gate closure, should be considered. A decision on whether or not to adopt a gate closure which is earlier than one hour should be taken during the implementation phase. Any transitional gate closure time should not be earlier than four hours, and should transition to one hour within twelve months.

3 EX ANTE MARKETS

3.1 INTRODUCTION

The EU Guideline on Capacity and Congestion Management (CACM) sets out objectives and minimum conditions for the achievement of efficient and competitive electricity trading across Europe including harmonised rules for Day Ahead and Intraday Markets. These rules will be based on an agreed approach to capacity calculation, congestion management and electricity trading. More detailed rules and methodologies for operation will be developed by the TSOs and Nominated Electricity Market Operators (NEMOs) and shall also apply to the I-SEM as appropriate.

The CACM Guideline and its future development therefore applies not just to the market rules for I-SEM as it interfaces with the European markets but also to the complete set of market arrangements within these timeframes. The scope for determining the rules for the ex-ante markets within I-SEM is therefore also restricted within this framework. The following sections set out the main features of the ex-ante markets, the thinking behind their design and the necessary steps to be taken for their implementation.

3.2 I-SEM EX-ANTE MARKETS

The detailed design of the Day Ahead Market (DAM) and Intra-day Market (IDM) is largely determined at an EU level.

Day Ahead Market

The DAM will utilise the day ahead pricing algorithm EUPHEMIA² which is now operational across a number of European markets. While the use of EUPHEMIA is mandated by the High Level Design, the precise implementation will be decided as part of the implementation stage. The RAs have requested SEMO to investigate the feasibility of possible implementations of EUPHEMIA for I-SEM. SEMO has therefore been conducting a series of EUPHEMIA trials. The goal of the trialling is to develop

² <https://www.apxgroup.com/wp-content/uploads/Euphemia-public-description-Nov-20131.pdf>

SEMO's understanding of the feasibility, quality and performance of EUPHEMIA and to inform on its best use for I-SEM. This trialling is broken into two phases -

- **The Initial Phase** - trials performed by SEMO prior to industry engagement and interaction
- **The Commercial Phase** – trials performed by SEMO in conjunction with industry

The Initial Phase is completed. SEMO have been engaging with the I-SEM working group since April 2015 in order to co-ordinate the Commercial Phase. This Commercial Phase will involve further trialling of EUPHEMIA with trials being performed by SEMO in conjunction with the industry working group.

The primary goal of the Commercial Phase is for market participants and SEMO to gain first-hand experience in the formation of orders and related strategies for EUPHEMIA and to share the key learnings gained with all relevant stakeholders, including the RAs.

The trialling will inform the implementation stage to ensure that the use of EUPHEMIA can be tailored to best meet the needs of the all-island market, including the use of the out-turn results from EUPHEMIA as the starting point for unit commitment and dispatch by the TSOs.

Also, in relation to the Day Ahead market and as per the CACM Regulation (Article 44), the TSOs are required to coordinate with other TSOs with the same capacity Calculation Region to develop fallback procedures to ensure efficient, transparent and non-discriminatory capacity allocation in the event that the single day-ahead coupling process is unable to produce results.

Intraday Market

The IDM is still under development. It is possible that the European cross-border IDM solution (known as XBID) may not be in place for the I-SEM Go-Live in Q3 2017. As participants will be balance responsible in the I-SEM, the IDM is an important mechanism to give participants the opportunity to trade into balance following publication of the DAM results and updated demand and wind forecasts. Hence, this paper sets out a number of options which could be implemented in the event that the IDM is not in place for I-SEM Go-Live. This also includes the possibility of implementing intraday auctions as part of the I-SEM design.

3.3 SUMMARY OF RESPONSES RECEIVED

In the I-SEM Markets Consultation Paper, comments were sought in response to two questions relating to the Intraday Market:

- A. Which of the three options put forward for interim IDM arrangements is most appropriate?
- The I-SEM could commence with an IDM which covers the I-SEM zone only;
 - An interim arrangement could be put in place to couple the I-SEM IDM with the GB IDM; or
 - An interim arrangement could be put in place to implement regional intraday auctions between GB and I-SEM in advance of the XBID go-live.
- B. Should intraday auctions be implemented in I-SEM? Are there any advantages to those auctions not described in the Consultation Paper?

A summary of the responses to these two questions is presented below.

Which of the three options put forward for interim IDM arrangements is most appropriate?

The majority of responses were against Option 1, the I-SEM-only IDM option, as it was felt this would not deliver sufficient liquidity. However, one respondent did note that Option 1 could use counter trading, similar to today's system used to correct interconnector flows, after DAM closure and that this would be the simplest option. Another respondent noted that this option is at odds with the ethos of the Target Model and would likely be non-compliant with CACM.

The majority of respondents therefore supported either of the I-SEM plus GB regional approaches outlined in Options 2 and 3, with one respondent suggesting the GB approach for continuous trading and intraday auctions should be replicated in I-SEM. It was noted by several that both Options 2 and 3 would require engagement and agreement with GB counterparts, and that this discussion should start as soon as possible.

Several respondents noted that whatever option is chosen needs to be compatible with XBID in order to:

- minimise costs associated with an interim solution;
- minimise IT system redundancy; and
- smooth the transition to full European intraday price coupling.

In line with this, several responses suggested that if no interim solution can be found, I-SEM implementation may need to be delayed, or implemented without an IDM (and if the latter, imbalance arrangements may need to be softened).

Should intraday auctions be implemented in I-SEM? Are there any advantages to those auctions not described in this paper?

The majority of responses supported the implementation of intraday auctions in I-SEM, either on an interim basis before the introduction of XBID, or as an enduring solution to compliment XBID. This is because it was considered that auctions would:

- focus liquidity and deliver more efficient allocation of capacity;
- provide signals for efficient investment in and operation of interconnection;
- provide opportunity for intraday trade to develop and volumes to coalesce, which may support continuous trading in time; and
- create windows for TSOs to take early actions.

However, some responses doubted these assertions and suggested that auctions simply reallocate traded volumes to defined windows and do not increase trade volumes. Another suggested that the proposition that intraday auctions will increase liquidity needed to be tested before adopting such an approach. There was also a concern expressed that auctions could divert liquidity away from XBID (if auctions were to be implemented alongside XBID).

3.4 SEM COMMITTEE RESPONSE

Based on consideration of the responses, Table 3.1 sets out a summary of the benefits and drawbacks of each option from the SEM Committee’s perspective.

Table 3.1 – Benefits and drawbacks of each option

Option	Benefits	Drawbacks
1 (Local IDM)	<ul style="list-style-type: none"> • It would be the simplest, and possibly cheapest, option to implement. • SO-SO countertrading could be used to correct interconnector flows after DAM closure. • Developing arrangements for continuous IDM trading in I-SEM is a necessary step for compliance with CACM and integration with XBID. 	<ul style="list-style-type: none"> • Having an I-SEM only IDM would limit liquidity and potentially lead to issues with market power. • An I-SEM only IDM may also be non-compliant with CACM, given the absence of cross-border coupling.
2 (Regional Continuous IDM)	<ul style="list-style-type: none"> • Coupling with GB would increase liquidity and improve compliance with CACM. • It may be easier to implement than Option 3. Continuous cross border intraday trading already occurs in several markets e.g. the Elbas market covering the Nordic and Baltic regions, as well as Germany. Therefore trading solutions have already been developed which may be relatively simple to implement on the I-SEM/GB border. • This option may also transition more easily into the XBID solution than Options 1 or 3. 	<ul style="list-style-type: none"> • Requires engagement and cooperation from GB counterparts. • Intraday capacity unpriced
3 (Regional Auctions)	<ul style="list-style-type: none"> • Auctions may focus liquidity • Intraday capacity priced 	<ul style="list-style-type: none"> • Requires engagement and cooperation from GB counterparts. • Cross-border IDM auctions are not being widely progressed elsewhere, so developing a system to allow it might require a complex bespoke solution that could become redundant with the implementation of XBID. • A regional auction including I-

		<p>SEM and GB would have implications for Netherlands and France, which in turn have implications for their neighbours. It is difficult to draw the boundary for such an auction, increasing the complexity of delivering such a solution.</p>
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The SEM Committee’s response to respondents’ comments regarding interim IDM arrangements is set out below.

Regarding Option 1, the SEM Committee considers that an I-SEM only IDM will not deliver intraday cross border coupling which is required by the CACM. As such, Option 1 in isolation is not a viable solution. Leaving aside CACM compliance, the introduction of I-SEM with only a within zone intraday market could be seen as a retrograde step from the current trading arrangements, especially for the second half of the trading day. The current market has an intraday trading facility with the last gate covering the second half of the trading day and closing at 08:30. In addition, unless an off-the-shelf solution could be put in place, developing an interim I-SEM only IDM could result in redundant costs.

The SEM Committee considers the most appropriate solution for the I-SEM IDM is either Option 2 or Option 3 or a combination of both.

Regarding Option 2, developing cross-border coupling with GB is consistent with the CACM and it should be possible to make it compatible with the approach envisaged under XBID. While effort and coordination are required in and between I-SEM and GB to deliver a solution, this will need to happen at some point anyway. With respect to Option 3, developing cross border intraday auctions in isolation does not appear to be the optimum solution on an enduring basis given the requirement under CACM for continuous trading. Therefore implementing it on a transitional basis needs to be considered in the context of whether it could compliment the enduring solution or whether there is a significant risk that it could represent a redundant cost.

The SEM Committee notes that, as a solution, implementing auctions goes beyond the basic requirements of CACM. If it requires time and effort to be devoted to developing a solution that may not be consistent with XBID it runs the risk of

becoming obsolete. It is difficult to limit the concept to GB and I-SEM, given ripple effects into neighbouring countries, which increases the complexity and effort required to deliver a regional auction.

A key aspect of the potential attractiveness of Option 3 is whether the I-SEM would include intraday auctions in the longer term. As mentioned previously, a large number of respondents favoured implementing auctions as part of the enduring design. The SEM Committee, in the Markets Consultation Paper, put forward a number of potential attributes of auctions and there was support for these.

Related to this and perhaps at the heart of whether auctions might be required is the functionality that XBID will include. For example, if XBID provides products such as a sophisticated matching algorithm then much of the functionality of intraday auctions would be repeated in the continuous market.

However, if a more limited version of XBID is put in place for the start of I-SEM there will be a number of requirements in I-SEM that it is unlikely to satisfy. For example, the relative size of units compared to system demand means that a sophisticated matching mechanism may be required. If this is not in the initial version of XBID it might cause difficulties for I-SEM participants, especially given the likely approach to system operation and reduced TSO interventions.

The implementation of cross border auctions would appear to address the potential issues with a basic continuous solution. In particular, if a solution similar to the DAM algorithm was run again for intraday coupling, many of the potential issues identified above would be addressed. In particular, it would provide a solution for losses, capacity pricing and the sophisticated matching mentioned above.

There are a number of uncertainties with the timing of XBID implementation and with the functionality that will be in place when it initially goes live. The XBID project is expected to be operational in 2017. However, this places a risk for I-SEM as any delay to XBID would likely result in a delay to I-SEM Go Live. Given that there are many external factors determining the implementation of XBID the risks are significant for the I-SEM.

3.5 SEM COMMITTEE DECISION

In light of the considerations outlined in the preceding section, especially the uncertainties surrounding the implementation of the XBID project, SEM Committee has decided that an interim solution should be implemented to ensure that an IDM is in place from the beginning of I-SEM. However, the SEM Committee is of the view that a decision on the shape of this interim solution is best taken in the first quarter of 2016, as:

- By the end of September this year the identity of the NEMO will be known. It should be more straightforward to make robust implementable decisions based on discussion with the NEMO on what actually can be put in place in the time available; and,
- By the end of 2015, there should be greater clarity on the timelines for XBID and on its expected functionality.

The SEM Committee sees merit in the inclusion of regional intraday auctions as part of the intraday solution for I-SEM. However, the decision on whether or not to implement these will depend on the functionality that is ultimately available in XBID. If XBID can provide the required sophistication and functionality there would appear to be little logic in maintaining two systems with similar functionality. It may be that auctions should be implemented at market start but phased out as XBID functionality increases although assessments of this approach can only be made once the XBID functionality is clearer.

Once NEMO designation is finalised, the SEM Committee will request that the NEMO and the TSOs bring forward a recommendation to the SEM Committee on the most appropriate solution for an interim intraday solution. In developing this report the NEMO will be cognisant of the guidance in this section in particular in relation to functionality. The report should also provide cost estimates of the recommended solutions and should set out any alternatives considered. It is expected that the NEMO and TSO will need to engage with other NEMOs and TSOs in developing this recommendation.

4 PHYSICAL NOTIFICATIONS

4.1 INTRODUCTION

The physical notification (PN) submitted by a participant to the TSOs in respect of a generator unit represents the MW profile that the participant intends to generate in the absence of having any incremental offer or decremental bid accepted by the TSOs in the BM. Similarly, the PN submitted by a participant to the TSOs in respect of dispatchable demand represents the MW profile that said participant intends to consume in the absence of having any incremental offer or decremental bid accepted by the TSOs in the BM.

PNs are important for the secure and safe operation of the system by the TSOs as they provide an indication of the expected running regime of each unit on the system. In aggregate, PNs provide the TSOs with the market's expectation of the supply/demand balance and this allows the TSOs to take actions when required. PNs also, importantly, provide the TSOs with locational information on the expected generation at different points on the transmission system. This allows the TSOs to anticipate constraints on the transmission system and take non-energy actions to resolve these constraints where appropriate.

4.2 I-SEM PHYSICAL NOTIFICATIONS

The Consultation Paper sought comment with regard to the timings and granularity of PN submissions.

- With regard to timings the paper suggested that there may be no reason to implement anything other than a continuous notification process with the aim of said process being to get the best information to the TSOs as early as possible, without putting requirements on participants that are overly onerous.
- Regarding granularity, the paper suggested that there may be no benefit in having a granularity of less than one minute and that it may be prudent to ensure that TSO systems are procured that allow for a range of granularities with the most appropriate level being decided upon in the detailed implementation phase.

The Consultation Paper further outlined three options as to how PNs from participants should be linked to their ex-ante trades. These three options were:

- (1) PNs Linked to Ex-ante Trades at All Times - under this option the PNs submitted in respect of a unit would be required to match the ex-ante trades in respect of that unit at all times;
- (2) PNs Linked to Ex-ante Trades at Gate Closure Only – under this option the requirement that PNs match the ex-ante position would apply at gate closure only. PNs submitted before this should be the participant’s best estimate of their ex-ante trades at gate closure, even though the participant might not, at any given time, have executed the trades it was intending to execute in order to achieve its intended final combined day-ahead and intraday market position; and
- (3) PNs Reflecting the Best Estimate of Intended Generation or Demand³ - under this option there would be no requirement to link PNs to ex-ante positions at any time, even at gate closure.

The Consultation Paper raised the question as to whether wind generators and non-dispatchable demand should be required to submit physical notifications. In particular it was stated that these two categories of unit have little control over their end position and where the TSOs already have forecasts there may not be significant value in requiring them to submit physical notifications.

Finally, the Consultation Paper introduced the concept of an information imbalance charge. This was introduced in the context of providing an incentive on participants to submit PNs which are as accurate as possible. The charge could be levied on the difference between a unit's metered quantity and its Day Ahead PN and/or FPN, as modified by any bid-offer acceptances. It was noted that any such information imbalance charge likely needs to be considered alongside the treatment of uninstructed imbalances which are discussed in the imbalance settlement chapter.

³ At the RLG meetings these options were described as: “Linked Physical Notifications”; “Partially Delinked Physical Notifications” and “Fully Delinked Physical Notifications”, respectively.

4.3 SUMMARY OF RESPONSES RECEIVED

Timing and Granularity

The TSOs stated in their response that submission of initial PNs by 14:00 appears to provide a longer timeframe than necessary for participants to convert their day-ahead market positions into an initial PN. The current deadline operated across Europe is for notifications to be submitted by 14:30 CET (13:30 GMT). For consistency, the TSOs believe this should be considered. The TSOs observed that it had been suggested during the Rules Liaison Group meetings that participants be required to be able to create and submit updated PNs within 15 minutes of an intraday trade. They suggested that there did not seem to be a need for a much longer conversion process at day-ahead compared to intraday.

With regard to the frequency of PN updates by participants to the TSOs, some respondents noted that either a MW tolerance trigger or a defined time seemed appropriate.

However a larger number of respondents stated that the updating of PNs should be left to the discretion of participants for various reasons. The commercial impact that such obligations have on participants was cited by some respondents. They deem it appropriate that updates from intraday trades are submitted as early as possible rather than being based on volume of deviation or some other gated standard.

Notably though two respondents highlighted that in their opinion the options proposed were not relevant if PNs are partially or fully delinked as in that case the participants themselves would decide when to update their PNs based on IDM trading rather than following any of the proposed triggers.

Only a small number of respondents addressed the issue of granularity of PNs. One respondent stated that spot data seemed sensible. Another noted that while linear interpolation between spot data would work at 1 minute resolution, at say 15 or 30 minutes it would not be appropriate. Another respondent noted that data with granularity of less than 1 minute was unnecessary and that any resolution less than an hour should be supported by a cost benefit analysis.

One respondent also noted that given that the TSOs' scheduling tools work at half-hour granularity and settlement is half-hourly, it is questionable whether any purpose is served by higher granularity than 30 minutes.

Lastly, one respondent noted that this issue was a question that should be addressed in the detailed implementation phase.

PNs for wind and non-dispatchable demand

Of the respondents that expressed a view on the issue, a small majority felt that wind and non-dispatchable demand should not have to submit any PNs.

These respondents stated that, given the sole purpose of PNs is to give the TSOs information with regard to a unit's intended output, submission of PNs from these participants serve no purpose whatsoever as the TSOs will use their own wind and demand forecasting tools to inform any actions to ensure the system is balanced.

Those respondents that stated these participant types should submit PNs largely stated that such an obligation, given that participants are balance responsible, will incentivise improved forecasting which in turn will improve liquidity in the IDM. One respondent noted that there is a financial risk to the participant associated with a PN and questioned the impartiality of the TSOs should they be submitting PNs on behalf of these participants.

Lastly two respondents stated that wind generation should have the option to submit PNs whereby the PN would reflect the priority dispatch volume of the unit and any volume beyond the PN level would not have priority dispatch.

Relationship between PNs and Ex-Ante trades

There was a relatively equal divide between those respondents in favour of partially delinking and fully delinking PNs from ex-ante contracted positions (options 2 and 3). Respondents by-and-large were of the view that the fully linked approach (option 1) would limit the trading a unit could undertake due to differences between the unit's technical capability and positions that could be realistically achieved from the ex-ante trades. This would in turn reduce liquidity in these markets.

Those respondents in favour of partially delinking PNs (Option 2) noted that having FPNs fully linked to ex-ante market positions at gate closure would give the TSOs the best information available at gate closure to take decisions to balance the system. Two respondents in favour of this approach further noted that the fully de-linked approach (Option 3) would allow participants to self-dispatch. One of these respondents outlined an example whereby the participant essentially self-dispatches by submitting a low decremental price to stay on as the TSOs do not have a view of the ex-ante market positions and therefore would likely take a lower cost action based on the information available to it.

In general those respondents in favour of fully delinking PNs noted that rather than creating a market rule to link PNs to ex-ante trades, a well-designed market should achieve the same objective and therefore fully delinking PNs should only serve the purpose of providing the TSOs with good information about participants' intended positions. One respondent also noted that participants should not be punished if they are helping to resolve a system imbalance and that this scenario may arise if the PNs were partially or fully linked to ex-ante market positions.

One respondent highlighted its concern that Option 3 would allow vertically integrated participants to self-balance in the BM rather than trading to balance as said participants would be able to overstate their PNs in order to offset a short supply position.

Some respondents also noted concern that it was not clear whether either Option 2 or Option 3 actually improves the quality of information that the TSOs are receiving as PNs could still significantly change within the last hour. Specifically under Option 2 the requirement to link final PNs could invoke significant change to the PNs close to gate closure and under both options any dispatch decisions taken by the TSO may not be at least cost to the system as sight of ex-ante market positions is not available.

One respondent favoured a variant of Option 1 whereby the PNs should be fully linked to ex-ante trades at all times. It was argued that this would provide the best information to inform market participants of the length of the market while at the same time providing the TSOs with the best information when taking decisions to balance the system as otherwise bid-offer acceptances could be made against incorrect market positions at inaccurate prices. However this respondent further suggested that participants also submit indicative FPNs prior to gate closure that are

physically feasible, thus giving the TSOs insight into the units' intended generation/consumption.

Information Imbalance Charge

The majority of respondents disagreed with the proposal to introduce an information imbalance charge. Largely these respondents stated that the provisions of the Grid Code and licence conditions ensured that respondents followed dispatch instructions and that the current incentives were already sufficient (Generator Performance Incentives (GPIs) and treatment of uninstructed imbalances). A number of respondents further highlighted that an information imbalance charge is normally only a feature of a self-dispatch market.

Furthermore, some respondents noted that generators operate under frequency sensitive mode as per Grid Code requirements and hence fluctuations in the system frequency will cause generator outputs to deviate from their FPNs. One respondent also queried how accurate PNs could be defined given the uncertainties in the market and therefore believed that any decision on the 'accuracy' of PNs would be arbitrary.

However a minority did agree that the functionality for an information imbalance charge should be built into the I-SEM systems, as it would be more cost effective to do so in implementation (than at a later stage), but that it should be initially set to zero.

One respondent did agree that an information imbalance charge should be implemented at the outset of the market but argued that this incentive, combined with the imbalance exposure risk, should be sufficient for participants with physical assets to follow their dispatch instructions from the TSOs. However, on this basis this respondent noted that special treatment of uninstructed imbalances and GPIs are no longer necessary and should be removed and overhauled for I-SEM respectively.

4.4 SEM COMMITTEE RESPONSE

Timing of PN Submissions

The SEM Committee notes both the views that the updating of PNs should be at the discretion of the participant and that there should be a tolerance between PNs and

ex-ante contract positions which, if exceeded, require the resubmission of PNs. The SEM Committee also notes the view that, under the proposals for partially or fully delinked PNs, participants would take a view as to whether or not to update their PNs at any time throughout the intraday period, rather than the submission of updates being based on particular triggers.

The SEM Committee agrees that under the fully linked approach it would in principle be possible to define a strict tolerance on the allowable deviation at all times between the submitted PNs and the *actual* ex-ante contract positions that they would be required to reflect. However, under the partially or fully delinked options, the requirement would be that the PNs correspond with the ex-ante contract position that the participant *expects* to have at gate closure. As such, it would be difficult to specify a mechanistic trigger, as reflecting an expected position would inevitably involve discretion on the part of the participant. Instead, the obligation could be stated as being merely that the PNs should *at all times* be:

- the participant's best estimate of its intended level of generation and/or consumption, reflecting its intended metered quantities (excluding any accepted offers and bids) and technical characteristics, or
- the participant's best estimate of its intended level of generation and/or consumption, reflecting its intended metered quantities (excluding any accepted offers and bids) and technical characteristics, given also the requirement that the metered quantities (excluding any accepted offers and bids) reflect also the ex-ante contract position at gate closure,

these being the approaches in, respectively, the delinked and partially delinked options.

That said, guidance would be required, or the obligation suitably caveated, to avoid the possibility of participants being obliged to constantly resubmit PNs that differed from the previous submissions by a trivial amount.

As regards the timing of the first submission of PNs, the SEM Committee notes that the TSOs in their response stated that a 14:00 submission of initial PNs on D-1 appears to provide a longer timeframe than necessary and that it should be 13:30. In particular, the TSOs suggest that participants will not need two hours to develop their PNs and that they won't have as much time during the intraday. The SEM

Committee does see logic in this argument from the TSOs and if 14:30 CET (13:30 GMT) is the time used across Europe there may be value in having both at the same time. However, while in general the SEM Committee is endorsing a 13:30 timing of initial PN submission, this should be finalised in the detailed rules drafting and implementation.

Granularity of PN Submissions

The SEM Committee notes the comments concerning the granularity or resolution for the specification of PNs, including the comment that the current TSO scheduling tools work at half-hour resolution and that this raises the question as to what purpose finer granularity would serve.

It is the SEM Committee's view that PNs are essential information needed by the TSOs in balancing the system, and that system balance must be maintained minute-by-minute⁴. The SEM Committee appreciates that, as part of system operation, the TSOs may undertake certain system studies in which demand profiles are represented by spot values spaced at thirty minute intervals and thus that indicative generation profiles are calculated with the same resolution. However, it is the SEM Committee's understanding that dispatch instructions will still be issued to a resolution of one MW and one minute, e.g. a dispatch instruction could be issued to a unit to ramp up at 16:24 to reach an output of 305MW.

This is consistent with instruction profiling whereby the instruction given may be simple but with a complex version of the instruction, with a greater amount of detail, being implied by the relevant technical offer data (TOD). Thus, an instruction may be given to ramp up at time t (specified to minute resolution) to n MW (specified as a whole number of MW) with the rate at which the ramp up occurs, and hence the MW levels at all intermediate times, being implied by the TOD. Likewise, a synchronise instruction may be given as simply to synchronise at time t (specified in minutes) and run up to n MW (specified as a whole number of MW), with the detailed procedure in terms of block loadings, dwell times/soak times and the various intermediate ramp up rates again being implied by the TOD. This process, of

4 It would be necessary to balance the system on a second-by-second basis but for the fact that system inertia accommodates imbalances over very short-time scales – anything up to a few seconds – while automatic frequency response is used to correct imbalances that may arise over periods of up to a few minutes.

implying a complex instruction from a simple one, applies in I-SEM whether the TSOs are instructing a balancing action or whether the TSOs do not require a balancing action and are merely facilitating the participant following its PN. It is for detailed consideration as part of the implementation phase whether participants:

- (i) will have to specify PNs that explicitly detail the block loads, dwell times/soak times, and intermediate ramp ups, with each segment being described by beginning and end MW level and minute time;
- (ii) will be able to specify an abbreviated instruction, with the details being inferred from the TOD;
- (iii) will be permitted to specify an approximate or 'representative' run-up profile;
- (iv) whether some other protocol between participant and TSO can achieve a similar outcome.

For the avoidance of doubt any deviations between an instruction and a PN which arises as a consequence of the instruction having to comply with TOD or being agreed between the TSOs and the participant does not give rise to a bid-offer acceptance. To the extent that there was a net MWh deviation over a whole settlement period, the discrepancy would be treated as under-generation (or over-generation, as the case may be).

The SEM Committee recognises also that TOD, even with three heat states, may not adequately capture the full capability of the participant. The details need to be decided as to how TOD will be represented and used to ensure the physical feasibility of instructions and possibly also of PNs, and how these processes can allow balancing service providers to offer flexibility that might not be expressed by the standing TOD, e.g. where a generator is between warm and hot states, such that the Notice To Sync time is shorter than the warm parameter but longer than the hot parameter. Possibilities could include allowing the balancing service provider to agree an instruction that exceeds the TOD with the TSO, to ensure that, where needed, it provides the maximum balancing actions to the system, and incur neither a discount for over-generating nor a premium for under-generating. The SEM Committee considers that these matters can be best addressed in the implementation phase.

PNs for wind and non-dispatchable demand

In general there was support for the proposition that wind and non-dispatchable demand should not be required to submit PNs and/or FPNs. However some respondents raised the potential for submissions to be required from these participants at some point in the future.

At this time the SEM Committee sees considerable merit in a solution that does not require the submission of PNs and/or FPNs from wind and non-dispatchable demand, as it is questionable whether requiring such submissions would, in the first instance, have any value. However the SEM Committee is of the view that these participants should be able to use the processes and systems that will be in place to accept such submissions from all market participants, should they wish to provide same.

The TSOs' response is particularly useful on this issue. There is a widely held view that the forecasts available to the TSOs are the best of their type available for both wind and demand. This may well be the case at present in an ex-post market where participants may not be overly concerned regarding forecasting. However, given balance responsibility in I-SEM the positions of suppliers and wind generators will likely change. These participants will be seeking to match their ex-ante contracts with outturn consumption/generation and therefore will be greatly interested in their own forecasts. In addition, the TSOs have suggested that with increases being observed in micro-generation etc., it is expected that participants will have better knowledge of these installations than the TSOs and will be better placed to account for these installations in their forecasts. They consider there to be a value in these participants submitting PNs based on their forecasts to the TSOs. This point was also acknowledged by some other respondents (in addition to the TSOs).

The SEM Committee recognises that there could be a significant additional burden on participants to supply this information to the TSOs for I-SEM Go-Live but is of the view that it will likely have an important role to play in the future. Systems will be implemented to allow other participants to supply this information, and that participants that are exempted from the requirement to submit PNs should have option to do so. It should be noted that the current SEM systems do have provision in place for wind generators to submit forecasts.

It may need to be considered what value can be gleaned from PN submissions from wind and non-dispatchable demand from market go-live if only a subset of parties submit the data. Ideally, the PNs of individual parties could be incorporated into the aggregate forecast but how this is done is likely to depend on whether forecasting is done at aggregate level or at an individual party level. There may also be interaction between this and the common grid model which would also be dealt with in the implementation phase.

Relationship between PNs and Ex-Ante trades

The responses on the issues around delinking of ex-ante trades and PNs focused on three key areas.

The first area was whether ‘PNs Reflecting the Best Estimate of Intended Generation or Demand’ (Option 3) would result in a self-dispatch market. As per the Consultation Paper, the SEM Committee does not believe this to be the case as a plant will not be able to force itself onto the system through its FPN and receive compensation for being dispatched down. Nevertheless, there are a number of key features of this option that distinguish it from the other two options.

Full delinking does appear to allow generators and suppliers to spill through the balancing market. This is especially facilitated with a single imbalance price. A key question is whether there is any reason that this shouldn’t occur. In practice, any plant that spills through the BM would likely have been able to bid zero in the ex-ante markets to obtain a position.

The second issue relates to the flexibility for generators associated with delinking. In particular, at least one generator suggested that requiring PNs to be linked to traded positions will limit the trading a generator can undertake. The SEM Committee is of the view that this is not a substantive issue and that it can be addressed through allowing some level of tolerance in the linked approach. Indeed this was suggested by a number of responses supporting a linked approach.

The third issue raised with delinking appears to relate to actions of generators which contribute to system balance. In particular, one respondent stated in their response “We do not think that participants should be punished for resolving a system imbalance just to avoid ‘self-dispatch’ terminology and TSO/participant sensibilities...” This is potentially a substantial issue and relates to the central

dispatch nature of the market in I-SEM. In some markets, BSPs are encouraged to be proactive in the BM such that, for example, if the system is short they would go long. This happens in some self-dispatch markets. However in the context of I-SEM, at least in the medium term, this is not expected to be a feature. For example, with a highly constrained market, the supply/demand balance may be tight but only the TSOs will know the subset of plant that can resolve the supply/demand imbalance. Therefore, the potential for a more “pro-active” balancing regime is not being considered at this time and so this issue of itself wouldn’t support a delinking of PNs.

The SEM Committee, in the Consultation Paper, discussed the potential that parties might wish to deviate from their contracted position and that were this to be the case, the TSOs would at least want to know this. This was an argument in favour of delinking. The philosophy of the I-SEM is that parties get their physical positions through the ex-ante markets. In the extreme, delinking could detract from this philosophy. In the longer term, as the market gets established, delinking may be appropriate but earlier on this would not be desirable. The issue of generators declaring less accurate information to the TSOs than what it intends to do can be addressed elsewhere in the trading arrangements such as through the treatment of uninstructed imbalances.

The SEM Committee is of the view that the difference between Option 1 and Option 2 is largely one of degrees of tolerance. If Option 1 (PNs linked to ex-ante trades at all times) had a very large tolerance built in, it would look very close to Option 2 (PNs linked to ex-ante trades at gate closure only). The SEM Committee is of the view that Option 2 is more appropriate than Option 1 in that it provides more flexibility to generators as to how they trade in the ex-ante markets.

A number of respondents raised the prospect that a tolerance would need to be built into Option 2 given the potential difficulties in exactly matching trades with plant capabilities. This point has merit but any tolerance likely would allow generators to spill through the BM to a small degree should they choose to do so. This would, however, likely be quite different in magnitude to the spilling discussed in the delinked approach.

There is an open question as to how to enforce the linking of FPNs to ex-ante trades at gate closure. In practice, it is unlikely that there will be systems in place to be able to perform real-time checks on the differences between FPNs and ex-ante positions, and that any monitoring and enforcement actions will need to be taken ex-post. In

addition, the requirement for final PNs to match ex-ante contract positions will need to be codified. The TSC, the Grid Code or licences could be the appropriate place for this. From an enforcement point of view it is likely best placed in the licence. This will need to be considered as part of the implementation phase.

The SEM Committee notes the concerns from some participants around delinking. The concern and confusion appears to be mainly related to the full delinking of PNs and ex-ante trades.

The SEM Committee has decided that the most appropriate course of action for market start is to put in place a requirement that FPNs are linked to ex-ante trades at Gate Closure but that there be no specific requirement for initial PNs to be linked to ex-ante trades, i.e. Option 2 in the Consultation Paper. There should be a tolerance allowed for, with this tolerance to be established in the implementation phase. The reasons for this SEM Committee position are set out below.

- The linking of FPNs and ex-ante positions is in line with the philosophy of the I-SEM as set out in the High Level Design, where great emphasis was placed on trading in liquid centralised ex-ante markets especially given the influence of the ex-ante markets on efficient interconnector flows.
- Fully delinking PNs and ex-ante positions would allow vertically integrated or contracted parties to excuse themselves from the ex-ante markets. Much has been made of the need for liquidity in the ex-ante markets and the SEM Committee is of the view that, at least for market start, as much as possible needs to be done to promote liquidity in these markets.
- The SEM Committee is of the view that linking at gate closure is the appropriate decision, and considers that the arguments raised in favour of delinking are not substantial enough to outweigh this view.
- The potential for delinking has created concern and confusion among a number of respondents. The SEM Committee is of the view that this issue is not of sufficient significance and importance that it should be allowed create such uncertainty and is of the view that for market start, the PNs linked at gate closure option provides more stability and certainty to all participants.
- The SEM Committee will further consult on the best mechanisms to enforce the decision.
- The SEM Committee will keep this issue under review post I-SEM go-live.

The SEM Committee recognises the linking PNs and ex-ante trades would not be appropriate for assetless traders. By definition, an assetless trader will have an expected output or consumption of zero. The SEM Committee believes that the implementation phase should consider the suite of rights and obligations that would be appropriate for assetless traders but that it should include the facility for assetless traders to hold ex-ante contract positions which, necessarily, will not be linked to any physical position. It is also recognised that participants that do have generation assets, supply physical demands or have interconnector units might also want to engage in assetless trades, and the SEM Committee considers thus that every participant should be able to make assetless trades that are unconnected with any particular physical unit, i.e. any unit having any metered generation, demand, export or import. Notwithstanding the ability to make assetless trades, the requirements for linking PNs and ex-ante positions at gate closure will continue to apply to each physical unit. This is consistent with the concept of the unit based approach set out in the HLD. It is for consideration during the implementation phase if, when and how such trades are identified as being assetless as distinct from trades associated with physical units.

Information Imbalance Charge

The responses to the consultation suggest that the case for an information imbalance charge is not clear. Having considered the matter further and having considered the consultation responses the SEM Committee is of the view that any discussion around a potential information imbalance charge should relate either to the difference between PNs prior to gate closure and actual output (adjusted by any bid-offer acceptance) or to the difference between PNs and FPNs. This is because the differences between dispatch instructions (FPNs adjusted by bid-offer acceptances) will be addressed through the treatment of uninstructed imbalances.

A key question here is how effective the Grid Code will be in ensuring accuracy of PNs submitted. As discussed elsewhere, there will likely be a cost to the system in general where less accurate information is submitted to the TSOs. This will most likely manifest itself in greater non-energy action costs. The Grid Code does include the concept of Prudent Utility Practice which may encompass any requirements around the submission of accurate information.

The SEM Committee recognises that the introduction of any information imbalance charge must be fair and proportionate. In particular, it may be the case with a

market like I-SEM that generators just don't have accurate information of their running for the coming day given the level of priority dispatch generation, etc. It would not be fair to penalise a generator on something they had no control over. For example, if wind forecasting at the DA stage is less accurate on a certain day then there may well be significant changes in the PNs of thermal generators that were not known earlier.

The ideal scenario for PNs is a situation where a BM unit knows its most accurate expectation of its expected position at the end of the IDM. At a minimum, this would be the unit's ex-ante position achieved so far. Better than this would be the ex-ante position achieved to date modified by a reasonable expectation of further trades.

The SEM Committee notes that the TSOs, in their response, did not suggest that the introduction of an information imbalance charge is required. In particular, the TSOs are of the view that uninstructed imbalance charges (Discount for Over Generation (DOG) and Premium for Under Generation (PUG)) would be sufficient. The TSOs appear to, at least in part, base this view on the additional complexities likely associated with the introduction of an information imbalance charge.

The SEM Committee is of the view that an information imbalance charge need not be a necessary feature of the market at Go-Live and believes that a Grid Code obligation should prove sufficient, but also believes it is prudent to allow for its introduction at some stage.

In conclusion, the SEM Committee is of the view that situations may occur where an information imbalance charge would be useful or required. In addition, the SEM Committee believes that it would be prudent to include functionality in the market systems to implement an information imbalance charge at the outset of the market, as it would be much more costly to add such functionality at a later date. The BETTA market in GB has provision for an information imbalance charge, but the rate was set at zero initially and has remained at zero since it commenced operation.

The issue with this will be whether or not the requirements can be sufficiently defined at this stage to allow the TSOs to systemise the charge. The most prudent approach may be to put systems in place to cater for an information imbalance charge that compares PNs and FPNs at a time (for example H-6) to be parameterised and determined later. The charge itself could be linked to the imbalance price with some discount or premium, depending on the direction, to be determined.

4.5 SEM COMMITTEE DECISION

Timing on PN Submissions

The SEM Committee had decided that an obligation should be placed on participants requiring that their PN submissions should at all times be the participant's best estimate of its intended level of generation and/or consumption, reflecting its intended metered quantities (excluding any accepted offers and bids) and technical characteristics, given also the requirement that the metered quantities (excluding any accepted offers and bids) reflect also the ex-ante contract position at gate closure. The SEM Committee has decided that, except at gate closure, the obligation be qualified to avoid the possibility of participants being obliged to constantly resubmit PNs that differ from previous submissions by an immaterial amount.

The SEM Committee endorses 13.30 as the time of initial submission of PNs but has decided that the timing of will be finalised during detailed rules drafting and implementation.

Granularity of PN Submissions

The SEM Committee has decided that it is for detailed consideration as part of the implementation phase whether participants:

- (i) will have to specify PNs that explicitly detail the block loads, dwell times/soak times, and intermediate ramp ups, with each segment being described by beginning and end MW level and minute time;
- (ii) will be able to specify an abbreviated instruction, with the details being inferred from the TOD;
- (iii) will be permitted to specify an approximate or 'representative' run-up profile;
- (iv) or whether some other protocol between participant and TSOs can achieve a similar outcome.

The SEM Committee has decided that any deviations between an instruction and a PN which arises as a consequence of the instruction having to comply with TOD or being agreed between the TSO and the participant, whereas the PN does not, will not give rise to a bid-offer acceptance.

PNs for wind and non-dispatchable demand

The SEM Committee has decided that wind and non-dispatchable demand should not be required to submit PNs but that these participants should be able to use the processes and systems that will be in place to accept such submissions from all market participants, should they wish to provide same.

Relationship between PNs and Ex-Ante trades

The SEM Committee has decided that PNs must be linked to ex-ante trades at gate closure only. The SEM Committee has decided that the means of enforcing this obligation should be considered and that consulted upon as part of the implementation phase. The SEM Committee will keep this issue under review post I-SEM go-live.

The SEM Committee has decided that participants should be able to also make assetless trades that are un-related to any particular physical unit, and that the implementation phase should consider the suite of rights and obligations that apply to such trades.

Information Imbalance Charge

The SEM Committee has decided that the capability for an information imbalance charge should be included in the I-SEM systems but that the information imbalance charge should be initially set at zero and amended, if required, as the market develops.

5 FORM OF OFFERS, BIDS AND ACCEPTANCES

5.1 INTRODUCTION

Being instructed to deviate from its physical notification (PN) is likely to change a unit's costs. For example, increasing the output of a fossil-fuelled generator increases fuel costs, whereas reducing the output will decrease them.

Accordingly, the HLD envisages that participants declare:

- **offers** to increase generation or reduce demand; and
- **bids** to decrease generation or increase demand.

Offers can be regarded as offers to sell energy to the system (or to the TSOs acting on behalf of the system), while bids can be regarded as bids to buy additional energy from the system (or from the TSOs acting on behalf of the system). In the case of a bid to reduce generation, the participant is, in effect, bidding to buy *back* from the system, energy it has sold to other market participants through the ex-ante markets. Similarly, an offer to reduce demand is an offer to sell *back* energy that the participant has bought.

When the TSOs instruct a participant to deviate from its PN, the TSOs are accepting the offers and/or bids submitted by the relevant participant. The issue thus arises as to how participants can most accurately express the change in their costs that will result in the event that the TSOs instruct them to deviate from their PNs.

5.2 OFFERS, BIDS AND ACCEPTANCES IN I-SEM

The Consultation Paper set out options whereby participants can declare their costs (and the level of compensation they require). Firstly options are considered for declaring incremental and decremental (per MWh) costs. Three potential options are considered below for the manner in which participants can express their (per MWh) costs, which are referred to as:

- (1) Simple MWh;
- (2) MW Relative; and
- (3) MW Absolute.

Secondly, options are considered whereby participants can reflect costs that do not vary with output, i.e. start-up costs and no-load costs. A number of options are set out in the following sections for the recovery of start-up costs in the I-SEM BM:

Option 1: Start Up Contracts;

Option 2: Block bids; and

Option 3: Explicit Start Costs.

The Consultation Paper also considered how rebidding following acceptance of a bid or offer can be accommodated within the I-SEM design so that participants can reflect changing costs throughout the day. Three approaches were considered in the paper:

- fixing the price of only accepted offer and bids;
- “undo” prices; and
- fixing all offer and bid prices following an acceptance.

Finally, the Consultation Paper discussed the form of TSO instructions to market participants. Specifically, the paper described open and closed instruction approaches.

5.3 SUMMARY OF RESPONSES RECEIVED

Sixteen respondents provided specific comments on the form of offers and bids. Of those who responded on this issue, none supported the Simple MWh format, ten preferred the Absolute MW format, while five preferred the Relative MW format. One respondent considered it difficult to provide comment in the absence of a wider discussion on price-maker wind.

Respondents that supported the Absolute MW format cited simplicity, transparency, the mitigation of market power and fewer resubmissions of data as the rationale for favouring it. It was also observed that if the option of allowing participants to submit two separate cost curves was included within the Absolute MW approach – one for being instructed up and one for being instructed down – it would be possible to replicate the Relative MW approach. One respondent highlighted that the possibility of incorporating two separate order curves would depend on the imbalance pricing approach taken (it should be relatively simple to incorporate in the flagging and

tagging and simple stack approaches and in one potential variant of the unconstrained stack with plant dynamics approach).

Other respondents supported the Relative MW format. One respondent suggested that if this approach was to be adopted there should be a standard convention whereby the offers and bids of participants are understood to be relative to PN submissions as adjusted for bid-offer acceptances made by the TSO prior to gate closure. It also considered that it would better facilitate risk management. Another respondent found the proposal in the Consultation Paper that bid-offer acceptances would not change the PNs confusing, and also stated that the Relative MW approach would be consistent with IDM trading and the market in Great Britain.

One respondent sought confirmation that the intention of the Relative MW format was that when the TSO is making a bid-offer acceptance, it would not only take into account PNs but also any previous bid-offer acceptances that it has made. This respondent argued that making acceptance decisions based solely on PNs would be impractical in circumstances where the TSO has also already taken a prior non-energy commitment or DS3 reserve action.

Treatment of start costs

Around half of the responses on this issue stated a preference for Explicit Start Costs. Four respondents preferred Block Bids, with no respondent indicating a preference for Start-up Contracts.

Most respondents considered that the design of the BM should guarantee the recovery of start-up costs. Two respondents stated that, regardless of the approach adopted, it is essential that the cost of starts are properly reflected in the balancing market price and that out-of-market arrangements should be avoided as they would distort the markets and undermine the incentives for participants to trade ex-ante.

One respondent stated that under the start-up contracts and explicit start-up costs options, it may be possible in all of the imbalance pricing approaches to include the start-up costs in the calculation of the imbalance price. However, the basis for settling on the better of the imbalance price or bid-offer price is then complicated. The bid-offer price, which may in some approaches exclude consideration of start-up costs, would be compared with an imbalance price which includes consideration of start-up costs.

Two respondents considered that start costs should be submitted explicitly through a similar mechanism to the current market and recovered through an ex-post payment similar to make-whole payments in the current SEM. One of these respondents added that moving to recovery of start costs in the imbalance price could be considered over time and that recovery of start costs in marginal market prices delivered from a new pricing structure appears foolhardy. Another respondent did not wish to proffer a preferred solution as they did not have a clear understanding of the scale of impact a truly cost reflective BM price would have on participants with an imbalance.

Respondent's arguments in favour of Block Bids (Option 2) included:

- One respondent stated that Block Bids will give generators the greatest control over their own optimisation strategy. It will be the most straightforward in terms of how these costs are included in Imbalance Pricing.
- One respondent highlighted that generators will have to fit fixed costs into some form of Block Bids in XBID anyway – it is operationally complex to maintain two different pricing structures for the same plant in two different markets. It is important to have a consistent offer structure in the IDM and BM. The need for consistency was backed up by another respondent.
- This respondent also stated that Block Bids are more likely to be consistent with products envisaged in the Electricity Balancing Network Code and that while a range of Block Bids would be complex for the TSO to compare against each other; this would be a lesser disbenefit than reduced IDM liquidity and greater spilling into the BM.
- One respondent considered that Block Bids allow participants to provide packaged costs which reflect their total costs and provide explicit price signals to the market.

The main argument made against Block Bids was that they are too inflexible and not granular enough. One respondent observed that a participant would have to submit Block Bids for every possible time period over which the plant could run. This is impractical and a lower number of Block Bids would be submitted in reality. Block Bids would therefore reduce the flexibility that thermal generators are capable of providing. Another respondent commented that multiple block bids would not be necessary in a well-designed market and should be avoided, while another considered that block bids would likely limit the ability of flexible generators to provide balancing services to the market.

Some of the comments in favour of Explicit Start Costs (Option 3) included that:

- they would be transparent as they allow the participant to submit a clear representation of the underlying costs;
- they avoid complexity in the Imbalance pricing process;
- they would appear appropriate to ensure the costs are not an inhibition to offering services to the market;
- they would facilitate flexibility in the dispatch decisions for the TSO to manage the constrained system; and,
- they could feed through to the unconstrained imbalance pricing method.

Some of those in favour of explicit start costs additionally stated that they should be recovered exclusively from out of balance market payments.

There were also a number of arguments made against the use of explicit start costs (and explicit contracts):

- explicit start costs would be complex and contracts would not be fully transparent;
- if explicit start costs were available in the balancing market, it would act as an incentive to avoid the IDM and liquidity would be reduced in that market;
- one respondent felt it is essential that fixed costs are properly reflected in the BM price – this would require some form of uplift mechanism necessitating implementation of an inter-temporal scheduling and pricing algorithm; and,
- the implementation of explicit fixed costs would seem to represent a significant change to the HLD.

Outside of the options proposed, one respondent commented that it was not clear why a simple incremental offer and decremental bid format would not work for I-SEM. Further, the volume certainty provided by block bids would also be provided under simple incremental offers and decremental bids if the TSOs respected the technical operating parameters of units when making bid-offer acceptances via the balancing market. Another respondent considered that all BM pricing should be determined from the bid-offers submitted by participants.

However, one respondent stated that it could be difficult to recover start-up and no load costs through BM incremental offer prices. Another respondent believed that there would be merit in units recovering their start-up costs on a more 'paid as bid' basis rather than through the current uplift methodology.

Re-bidding

Fifteen respondents provided comments on rebidding. While freezing all of a unit's bid-offer prices when it had one bid-offer accepted was seen as unworkable, most respondents felt that the price of accepted offers and bids should be fixed upon acceptance; with the remaining bid-offer prices being allowed to be changed until they too were accepted by the TSOs (or until gate closure). If a market participant were prevented from re-bidding it was considered likely that the risk of an adverse movement in underlying costs would be priced into the original bid.

Most respondents considered also that some form of undo price should be included within balancing market bid-offers in order to provide for the recovery of any sunk cost that may be incurred should a unit be instructed to deviate from its PN but then have that instruction subsequently cancelled. However, one respondent felt that were undo prices to be fixed at the time an action is taken, it would result in perverse bidding given the undo price is essentially a guess of the costs of the generator in the future. Another respondent was also against undo prices being frozen.

Open and Closed Instructions

Fifteen responses were received on the issue of open vs. closed instructions. Twelve of these favoured closed instructions, while three favoured open instructions.

The arguments in favour of closed instructions included:

- closed instructions will be needed to comply with the Electricity Balancing Network Code – if any changes are needed for the future, they should be made now;
- other markets use closed instructions;
- closed instructions would help market participants to operate their generators more systematically and efficiently;
- it was unclear how open instructions would work in imbalance settlement; and
- the closed instruction places a ‘value’ and thus an incentive on TSO revision actions.

The arguments for open instructions included:

- the control rooms would receive unnecessary noise from the regular updating of closed instructions;
- providing the TSO with the ability to lock accepted prices down on a case by case basis with a closed offer of fixed duration would provide the TSO with too much influence over a generator's ability to change its costs; and
- it would maintain the current practice from the SEM where the open format is used in communications with the participants, and the closed format is used for cross border exchanges of energy.

5.4 SEM COMMITTEE RESPONSE

Form of Offers and Bids

It was raised within the responses that Physical Notifications may need to be changed following the acceptance of a bid or offer and that this would particularly be the case under the Relative MW format, whereby the prices of subsequent bids and offers are likely to change after the acceptance of an earlier bid or offer. The SEM Committee reiterates the definition of a Physical Notification provided in the consultation paper: the PN submitted by a participant to the TSOs represents the MW profile that the participant intends to generate (consume) in the absence of having any incremental offer or decremental bid accepted by the TSOs in the BM. Therefore, it is neither necessary, nor appropriate, to change the PN following the acceptance of a bid or offer. If a second bid or offer is being accepted, settlements will take account also of any previous bid or offer acceptances.

The SEM Committee has decided that the absolute MW option is the best approach. The main benefit of the Absolute MW approach highlighted in the consultation was the fact that subsequent bid-offer prices would not need to change following the acceptance of a previous bid-offer if the underlying costs had not changed but could, nevertheless, be changed if the participant wished to do so.

The SEM Committee acknowledges that decremental costs may not be the equal and opposite of incremental costs in the same MW range. Participants would be able to reflect this by re-declaring their costs after each bid-offer acceptance. However, to avoid participants having to do this when the underlying costs have not changed, under an Absolute MW approach, a two cost curve solution would be appropriate, with participants being able to use these curves to best reflect their costs.

Treatment of Start Costs

The SEM Committee acknowledges the responses received on the treatment of start costs. The SEM Committee is keen that participants are facilitated to adequately recover their costs of starting a unit in the Balancing Market and notes the concerns expressed regarding the need to ensure both that start costs in the BM feed into the imbalance price and that liquidity in the IDM is not affected, i.e. that BM prices are not dampened through reflecting only marginal operating costs, thus removing buy side liquidity from the IDM. In particular, the SEM Committee acknowledges that start costs will have to be implicitly included in offers to the ex-ante markets and is keen to ensure consistency of cost recovery across the ex-ante markets and the BM.

The SEM Committee is keen to avoid, as far as possible, out-of-market payments for start costs in the Balancing Market. This concurs with participant concerns that such arrangements may not be transparent, and that the efficiency drivers are likely to be less effective under a series of bilateral arrangements compared to an offer based market. The SEM Committee considers that, as far as possible, all start-up costs incurred for energy balancing reasons should be incorporated into the imbalance price, and that this would be more readily achieved through a market offer approach. This leaves the question of whether fixed costs should be explicit, incorporated within block bids, or incorporated within simple bid-offer prices, as suggested in participant responses.

In the Markets Consultation Paper, the initial preference was for an approach based upon Start-Up Contracts or Explicit Start Costs rather than Block Bids. The key concern in the Consultation Paper, which was also reflected in some of the

responses received, was to allow participants the ability to recover their start costs while also giving sufficient flexibility to the TSOs to operate the system. Having considered this further, it is not clear that explicit start costs are a prerequisite to achieve this in both the energy balancing and re-dispatch timeframes.

The key rationale for avoiding the use of explicit start costs for energy balancing actions relates to the difficulty in incorporating them into an imbalance price that is being published close to real time. The RAs project team presented on the issue of start costs at the 1st July RLG and put forward the view that any solution that socialises start costs across all demand would not be suitable in I-SEM. There is significant concern that if start costs were reflected in IDM prices but not in imbalance prices, buy-side participants would be incentivised to migrate towards the BM rather than buying in the IDM.

However, the above concern does not, in and of itself, categorically rule out the use of explicit start costs. There are approaches available to incorporate them into the imbalance pricing arrangements. A number of these approaches were discussed with the RLG on 1st July.

- One such approach is to create an uplift adder for the imbalance price which would be paid to Balancing Service Providers (BSPs) and paid by all parties which are out-of-balance. However, this approach is not straightforward. It requires an uplift algorithm which spreads the costs (and thus cost recovery) across imbalance settlement periods (ISPs) in a way which reflects the running of the plant. In the I-SEM, the imbalance price will need to be published soon after the relevant ISP. This greatly compresses the amount of time the uplift algorithm would have to solve and also means that the algorithm would have to make assumptions regarding the expected running times of units. Finally, this approach would require make whole payments in order to ensure full cost recovery for any unit which did not, in fact, run as was expected by the algorithm.
- Another approach would be to pay for start costs through side payments (paid only to individual Balancing Service Providers (BSPs) which actually incurred start costs), which would be funded through an uplift adder on the imbalance price only. This would, by definition, mean that the price paid to BSPs for balancing actions and the price paid by participants for imbalance volumes would be different at some times. It should be easier under this approach to establish and publish the imbalance price promptly. It would be more practical to recover the

incurred start costs over a shorter period as the total €/£ amounts involved would be smaller and thus would be less likely to lead to extreme price spikes. However, the key drawback to this approach is the potential for lost incentives on the BSP side. If the clearing price for balancing actions excluded start costs then BSPs would be excluded from earning infra marginal rent on the starts of other units in the BM, while prices in the IDM would be inclusive of start costs. Although it might be argued that this lost incentive isn't significant given that the TSOs will limit early energy actions, a number of participants have expressed concern that it would distort the market as a whole.

The SEM Committee remains of the view that block bids do not provide sufficient flexibility either for the market or for the TSOs. In particular, a significant number of blocks would need to be submitted simultaneously by generators in order to allow them to reflect different potential running patterns and the level of complexity this would impose on the TSO systems is significant. In addition, it is not clear whether it is possible for enough blocks to be submitted to satisfy all possible TSO requirements, especially for re-dispatch.

Having considered the matter, the SEM Committee is thus of the view that in the balancing market timeframe, market participants should represent any fixed costs (such as those reflected in start-up and no load costs in SEM) within their simple incremental offers and decremental bids to the TSOs in I-SEM.

The key advantage of the use of bid-offers which are inclusive of these fixed costs relates to imbalance pricing as it avoids the need for any complex uplift algorithm in the imbalance pricing process.

The use of simple bids and offers allows generators to adequately represent their start costs in manner that reflects their commercial risk of operation. The most conservative method to do this is to spread a unit's start cost across its minimum on time and minimum stable generation. If a unit is called by the TSOs then they must be taken for at least their minimum on time and output, thus ensuring that they will recover their start costs over the instructed output. Participants would have the flexibility to adopt alternative bidding strategies if they so wished.

There are, however, limitations to the use of simple bids and offers for early actions. In particular, the TSO scheduling software will use the bid-offers available at some point ahead of real time. These bid-offers will likely include start costs in all trading

periods, as units will not know in what trading period they will be started. It is expected that, once committed, a unit would reduce its bid-offer prices for those periods after its minimum on time to reflect the fact that its start costs would be recovered by this time. However, the scheduling software, when optimising non-energy actions, would not have sight of this probable reduction in bid-offer prices. This could lead to dispatch schedules and re-dispatch actions that, while optimal at the time the decisions to commit units were made by the scheduling software with the bid-offers available to it, are not optimal when assessed over a longer time period.

The SEM Committee is of the view that this issue is created by the re-dispatch market (non-energy) and balancing market running consecutively and using the same systems. The SEM Committee believes that the best way to address this issue is to acknowledge that the two markets run consecutively and allow for the possibility for different bid-offer formats in both. If the I-SEM were to have separate re-dispatch and balancing markets they would likely have different requirements; even if the two markets were separate the issues under consideration would still arise.

The SEM Committee considers that the logical conclusion following from the above is that bid-offer formats should be available to reflect the specific requirements of the different timeframes and that the I-SEM systems should be able to accommodate explicit fixed costs in the re-dispatch timeframe before balancing.

As discussed above, the SEM Committee is of the view that the imbalance price should reflect any start costs incurred for energy balancing. The SEM Committee would expect that a generator would submit bid-offers at BM gate closure that would be inclusive of fixed costs and would therefore not include explicit start costs. It is unlikely that a generator would want to submit an explicit start cost at gate closure as this would suppress the balancing price. However, the SEM Committee would be open to measures being put in place to specifically stop explicit start cost submission at gate closure.

In the re-dispatch timeframe before balancing, participants should have the option to submit explicit fixed costs. For out-of-merit non-energy actions these fixed costs should be recovered as side payments to units, with the costs socialised across all demand. Given the decision that generators will get paid the higher of the imbalance price and their offer price in settlement, the SEM Committee is of the view that a mechanism will need to be put in place to ensure that units don't over-recover their

fixed costs. This mechanism will consider the revenue earned by a generator over a contiguous operating period.

This solution for re-dispatch actions should address the concerns outlined above for non-energy actions and the ability of the TSO scheduling software to plan the system. For periods in which early actions could be called, large generator units which were not committed would likely submit explicit fixed costs. The detailed implementation phase will need to consider the detailed algebra and settlement process for these combined with substitutive IDM trades, and so on.

The SEM Committee is of the view that the solution outlined above addresses the needs of the re-dispatch and balancing markets. However, the SEM Committee accepts that there are unresolved issues with the approach outlined. The main issue is the overlap between the re-dispatch and balancing market timeframes and the impacts on the balancing market of early re-dispatch actions.

For example, say a plant, which was out-of-merit at the day-ahead stage, is called by the TSOs for non-energy reasons. Where this happens, the participant can trade in the IDM and its IDM trades will substitute the bid-offer acceptance by the TSOs. This can happen where the plant was not competitive at the time of the bid-offer acceptance but subsequently comes into merit. In general, there is no issue with this scenario once the participant in question actively trades in the IDM.

- There is an issue, however, where a plant has a bid-offer accepted by the TSOs for re-dispatch but is not subsequently successful in the IDM. In such a scenario, the generator will be committed and have its start costs paid for re-dispatch but may then appear more economically advantageous than some other plants in the balancing timeframe given that its start costs will already be paid for.
- As mentioned previously, this issue exists due to the requirement for early actions by the TSOs and the difficulties in using simple bids and offers and the complexity in using block bids. At this stage the SEM Committee is of the view that this decision should go no further than to state that the systems developed should accommodate explicit start costs and that in the balancing timeframe only simple bids and offers should be used.

It will be possible, during the detailed market rules development stage to consider this matter further and to decide whether further refinement of the solution is required.

- For example, once the TSOs' systems and processes are developed it should be possible to investigate whether simple bids and offers can be effectively utilised by the scheduling algorithm for early actions. Alternatively, the TSO systems may be able to take into account the start costs of already committed plants when making decision in the balancing timeframe.
- Alternatively, it will be for consideration whether an uplift adder to the imbalance price should be implemented. This uplift adder would be reflective of start costs incurred for early energy balancing actions and would include a mechanism to allocate the total start costs to individual trading periods.

In summary, the SEM Committee is of the view that the decisions on start cost formats set out in this section best address the problems identified for energy actions and imbalance pricing and for non-energy actions and TSO scheduling. The decisions correctly reflect that the same mechanism will be used by the TSOs to take non-energy (re-dispatch) actions and energy balancing actions. The remaining issues with this approach should be considered in the implementation phase and to the extent that additional measures such as a pricing uplift are required they are best developed then.

Re-bidding of Offer and Bid Prices

The SEM Committee concurs with the majority of respondents that the prices of accepted offers and bids should be frozen, as if this were not the case TSO would be subject to considerable cost uncertainties. The SEM Committee does not consider, however, that the prices of unaccepted offers and bids should be frozen as it is important that participants retain the commercial flexibility to reflect changes in underlying costs. The desire for undo prices to be submitted at the same time as offers and bids is noted. As mentioned above, this would be provided for under the Absolute MW approach by allowing two cost curves.

Open and Closed Instructions

The SEM Committee notes that the majority of respondents favoured closed instructions in preference to open instructions. The SEM Committee notes the arguments in favour of closed instructions, including consistency with the draft

Electricity Balancing Network Code and with other markets, and that closed instructions would help generators operate generating units more systematically and efficiently. The SEM Committee notes also the concerns as to how open instructions would work in settlement, and that closed instructions would place a value on TSO revision actions.

The SEM Committee notes the concerns that closed instructions would result in excessive “noise” in updating closed instructions, and also the comment that open instructions would be consistent with current practice.

The SEM Committee does not necessarily agree with the concerns expressed regarding open instructions. The SEM Committee envisages that an open instruction would be settled, as suggested in the Consultation Paper, by fixing the offer price for the minimum quantity implied by the unit's technical offer data (TOD). Participants could revise their offer prices for any unaccepted quantities and the TSOs would be deemed, minute-by-minute, to have accepted a further quantity, being the minimum allowable additional quantity given the unit's TOD, until such time as the TSOs instructed the participant to return the unit to the PN.

The SEM Committee acknowledges that this approach would give only limited certainty to generators regarding the quantities accepted by the TSO. However, using explicitly-closed instructions, i.e. in which every instruction, and every revision to an instruction, were required to return the unit to its PN, the incentive would be on the TSOs explicitly to accept only the minimum quantity – particularly if a bid-offer has an unfavourable undo price – and then to frequently revise the instruction minute-by-minute, accepting only the smallest possible additional quantity with each revision. In effect, the TSO would issue explicitly closed instructions that would have the same commercial effect as settling an open instruction as a sequence of closed instructions. Thus, the SEM Committee would be concerned that explicitly closed instructions would not necessarily give participants any degree of certainty, while resulting in the “noise” that the respondent expressed concern about.

Hence, the SEM Committee considers that instructions could be treated as closed in settlement but still be open in format as far as the dialogue between TSO and participant is concerned. The protocol would be as follows:

- (1) the TSOs issues an open instruction e.g. *“go to and stay at xMW (until further notice)”*;

- (2) this open instruction is treated in settlements as an initial closed acceptance, accepting the minimum quantity permitted given the TOD of the participant;
- (3) in each subsequent minute, a further closed acceptance, again being the minimum permitted by the technical offer data, is deemed to have been accepted;
- (4) participants are able at any time to revise offer and bid prices for any offer and bid quantities not yet accepted, and to revise PNs as discussed in Section 4;
- (5) the sequence of closed instructions continues in settlement until the instruction is closed by an instruction of the form “*return to FPN of yMW*”.

The TSOs could choose to close an instruction either because the bid-offer acceptance was no longer required or because relevant offer or bid prices had changed, such that another balancing action was preferred.

This approach would also allow the TSOs to issue a bid-offer acceptance that is longer than the minimum permitted by the TOD. This could be achieved by an instruction of the form “*go to and stay at xMW until at least time t*”, and would be treated in settlements as an initial acceptance of the minimum bid-offer acceptance quantity implied by staying at xMW until time t and only then returning to PN as quickly as possible given the TOD. The bid-offer acceptance could be extended, as in (3) above.

Whilst the SEM Committee notes the comment that closed instructions would give the TSOs too much influence over a generator's ability to change its costs, the TSOs would be expected not to accept balancing actions merely to prevent the relevant generators changing the price of these actions and would, in any case, by so doing run the risk that the action would, at a cost, have to be undone.

This approach would also maintain consistency with current practice. The SEM Committee does not regard consistency with current practice as necessary, particularly in circumstances where a change would deliver other benefits. However, in this instance, the SEM Committee considers that such consistency can be maintained, i.e. with instructions having an open format for operational purposes, without compromising settlements in any way.

5.5 SEM COMMITTEE DECISION

Form of Offers and Bids

The SEMC Committee has decided that the format of offers and bids should use the Absolute MW approach, with the option for units to avail of two cost curves[, on the basis that:

- under this approach, it is not necessary to update bids and offers each time the PN changes (although participants would still be free to re-declare prices based on, for example, changing commodity costs).
- it allows participants, if they so wish, to submit differing incremental and decremental costs.
- it provides the basis for undo prices. For example, when an offer is accepted, the bid for the same range becomes the undo price of the original offer.

Treatment of Start Costs

The SEM Committee has decided that in the balancing market timeframe, market participants should represent any fixed costs (such as those reflected in start-up and no load costs in SEM) within their simple incremental offers and decremental bids.

The SEM Committee has decided that bid-offer formats should be available to reflect the specific requirements of the different timeframes and that the I-SEM systems should be able to accommodate explicit fixed costs in the re-dispatch timeframe before balancing.

The SEM Committee has decided that the imbalance price should reflect any start costs incurred for energy balancing. This should be achieved through either of the following.

- For example, once the TSOs' systems and processes are developed it should be possible to investigate whether simple bids and offers can be effectively utilised by the scheduling algorithm for early actions. Alternatively, the TSO systems may be able to take into account the start costs of already committed plants when making decision in the balancing timeframe.

- Alternatively, it will be for consideration whether an uplift adder to the imbalance price should be implemented. This uplift adder would be reflective of start costs incurred for early energy balancing actions and would include a mechanism to allocate the total start costs to individual trading periods.

Given the decision that generators will get paid the higher of the imbalance price and their offer price in settlement, the SEM Committee has decided that a mechanism will need to be put in place to ensure that units don't over-recover their fixed costs, and that this mechanism will consider the revenue earned by a generator over a contiguous operating period.

Re-bidding of Offer and Bid Prices

The SEM Committee considers that the price of accepted bids and offers should be frozen upon acceptance, but that the bids and offers for any volumes not subject to an acceptance should be allowed to be re-priced.

Open and closed instructions

The SEM Committee has decided that instructions should be closed in settlements but open in respect of the format of instructions between the TSO and participant. The TSO will issue instructions of form, *“go to and stay at x MW until further notice”* and such an instruction will be treated as an initial acceptance of the minimum quantity given the relevant technical offer data, particularly ramp-rates and minimum on time, of the unit, and then subsequent acceptances minute-by-minute of the minimum additional quantity given the technical offer data. These subsequent acceptances continue until the TSO instruction returns the unit to its PN. The TSOs also have the option of increasing the duration of the initial acceptance by issuing an instruction of the form, *“go to and stay at x MW until at least time t”*.

6 INTERACTIONS BETWEEN THE BALANCING MARKET AND INTRADAY MARKET

6.1 INTRODUCTION

As set out in the I-SEM HLD, the IDM and BM will be open and will operate in parallel to each other in I-SEM. This means that during the continuous running of the IDM, the TSOs will have the ability to take early actions under the circumstances set out in Section 2.

While other EU markets may not have concurrent opening of the IDM and the BM, the relevant TSOs still need to take dispatch actions to maintain system security prior to IDM gate closure. For example, the BETTA market in GB adopts the late opening approach, whereby BM actions, i.e. bid-offer acceptances, cannot be taken until after IDM gate closure, which is one hour before the start of the relevant settlement period. However, National Grid enters into contracts with market participants covering very significant quantities of generation and demand reduction that oblige the contracted participants to behave in the BM in accordance to instructions that may be given in advance of IDM gate closure.

Another key difference between other markets and the I-SEM is the treatment of reserves. In I-SEM, it is proposed that the current SEM approach to reserves be maintained. Under this approach reserve deployment is achieved by moving a plant up or down from its unconstrained position. This, in and of itself, will create significant non-energy actions. In other markets it is often the case that the reserve contract between the TSOs and the relevant participant requires the participant to position itself at the reserve deployment level and any forgone revenue from the volume not participating in the energy market is covered in the reserve contract. Such an approach is generally seen in a self-dispatch market.

6.2 CONSULTATION PAPER PROPOSALS

The Consultation Paper put forward three options for the treatment of those instances where the TSO executes an early bid or offer acceptance on a unit, while the IDM is still open. Specifically, the three options set out how the participant would interact with the IDM in these instances and were as follows:

- Option 1: Freeze PNs;
- Option 2: Additive PN Changes; and
- Option 3: Substitutive PN Changes.

The first option would simply prohibit PN changes in respect of a particular BM Unit after any acceptance of an offer or bid in respect of that unit.

The second option would allow PN changes, after which any offer or bid acceptance that had already been issued would be measured relative to the new PN rather than the PN at the time at which the acceptance had been made. A consequence of this approach could be that the TSOs seeking to maintain the output of a given BM Unit at a particular level, say to comply with a system constraint, would find the instructed output of the unit changed as a result of the PN change or, would have to imply the automatic acceptance of a further offer or bid as a direct consequence of the PN change.

The third option would also allow PN changes. In this “substitutive” approach, a PN change would not imply a change in output or the automatic acceptance of a further offer or bid. Instead, the MW output implied by the offer or bid acceptance would not change, and the change in PN would imply a change in the offer or bid volume already accepted. By this means, a participant that had, say, sold energy in the BM through an offer acceptance, would be able to sell that energy instead in the IDM. There were a further two variants within the substitutive approach discussed in the consultation paper. The first would see the relevant bid-offer acceptance price swapped out in full for the IDM price achieved and the second would see the imbalance price swapped out for the IDM price achieved, with the participant retaining any premium on the relevant bid-offer acceptance price over the imbalance price.

The consultation paper also discussed a potential issue whereby BM participants could make additional gains from early actions by the TSOs. This issue would arise where a participant submits a non-zero level PN, the TSOs accept a BM offer (or bid) before IDM gate closure, and the participant subsequently buys (or sells) in the IDM and reduces (or increases) its PN. This was referred to as “Trading in the Opposite Direction” in the consultation paper, as the participant is trading so as to reduce its output when the TSOs, through the offer acceptance, are seeking to increase its output or, conversely, trading so as to increase its output when the TSOs are seeking

to reduce its output. The particular concern is that a participant that has an offer accepted at a high price (or a bid accepted at a low price), presumably as a result of a system constraint, could reduce (or increase) the PN so as to increase the volume on which the premium, over and above the imbalance price, must be paid.

The consultation paper put forward three options for dealing with this possibility:

- Option 1: No specific measures (i.e. deal with the issue through local market power measures);
- Option 2: A prohibition on PN changes which are “in the opposite direction” to the bid-offer acceptance; and
- Option 3: Allow PN changes in the opposite direction but, where bid-offer acceptances are system actions, limit the quantity on which the premium is paid such that it is not paid on the change in PN in the opposite direction to the bid-offer acceptance.

6.3 SUMMARY OF RESPONSES RECEIVED

As highlighted in Section 2, a large number of respondents noted concerns with regard to the impacts that early actions by the TSOs may have on the IDM and the BM, in particular the impact that these early actions may have on: (a) liquidity, (b) market price formation and (c) the potential for market participants to gain a commercial advantage in the IDM or BM.

Some respondents also stated that intervention by the TSOs prior to IDM gate closure was not in the spirit of the EU Target Model. Further some respondents noted that if the TSO actions were limited to unit commitment only then some of the issues highlighted in this section of the paper are largely mitigated, for example the repeated cycle of arbitrage does not occur if the TSO only instructs a start to minimum load.

Treatment of PNs after a BM bid-offer acceptance

Respondents were unanimously in agreement with the SEM Committee not to progress with the option to freeze PNs as they agreed it was overly restrictive and would impact IDM liquidity.

The majority of respondents were in favour of the substitutive approach. These respondents stated that, of the options proposed, the substitutive approach appears to best limit the distortion that early TSOs actions can have on participants trading in the IDM; price formation in the IDM; and the liquidity of the IDM. Furthermore, some respondents noted that the substitutive approach gives precedent to participants to solve market imbalances over the TSOs actions. One respondent also noted that the substitutive approach avoids sustaining units in positions of long term market power and that under the additive approach participants would be incentivised to run contrary to the TSOs' desired running of the unit.

At a high level the couple of respondents that supported the additive approach did so on the basis that the substitutive approach was overly complex and that there was no precedent for such an approach in other markets. One participant commented that the additive approach had the greatest merit as it provided greater clarity for both participants and the TSOs on the quantities to be settled in the balancing mechanism. Further, a couple of respondents stated that while there was potential for market distortion through the additive approach (i.e. it gives the extra-marginal unit a better opportunity to trade in the IDM as its start costs are covered), it would improve liquidity in the IDM compared to the substitutive approach under which a unit would be unlikely to trade unless the IDM price was more attractive than the price of its bid-offer acceptance. Lastly, one respondent noted that a substitutive trade does not necessarily leave the net position of the system unchanged. For example, a substitutive IDM trade could be matched cross border and this could necessitate a further TSO action.

Option within the Substitutive Approach

Should the substitutive approach be implemented, the majority of respondents were in favour of any IDM price achieved by a participant replacing the relevant bid-offer acceptance price in full. The primary reason for this position was related to the complexity of implementing the 'locking in the premium' approach.

However, a significant number of respondents stated that more information needs to be provided before a decision can be reached on a preference of one approach over the other. Respondents requested clarity on the 'locking in the premium' proposal and a quantitative assessment of both proposals.

One respondent noted that under the ‘locking in the premium’ approach, the generator is looking to achieve a better price in the IDM than its expectation of the BM price but that such a trade is unlikely as the buyer in such a scenario would likely wait for the lower BM price. Another noted that, regardless of the option chosen, the substitutive approach will increase the IDM price above the BM by creating a price floor in the IDM set by either the bid-offer acceptance or the premium.

A small number of respondents did however support the ‘locking in the premium’ approach. These respondents stated that under this approach the participant has a greater incentive to trade in the IDM, thereby increasing liquidity. One respondent also noted that having the trading activity set against a system-wide signal (the BM price) aligns the individual participants’ interests to a single objective thereby achieving a better overall outcome for the system.

Trading in the Opposite Direction

One respondent suggested that trading in the opposite direction should be prohibited. A further respondent commented that non-energy actions could be frozen. In general respondents were closely divided between those in favour of trading in the opposite direction being allowed, but dealt with under local market power mitigation measures, and those who required further information, analysis, or industry engagement before reaching any conclusions. One respondent suggested that an information imbalance charge could be utilised to dissuade trading in the opposite direction.

Two respondents stated that trading in the opposite direction should not arise if early TSO actions are limited to unit commitment decisions unless the generator trades to decommit itself in the IDM. Others commented that such trades will be minimised if TSO early actions are minimised, and that this would be desirable.

A small number of respondents were in favour of the other options presented with one of these respondents stating that an alternative might be to freeze trading in the opposite direction only for non-energy actions as a participant ‘undoing’ an energy action is not as critical to system security.

6.4 SEM COMMITTEE RESPONSE AND DECISION

Interaction between BM bid-offer acceptances and IDM trades

The SEM Committee notes that respondents were unanimously against freezing PNs after any bid-offer acceptance by the TSOs. While the TSOs may, in most circumstances, be instructing balancing actions only when necessary to do so and, in many circumstances, not until after IDM gate closure, it is necessary to cater for the eventuality that the TSOs instruct balancing actions before gate closure. The SEM Committee agrees that to prevent and PN changes after any bid-offer acceptance would be undesirable:

- firstly, the option is highly restrictive, and would prevent participation in the IDM in such circumstances;
- secondly, it could give perverse incentives for the TSOs to instruct small actions on BM Units ahead of any clear need in order to 'lock-in' bid-offer quantities, in order to inhibit further PN changes and reduce uncertainties that could otherwise complicate system operation. While it would not be expected that the TSOs would exploit such perverse incentives, it is better not to create them in the first instance; and
- thirdly, the restriction could be counter-productive, in that participants might price the loss of opportunity to trade in the IDM into their offer and bid prices.

The SEM Committee notes that the respondents supporting the additive approach did so, apparently on the basis of the potential complexity in the substitutive approach. The SEM Committee does not agree with this view. There may be a level of complexity in implementing a substitutive approach, but the SEM Committee believes that this complexity is related purely to the detailed algebra required to deliver it, while the principle being embodied is as simple as any of the other approaches.

A further reason stated for preferring the additive approach over the substitutive approach concerned the possibility that IDM trades have a GB counterparty and thus trigger a change in the cross-border exchange. It was argued that in such circumstances the substitutive approach, by 'unwinding' a previous balancing action, would require the TSO to take an additional action, whereas under the additive approach the initial action would not be unwound and hence the IDM trade would

provide the extra energy required. However, the SEM Committee is of the view that this is not a significant issue. If the substitutive PN change reduces the quantity of a bid-offer acceptance, but changes the overall position in I-SEM, this will simply require a re-optimisation of the system by the TSO. In many ways it seems more appropriate that the re-optimisation occur after the substitutive PN change as it addresses the event that the non-energy action is now needed at a different point on the system.

The SEM Committee notes that the majority of participants favour the substitutive approach, whereby a participant may, subsequent to a bid-offer acceptance, sell (or buy, as the case may be) the quantity that has been subject to the bid-offer acceptance in the IDM to another market participant, notwithstanding it has been sold (bought) in the first instance to (from) the TSOs. It would seem to be ideal if for every buyer in the ex-ante market there is a seller and vice versa. After the adjustment for transmission losses etc., this should, in principle, be possible. However, when the TSO accepts, say, a net quantity of offers then this could leave an equal quantity of buyers 'stranded', with no possibility of finding a counter-party and hence with an exposure to the imbalance price. In effect, the net quantity of balancing actions is energy that has been bought (sold) by the TSOs and sold to (bought by) participants at the imbalance price, precluding the possibility that those participants could trade this quantity in the ex-ante markets. The substitutive approach seeks to at least in part address this problem by allowing any energy bought or sold by the TSOs prior to IDM gate closure to be traded in the ex-ante markets instead. There will likely still be reason for supply not to equal demand; these would relate to issues such as re-dispatch for priority dispatch and non-energy actions.

The SEM Committee decision is to proceed with the substitutive approach for IDM trades which follow a bid-offer acceptance by the TSOs.

Where a participant makes substitutive IDM trades, following a bid-offer acceptance, the trades will have to be such that they would lead to a standalone final physical notification that was technically feasible. So if, say, a unit is committed early by the TSO through the Balancing Market and subsequently seeks to make substitutive trades in the IDM, the requisite minimum MW level of these trades at gate closure is the unit's minimum stable generation. This requirement is being introduced so as to avoid the possibility of a participant being left with a technically infeasible final physical notification if an early TSO instruction is subsequently cancelled.

Substitutive Options

The SEM Committee has decided that, where a participant makes a substitutive IDM trade, the IDM price achieved by the participant will replace the price of the relevant bid-offer acceptance in full.

This will best maintain the principle of unconstrained ex-ante markets. The concept of the unconstrained market is well established and valued in SEM and the SEM Committee considers it important that there is no perception of constraints being introduced into the IDM in I-SEM.

The SEM Committee does not agree that the ‘locking in the premium’ approach would be too complex to implement, but considers that it is less straightforward and intuitive than the chosen approach.

Finally, the SEM Committee does not agree that the chosen approach to substitutive IDM trades will increase the IDM price above the BM price by creating a price floor in the IDM set by the bid-offer acceptance price. Only the relevant participant, with the bid-offer acceptance, will be seeking to achieve a better price than its bid-offer acceptance price.

Trading in the Opposite Direction

The SEM Committee has decided that the systems developed by the TSOs should have the ability to limit the premium in the event of trading in the opposite direction. Any decision on whether to use this functionality can be taken in the context of the overall market power mitigation strategy and, in particular, any measures put in place to address local market power.

The SEM Committee notes that views were evenly divided between Option 1, i.e. putting in place no restrictions, and Option 3, i.e. allowing PN changes but preventing any increase in a bid offer acceptance premium as a result. The SEM Committee notes also that some responses that favoured Option 2, i.e. preventing PN changes that would increase any BOA premium, did so on the grounds that Option 3 was too complex. The SEM Committee does not agree with this view. While Option 3 may require some additional detailed settlement algebra to be developed, providing the objective is clear and it is established that the algebra fulfils that objective, this approach would be simpler for participants than Option 2. Option 2, while avoiding detailed settlements algebra, would instead require

additional rules – themselves likely to be complex - that define when and how participants can and can't change their PNs, and participants would then have to ensure their compliance with these rules at all times.

The SEM Committee also notes the view that minimising TSO intervention in the balancing market before gate closure will minimise the possibility that trading in the opposite direction will happen and hence reduce the magnitude of the problem. Nevertheless, with simultaneous operation of the IDM and the balancing/re-dispatch market, the possibility of trading in the opposite direction does arise, and hence the SEM Committee considers that it needs to address the appropriate treatment in the event of it occurring.

As the SEM Committee understands it, the arguments in favour of allowing trading in the opposite direction are that market conditions are subject to change throughout the time that the IDM is open. Thus, it is possible that a participant would wish to adjust its position between the point in time that a bid-offer is accepted and gate closure. For example, it is possible that a unit could have a position in the ex-ante markets but be dispatched down by the TSOs, perhaps due to a transmission constraint, and then if the market tightens the participant would want to sell additional output from that unit. The argument is that, had the TSOs accepted the decremental bid later, i.e. at gate closure, it would have had to accept a larger bid quantity and it is right and proper that any discount to the imbalance price which might apply should apply to the larger bid quantity.

If the TSOs did indeed delay accepting the bid until after gate closure, then there would be a risk that the participant – realising that the acceptance of a low-priced bid during a previous settlement period indicated the severity of the system constraint – could instead lower further its bid price for subsequent periods. There is no obvious algorithmic solution to this problem and such behaviour can probably only be prevented by appropriate market monitoring combined with enforceable rules or principles about the exercise of local market power.

Accordingly, in the event that such a bid were accepted before gate closure, it would seem reasonable to apply the same approach to PN changes made after the BOA, i.e. to rely on market monitoring and enforceable local market power principles. It could be argued that to have settlement rules that would prevent exploitation of system constraints would only be solving half of the problem, and would also run the risk of also preventing some forms of legitimate behaviour. For example, any local market

power measure which enforces cost-based bidding would seem to address the concerns around trading in the opposite direction.

Nevertheless, in the absence of clarity on the detail of any local market arrangements ahead of TSO systems procurement the SEM Committee is of the view that it is prudent to make provision to address the issue now. Therefore the SEM Committee is of the view that the systems developed by the TSOs should have the ability to limit the premium/discount in the event of trading in the opposite direction. Any decision on whether to use this functionality can be taken in the context of the overall market power mitigation strategy and in particular any measures put in place to address local market power.

Given the clarity provided on system operation in the I-SEM it is not clear that any measure which limits the premium/discount to that in the initial bid-offer acceptance would be as discriminatory on the participant as might have been suggested previously. If the TSO action is taken as late as possible, there shouldn't be an opportunity lost for the participant. The issue doesn't arise for actions after gate closure and where actions are taken on a last time to call basis the participant will have had as much time as possible to trade in the IDM.

Finally, the SEM Committee acknowledges the suggestions that trading in the opposite direction should be prevented when bid-offers have been accepted for non-energy actions but not prevented should bid-offers be accepted for energy actions. In the view of the SEM Committee, this would be very difficult to implement, as it is possible that the classification of an action would not be clear at the point in time that the participant wished to make the PN change. Notwithstanding the views above as to whether market monitoring is the preferred option, Option 3 would, in any case, solve this problem by permitting the PN change but removing any financial benefit deemed to be unwarranted in the event that the action proved to be a system action.

7 TREATMENT OF SYSTEM SERVICES

7.1 INTRODUCTION

In order to ensure Operational Security, the TSOs manage limits related to frequency, voltage, thermal, short circuit and dynamic stability. As part of the processes to manage these limits, the TSOs pay market participants for the provision of system services.

7.2 CONSULTATION PAPER SUMMARY

The Consultation Paper examined the issues surrounding the interactions between participant trading in the I-SEM and the TSOs ensuring that adequate operational reserves are in place for real time operation. This chapter in the consultation paper built on the proposals described in Chapter 6 (Interactions between the BM and IDM).

No proposals were put forward in the Consultation Paper on the treatment of system services but rather the chapter sought to discuss the treatment of the services in I-SEM.

The Consultation Paper also discussed the potential for pre-balancing market actions by the TSO. This referred to the (expected to be rare) occasions where the TSOs need to instruct a plant for non-energy reasons before the BM opens due to long start times. Two options were put forward in the paper:

- Option 1: Issue dealt with through the systems services framework; and
- Option 2: Bids and offers from the previous day are used by the TSOs.

7.3 SUMMARY OF RESPONSES RECEIVED

The majority of respondents to this section focused on the specifics of the three individual questions asked:

1. The proposal whereby a unit that is deployed for reserves should be constrained to the minimum extent possible in the IDM.

2. Are there any market power issues that need to be specifically addressed in relation to System Services?
3. Which of the two approaches should be utilised where the TSOs have to schedule a plant before the opening of the Balancing Market:
 - A. A system services framework would be used to contract with those generators that need to be scheduled prior to the BM opening.
 - B. The TSOs would use incremental offers and decremental bids from the previous trading day to call a plant pre-BM.

A summary of these responses is presented below. In respect of more general comments on this section:

- Many respondents commented on the need for the TSOs to limit 'early' actions for the provision of system services in order to avoid potential conflicts with the ex-ante markets.
- Some respondents queried the validity of the examples provided in the Consultation Paper around the deployment of system services. In particular the deployment of reserves on already synchronised market participants were considered to be achievable 'within the hour' with only commitment requirements extending into the intraday period.

1. The proposal whereby a unit that is deployed for reserves should be constrained to the minimum extent possible in the IDM

The vast majority of respondents agreed with the proposal that a unit that is deployed for reserves should be constrained to the minimum extent possible in the intraday market. One respondent did however caution that such an approach may subsidise the market activity of regularly constrained participants at the expense of other participants.

One respondent noted that the treatment of reserves is no different from other system constraints. This respondent also noted that constraint management should also consider system security, facilitation of priority dispatch and minimisation of consumer costs.

One respondent noted that the requirement for deployment of reserves during the intraday market was probably limited to generator start-up actions given that, once on-line, most generators can be positioned to provide reserve within minutes.

One respondent noted that while the ability of a constrained market participant to trade intraday should be facilitated, deployment to provide a service inherently represented a physical limitation on the production/consumption of the market participant. This respondent noted that it may therefore not be possible to physically accommodate updates to market positions if these negatively impacted on the delivery of the required System Services.

One respondent queried the basis of payments for System Services and whether the example provided in the Consultation Paper aligned with the DS3 System Services decision paper.

2. Are there any market power issues that need to be specifically addressed in relation to System Services?

There was a mix of views expressed in response to this question with responses generally considering the broader market power issues rather than specific system services interactions. Some respondents indicated that there was potential for market power to be exerted in some circumstances. Other respondents indicated that there was no evidence of such behaviour and/or that legitimate commercial activities by market participants should not be prohibited.

One respondent on the interaction with system services noted the SEM Committee decision to allow for regulated tariff arrangements for procurement of system services where there is deemed to be insufficient competition. This respondent stated that similar competition issues could arise in the actual deployment of these system services through the I-SEM BM.

Most respondents noted that this issue would be addressed in the Market Power Workstream.

3. Which of the two approaches should be utilised where the TSOs have to schedule a plant before the opening of the Balancing Market:

- A. A system services framework would be used to contract with those generators that need to be scheduled prior to the BM opening.**
- B. The TSOs would use incremental offers and decremental bids from the previous trading day to call a plant pre-BM.**

The vast majority of respondents indicated a preference for option 'B' (using the BM bids and offers from the previous trading day) as a more transparent mechanism for the procurement of pre-BM actions. Option 'A' (a System Services contract) was considered to potentially incentivise older, less flexible plant and to lack transparency. Option 'A' was also considered to run contrary to the objectives of incentivising improved flexibility as envisaged under the DS3 System Services programme and would potentially divert funding from existing DS3 System Service products.

A variant of option 'B' was proposed by one respondent that would allow the generator in question to resubmit their prices subsequent to the pre-BM action to manage their commercial risk. Other respondents noted that a generator could always factor in their future start costs to their submitted prices even if their start-up time extended into the next day.

Some respondents that did not indicate a preference stated that important aspects of the selected design should be to allow market participants to make price changes under either approach and to consider the end cost to consumers.

The ability of the market design to accommodate different operating modes on a generator (a CCGT operating in OCGT mode) was suggested by one respondent as providing a mechanism to incentivise faster start-up times and greater flexibility.

A more general view was expressed by many respondents that the TSOs should minimise such pre-BM actions and one respondent stated that the TSOs should not be allowed to take such actions before the results of the day-ahead market are known.

7.4 SEM COMMITTEE RESPONSE AND DECISION

Minimising constraints on IDM behaviour

The SEM Committee notes the comments that the TSOs need to limit early actions for the provision of system services in order to avoid potential conflicts with the ex-ante markets, and that the deployment of reserves should generally be achievable within the hour after the closure of the IDM. The SEM Committee notes also similar comments that, for units that are constrained for reserves, the restrictions on behaviour in the IDM should be minimised and comments that observed that only

generator start-ups need to be made 'early' with subsequent deployment of reserves being possible at short notice. The SEM Committee recognises all of these concerns and observations and, as discussed earlier in this paper with regards to the interaction of the IDM and BM and to system operation in the I-SEM, considers that actions should be taken as late as possible precisely to minimise such conflicts.

The SEM Committee notes the comment that balancing actions to provide system services inherently represent a limitation on production or consumption of the relevant unit and that it may thus be impossible to accommodate updates in market position if these negatively impact on the delivery of such services. The SEM Committee recognises the importance to the TSOs of being able to manage the physical production or consumption of a unit in order to facilitate the delivery of system services. However, the SEM Committee does not agree that this need affect the ability of participants to make IDM trades, and in the section on IDM and BM interaction has discussed the approach to achieve this.

Market Power Issues relating to System Services

The SEM Committee notes the various views concerning market power issues relating to the delivery of system services, with some respondents believing that there was potential for market power in some circumstances and others arguing that legitimate commercial activities should not be prohibited. The SEM Committee notes also the comment that the use of regulated tariffs has been determined for the procurement of system services where there is insufficient competition and that similar issues could arise in respect of the BM actions to deploy such services.

The SEM Committee agrees that legitimate commercial behaviour should not be prohibited, while recognising that there may be circumstances where competition is limited.

Scheduling Plant before BM Opening

The SEM Committee decision is that the TSOs will use bid-offers from the previous trading day to call a plant before the opening of the BM if this is required.

The SEM Committee notes that most respondents preferred the option to use offer prices from the previous trading day, rather than a separate contract, in the event that a unit has to be called before the BM has opened, say as a result of a long Notice to Sync time. The SEM Committee concurs with this view. Indeed, while a start may be instructed in anticipation of a system need on the following day, the

start cost will be the start-up cost that has been submitted on the day in which the start is instructed. Moreover, any relevant unit will be aware of its long Notice to Sync time and will be able to submit offer prices that reflect its costs accordingly.

The SEM Committee does not agree with the comment that calling actions prior to BM opening should be prohibited. As discussed elsewhere, the SEM Committee is keen to minimise the use of early actions to the greatest extent possible and under such an arrangement, an action would only be taken by the TSOs before BM opening in the event of a compelling system requirement.

The SEM Committee notes and agrees with the observation that the ability of the market design to accommodate different operating modes (with consequentially different cost structures) would provide a mechanism to incentivise faster start-up times and greater flexibility.

8 IMBALANCE PRICING

8.1 INTRODUCTION

A key aspect of the detailed design of the imbalance pricing arrangements is the methodology for setting the imbalance price. The I-SEM HLD stated that the I-SEM will employ a single marginal energy imbalance price, such that market participants with a long position in imbalance settlement (i.e. contracted position is more than allocated volumes, as modified for any accepted offers and bids) will receive the same imbalance price as is paid by market participants with a short position (contracted position less than allocated quantities, again as modified by any accepted offers and bids) in the same imbalance settlement period.

A key consideration within the pricing methodology will be the treatment of non-energy actions. Unconstrained energy balancing actions will be subject to marginal pricing, while non-energy actions will be pay as bid.

8.2 CONSULTATION PAPER PROPOSALS

The Consultation Paper set out three broad approaches to setting the imbalance price:

1. The Tagging and Flagging Approach - A “cause” based method for identifying energy and non-energy actions with the imbalance price being set only on energy actions.
2. Simple Stack- With this approach there would be a simple stack of the available bids and offers and the price would be set based on the net imbalance volume.
3. Unconstrained Stack with Plant Dynamics Included - There are two key additions that this option would have over the simple stack:
 - Plant Dynamics
 - An Optimisation Time Horizon.
4. Price Based Method - Unconstrained Unit from the actual dispatch - A price based methodology for distinguishing between energy and non-energy actions

but shares a number of characteristics with the cause based flagging and tagging method.

8.3 SUMMARY OF RESPONSES RECEIVED

Of the responses received, approximately three-quarters commented on imbalance pricing, and half expressed preferences for a particular option or particular options or expressed views that implied a preference for one or other of the options. Of the responses expressing a preference, 'Flagging and Tagging', 'Simple Stack with Dynamics' and 'Marginal Unit from Actual Dispatch' were, in more or less equal numbers, the preferred options.

A number of comments were made of a general nature. Respondents variously commented that imbalance prices should be intuitive and predictable for the given state of the system and that imbalance prices should reflect actual market signals and conditions, being high when the system is short and low when the system is long. One response said that the formation of the imbalance price is one of the most crucial design decisions outstanding for the ETA consultation.

It argued that expectations of the imbalance price will strongly influence IDM and DAM prices, as well as affecting contracting in futures markets. Another response said that balancing market pricing needed to be consistent with earlier markets as well as with the conditions prevailing in the Balancing Market. Another response said that concerns existed in relation to the liquidity of the DAM and IDM and that this heightens anxiety in relation to the balancing market and focuses consideration onto the pricing methodology. A further response stated that there appeared to be a spectrum of imbalance pricing mechanisms, from the least (Simple Stack) through to the most (Unconstrained Unit from Actual Dispatch) constrained, pricey and volatile. It argued that lower imbalance prices could tend to increase PSO costs but that this might be preferable to high imbalance prices that would spill forward into the ex-ante markets and disrupt essential exports of surplus wind generation. Another respondent said that it was important when making the decision that the outcome or goal of the design process – i.e. what the imbalance price should represent or look like - be considered.

A number of responses cautioned against what was described as an overly academic or chaotic algorithm introducing a disconnect between imbalance prices and market

conditions. They cited the current SEM uplift algorithm, with one respondent describing this as introducing “junk volatility”.

One response suggested that it would be not unreasonable to give the market more than three months of summer market trialling before exposing participants and ultimately the consumer to large imbalance price risk. Another response expressed the view that the imbalance pricing approach needed further design consideration and that modelling and sense checking of the different options should be undertaken for a range of market scenarios. Another respondent believed that a quantitative assessment should be carried out to provide an indication of the effects in balancing market prices and interconnector flows and that it was not prudent to settle on an option in the absence of such assessment.

One response said that it was not possible to comment in detail on imbalance pricing prior to a clear decision on system operation within I-SEM whilst another said the objective function of the TSOs was a concern that needed to be addressed before final decisions could be made.

A few responses mentioned that quick delivery of imbalance prices would be important to aid decisions for those who wished to participate in the IDM.

Flagging and Tagging

Several respondents preferred Flagging and Tagging. Several more listed Flagging and Tagging as one of two preferred options.

One respondent preferring Flagging and Tagging commented that it was well-established in BETTA, would not require the development of complex algorithms and processes. This respondent further stated that clear principles around system operation would limit any perceived complexity in the flagging and tagging of actions and allow timely publication of imbalance prices. It also believed that, under the flagging and tagging option, since the imbalance price would be based on actual actions taken by the TSOs it would give a truer and fairer value of the cost of balancing the system. Other responses expressed the view that, appropriately designed, Flagging and Tagging could give a relatively stable price which is a fair indication of the supply-demand balance, whilst another respondent said that Flagging and Tagging may be more likely to deliver the appropriate pricing signals required under the I-SEM energy market design.

One respondent argued that Flagging and Tagging was more consistent with the HLD. Another respondent felt that some combination could be considered of Flagging and Tagging to remove constraint and short term actions and price to assess actions which should contribute to the imbalance price. A third respondent suggested that it might be possible to combine stages of the BETTA approach, such that all actions (whether “energy” or “non-energy”) up to the volume of the NIV could simply be identified as price effecting.

Several respondents, including many of those that stated a preference for Flagging and Tagging, acknowledge problems with the approach. These respondents cited, in particular, the problems associated with identifying “energy” and “non-energy” actions. One said that the cause-based approach was arbitrary and subjective, and that experience with BETTA shows that long-standing difficulties have not yet been resolved, whilst another said that it was not possible to provide a definitive view without clarification of the frequency and type of TSO actions under I-SEM energy markets, and robust qualitative and quantitative analysis of the design proposals. A further respondent said that it was not in favour of a methodology:

- that would not come under audit review, given the importance of the formation of imbalance price;
- that has layers of processing from real time to post-processing which can't be easily replicated by participants; and
- that there would be a risk of multiple modifications to the pricing process and challenge of the method statement which would negatively impact the functioning of the Balancing Market and imbalance pricing.

In addition to the concern regarding the lack of clarity regarding the classification of actions, several respondents commented on the possibility, in relatively highly-constrained SEM, that few actions might be classified as energy actions, leaving a narrow subset of actions for imbalance price formation. One respondent said that, in the context of the SEM, flagging any action as purely energy would be difficult. Another said that, given the all island system is highly constrained, there might be insufficient volume for energy imbalance pricing formation, and also said that that there will not be sufficient or robust volume available for energy imbalance pricing formation and that, for this reason and the lack of certainty and transparency, that Flagging and Tagging was not suitable for I-SEM. The TSOs stated that:

- there was a risk of over-tagging, leaving few or no units to set price;
- there was a challenge to distinguish different actions on the same unit;

- there was a potential reliance on manual processes, with implications for system operations resourcing;
- there was limited scope for ex-post review processes from publication timings; and
- it was likely to be perceived as discretionary.

One respondent said it would welcome detailed analysis of schedules to quantify the extent of actions likely to be tagged. It argued that a large number of actions may result in a dampening of the BM price but may also create significant volatility, and that all aspects of this issue needed to be fully understood before a design decision is concluded. One requested feedback to assess the impact of non-energy actions on balancing price, whilst another said that it was not possible to provide a definitive view on the appropriate approach to imbalance pricing without clarification of the frequency and type of TSO actions under I-SEM energy markets, and robust qualitative and quantitative analysis of the design proposals.

Simple Stack

None of the respondents expressed a preference for a Simple Stack imbalance pricing algorithm.

Several respondents commented that the Simple Stack was not a suitable approach for imbalance pricing. These respondents variously commented that:

- it was too simplistic;
- since it is fully unconstrained and takes no account of plant dynamics or which plants were actually running, the Imbalance Price is likely to be dampened and consequently will not incentivise balance responsibility; and
- it would not provide a coherent price and could have unintended consequences if prices are lower or less volatile than in the ex-ante markets.

Another respondent said that from a supplier perspective this option would notionally provide a dampened BM price however it accepted that it is a movement away from a reasonable market design and for that reason should only be considered as a fall back option, whilst another stated that the option suffers from issues associated with producing non-realistic prices, even though those prices are lower and more stable in line with the respondent's requirements. This last respondent said that it could support the Simple Stack on a transitional basis until the performance of one of the more complicated options were ascertained.

One respondent said that as the approach removes the need to identify every TSO action, the unit that sets the price may not have a volume or receive revenue, whilst another said that if imbalance prices are not linked to actual dispatch there may be an increased risk of price manipulation due to generators that could not technically deliver energy in a settlement period being able to set the imbalance price. One respondent said that it was concerned that the Simple Stack would result in plants being called on to provide balancing services however in a manner which may not recover the costs of that generator, and that it did not see an obvious methodology for the recoup of start-up costs in a manner which is transparent but also ensures that there is no over recovery for other participants. A further respondent also commented on the issue of start-up payments, commenting that it was unclear how start-up costs would (if they should) be appropriately placed into the marginal clearing price of such a simple stack.

One respondent stated that it did not believe the Simple Stack option is in keeping with the HLD decision. Another said that it was not sure that the resulting price would be not less than the weighted average price for activated positive Balancing Energy for Frequency Restoration Reserves and Replacement Reserve required under the electricity balancing code.

Simple Stack with Plant Dynamics Included

A couple of respondents stated Simple Stack with Plant Dynamics as being their most preferred, but several respondents listed it as a preferred option together with either Tagging and Flagging or Unconstrained Unit from Actual Dispatch.

One respondent said that was significant merit in this option for a number of reasons that:

- it addresses the shortcomings of the Simple Stack option;
- eliminates the need for a detailed identification process of energy and non-energy actions, and the attendant ex-post re-adjustments and reconciliations, a process potentially fraught with subjectivity; and
- imbalance prices will be algorithmically determined, lending it greater objectivity and replicability.

Another respondent said that this was its favoured option as there is no need to identify what is an energy or non-energy action and that it does not give non-running plants a quantity, leading to cheaper prices and more predictable prices. A third agreed that the inclusion of plant dynamics, technical offer data and an optimisation

window made this option an improvement over the simple stack in that only actions that could actually respond in the time identified could be considered. A fourth said that an unconstrained stack taking account of technical plant characteristics as well as an optimisation time horizon should be used in imbalance pricing, and that this should help smooth the transition to I-SEM, would be transparent and should allow for more robust, predictable and stable price outcomes. A fifth respondent said that the option appeared to best meet the requirement of an unconstrained pricing imbalance mechanism. Another stated that the unconstrained stack with plant dynamics would result in the purest form of system-unconstrained balancing price but that it would need to see this approach modelled – not necessarily for out-turn prices – but for technical feasibility before proceeding with this option. A further respondent considered that this option would be more robust than Simple Stack but that there would still be some level of socialisation of system constraint costs required.

A number of respondents were not in favour of this option. One respondent said that the option seemed highly complex with the requirement for the development of a bespoke complex algorithm, and that considerable on-going processes would be required in order to feed all the various inputs into the algorithm. This respondent was further concerned that transparency around the algorithm could be an issue and that the setting of the optimisation time horizon would be difficult and ultimately arbitrary. It felt that this option also has the potential of diverting liquidity away from the ex-ante markets, to what essentially becomes a net pool arrangement.

A number of other respondents also had concerns about the optimisation window. One said that, whilst it was a slight improvement over the Simple Stack, it remained likely to dampen prices below the true marginal cost and would be subject to variability depending on how plant dynamics are utilised and the optimisation horizon is set. Another said that there was a lack of clarity about the length of optimisation time horizon required and that the setting of the time horizon may be complex and a particular time horizon could incorrectly dampen prices which would have negative impacts on signals to trade and provide liquidity in the DAM and IDM.

Another said that if this option were chosen, the optimisation time horizon must be appropriately designed to ensure that prices are delivered quickly to the market, i.e. within hours of each settlement period.

A number of respondents commented that this pricing option would be not dissimilar to Option 2 in the HLD consultation, which the respondents did not support and which had been rejected by the SEM Committee. One said that it had not supported Option 2 in the HLD because it believed there would be a natural tension in respect of where liquidity is centred, i.e. in the ex-ante markets or the balancing mechanism. It requested that further quantitative analysis be undertaken on the proposal to ensure the issues that were raised in the consultation can be adequately addressed, but said that it did not believe this option should be used as anything other than a backup procedure. Another respondent had concerns that the length of time used for optimisation could effectively result in the TSOs running today's algorithm as soon as the DAM closes, and that it was unclear as to the effect that this would have on the IDM and how IDM trades would be reflected. A further respondent said that through a similar mechanism as occurs in the SEM today, technical dynamics are used along with commercial offer data to form a merit order based on achievable offers or bids from each participant (i.e. generator-constrained not system constrained), and that it believed that this option may have a role in the I-SEM, and that additional analysis and modelling was warranted. Another respondent noted that the HLD states that imbalance prices will reflect the marginal costs of energy balancing actions taken by the TSOs and that hence neither of the price-based unconstrained stack methods are consistent with the HLD decision.

One respondent said that the removal of the obligation on the TSO to account for dispatch decisions (tag and flag) would also seem to be a motivating factor in this proposal. This respondent also considered that introducing a 'complex stack' approach to imbalance pricing may just compound the issues associated with TSO early action; i.e. result in weaker balancing incentives on participants, reducing liquidity in ex-ante markets and therefore reinforcing the continuing requirement for extensive early TSO intervention via the balancing market.

One respondent said that there was a question as to whether start-up costs should be recovered within the balancing market price. Another said that how to manage start-up costs, and deliver prices quickly needs further consideration.

Unconstrained Unit from Actual Dispatch

A number of respondents cited Unconstrained Unit from Actual Dispatch as being their preferred option. Several others listed it as a preferred option together with either Flagging and Tagging or Simple Stack with Plant Dynamics.

Of the respondents that supported the option, one said that strong imbalance and cost reflective price signals are important to promote greater participation and encourage investment in flexible generation and demand response, and that it saw merit in this approach above the other options to improve cost reflectivity, provide appropriate signals to current participants and new entrants and allow a more nuanced algorithm approach to a highly constrained system. Another said that its preference was for imbalance pricing to reflect actual dispatch to ensure the imbalance market is cost reflective, and that pricing based on the unconstrained unit from actual dispatch would more closely align with this preference. Another said that the option has a number of advantages over the other price based methods proposed, in that it is based on actual dispatch, does not require an optimisation time horizon to be set and importantly is already in operation in other markets. This respondent said that, of the price based methods, this was their preferred option. A fourth respondent said that the unconstrained unit from actual dispatch option had many benefits in terms of its implementation and operation, most of which are due to its reduced complexity, and that this method:

- involves a straight-forward (and mature) market pricing methodology;
- does not require a detailed process of dividing energy and non-energy actions; and
- should produce prices that can potentially be published closer to the time of delivery.

However, this respondent also said that the option unearths an inherent issue in the methodology which should be considered, namely that actual dispatch includes aspects of system constraints, which leads to the possibility of a feedback loop where, for example, SNSP curtails wind, driving up the Balancing Market price (set by actual dispatch), which could also influence drive up prices in ex-ante markets, eroding exporting opportunities, depressing the absolute SNSP limit.

In its response, the TSOs said the option:

- reflects actual dispatch;
- avoids manual and discretionary complexities of flagging and tagging; and
- builds on established systems and methodologies in international markets.

A further respondent said that, apart from the stated benefits of being established international practice and having no need for detailed identification of non-energy actions, its potential to produce close-to-real-time prices will be of immense benefit to a system moving towards greater dynamism – more variable generation, greater

demand side participation. In this respondent's view, the perceived disadvantages outlined in the consultation paper were not strong enough to discount this option and the respondent recommended it for further detailed consideration.

Of the respondents that did not support this option, one said that this approach to imbalance pricing, as with Simple Stack with Plant Dynamics, was being suggested because of untested assumptions regarding the frequency and type of TSO actions.. This respondent said that the removal of the obligation on the TSOs to account for dispatch decisions (tag and flag) also seemed to be a motivating factor in this proposal and that, while closer to the intent of the HLD than the 'Simple Stack' and 'Complex Stack' options, they believed that introduction of a 'Constrained Stack' approach represent a change to the I-SEM HLD decision which explicitly referenced the requirement for the TSO to put in place a system to identify energy and non-energy actions. Another said that it was uncertain as to why, in a market where constraint elements are recognised as a higher proportion of overall TSO actions, it was viewed that an algorithm would be able to readily solve an objective function whereby a narrow subset of actions are not associated with such constraints. This respondent also questioned , on a more principled level, what the intent of ensuring the inclusion of greater levels of constraints in the pricing outcomes was meant to achieve, and that it went beyond pricing off Balancing Energy Frequency Restoration Reserves and Replacement Reserve as required under the electricity balancing code by including further constraints such as Primary Operating Reserve (POR) and system non-synchronous penetration (SNSP) which would not be covered in those reserve definitions.

Another said it did not support the inclusion of explicit SNSP and further constraints into the imbalance price mechanism and that, unlike flagging and tagging approaches (where non-energy balancing actions cheaper than the net imbalance volume stack are considered energy balancing), such an algorithm would exclude all such "non-energy" actions from price setting, driving prices higher. This respondent said that high imbalance prices would create perverse incentives in the ex-ante markets, which would lead to excessive imports. It was also observed that it is a constrained optimisation that leads to concerns regarding the stability of the algorithm's pricing outputs. A third respondent said that it appears that an already constrained dispatch is subject to an ex-post algorithmic analysis that reinterprets the reasons for dispatch already taken by a TSO, and it was difficult to see how an algorithm will fare much better than the TSO creating cause-based Flagging and Tagging.

Other comments were that, given the ongoing uncertainty over the objective function for the TSOs in the BM, it is not possible, based on the information available, to comment on whether or not leveraging off TSO systems and not requiring any identification of action is indeed an advantage; and that it was difficult to comment on how the resulting Balancing Market price profiles would relate to pricing in earlier timeframes and hence on whether the pricing could have any distortive impact on the overall dynamics of the markets. Another comment was that the option appears to be inconsistent with the HLD as the pricing may not reflect the marginal cost of actual energy balancing actions taken by the TSOs. A further comment was that the option involved excessive complexity for a small unconstrained market, and that it needed much more study before exposing consumers to its potential volatility.

A couple of respondents commented that they concurred with the RAs' view that this approach would be a "black box", and considered that any such option should be ruled out in the interests of transparency and considering participants' ability to accurately forecast the market. One of these respondents said that any such option was not considered suitable for I-SEM, particularly in light of the challenges faced in understanding exactly how EUPHEMIA will accept or reject market participant bids as well as determine schedules and prices for bidding zones, and that Euphemia is the only level of pricing complexity in terms of transparency and understanding of potential market and price outcomes that I-SEM market participants should have to deal with.

The Marginal Imbalance Price

Many respondents that commented on imbalance pricing were in favour of some form of mechanism to dampen imbalance prices. One respondent said that the incorporation of some form of risk mitigation function was of paramount importance to suppliers and other imbalance price-exposed parties, and that Price Average Referencing (PAR) or another methodology is merely the mechanism to deliver this. This respondent said that GB transitioned to marginal pricing over a significant time period, and that this reflects a clear desire not to have a market which is so punitive that participants exit, and that this is especially relevant in an all-island context as participants are moving to a new market in I-SEM and the SEM specifically encouraged stand alone entry. A third respondent said that participants and the TSO are moving to a radically different set of trading arrangements and that the level of imbalance exposure facing participants is orders of magnitude above that in SEM.

Another believed that a cautious approach to the start of this market is appropriate, commenting that the intraday market might not exist, intraday market liquidity if it does exist may be limited, and participants will be moving up a learning curve in terms of trading. A further response observed that these pricing arrangements are new, the industry requires time to bed down trading capability, and within that context some form of softening of the last MWh price setting is prudent and sensible. This respondent said that if, over time, it is demonstrated that the PAR is excessive, unnecessary, or is limiting activity in the intraday market, it can be relaxed. Another respondent suggested that an additional benefit is that it gives a true price signal for market investment.

One respondent proposed a transitional arrangement whereby a PAR volume (to be determined) is introduced in a manner which allows the market to bed down, and mitigates against unintended impacts on the balancing price of the design of the market. This respondent said that it supported the need to ensure balancing is cost reflective and in keeping with the dynamics of the supply-demand curve. It said that, however, the risk in the initial period of the market is that trading platforms are being introduced across a number of participants, and there is a natural period of insecurity regarding how the design of the pricing mechanisms will play out in operation and that the introduction of a short term PAR will mitigate this risk. The respondent said it would welcome further discussion with the SEMC on the point.

Another respondent commented that it accepted that a learning period may be required to achieve an Imbalance Price that is appropriately sharp and that, in the initial stage of I-SEM, it may therefore be appropriate to determine the Imbalance Price on an average basis rather than on the last 1 MW. However, this respondent said that the Imbalance Price needs to be reflective of the actual costs of balancing the system and that any dampening of this price will mean true value of flexibility is not exposed and flexible generators are not properly incentivised. Another respondent stated that, given the risk of volatile pricing, it might be sensible for a small market going through substantive change to seek to have options available to dampen volatility while the new systems and processes bed in. However, this respondent also said that this needs to be tempered with the downside that such dampening could influence the wider functioning of the markets by introducing distortions. The respondent said that this area needs further analysis to help identify the best approach to adopt.

Some respondents did not see any merit in averaging. One respondent was concerned that a consequence of averaging could be to dampen imbalance prices which in turn could reduce incentives in the earlier market timeframes and reduce liquidity, whilst another did not support PAR pricing or other mechanisms to blunt the imbalance price.

8.4 SEM COMMITTEE RESPONSE

General Comments

The SEM Committee notes that there were diverse views regarding imbalance pricing options. While only a minority of respondents expressed a single clear preference, many identified two preferred options.

In response to the requests by a number of parties for further consideration of imbalance pricing issues, the RAs held a further Rules Liaison Group to discuss the options in more detail, and received further comments from interested parties. The majority of these respondents supported an imbalance pricing approach that was based on the actions taken by the TSOs in dispatch, i.e. Flagging and Tagging or the “unconstrained unit from actual dispatch”. One respondent specifically supported the unconstrained stack with dynamics option, primarily as it would be less subjective than other options. In general, there was a slight overall preference expressed for the Flagging and Tagging approach, with respondents regarding the major attributes of this option being the strong alignment between the TSO actions taken in dispatch and the resulting imbalance prices, and that it could be implemented without the development of a complex algorithm. Respondents to the RLG that did not favour Flagging and Tagging were concerned that it was potentially subjective. This concern was shared by some supporters of the option, who suggested that if Flagging and Tagging was the approach adopted, there would need to be clearly defined TSO processes and transparency of the TSO tagging actions. A number of respondents favoured the unconstrained unit from actual dispatch option. The main supporting arguments were that it would avoid the potential subjectivity and avoid the potential no energy action to set the price outcomes that could arise under of Flagging and Tagging. Respondents noted that such an approach would be no more of a “black box” than other options, or aspects of the existing SEM arrangements. Those that preferred Flagging and Tagging commented that setting prices on the basis of the unit from actual dispatch (Option 4) would blur the distinction between energy and non-energy actions taken by the TSO; that it

would include system constraints within the calculation of imbalance prices, and, would incorporate elements of perfect foresight within the price formulation.

In addition to comments on the four imbalance pricing options, respondents to the RLG also raised broader comments on three areas.

Firstly, some respondents questioned whether the Simple Stack, Unconstrained Stack with Dynamics and the Unconstrained Unit from Actual Dispatch options were consistent with the HLD, and should thus be discounted or suggested that, if one of these options was preferred, the consequential changes to the HLD could only be made subject to further consultation. The SEM Committee Decision on the High Level Design SEM-14-085a, was cited in support of this position along with other SEM papers including, the Draft Decision paper. Additionally, some respondents argued that the unconstrained stack options were similar to Option 2 of the HLD which had been rejected, and that they should be discounted on that basis.

The SEM Committee considers that its HLD decision on imbalance pricing is clear and that its primary objective is captured in Section 3.2, “Decision 2 - I-SEM Trading Arrangements”, which states that there will be “marginal pricing for unconstrained energy actions”. Sections 4.4.16 to 4.5.18 expand on this objective, explaining that non-energy actions will be paid as bid, and that there will be a process for separating energy and non-energy actions to remove any “pollution” of energy imbalance prices arising from bids/offers accepted by the TSOs for system reasons.

The methods for achieving the separation of energy and system actions differ between the options. Flagging and Tagging (Option 1) relies on the classification of individual actions taken by the TSOs to separate energy and system actions, while the “Unconstrained Unit from Actual Dispatch” (Option 4) identifies the cheapest unconstrained unit from the actual dispatch i.e. most economic action available to the TSO to meet a marginal change in the net imbalance volume based on the actual dispatch.

The unconstrained schedule options (Options 2 and 3) not only utilise an algorithm to identify the non-energy actions but also consider the actions that the TSOs could have taken in an unconstrained system. The SEM Committee notes that the detailed implementation of the options could lead to different imbalance pricing outcomes, depending on how energy and non-energy actions are classified and the operation of the methodology to remove potential pricing pollution resulting from non-energy

actions. Determining the exact basis of energy and non-energy actions will form part of the implementation phase, but the SEM Committee is mindful that debates in GB have noted that there is unlikely to be a consensus on the classification of such actions, and that any approach taken may be imperfect. However, the SEM Committee considers that while classification of actions for imbalance pricing purposes, and the methodology to implement the pricing, will require detailed consideration, there are no substantive reasons why each of the options consulted upon could not meet this objective, and that all options are thus able to meet HLD objectives set out in SEM-14-085a.

The SEM Committee recognises that the unconstrained stack options share a common feature with HLD Option 2, “mandatory ex-post pool for net volumes”, insofar as both would set prices based on an unconstrained ex-post schedule. However, the key distinction is that the original HLD option was “characterised by a pool based approach to the determination of dispatch, and ex-post prices and volumes”⁵. In contrast, the detailed design imbalance pricing options consulted on would calculate a price, but not allocate volumes. Thus, generators could not obtain revenues for unconstrained schedule quantities, thus maintaining the principle of the HLD that market volumes need to be secured in either the DAM, IDM, or through the acceptance of a bid/offer by the TSOs within the balancing market. The SEM Committee thus considers that the unconstrained stack imbalance pricing options are distinct from rejected HLD approaches and that they should not be discounted based on this argument.

Secondly, some respondents questioned whether the unconstrained stack options meet the requirement of the Network Code on Energy Balancing. The SEM Committee considered the requirements of the Network Code⁶ at the time of formulating imbalance pricing options. It notes that the Network Code is not finalised, and may be subject to further development. Further, the I-SEM will be classified as a central dispatch market and that this status may mean that some provisions of the Network Code will not, as presently drafted, apply to the I-SEM, or at least that there may be some necessary interpretation for central dispatch systems. Notwithstanding that the detailed requirements of the Network Code for Energy Balancing are not finalised, the SEM Committee considers that all the options consulted upon should be capable of implementation in a manner compliant with its

⁵ SEM-14-008, Section 7.2.1.

⁶ “Network Code on Electricity Balancing”, Version 0.3, ENTSO-E, 6 August 2014.

requirements, insofar as they are presently set out. However, the SEM Committee is keen that the I-SEM will be stable and robust to future requirements of the integrated European energy market. The determination of the imbalance pricing option needs to be taken with this objective in mind. Arrangements that can draw on the experience of other relevant jurisdictions may therefore be prudent.

Thirdly, a number of respondents stated that there was a need for further quantitative analysis to be undertaken prior to any decision on the preferred imbalance pricing option being taken. The SEM Committee does not consider that the modelling of specific imbalance pricing options at this juncture would provide a robust basis for the selection of one of the options as participant behaviour and market outcomes in ex-ante timeframes are unknown. Quantitative analysis could be unduly influenced by assumptions on market behaviour in these timeframes and the basis for differential analysis between imbalance pricing options would be limited. Further, the SEM Committee considers that significant details of the preferred option will require resolution throughout the remainder of 2015 and into 2016, and the level and profile of prices, and the differential impact on classes of participants will be influenced by these aspects of the market design. Consequently, it would be imprudent to base the choice of option on modelling that would necessarily make assumptions on aspects of market design that are not yet determined. The SEM Committee thus believes that the choice of option is most appropriately made on a qualitative assessment, and that modelling will be more appropriate during the implementation phase when the differential impact of specific parameters can be appropriately assessed.

Flagging & Tagging

The SEM Committee notes the comments that a Flagging and Tagging approach is well established in the GB trading arrangements. The approach was adopted in BETTA, starting not long after Go-Live in 2001, and evolved through a number of modifications until 2009, since when the methodology has remained unchanged. Ofgem's Electricity Balancing Significant Code Review will change how the imbalance price is calculated, although not the approach to the identification of actions to be excluded from the price calculation, which will continue to be done through the existing flagging and tagging methodology. The SEM Committee also notes and supports the comments that clear principles will limit the perceived complexity of the methodology and that the methodology, being based on actual actions taken by the TSOs, will reflect the actual costs incurred to balance the system. The SEM

Committee supports the views that the approach, appropriately designed, could give relatively stable prices that fairly reflect the balance of supply and demand.

The SEM Committee recognises the concerns with the approach. In particular, it recognises concerns regarding the identification of energy and non-energy actions. The SEM Committee notes also that, during various modification assessments in GB, it has been stated that there is no industry consensus on what constitutes energy and non-energy actions. Nevertheless, the SEM Committee considers that a robust methodology can be developed and notes that the technique has formed a satisfactory basis for the BETTA arrangements in GB for nearly fifteen years, now, and that any lack of replicability does not seem to have hampered the GB market.

The SEM Committee notes also the concerns that the relatively high level of constraints could result in an insufficient quantity of energy balancing actions to form the basis of a reliable price calculation. The SEM Committee believes that this issue is a potential concern if the tagging methodology works, as does the BETTA Flagger and Tagger methodology, by identifying entire units as, for a period, having only non-energy actions and thereby tagging out all balancing actions instructed on these units. However, if the methodology applies to individual actions, or even identifies actions as being partially energy and partially non-energy, then this problem is less likely to arise.

Simple Stack

The SEM Committee notes that none of the responses received supported the Simple Stack option. The Committee agrees with comments that, by ignoring plant dynamics, the approach is too simplistic to provide a realistic basis for a reasonable market design and that as a result, it is likely that prices would be overly dampened and flexibility may not be adequately rewarded. It notes that the approach has similarities with BETTA Proposed Modification P211. Whilst the proposal argued that the extent of the distortion to prices from the simplistic approach was surprisingly limited, the SEM Committee notes that the proposal was rejected in favour of the current system of flagging actions as system or energy.

The SEM Committee also notes comments that during the development of P211 the lack of a link to actual dispatch creates a vulnerability to price manipulation. In respect of units that are likely to set the marginal price in the unconstrained schedule but which are unlikely to run as their output is displaced by the output from constrained-on generators, the incentive is to underbid such units in order to

maximise inframarginal rent. However, except in the case of the unit being behind an export constraint, in which case it is unlikely to be price-setting, the incentive is very limited. If the unit is underbid by more than a limited amount, it is likely that the unit will be run and the output from another displaced instead, and that the unit will then run at a loss. In contrast, in I-SEM, there is no incentive to underbid, as there is no inframarginal rent for displaced generators. Consequently, there is no disincentive to overbidding the price of such units, potentially to a large degree, and that the imbalance price would thus likely be set by such a unit which could be bidding considerably in excess of its costs. Ofgem identified the adverse price risks associated with these “sleeper” bids during its considerations of Modification Proposal P211 in GB.

The SEM Committee notes the comment that the approach would result in plant being called to provide balancing services in a manner that may fail to recover the costs of the generator providing the action. The SEM Committee does not agree with this concern. Although the approach calculates the imbalance price on the basis of the costs of a generator that would not, in practice, be able to run, this does not preclude the imbalance (and balancing) price being calculated such that, had the unit run, it would recover its costs. As is described in the context of the imbalance settlement and the treatment of constraints, it has been proposed that units be paid the maximum of the imbalance price and their offer price for offers, or pay the minimum of imbalance price and their bid price for bids. By this means, any unit that is more expensive than the imbalance price still recovers its costs.

The SEM Committee notes the suggestion that a simple stack approach could be an appropriate transitional measure, prior to a more complex solution being implemented. The SEM Committee considers that a transitional approach will not be required, and the enduring solution that forms part of its decision is capable of implementation by go-live. In the unlikely event that the full enduring solution is not able to go live at market start, some back up procedure would be required, although it may be more appropriate for this to be a simplified variant of the final approach to imbalance pricing, in order to minimise any transitional price affects that could arise under different approaches. However, it will be prudent for the TSOs to consider potential back up arrangements as part of their implementation plan.

Finally, the SEM Committee acknowledges comments to the effect that the approach does have the advantages that it avoids the requirement to classify every TSO action

and would avoid the “no price” risk identified with a GB approach to flagging and tagging.

Simple Stack with Dynamics

The SEM Committee acknowledges that a couple of responses expressed a sole preference for the 'Simple Stack with Dynamics' approach but that several responses listed the approach as one of two preferred options.

The Committee acknowledges an argument in favour of this approach is that it represents an improvement over the Simple Stack approach, in that the extent to which balancing actions are deemed able to resolve an energy imbalance is limited by the technical offer data of the units providing the balancing actions. The SEM Committee notes the further argument in favour of the approach that it best meets the requirement for an unconstrained imbalance pricing mechanism. In this regard, the option can be considered to be most similar to the current SEM pricing algorithm, albeit this option would not allocate an unconstrained quantity but only set an unconstrained price.

The SEM Committee notes the comment that the approach would be more “robust” than a simple stack. It is difficult to ascertain precisely what participants consider robustness to constitute in this context. The SEM Committee's view is that robustness describes the reliability with which the approach embodies a particular principle or set of principles, with an approach that lacks robustness being one which carries through the underlying principles over only a limited range of conditions, typically as a consequence of relying on some assumption that is, itself, not a robust assumption. Thus, the SEM Committee view is that any of the options could be made to be robust, with the principles of operation being the distinguishing features. The SEM Committee notes also the same respondent argued that, despite the robustness, some level of socialisation of constraint costs would be involved. The SEM Committee regards this as a separate issue. The more constraints are built into the pricing algorithm then the less the level of constraints that should need to be socialised, and vice versa. By including technical offer data in the pricing-setting methodology then constraint costs should indeed reduce the additional dispatch costs that are likely to arise from the technical limitations of balancing service providers.

The SEM Committee acknowledges the arguments against the Simple Stack with Dynamics option. In particular, the SEM Committee acknowledges the view that the

approach would require a highly complex algorithm, lacking transparency, and the views that the approach would require an optimisation time horizon that was potentially arbitrary, would prevent prices for the market being determined quickly and which could potentially dampen prices. The SEM Committee agrees that this approach would require the development of an additional complex algorithm, although this criticism could be levelled potentially at any of the pricing options.

Dampening of prices under this option could arise from two potential sources - the first being the calculation of a schedule that assumes perfect foresight; and the second arising from the allocation of fixed costs and/or the costs of reserve. It is the SEM Committee's view that the allocation of costs could potentially be soluble although shares concerns that perfect foresight might be more difficult to eliminate. The SEM Committee share also concerns that it might be difficult to determine prices quickly and that the choice of time horizon would be complex.

As discussed elsewhere, the SEM Committee does not agree with comments that the approach resembles Option 2 of the HLD, which was rejected by the SEM Committee during the HLD process. Option 2 of the HLD involved the allocating of unconstrained quantities, that precluded the necessity for participants to secure ex-ante market positions, whereas Simple Stack with Dynamics advocates only setting prices and not the allocation of unconstrained quantities.

The SEM Committee notes also the comments that the approach is motivated by a desire to remove the need to account for TSO dispatch actions. Whilst the SEM Committee understands that transparency of TSO decisions is desirable for market participants this is distinct from whether or not the precise reasons for the TSO calling any particular balancing action is integral to the pricing algorithm. Even if the pricing algorithm does not rely on such judgements, transparency of TSO actions could be provided as a separate matter.

Finally, the SEM Committee notes the comments that questioned whether start up costs would be recoverable or would require further consideration. The SEM Committee's view is that this issue is relevant under any of the approaches. All of the approaches seek to identify a set of actions that are deemed eligible to contribute to the imbalance price. A marginal pricing approach should identify a price that would allow all such actions to recover their costs, including no-load and start-up costs. To the extent that they are not recovered through the imbalance

price, the imbalance settlement algebra would ensure that such costs are recovered by side payments.

Unconstrained Unit from Actual Dispatch

The SEM Committee acknowledges the comments in support of Unconstrained Unit from Actual Dispatch that a strong imbalance price with cost reflective price signals will be important to promoting greater participation and encourage investment in flexible generation and demand response. The SEM Committee agrees with these comments. The SEM Committee notes also and concurs with the comments that this option has the advantage of reflecting actual dispatch, of reflecting international best practice and of avoiding the need for an optimisation window and producing close to real-time prices.

The SEM Committee also acknowledges the comments critical of the option. Specifically, the SEM Committee notes the comment that the option was being suggested due to untested assumptions regarding the frequency and type of TSO actions and, as with Simple Stack with Dynamics, in order to avoid the need to account for TSO actions. As with Simple Stack with Dynamics, the SEM Committee rejects this comment and, whilst recognising that the desirability for market participants for transparency of TSO decisions, does not agree that this implies that the explicit accounting of TSO actions must necessarily form a key feature of the pricing algorithm. The SEM Committee notes also the comments that argued that the inclusion of a 'constrained stack' is a change to the HLD and that questioned the purpose of including a greater level of constraints and that it goes beyond pricing off Frequency Restoration and Replacement Reserve. It is the SEM Committee's view that this option is no different to Flagging and Tagging, in this respect. Both this option and Flagging and Tagging start from actual dispatch, and thus both options use a stack that implicitly includes all constraints, including SNSP constraints, that affect the operation of the system. The difference between the two options is the process whereby those constraints that are deemed to be non-energy constraints are excluded from setting the price: in the case of Flagging and Tagging this is by explicitly identifying actions that are deemed to be non-energy actions and discounting these from the imbalance pricing calculation, whereas under Unconstrained Unit for Actual Dispatch, units which are not subject to non-energy constraints will be identified by establishing the most economic unit capable of meeting a marginal change in imbalance volume (up or down). Units operating at their technical limits cannot meet this marginal change in the imbalance volume nor can units which are bound by non-energy system requirements. Thus, it is not

obvious that Unconstrained Unit from Actual Dispatch, which may be regarded as an 'algorithmic approach' would necessarily fare any worse than Flagging and Tagging, which will itself include complex algorithms to determine flagging decisions.

The SEM Committee also notes the comments to the effect that uncertainty in the Consultation Paper regarding the objective function of the TSO made it difficult for respondents to comment on how balancing market prices will relate to prices in earlier market timeframes and that the option is inconsistent with the HLD as pricing may not reflect the marginal cost of energy balancing actions actually taken. The SEM Committee does not necessarily agree with these comments and has suggested above that all the pricing options are in line with the HLD. Both Option 1 and Option 4 are based very closely on actual dispatch. Option 1 uses the actual dispatch as a starting point for applying Flagging and Tagging and Option 4 uses the real-time dispatch as a starting point to calculate a shadow price. These options are in contrast to Options 2 and 3 which rely on a dispatch that is unconstrained, and hypothetical. When the system is relatively unconstrained, the prices under Option 1 and Option 4 should not be significantly different, with Option 1 representing the cost of the last action taken while the price under Option 4 comes from the shadow price of a demand constraint and reflects the change in balancing cost for a change in energy imbalance volume. It could easily be expected that these prices could be derived from the same unit so the costs should not differ significantly. When the system is more constrained, the two prices may differ to the extent that some of the system constraints are not reflected in the Flagging and Tagging procedure but are implicit in the dispatch used under Option 4. The potential for there to be times when there are no energy actions to set the price under Option 1 has been discussed above and the requirement for a mechanism to address this was also covered. In contrast, Option 4, using the same dispatch, would always calculate a price. This price would be set by adding/subtracting an increment/decrement of demand and hence would reflect the cost of the required energy balancing action. The SEM Committee does not consider that this is inconsistent with the HLD.

Finally, the SEM Committee notes the comments that the approach is potentially a "black box". However, the SEM Committee believes that it should be possible to design the mechanism such that this problem is no worse than with some of the other options, and notes that the approach, broadly, is used in other jurisdictions, where concerns as to the forecastability of outcomes will be every bit as important as in the I-SEM.

Marginal Pricing

The I-SEM HLD decision stated that imbalance pricing would be based on a single marginal price, and that the detailed definition of the marginal price within each settlement period was to be subject to further consideration. Specifically the response paper that accompanied the HLD decision noted that, “The detailed definition of the marginal bid and offer used to set the imbalance price in each settlement period will be an important issue to be addressed in the detailed design phase”. It identified a non-exhaustive list of issues that would require detailed consideration, including the volume of bids and offers defined as the marginal amount and the process for separating energy and non-energy bids.

The SEM Committee notes the divergence of views expressed and the number of responses that urged it to consider some form of averaging of the marginal price on a transitional period. These comments reflect understandable uncertainty on the part of participants regarding the level and profile of imbalance prices, whether such prices will be amenable to being forecast, and whether participants will be able to efficiently trade out forecast imbalances in the IDM. The SEM Committee acknowledges that, certain classes of participants, notably variable generation and suppliers are concerned that the uncertainty associated with their output level, and customer demand within the IDM timeframes will give rise to imbalance exposures that they cannot trade out ex-ante. The SEM Committee recognises the need for the imbalance price to both produce a signal for parties to trade balance ex-ante and to provide appropriate price signals to flexible plant within balancing market timeframes. The approach to marginal imbalance pricing must therefore balance the ability to forecast prices with efficient incentives.

In the responses to the detailed design Consultation Paper a number of participants who favoured a Flagging and Tagging approach appeared to favour it as it provided an imbalance pricing methodology that allowed for some explicit averaging of the marginal price. Reference was made to the GB arrangements where a Price Average Reference (PAR) value of 500MW is presently adopted. This PAR approach sets imbalance prices as an average of a number of actions, the MWh quantity of which is determined by the PAR value, with the value being market parameter. GB has operated off PAR 500 for a number of years, in the context of its dual cash out regime within the balancing market, although following Ofgem’s Significant Code Review of Cash Out pricing it is moving to both single cash out price and a PAR 1 reference value.

The SEM Committee considers that the question of the imbalance pricing methodology and some form of price averaging are separable, and that any of the imbalance pricing options could be implemented with some form of price averaging albeit with different degrees of difficulty. Further, averaging over a number of MWh is only one way in which imbalance price signals may be made less sharp, as the selection of any of a number of parameters under any of the options would have a price impact.

8.5 SEM COMMITTEE DECISION

Imbalance Pricing

The debate around which imbalance pricing approach should be adopted has been one of the most involved of the detailed design development process. Respondent's views on their preferred options has highlighted the emphasis that parties place on the different perceived attributes and limitations of each option. However, the responses were clear on the following issues.

- Firstly, there was a strong consensus, although not unanimity, that imbalance prices should be based on the actions taken by the TSO to balance the system – even if some parties then considered that some averaging of this price might be required as a transitional measure.
- Secondly, that the approach should be capable of delivering prices shortly after the trading period.
- Thirdly, that any arrangements should not be overly influenced by any TSO subjectivity in determining which actions, or parts of actions, are classified as non-energy and thus excluded from the calculation of imbalance prices.
- Fourthly, that the basis of the price calculation should be transparent.

The SEM Committee considers that the features of a preferred imbalance pricing approach identified by respondents are desirable, and that the chosen approach should be in line with these. Additionally, the SEM Committee considers that the imbalance pricing approach adopted in the I-SEM should be robust to developments in the Target Model, and that an approach that is aligned to, although not necessarily identical to, that being used in interconnected jurisdictions would have clear benefits. Finally, an approach that has some scope for flexibility may be more amenable to being refined in the light of experience and changing requirements.

The SEM Committee has decided that the imbalance pricing approach that best meets these requirements overall should be based on Option 1 in the Consultation Paper, Flagging and Tagging.

The SEM Committee has set out in the paragraphs below its rationale for the chosen pricing option based on the features identified above.

Prices should be based on actions taken by the TSO

The Flagging and Tagging and “Unconstrained Unit based on Actual Dispatch” options provide the strongest linkage between imbalance prices and the actual actions taken by the TSO in dispatch. In the SEM Committee’s view this gives them distinct advantages over the unconstrained schedule approaches. Prices should be more efficient, as they would reflect the actual costs of meeting imbalances rather than the hypothetical costs of meeting imbalances that would be derived under the unconstrained stack approaches. While the Simple Stack with Dynamics option would seek to align prices with actions that the TSO could have taken were the system unconstrained, it seems likely that it would build some degree of perfect foresight into the imbalance price calculation. The approach taken over the optimisation window and the treatment of other constraints within the unconstrained schedule algorithm are likely to make price outcomes less reflective of actual costs than approaches based on actual dispatch actions taken by the TSO. While Options 1 and 4 both use dispatch outcomes as the starting point of dispatch the approach to identifying the marginal action used to set the imbalance price differs.

The objective of Flagging and Tagging is to set the price on the most expensive action taken by the TSOs, that is not tagged as non-energy, to meet the net imbalance volume. Option 4 would identify the price of the next unconstrained action that could be taken by the TSO, given the dispatch profile. Ideally, these differences would be limited to the price variance between one incremental unit and the next. In practice, either approach would require development and price outcomes under either approach would thus be dependent on the setting of key parameters, for example the parameters around the treatment of short term actions, and, under Option 4, the definition of the unconstrained unit that could provide the next energy action. The SEM Committee considers that the Flagging and Tagging approach is more strongly aligned with the intention of the HLD as it explicitly identifies the nature of each action taken, and the marginal energy action taken to meet the NIV.

Delivering prices shortly after the trading period

The SEM Committee considers that the prompt publication of prices has an important role to play in providing appropriate risk management tools for trading parties. In addition, early publication is required under the Transparency Regulation. In association with a price calculation approach that is clear, objective and transparently delivered, the imbalance prices for the immediately preceding trading periods provide an important part of the information that participants will use to inform ex-ante trading decisions, notably in the IDM. In order to further inform participants of potential imbalance prices, the SEM Committee believes that further consideration should be given to the nature of, and timing of publication of, forecast Balancing Market data.

The SEM Committee considers that all of the options, with the possible exception of Simple Stack with Dynamics, are capable of producing prices shortly after the end of the trading period. The experience of Flagging and Tagging in GB is that it produces prices within about 15 minutes and the SEM Committee has no reason to believe that timescales of less than an hour would be infeasible in the I-SEM.

The issue of potential periods in which there are no energy actions to set the price arising under Flagging and Tagging remains to be addressed. The GB approach is that a unit that is tagged as delivering a non-energy action has the entirety of its output excluded from the imbalance price calculation. The SEM Committee notes that Flagging and Tagging is the option of the four presented that has the greatest potential to fail to calculate an imbalance price in a given imbalance settlement period. However, whether non-price periods may arise is dependent on a number of factors including ,whether or not the GB approach to the classification of a tagged unit (i.e. if tagged all of its output is deemed to be non-energy) is adopted. This approach would be likely to give rise to more periods in which there are no energy actions to set the price than an approach that left more units classified as energy, and thus able to set the price. There are implications for both the potential for periods in which there are no energy actions to set the price and the level and profile of prices resulting from either approach. Finally, should there be a risk of periods in which there are no energy actions to set the price; a fall-back pricing option would be required. The SEM Committee considers that all of these issues should fall within the scope the detailed implementation phase.

Imbalance pricing should be transparent and should not introduce TSO subjectivity to the calculation of imbalance prices

Actions taken by the TSO should be objectively defined as far as possible, and aligned with the TSOs meeting their objective function when dispatching plant. The SEM Committee considers that, in this area, an algorithmic approach would offer advantages over manual Flagging and Tagging.

The SEM Committee has decided that the implementation of Flagging and Tagging in the I-SEM should include the greatest level of objectivity that can be achieved. There are three key elements to this.

- First, the process for the classification of actions taken by the TSOs needs to be clearly documented, thus avoiding ambiguity.
- Second, the processes put in place by the TSOs to tag out non-energy actions from the calculation of imbalance prices must be published, and the TSO performance audited and reported on annually.
- Third, the SEM Committee considers that the implementation of Flagging and Tagging in TSO systems should focus on solutions that are automated to the greatest extent practical.

The SEM Committee considers that these measures can build upon the GB experience, delivering robustness to the calculation of prices, and engendering confidence in it among stakeholders.

Established track record, and alignment with neighbouring jurisdictions

The GB arrangements represent a known and proven approach to the calculation of imbalance prices. The adoption of an aligned approach in the I-SEM offers a number of benefits although, as identified earlier, the SEM Committee believes that there will be differences in the implementation of Flagging and Tagging between GB and the I-SEM. The intention is to draw on the experience of GB, build upon it, and adapt the approach for the particular characteristics of the all-Island market.

The GB arrangements have evolved over a number of years. For example, the GB approach to the classification of actions has developed to provide an increasingly robust classification of actions and to remove system actions from the setting of imbalance prices. Material errors under the approach are low and Ofgem has commented positively on the performance of Flagging and Tagging in the GB market during its Significant Code Review on Cash Out Prices. It is notable that while the GB market is moving to single marginal (PAR 1) pricing, it is doing so while maintaining

Flagging and Tagging as the methodology applied to distinguish energy and non-energy actions for pricing purposes. The SEM Committee considers that the I-SEM development can effectively draw upon the experience of the GB arrangements, while seeking to further develop them. The I-SEM arrangements will thus share with BETTA the conceptual approach to removing non-system actions from imbalance pricing, but will not be a replication of all aspects of the GB arrangements.

GB will be implementing the Target Model requirements prior to I-SEM going live. I-SEM will thus be able to closely follow any adaptations to the GB arrangements associated with Target Model compliance and potentially adapt its own developing arrangements if necessary. The SEM Committee considers that the broad alignment of GB and I-SEM approaches to imbalance pricing calculations should facilitate efficient cross border trades within balancing timeframes. The SEM Committee considers that other approaches, while implemented elsewhere, are less directly applicable to the I-SEM in the context of the Target Model.

In addition to its use in the GB market arrangements, it should be noted that other markets across Europe use an approach to pricing which considers actions taken and seeks to remove system actions. The sophistication of these approaches is generally less than that required in GB and in I-SEM as their more interconnected systems in many cases gives rise to less non-energy actions.

Therefore, the approach being adopted in I-SEM is not without precedent, although the SEM Committee recognises that the detailed arrangements in I-SEM will be more complex and will require significant implementation effort because of the likely level of non-energy actions.

The Marginal Imbalance Price

The SEM Committee considers that the principle of balance responsibility is central to the I-SEM approach, and the creation of ex-ante liquidity. Marginal pricing most accurately reflects the actual costs incurred (or potentially incurred) by the TSO in balancing the system. As noted by Ofgem, this provides the signal to market participants to exhaust all opportunities to achieve an extra unit of balance where the cost of doing so is less than that of the TSO⁷. The SEM Committee remain of the

⁷ “Electricity Balancing Significant Code Review - Final Policy Decision”, Ofgem, 14 May 2014

view that “marginal” means the marginal cost of meeting the next increment of demand (up or down).

However, the SEM Committee recognises that, whichever imbalance pricing option is adopted, considerable detail remains to be developed in the upcoming months. The setting of parameters will have a significant impact on the level and profile of imbalance prices. The interaction of these parameters and explicit averaging across a specified quantum of MWs would need consideration as a package as, in principle, specific parameters could lead to setting sharp imbalance prices that were then mitigated, or, the pricing parameters themselves could reduce price levels or volatility. However, the setting of any parameters within the imbalance pricing approach must avoid the undue dampening of prices, which could adversely impact ex-ante liquidity while ensuring that any volatility is reflective of underlying cost drivers and avoiding the introduction of “junk volatility”.

Next steps

The SEM Committee considers that as part of the process to develop the detailed rules for the I-SEM, a Working Group should be established to develop the imbalance pricing parameters to be implemented. Inherent in this process will be the consideration of the impact of specific parameters to inform the final design and the case for the explicit averaging of prices. The SEM Committee is clear that any such measure should not blunt incentives to balance, notably in IDM, and that an explicit calculation of price that was not solely based on the marginal MW would need to be evidence-based and time limited.

9 IMBALANCE SETTLEMENT

9.1 INTRODUCTION

Imbalance Settlement is the process which, for each Imbalance Settlement Period (ISP), settles-

- the differences between:
 - the quantity of electricity that a participant has contracted to produce or consume in the ex-ante markets (adjusted for any incremental offers and/or decremental bids accepted by the TSOs in the Balancing Market); and
 - the quantity of electricity that the participant actually produced or consumed; plus
- the incremental offers and decremental bids accepted by the TSOs in the Balancing Market.

Imbalance Settlement must ensure that participants get paid the correct amounts for electricity quantities that they produce and pay the correct amounts for electricity quantities that they consume.

The I-SEM HLD states that all market participants in I-SEM shall be balance responsible and that imbalance settlement will be at the unit level for generation, with possible exemptions for certain renewables, and for dispatchable demand.

Incremental offers and decremental bids that are accepted by the TSOs in the Balancing Market can be considered as contracts with the TSOs to, respectively, produce and consume electricity. Therefore, in the simplest terms, it can be said that Imbalance Settlement must ensure that a unit's uncontracted electricity quantity, being its total metered electricity production or consumption (adjusted for any accepted offers and bids) minus its total contracted electricity production or consumption, must be sold or bought at the imbalance price.

In any given settlement period, participants may produce more or less energy than they have sold in the ex-ante markets, and may consume more or less energy than they have purchased. In such circumstances, these units are regarded as having 'an

imbalance’ and the quantities of energy produced or consumed and not covered by contracts (the ‘energy imbalances’) can be regarded as having been sold or bought to or from the Transmission System.

The imbalance price shall be calculated for each settlement period and used to settle or ‘cash-out’ these uncontracted quantities. The I-SEM HLD states that there shall be a single imbalance price in I-SEM, meaning that long and short energy imbalances will be settled at the same price in any given Imbalance Settlement Period, regardless of whether the system as a whole is long or short. The I-SEM HLD also states that the imbalance price shall be a marginal price based on unconstrained energy balancing actions. Imbalance pricing is discussed in Section 8.

9.2 CONSULTATION PAPER PROPOSALS

The Markets Consultation Paper was broken into the following sections for imbalance settlement:

- Settlement of Imbalances and Accepted Offers/Bids;
- Settlement of Imbalances and Accepted Offers/Bids Taking Account of PNs and Firm Access;
- Settlement of Curtailment;
- Settlement of Priority Dispatch Units When Constrained Down;
- Treatment of Uninstructed Imbalances;
- Interaction Between the Balancing Market and the Intraday Market;
- Settlement of Multiple Acceptances; and
- Quarter-Hourly vs Half-Hourly vs Hourly Settlement.

The first section of this chapter introduced and explained the proposed high level stylised algebra for imbalance settlement in I-SEM.

The next section, Settlement of Curtailment, discussed three options for the implementation of the SEM Committee decision on curtailment and their consequences for settlement. One of the options introduced the concept of a “deemed decremental bid” to be used in settlement that would have the same price as a curtailed unit’s ex-ante trades.

The next section discussed the settlement of priority dispatch units when they are constrained down, including the case where variable RES units, having chosen not to submit a physical notification, are constrained down. It included the proposal that a deemed decremental bid would again be used, in this case with a price of zero.

The next section, Treatment of Uninstructed Imbalances, discussed how uninstructed imbalances should be settled and proposed maintaining the concepts of the Discount for Over Generation (DOG) and the Premium for Under Generation (PUG) in the I-SEM systems.

The next sections discussed the interaction between the Balancing Market and the Intraday Market and the settlement of multiple acceptances. A refinement of the proposal on pricing in the Building Blocks Consultation Paper was introduced and goes as follows:

- a unit which had an incremental offer accepted would receive the maximum of its offer price and the imbalance price for any incremental volumes above its PN, and would receive its offer price for any incremental volumes below its PN; and
- a unit which had a decremental bid accepted would pay back the minimum of its bid price and the imbalance price for any decremental volumes below its PN, and would pay back its bid price for any decremental volumes above its PN.

The final section discussed the possible consequences of ex-ante trades based on trading periods of different duration to the Imbalance Settlement Period (ISP). Three options were introduced, two of which would reduce participant risk if this were the case but would mean that balancing actions were priced differently to imbalances.

9.3 SUMMARY OF RESPONSES RECEIVED

Settlement of Imbalances and Accepted Offers/Bids and Settlement of Imbalances and Accepted Offers/Bids Taking Account of PNs and Firm Access

A number of respondents felt that the imbalance settlement algebra should not be decided upon prior to clear decisions being made on system operation in I-SEM and a coherent design philosophy for the Energy Trading Arrangements. One respondent noted that substantive further work will be required to define the settlement algebra once the market design is agreed. Another respondent felt that the algebra should not be decided absent of robust detailed modelling and prior to decisions being made on other elements of the market design.

One respondent wanted more clarity on the interactions between PNs and settlement with regards to the interaction between the Balancing Market and the Intraday Market.

One respondent argued that, as the imbalance price will not be known at the time at which a participant submits their PN, they would be making a commercial decision to go short or long in the market and would not always gain if they “bias their PN”, as per the examples in the Appendix of the Consultation Paper. This respondent suggested that under some of the examples provided, the participant would be offering higher levels of liquidity into the Balancing Market and as the TSO may have other options they would not necessarily call a particular unit.

One respondent was of the opinion that the “un-notified imbalance” is not the same as the “uninstructed imbalance” and asked for clarity on this. It was also of the opinion that the proposed treatment of uninstructed imbalances as per the algebra is not penal enough.

The same respondent also disagreed with the treatment referenced in conditions (G2) - constrained-on payments where Final Physical Notifications are below ex-ante quantities - and (G6) - constrained-off payments for non-firm access - of the Consultation Paper. With regards to the treatment referenced in (G2), it felt that offers accepted by the TSO should be referenced against the FPN only and argued that a participant would separately be exposed to the imbalance between their ex-ante market position and the balancing market price. With regards to the treatment referenced in (G6), it felt that a participant with a decremental bid accepted by the TSO should be entitled to their decremental volume multiplied by their bid price,

regardless of whether it has firm access or not. The respondent also argued that if a unit was constrained down due to access restriction this should be seen as an imbalance and exposed to the imbalance price, which appears to contradict its previous preference.

Another respondent stated that it did not see the rationale why FPNs between the ex-ante quantity and the dispatch quantity for out-of-merit actions required the treatment as proposed in the algebra. Another agreed in principle that the imbalance settlement arrangements should ensure that parties are not incentivized to deviate from their traded, notified physical position or physical position but stated that it could not be confident that the proposed algebra fully delivers this.

Two respondents argued that the Net Imbalance Volume (NIV) should be calculated from the difference of ex-ante trades and delivered generation quantity, rather than the difference of physical notifications and delivered generation quantity. It was argued that if pricing is based on physical notifications, then a generator could have access to a commercially irrelevant submission that impacts the price for the wider market (in the case where physical notifications are delinked from ex-ante trades).

One respondent was of the view that a unit's physical notification should encompass all of its contracted positions, both from the ex-ante markets and the balancing mechanism, and thereby represent the actual running of the unit. Following from this it believed that the primary use of the physical notification would be in the scheduling processes and that it should not be considered in settlement calculations, and thus that the settlement calculations should be based on positions derived from the ex-ante markets, the balancing mechanism and the metered generation. The same respondent considered the concept of a "notified imbalance" to be inappropriate.

One respondent argued that the proposed algebra appears to include features to mitigate local market power and was concerned that other alternatives to the algebra have not been put forward and discussed.

Settlement of Curtailment

Several respondents again called for the SEM Committee's previous decision to remove compensation for curtailment from 2018 to be revoked. One of these respondents stated that imbalance prices should not be unnaturally high during SNSP events.

Two respondents argued that curtailed wind should be settled like any other imbalance at the imbalance price. One stated that to do otherwise amounts to another market support for a specific technology which would likely be levied on customers. The other stated that although Mandated Bidding would allay some of their concerns, it would also mean that the signal of the imbalance price to curtailed units, which helps ensure balance responsibility, would be lost. Wind units would be indifferent as to whether the volumes cleared in the ex-ante markets are actually realisable, because if they were to be curtailed then only revenues earned would need to be paid back.

Settlement of Priority Dispatch Units When Constrained Down

Six respondents supported the concept of price-taker wind in the Balancing Market as outlined in the Markets Consultation Paper. They agreed that wind units should not have to submit a physical notification, and that their availability signals from SCADA should be used as their physical notification instead. They also supported the proposal for a “deemed decremental bid” of zero to be used in the case where price taking wind, with firm capacity, without a physical notification is constrained down.

Four respondents were of the view that a wind unit with priority dispatch should have the option to become price-making for part, or all, of its output. They argued that wind units should not be constrained from managing their market risks. Further clarity was sought on the dispatch process for wind and it was stated that a requirement for systems investment by the TSO in an economic dispatch tool should not be a reason to prevent wind from offering flexibility and balancing energy in the same way that any conventional or demand side unit can. One of these respondents stated that all wind participating in the market should submit PNs in the same manner as all other generation. It believed that wind participation in the market would reduce the PSO, reduce volatility, support liquidity and support robust market prices, and that priority dispatch should not consequentially mean that wind would have no trading responsibility in the market.

A number of respondents argued that wind should be compensated for constrained down volumes in the Balancing Market even where it doesn't have ex-ante volumes. One respondent believed that price-taking wind generators would still be incentivised to participate in ex-ante markets even if this were the case as the imbalance prices received for spilling into the balancing market are likely to be lower than ex-ante prices.

One respondent stated that wind should be allowed submit a negative decremental bid price equal to its foregone subsidy while another sought clarity on negative decremental bids for wind.

Treatment of Uninstructed Imbalances

Ten respondents gave their views on the treatment of uninstructed imbalances, and the possibility of maintaining the SEM Discount for Over Generation (DOG) and SEM Premium for Under Generation (PUG) in the I-SEM systems in order to allow for specific treatment of uninstructed imbalances. Of those respondents who provided views on this topic, six were in favour of including the DOG and PUG parameters in the I-SEM systems and four were against.

Those respondents in favour of retaining the DOG and PUG parameters in the I-SEM systems argued that there is a need for specific pricing for uninstructed imbalances in I-SEM given that the TSO needs to expect that the dispatch instructions it places with participants will be adhered to in a central dispatch exchange based market and given that the new market's introduction will see an increased focus on balance responsibility. They also argued that the retention of specific pricing for uninstructed imbalances would act to discourage portfolio balancing after gate closure (where a portfolio player might purposely deviate from a dispatch instruction on one unit in order to offset an imbalance on a different unit), and would provide a clear distinction between notified and un-notified imbalances should final physical notifications (FPNs) be delinked from ex-ante trades.

It was also noted that the functionality surrounding DOG and PUG in SEM is well established and sophisticated, with defined tolerance bands for frequency following, and that the treatment of uninstructed imbalances in I-SEM should build on this functionality and retain said tolerance bands. The values of the parameters should continue to be set annually by the Regulatory Authorities after consultation.

Some respondents in favour of retaining DOG and PUG for uninstructed imbalances were of the view that this would eliminate any need for an information imbalance charge as it would incentivise the same general behaviour.

Conversely, respondents opposed to the retention of the DOG and PUG parameters in the I-SEM systems argued that there is already an obligation under the Grid Code to follow TSO instructions and did not consider that there would be a need for

further financial incentives to follow these obligations. They noted that there is also an obligation under the Grid Code to provide frequency response so appropriate tolerances need to be allowed for when assessing compliance with TSO dispatch instructions.

Respondents opposed to the retention of DOG and PUG also argued that specific treatment of uninstructed imbalances is not necessary or appropriate in I-SEM as there will already be sufficient dissuasion to go against TSO dispatch instructions by virtue of information imbalance charges and imbalance prices themselves, which do not exist in SEM. Some of these respondents were also of the view that their retention would effectively result in dual imbalance pricing under certain conditions while the I-SEM HLD states that there will be a single imbalance price.

Finally, it was stated that the additional costs that the TSOs are likely to incur as a result of participants not following dispatch instructions need to be quantified for the I-SEM, and that any uninstructed imbalance framework and associated penalties need to be proportionate to the actual costs incurred.

Interaction between the Balancing Market and the Intraday Market

One respondent sought further clarity on the interactions between PNs and settlement with regards to the interaction between the Balancing Market and the Intraday Market.

Settlement of Multiple Acceptances

Five respondents preferred the original proposal, under which a unit which had an incremental offer accepted in the Balancing Market would receive the maximum of its offer price and the imbalance price, and a unit which had a decremental bid accepted in the Balancing Market would pay back the minimum of its bid price and the imbalance price.

Three respondents preferred the refined proposal introduced in the Markets Consultation Paper, under which -

- A unit which had an incremental offer accepted would receive the maximum of its offer price and the imbalance price for any incremental volumes above its PN, and would receive its offer price for any incremental volumes below its PN; and

- A unit which had a decremental bid accepted would pay back the minimum of its bid price and the imbalance price for any decremental volumes below its PN, and would pay back its bid price for any decremental volumes above its PN.

A total of seven respondents commented on the importance of the recovery of costs incurred by generators due to cancelled or partially cancelled TSO instructions.

One respondent that preferred the original proposal stated that it appears to provide a less equivocal application of settlement rules and argued that all Bid-Offer Acceptances should be paid as an individual transaction. One respondent felt that the examples provided in section 9.8 of the Markets Consultation Paper were unrealistic as they relate to TSO incremental and decremental dispatch instructions which could all be concluded after IDM gate closure when the incremental offer and decremental bid prices cannot be varied. This respondent argued that prices will vary between the commencement of the IDM (and possibly earlier if the TSO takes even earlier actions) and IDM gate closure and that any change in the TSOs decisions in this period must reflect the net cost of the individual Bid-Offer Acceptances that have been agreed.

Another respondent that preferred the original proposal was concerned that the refined proposal may not facilitate participants to adequately manage their commercial risks. The respondent was also concerned that the emphasis seemed to be on the requirements of the TSO rather than on the commercial positions of participants.

A further respondent felt that the original proposal should be used given that there is a risk of physical notifications becoming infeasible and given that they felt that a mechanism for units to recover the costs of an undone action after gate closure has not been addressed.

Some other responses included the view that measures to mitigate potential gaming should not be written into market design at this stage and the view that it is not possible to comment on the refined proposal until there is more clarity on other detailed design issues.

Respondents that supported the refined proposal did so on the condition that the SEM Committee accepts that there are legitimate reasons to include different pricing within undo offers and that undo prices are provided for in the I-SEM design.

Respondents, including some who had no preference between the original and refined proposals, noted the importance of the recovery of costs incurred by generators due to cancelled or partially cancelled TSO instructions. They stated that these sunk costs should be recognised through undo prices. One respondent outlined that after IDM gate closure the TSOs will have incremental offers and decremental bids and that they will also require undo prices under circumstances where they accept offers and bids that they subsequently decide to partially or fully cancel over the course of the 2 hour period until delivery.

Finally, one respondent questioned whether the imbalance settlement algebra supports either the original or refined proposal.

Quarter-Hourly vs Half-Hourly vs Hourly Settlement

Only one respondent was in favour of Option (i), under the terms of which hourly ex-ante contract quantities would be split equally into the shorter Imbalance Settlement Periods. This respondent felt that Option (i) would have the benefits of keeping the balancing actions and imbalances priced the same and of providing more transparent market prices.

Most of the other respondents who commented on this issue were either in favour of Option (ii), under which participants would be given the ability to allocate ex-ante contract quantities between constituent Imbalance Settlement Periods as they wished, Option (iii), under which imbalances would be calculated on an hourly basis, with either a weighted or unweighted average of the Imbalance Settlement Period prices across the hour, or indifferent between the two. The two remaining respondents who commented on this issue were strongly of the view that the Imbalance Settlement Period should be of an equal time period to products available in the ex-ante markets.

Three respondents were specifically in favour of implementing Option (ii). One of these respondents proposed an automatic optimisation of ex-ante trades into the relevant Imbalance Settlement Periods, in order to reduce overheads for market participants. Another respondent was of the view that, for generators, if the FPN has to be linked to ex-ante contract quantities then it may naturally provide an allocation

of the generator's ex-ante contract quantities across the constituent Imbalance Settlement Periods. One respondent argued that Option (ii) should be implemented regardless of what granularity of products are available in the IDM as there may not be sufficient liquidity in this market to enable participants to manage their risk.

Four respondents were specifically in favour of implementing Option (iii). It was argued that this option would best facilitate market participants in determining exposures and monitoring the imbalances across the market that inform trading opportunities and TSO requirements for early commitment actions, and that these features would contribute to predictable market outcomes. It was also argued that Options (i) and (ii) introduce the risk of higher Dispatch and Balancing Costs and that Option (iii) is transparent, simple and conducive to a smooth transition from SEM to I-SEM.

One respondent in favour of Option (iii) stated that balancing should be over the minimum market-defined ex-ante duration. However, another argued that as the Day Ahead Market is the only market with assured liquidity at I-SEM go-live, imbalances should thus be calculated on an hourly basis at I-SEM go-live. It argued that there would still be incentives for short duration products to develop and that a cautious approach should be taken to introducing imbalance arrangements that require short duration products.

Another respondent was of the view that Option (iii) would allow the cash flows in settlement to most accurately reflect what occurred in the operation and balancing of the system. It preferred that an unweighted average of the constituent Imbalance Settlement Period prices be used, as this would incentivise balance responsibility and ensure that greater value was placed on being able to balance at times of system stress.

Seven respondents favoured either Option (ii) or (iii), as long as Option (i) was not implemented. They were of the view that the market design should facilitate participants to trade at a granularity that adequately allows them to manage their exposure to imbalance prices and that the balancing mechanism must not result in unmanageable residual imbalance exposure for participants, i.e. participants should not be exposed to imbalance prices outside of their control and which are an artefact of settlement timeframes across different markets. One respondent noted that Option (iii), as it is automated, may reduce the burden on smaller participants

required to submit both physical notifications and allocations of ex-ante contract quantities, but another noted that Option (ii) could also be automated.

One respondent noted that both Option (ii) and Option (iii) would result in a net cash shortfall in the market, but that any cash-balanced mechanisms are discriminatory to wind, which tends to have an imbalance position correlated with market price. A different respondent was of the view that the chosen option should not involve unnecessary levels of administration for wind traders.

Two respondents insisted that the Imbalance Settlement Period should be of an equal time period to products available in the ex-ante markets. They argued that period durations in the IDM and in Imbalance Settlement should be kept identical throughout and transitioned to shorter period durations simultaneously as required. Otherwise unnecessary procedures for allocating ex-ante contract quantities to shorter duration Imbalance Settlement Periods are required and either create unmanageable imbalance costs for participants or revenue shortfalls for the Balancing Market Operator. It was suggested that the I-SEM could go-live with a 30 minute Imbalance Settlement Period and 30 minute products in the IDM (but design the systems to allow for 15 minutes for both) and transition to 15 minutes for both, consistent with XBID and Electricity Balancing Network Code timelines.

Other Issues Raised

Partially supported hybrid generation units

One respondent raised the issue of how partially supported hybrid generation units will be treated in the I-SEM. It stated that these units will need to be able to construct offers and bids into the Balancing Market that ensure their operational costs are recovered, and that this is complicated both by the fact that not all such units will have a fixed fuel mixture throughout the day, and by the fact that only a proportion of their output will be supported by REFIT.

Trading Sites

One respondent stated that net settlement of trading sites is necessary to ensure they are not disadvantaged in the I-SEM compared with the current net settlement in SEM. It considered that it has not been clear to date within the I-SEM design process how it is envisaged that participants on a single site with individual meters for generation and demand will be settled. They proposed a de-minimis dispatch control level for High Efficiency CHP operating within a trading site, below which it

cannot be dispatched by the TSO. This de-minimis level could be the higher of the unit's minimum stable level or the minimum useful heat requirement..

9.4 SEM COMMITTEE RESPONSE

Settlement of Imbalances and Accepted Offers/Bids and Settlement of Imbalances and Accepted Offers/Bids Taking Account of PNs and Firm Access

The SEM Committee acknowledges that further work is required to define the detailed settlement algebra. The algebra included in the consultation paper is a stylised high level representation that was designed to illustrate and explain the concepts being consulted on, and not to fully define settlements functionality. The detailed settlement algebra will be finalised during the implementation phase following further work by the RAs, industry and the TSOs. The detailed settlement algebra work will reflect the forthcoming guidelines on system operation in the I-SEM, and the decisions on other elements of the Energy Trading Arrangements.

The treatment of FPNs between the ex-ante quantity and the dispatch quantity for out-of-merit actions as proposed in the algebra is designed to prevent participants from increasing the quantities on which premiums and discounts are paid by purposely biasing their FPN to be above, or below, their respective ex-ante traded quantity. While the imbalance price will not be known at the time at which a participant submits their FPN, units that have early bid-offer acceptances that are significantly out-of-merit could expect to gain by biasing their PN. The SEM Committee believes that this treatment should incentivise participants to submit PNs that do not deviate from their ex-ante positions. As discussed earlier, FPNs have to be linked to ex-ante traded positions at gate closure, but certain tolerances will be allowed and so the proposed algebra can still be used.

Net Imbalance Volume is the net quantity of offer acceptances and bid acceptances. This is equal to demand less the sum of generator FPNs (plus the output from generators not submitting FPNs) on the simplifying assumption that generation does not shortfall. Any demand in excess of the sum of FPNs (plus the output of generators not submitting FPNs), together with any generation shortfall, will necessitate more offers and/or less bids being accepted by the TSO. Thus, the net quantity of offer acceptances and bid acceptances should reflect generation shortfalls and increases in demand as required. Physical notifications will have to be linked to ex-ante trades at gate closure so generators will not be able submit

commercially irrelevant FPNs that could affect the price for the wider market. Moreover, the SEM Committee notes the comment that the Net Imbalance Volume should be calculated as the difference between actual generation and ex-ante trades, rather than actual generation and, broadly speaking, the sum of physical notifications. However, to the extent that the physical notifications and ex-ante trades are not identical, the difference between actual generation and ex-ante trades would not represent the quantity of balancing actions actually taken and hence imbalance prices set on the basis of such a Net Imbalance Volume would not reflect the cost of resolving imbalances.

The SEM Committee notes the comment that the concept of “notified imbalance” is inappropriate. The decision to link FPNs to ex-ante trades at gate closure means that the concept of a “notified imbalance” will not be significant in I-SEM. The settlement calculations will be based on FPNs (which the participant will be expected to derive from its ex-ante market positions), the balancing mechanism and the metered generation. However, certain tolerances will be allowed around this decision and so the proposed algebra should still remove any incentive for participants to bias their FPNs within any allowed tolerances.

The SEM Committee does not agree with the comment that a unit’s physical notification should encompass all of its contracted positions, both from the ex-ante markets and the balancing mechanism, and thereby represent the actual running of the unit. It considers that it will be clearer and more transparent for the physical notification to represent the expected final ex-ante position of the unit prior to bid-offer acceptances by the TSO, rather than also including BM bid-offer acceptances.

An “un-notified imbalance” and an “uninstructed imbalance” are, in practice, the same, both being the difference between a unit’s dispatch instruction from the TSO and its metered generation. The proposed treatment of uninstructed imbalances, as per the algebra in the consultation paper, is not designed to be penal but rather to ensure that units do not get the benefit of premiums and discounts on offer and bid acceptances for either under or over delivering on dispatch instructions. Specific treatment of uninstructed imbalances is covered elsewhere in this chapter.

Settlement of Curtailment

The SEM Committee decision to remove compensation for curtailment from 2018 is outside the scope of this consultation. The desire to re-open this decision (SEM-13-010) was raised during the RLG meetings and in responses to the Building Blocks

Consultation Paper. However, having considered this feedback, the SEM Committee remains of the view that there is no specific feature of the I-SEM implementation that would warrant re-opening this decision. The SEM Committee decision on curtailment (SEM-13-010) was made following detailed consideration of a wide range of issues and it would not be appropriate to re-open one very particular part of that process without looking at all the issues that were considered in reaching that decision. The decision has provided certainty to the industry regarding the enduring regime. The SEM Committee remains confident in the decision made and suggests that the uncertainty that would be associated with reopening the decision would not be helpful.

The SEM Committee does not agree that the implementation of a post-processing stage for curtailed wind, which uses a “deemed decremental bid” equal to some ex-ante reference price, or to actual ex-ante trades, to reflect the revenue earned from curtailed volumes, amounts to a new market support for a specific technology. Instead it represents the most direct implementation of SEM Committee decision SEM-13-010.

The SEM Committee sees merit in the argument that curtailed wind should be cashed out at the imbalance price, as to do otherwise means that the signal of the imbalance price is lost to curtailed units. This could mean that wind units will be indifferent as to whether their full ex-ante volumes are actually deliverable in reality, as if they are curtailed then they only have to pay back revenues earned and are not exposed to the imbalance price. However, the SEM Committee is mindful of the certainty given to industry in SEM-13-010. In support of the SEM Committee position, as laid out in the ETA Building Blocks Decision Paper, to implement a post processing stage which uses a “deemed decremental bid”, the vast majority of respondents, to both this consultation and the Building Blocks Consultation, did not favour cashing out curtailed volumes at the imbalance price.

Settlement of Priority Dispatch Units When Constrained Down

The SEM Committee remains of the view that a price-taker option in the Balancing Market for wind with priority dispatch plant, as outlined in the Markets Consultation Paper, is required in I-SEM. The SEM Committee notes that the majority of respondents who discussed this topic agreed with this view and supported the proposal for a “deemed decremental bid” of zero to be used in the case where price-taking wind, with firm capacity, without a physical notification is constrained down.

The SEM Committee agrees, in theory, with the respondents who proposed that a wind unit with priority dispatch should have the option to become price making for part, or all, of its output. However, any wind unit availing itself of this option would need to be treated in a manner consistent with non-priority dispatch, price setting generation.

The SEM Committee does not agree that wind should be compensated for constrained volumes in the Balancing Market even where it does not have ex-ante volumes. The SEM Committee put forward four options for consultation as part of the High Level Design (HLD) Phase of the I-SEM. Two of these options included an ex-post unconstrained market whilst two did not, and the final I-SEM HLD decision does not include an ex-post unconstrained market. An ex-post unconstrained market has the potential to split liquidity between it and the ex-ante markets. Given that ex-ante trading dictates cross-border flows the ex-post unconstrained market was seen as a risk to the efficient functioning of the overall market.

The SEM Committee also does not agree that wind should be allowed to submit a negative decremental bid price that would mean it would receive payment up to the value of its foregone subsidy as this would deliver the *de facto* payment of subsidies for electricity that was not produced in reality. Also, if curtailment is to be done on a pro-rata basis then all wind has to be treated with a comparable deemed bid. If different wind units had different deemed bids based on their support mechanisms then they would have to be dispatched down on a price basis before curtailment occurred.

Treatment of Uninstructed Imbalances

The SEM Committee agrees with the views expressed that there is a need for specific pricing of uninstructed imbalances in I-SEM given that the TSOs need to expect that dispatch instructions to participants will be adhered to and given that the new market's introduction will see an increased focus on balance responsibility.

The SEM Committee does not agree that an obligation under the Grid Code to follow TSO instructions precludes the use of financial incentives to further encourage units to follow these obligations. Grid Code obligations to follow TSO instructions exist under the SEM and are effectively complimented by the DOG and PUG financial incentives.

The SEM Committee agrees that appropriate tolerances need to be allowed when assessing compliance with TSO dispatch instructions to allow for changes in a unit's output resulting from factors outside of its control, such as the provision of frequency response. The functionality of DOG and PUG in SEM is well established and sophisticated, with defined tolerance bands for frequency following. The SEM Committee agrees that the treatment of uninstructed imbalances in I-SEM should retain this functionality and the relevant tolerance bands. The SEM Committee also considers that the values of the parameters should continue to be set annually by the Regulatory Authorities after consultation.

Regarding the argument that the retention of specific treatment of uninstructed imbalances is not necessary or appropriate as there will already be sufficient disincentive to deviate from TSO dispatch instructions, the SEM Committee is of the view that specific treatment is necessary in order to discourage portfolio balancing after gate closure (where one unit might purposely deviate from a dispatch instruction in order to offset an imbalance on a different unit within the same portfolio).

The SEM Committee does not agree that the retention of DOG and PUG would result in dual imbalance pricing. The current SEM does not employ dual pricing although within its framework DOG and PUG are overlaid on top of the System Marginal Price (SMP) to incentivise units to follow their dispatch instructions. The same construct can apply equally to the I-SEM in which, there will be a single imbalance price, with long positions receiving the same price as that paid by short positions, regardless of whether the market as a whole is long or short. DOG and PUG would be part of a framework overlaid on top of this to incentivise units to follow their dispatch instructions.

The SEM Committee is of the view that the costs incurred by the system as a result of participants not following dispatch instructions are unlikely to decrease as the market transitions from SEM to I-SEM, as in I-SEM many dispatch decisions will be taken closer to real time than they are at present. There is a risk that unless dispatch instructions are accurately followed the costs incurred in balancing the system could increase. Thus, it is important that effective incentives for participants to follow dispatch instructions are maintained.

Interaction between the Balancing Market and the Intraday Market

This is covered in Chapter Six of this paper.

Settlement of Multiple Acceptances

The SEM Committee acknowledges the importance of allowing participants the ability to recover any costs incurred due to cancelled or partially cancelled dispatch instructions from the TSO. As such the SEM Committee accepts the fact that there are legitimate reasons to include different prices within undo offers, or within re-declared bid-offers that would undo previous bid-offer acceptances.

The SEM Committee does not agree that the refined proposal may not allow participants to adequately manage their commercial risks and to recover costs incurred due to cancelled dispatch instructions. Under the refined proposal participants can still reflect the costs incurred, if they exist, in their undo prices or in their re-declared bid-offers that would undo previous bid-offer acceptances. Participants would never receive less than their re-declared offer price (or the undo price associated with a bid acceptance) and would never have to pay back more than their re-declared bid price (or the undo price associated with an offer acceptance).

The aim of the refined proposal is not to mitigate potential gaming, as this will be dealt with under the market power workstream and any local market power mitigation measures decided therein, but rather to ensure that the TSO can cancel or revise dispatch instructions at the actual prices submitted by participants.

Finally, the SEM Committee acknowledges that the high level imbalance settlement algebra outlined in the Consultation Paper does not currently support the proposal for the settlement of multiple acceptances and that more detailed algebra will need to be developed over the course of the ETA Implementation Phase.

Quarter-Hourly vs Half-Hourly vs Hourly Settlement

The SEM Committee agrees that the I-SEM market design should allow participants to trade at a granularity that adequately allows them to manage their exposure to imbalance prices. Participants should not be exposed to imbalance prices that they cannot hedge against in the ex-ante markets.

The SEM Committee does not consider that a requirement that the Imbalance Settlement Period be of an equal time period to products available in the ex-ante markets at I-SEM go-live is necessary, as long as participants are not exposed to risks that they cannot hedge.

Only one respondent favoured Option (i), i.e. the splitting of hourly ex-ante contract quantities equally into shorter Imbalance Settlement Periods. While the SEM Committee agrees with this respondent that this option would have the benefit of keeping the price of balancing actions and imbalances the same, it does not consider that this benefit would outweigh the disadvantage of exposing participants to risks that they cannot hedge. This respondent also argued that this option would provide more transparent market prices. The SEM Committee disagrees on this point and does not consider that any of the options presented would lead to opaque prices.

The SEM Committee is of the view that Option (ii) could be automated, and so could be implemented without placing any extra burdens on participants to submit allocations of ex-ante contract quantities. Ex-ante contract quantities could be allocated automatically so as to minimise participants' exposure to imbalance prices. Alternatively, as a participant's FPN must be linked to their ex-ante contract quantities, the FPN itself could provide an allocation of the ex-ante contract quantities across the constituent Imbalance Settlement Periods.

The implementation of either Option (ii) or Option (iii) would create a revenue shortfall which would need to be covered by a charge socialised across all demand. However, the SEM Committee believes that it would be more likely that Option (ii) would create greater revenue shortfalls and lead to a higher socialised charge. This is due to the fact that this option would see participants' ex-ante contract quantities allocated into constituent ISPs in the most beneficial way. This would result in participants with a short position over the entire ex-ante period having to "buy back" their short imbalance volume at the lower of the constituent ISP prices, and participants with a long position over the entire ex-ante period being paid for their long imbalance volume at the higher of the constituent ISP prices.

This characteristic of Option (ii) would also have the effect of dampening the imbalance price signal for balance responsibility to a greater extent than would be seen through Option (iii), as under Option (iii) participants with a short position over the entire ex-ante period would "buy back" their short imbalance volume at the average price of the constituent ISP prices, and participants with a long position over

the entire ex-ante period would be paid for their long imbalance volume at the average price of the constituent ISP prices.

The SEM Committee therefore agrees with the view that Option (iii) would deliver cash flows in settlement that most accurately reflected what occurred in the operation and balancing of the system. However, it does not agree that the use of the unweighted average, rather than a weighted average, of the constituent ISP prices would act to reduce any dampening of price signals at times of system stress and act to retain incentives for balance responsibility. Indeed, the SEM Committee considers that an average weighted by system demand is likely to be more representative of prices over the period of averaging. In the event of system stress, system demand will tend to be high rather than low, and hence a system demand weighted average would be likely to dampen the price less, not more, than a time-weighted average. Nevertheless, given that the incentive will be to trade into balance [over the hour], irrespective of whether Option (ii) or (iii) is adopted, the SEM Committee is of the view that the precise calculation of the average can be determined during the implementation phase.

Notwithstanding that either of Options (ii) or (iii) have the effect of calculating imbalance charges on an hourly basis by applying an average price to an hourly imbalance, the SEM Committee considers that this might best be implemented by the appropriate allocation of the hourly DAM contract quantities between half-hourly settlement periods. This, the SEM Committee believes, will simplify implementation by ensuring that the imbalance pricing and imbalance charge calculations are not affected. Moreover, by allocating only the hourly DAM quantities, participants will not be impeded nor discouraged from trading half-hourly shape in the IDM. As well as allowing participants to reduce their imbalance exposures further, this will also enable the Regulatory Authorities to observe whether IDM liquidity is developing to the point that it is adequate for managing half-hourly exposures.

The SEM Committee disagrees with views expressed by some respondents that Option (ii) or (iii) should be implemented on an hourly basis regardless of what granularity of products were available in the IDM. Instead the SEM Committee considers that balancing should be over the same duration as the minimum duration of product available in the ex-ante markets, so long as said product is not so illiquid so as to be ineffective for participants in terms of hedging their exposure to imbalance prices. Indeed, if the product is available to be traded in the ex-ante

markets then balance responsibility at that level of granularity should encourage participants to trade on these market timescales and increase liquidity. If participants were held balance responsible only over a longer duration then there would be far less incentive to trade this product in the ex-ante markets.

Finally, the SEM Committee does not agree with the respondent who stated that Option (i) would be discriminatory to wind. If Option (i) exposed participants to risks that they cannot hedge against, then this would apply to all participants. If the risk exposure were greater for wind then this would be due to the inherent characteristics of wind energy itself, not due to any discriminatory nature of the market rules.

Other Issues Raised

Partially supported hybrid generation units

The SEM Committee is of the view that partially supported hybrid generation units will be better able to represent their operational costs in I-SEM than in SEM, as they will be able to submit different bid-offer prices to the Balancing Market for each settlement period. This will enable them to represent their changing fuel mixture throughout the day in their offers and bids.

Trading Sites

The SEM Committee agrees that the principle of the existing treatment of trading sites should be retained in I-SEM. This will be progressed further through the implementation phase. The SEM Committee considers the proposal for a de minimis dispatch control level, below which the TSO could not dispatch a unit within a trading site, to be infeasible as the TSO needs final control of all large units on the system.

9.5 SEM COMMITTEE DECISION

Settlement of Imbalances and Accepted Offers/Bids and Settlement of Imbalances and Accepted Offers/Bids Taking Account of PNs and Firm Access

Although FPNs must be linked to ex-ante contract quantities at gate closure, certain tolerances will be allowed and so the high level algebra proposed in the Markets Consultation Paper will be used to remove any incentive for participants to bias their FPNs within these allowed tolerances.

A unit's physical notification will represent the desired running of the unit before any bid-offer acceptances by the TSO. The dispatch instructions issued by the TSO will represent the actual output required of the unit. The SEM Committee considers that this distinction must remain clear.

The detailed settlement algebra will be finalised during the implementation phase following further work by the RAs, industry and the TSOs. This work will reflect the forthcoming guidelines on system operation in I-SEM, and the decisions on various elements of the Energy Trading Arrangements, in the final detailed settlement algebra.

Settlement of Curtailment

The SEM Committee considers that cash out and post processing is the optimal way to implement its decision on compensation for curtailment in I-SEM from 2018. A generator in a curtailment event will be cashed out at the imbalance price. Subsequently, a post-processing stage will recoup any extra revenues earned by the generator where the prices in the ex-ante markets were higher than the balancing market prices, and will "make whole" any losses made by the generator where prices in the ex-ante markets were lower than the balancing market prices.

Settlement of Priority Dispatch Units When Constrained Down

The price-taker option in the Balancing Market for wind with priority dispatch, as outlined in the Markets Consultation Paper, will be implemented in I-SEM. A deemed decremental bid of zero will be used in the case where price-taking wind, with firm access but without a physical notification, is constrained down.

Wind with priority dispatch will have the option to become price making for part, or all, of its output. However, any wind unit availing of this option will be required to:

- follow dispatch instructions from the TSO;
- have exactly the same systems and interfaces required by any conventional unit;
- give up priority dispatch for the portion of its output that was price making; and
- submit a physical notification in the same manner as all other generation and be balance responsible for any deviations from it.

Treatment of Uninstructed Imbalances

The Discount for Over Generation (DOG) and Premium for Under Generation (PUG) will be retained in the I-SEM systems. The values of the parameters will continue to be set annually by the Regulatory Authorities after consultation.

The treatment of uninstructed imbalances in I-SEM will retain the functionality in SEM and thus the tolerance bands for frequency following will also be retained.

Interaction between the Balancing Market and the Intraday Market

The SEM Committee decisions on this area are covered in Chapter Six of this paper.

Settlement of Multiple Acceptances

Participants will be able to include different pricing within undo offers, or within re-declared bid-offers that would undo previous bid-offer acceptances, in order to recover any costs incurred due to cancelled or partially cancelled dispatch instructions from the TSO.

The SEM Committee has decided that the refined proposal, introduced in the Markets Consultation Paper, will be implemented for multiple bid-offer acceptances and for the acceptance of undo offers. This refined proposal is as follows-

- A unit which had an incremental offer accepted will receive the maximum of its offer price and the imbalance price for any incremental volumes above its PN, and will receive its offer price for any incremental volumes below its PN; and
- A unit which had a decremental bid accepted will pay back the minimum of its bid price and the imbalance price for any decremental volumes below its PN, and will pay back its bid price for any decremental volumes above its PN.

An illustrative example of how this approach would operate is shown in Figure 9.1. The initial dispatch instruction from the TSO (in red) represents an incremental offer acceptance above the unit's PN at a price of 60 €/MWh. In preparing to deliver this dispatch instruction the unit incurs costs of 10 €/MWh and so redeclares its decremental bid price (from its initial dispatch position) to 50 €/MWh. The TSO then issues a subsequent dispatch instruction (in green) which partially cancels its initial instruction and which represents a decremental bid acceptance. For the component

of the bid acceptance above the unit's PN it pays back the bid price of 50 €/MWh and for the component of the bid acceptance below the unit's PN it pays back the lower of the bid price and the imbalance price which in this case is the imbalance price of 40 €/MWh. The participant can never be forced to pay back more than its bid price and can thus ensure that costs incurred are recovered.

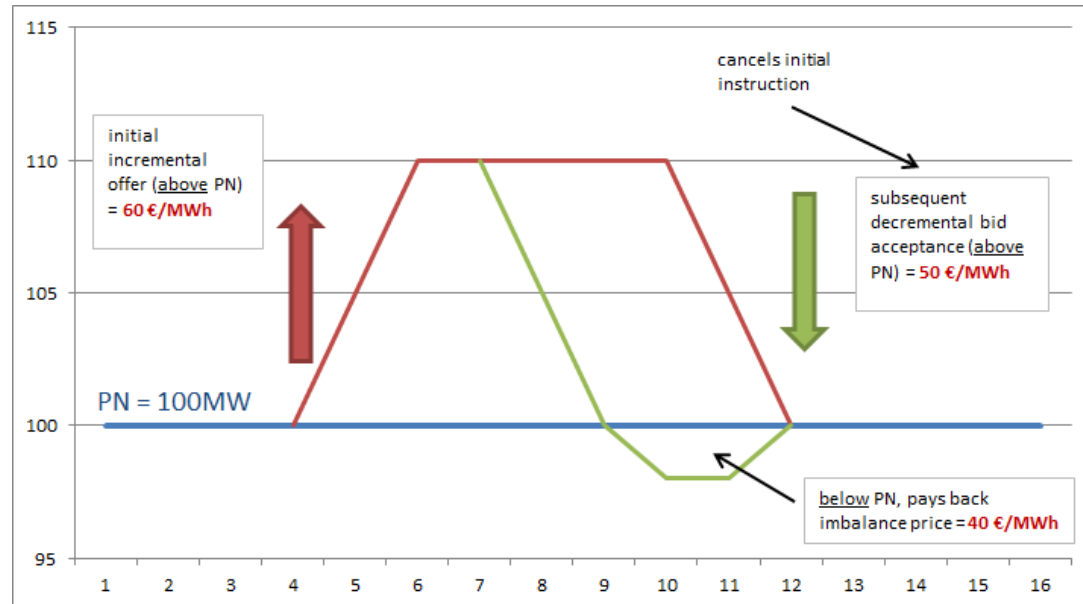


Figure 9.1

Quarter-Hourly vs Half-Hourly vs Hourly Settlement

The trading period duration for the DAM will be 1 hour at I-SEM go-live, although it is possible that a shorter trading period duration will be introduced in the future. In the IDM, 15 minute products will be available on the European borders where these are currently implemented. For the borders where these are currently not implemented, including the I-SEM – GB border, it is up to the involved Local Implementation Projects (LIPs) to decide on implementation of 15 minute products (i.e. to decide whether 15 minute products are available at XBID go-live, at a later point in time, or not at all).

The ISP duration in I-SEM will be 30 minutes at go-live although it is possible that this will move to 15 minutes in future as the European Network Code on Electricity Balancing progresses. Therefore the I-SEM systems should include the functionality to move to an ISP duration of 15 minutes.

The SEM Committee considers that the I-SEM systems should include the functionality to implement Option (iii), which will calculate imbalances on an hourly (or half-hourly) basis. Whether or not this functionality will be used will be

dependent on whether or not the granularity of products available in the ex-ante markets allows participants to manage their exposure to imbalance prices. The SEM Committee wishes to emphasise that such functionality will be utilised only in the event that there is no route for participants to manage their exposure to imbalance prices through the ex-ante markets. Functionality to recover any consequent revenue shortfall should also be included.

Notwithstanding that Option (iii) has the effect of calculating imbalance charges on an hourly basis by applying an average price to an hourly imbalance, the SEM Committee considers that this might best be implemented by the appropriate allocation of the ex-ante contract quantities between constituent settlement periods. The SEM Committee is of the view that the precise calculation of the average can be determined during the implementation phase.

Other Issues Raised

Trading Sites

The principle of the existing treatment of trading sites will be retained in I-SEM. This will be progressed further through the implementation phase.

10 OTHER ISSUES

10.1 INTRODUCTION

This section sets out a number of issues related to the detailed design of the energy trading arrangements. These are issues that have been covered at the RLG meetings and are introduced here.

10.2 GLOBAL AGGREGATION

In the electricity market it is the case that the sum of loss-adjusted generation does not equal the sum of loss-adjusted demand, leaving a residual error in each jurisdiction. This residual error in each jurisdiction is named the Loss-Adjusted Net Demand and is explained visually in Figure 10.1 below.

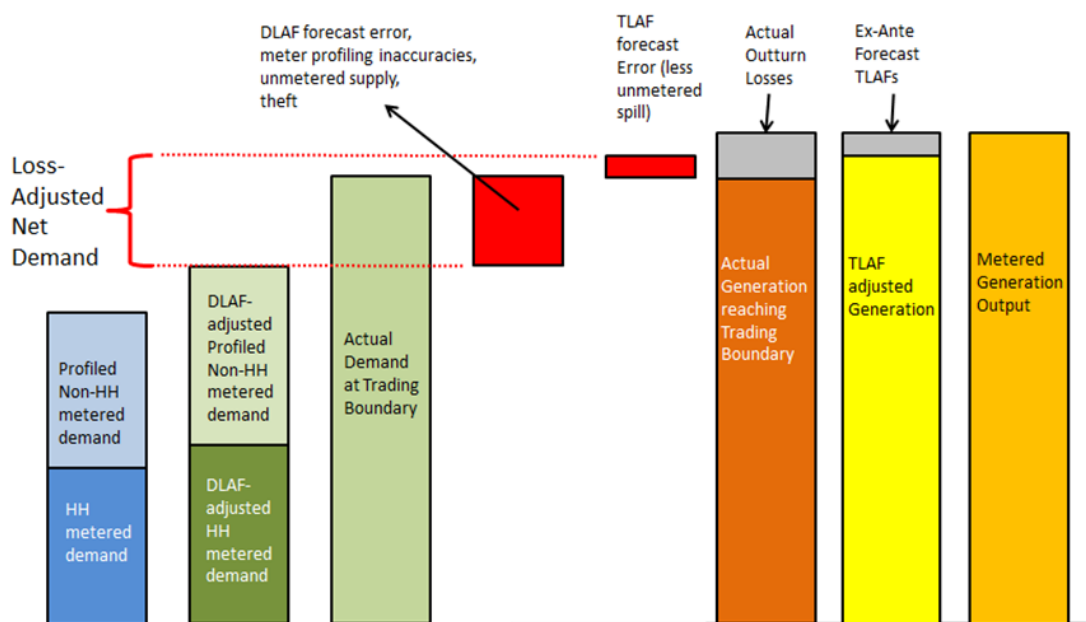


Figure 10.1 Loss-Adjusted Net Demand

10.2.1 CONSULTATION PAPER PROPOSALS

The consultation Paper puts forward three options for dealing with global aggregation in I-SEM -

- Option 1 - Allocating the cost of the residual error to suppliers;
- Option 2 - Allocating the volume of residual error to suppliers; and
- Option 3 - Fixing an Estimated Volume of Cost of the Residual Error for a given period.

10.2.2 SUMMARY OF RESPONSES RECEIVED

A large number of respondents made no specific comment on Global Aggregation. Comments that were received on the issue came mainly from active suppliers and from the TSOs and Market Operator.

The majority of suppliers supported the implementation of Option 3 in the Consultation Paper (Fixing an Estimated Volume of Cost of the Residual Error for a given period). The suppliers suggested that the tariff should be set annually.

The key rationale given by suppliers for Option 3 was that the underlying components distributed through global aggregation are not within the control of suppliers to accurately forecast and hedge. In particular, one supplier stated that market rules should not create unmanageable commercial risk for participants.

One supplier suggested that Options 1 and 2 in the paper do not provide the transparency, and consequently, the appropriate incentives for the parties responsible for the component errors to minimise them.

Within Option 3, only one supplier expressed a preference for A or B. The supplier expressed a preference for Option 3a and stated their belief that the volume based approach 3b) should be avoided as it is likely to distort TSO actions and therefore Balancing Market pricing.

Within Option 3, one supplier suggested that the market design should explore the possibility of balancing market operator tendering for supply of the residual error volume to achieve best price for consumers.

One supplier supported the implementation of Option 2 from the Consultation Paper (allocating the volume of residual error to suppliers). They were of the view that this option would fit best with the philosophy of the market by contributing to DAM liquidity and enabling full utilisation of the benefits a dynamic market brings with it.

The response from the TSOs and from ESB Networks stated that the proposal in Option 3 would represent a new concept in the market. The TSOs stated that this is a significant change from the current policy while ESB Networks requested clarity on how it would work.

The TSOs were of the view that, absent any evidence and analysis of the issue, that it was not clear whether there are any grounds on which to change the current SEM Committee position on the residual error volume, and in particular the cost allocation. The TSOs expressed the view that the implementation of Global Aggregation in I-SEM should be as close as possible to the implementation in the current SEM, and that Options 1 and 2 best achieve this.

In addition, the TSOs stated that a variant of Option 3 was considered previously and that the RAs rejected such an approach. They stated that the rationale for its rejection remain valid now.

The TSOs further stated that should an approach such as Option 3 be adopted, there may be unavoidable differences in implementation between Northern Ireland and Ireland due to differences in the licensing and statutory framework between the two jurisdictions.

Finally, the TSOs stated there are additional issues in terms of financial risk and exposure with Option 3 where the TSOs are the central management parties. They state that while the challenges with Option 3 are not necessarily insurmountable it would require the RAs to reassess the financeability of the TSOs to ensure they remained financeable under any change in the arrangements.

10.2.3 SEM COMMITTEE RESPONSE

The responses on these issues were, unsurprisingly, mainly from suppliers and Meter Data Providers (MDPs) and TSOs. These are the participants most affected by global aggregation implementation issues.

The SEM Committee understands the desire from the majority of suppliers that the costs recovered through Global Aggregation are collected through an ex-ante published tariff, rather than via a monthly ex-post reconciliation process. In

particular, suppliers have argued that this is not an area that they can adequately forecast, and that consequently these costs cannot be hedged.

In addition, the recovery of global aggregation costs through a tariff has merits in terms of reducing barriers to entry for suppliers in the market. An ex-ante tariff would provide certainty to suppliers in terms of their offerings to customers and can act to reduce any competitive advantages that may arise if some suppliers have “deeper pockets” than their competitors.

However, the SEM Committee fully understands the position of the respondent which favoured Option 2 and welcomes such a response which seeks to encourage a more dynamic marketplace with as much trading as possible occurring in open market places.

The first key consideration, however, is the magnitude of the issue. If the level of redistribution of costs through global aggregation is small, then the impacts on suppliers shouldn’t be significant as it would only give rise to a small proportion of the overall risks associated with supplier’s offerings to customers. Figure 10.2 below shows the redistribution of monies through global aggregation from October 2012 to end 2014

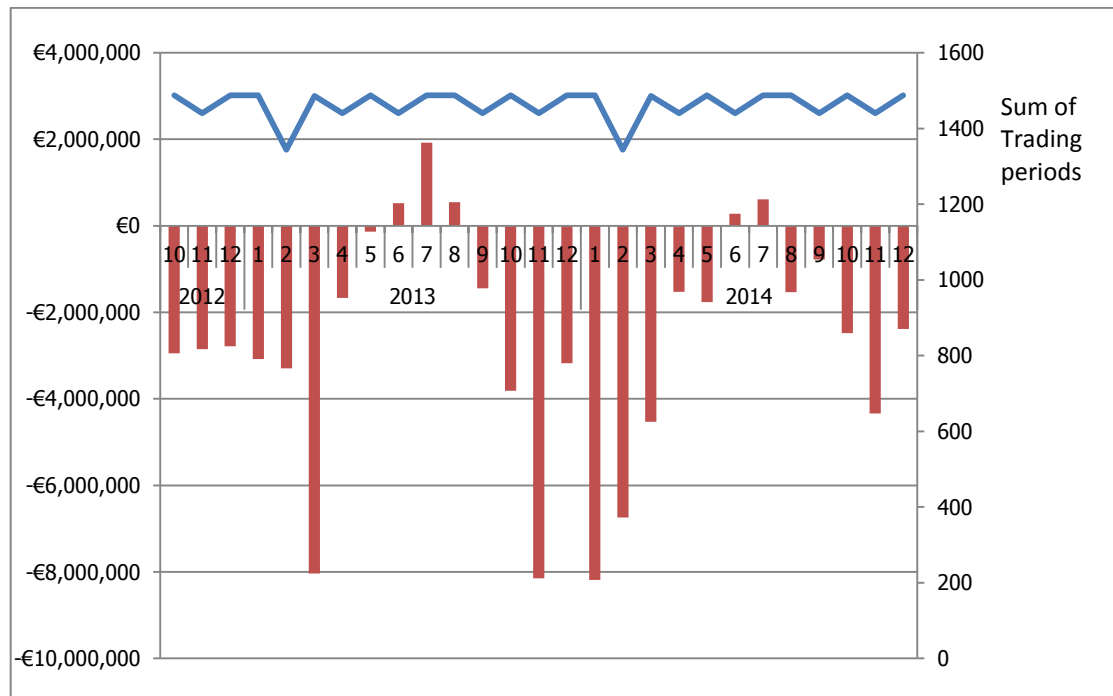


Figure 10.2 Global Aggregation revenue redistribution

As can be seen from the above, the majority of months have seen additional revenues collected from suppliers through global aggregation. The summer months appear to be the exception to this. Approximately €30m was recovered in 2013 while close to €34m was recovered in 2014. These figures are the combined sums for Ireland and Northern Ireland.

The above would suggest that the magnitude of the costs is sufficient to justify the introduction of a tariff for global aggregation. This will necessarily require a separate tariff for Ireland and for Northern Ireland given the differences in underlying policies which feed into the constituent elements of the Global Aggregation sum.

The next key issue to consider is the extent to which the level of redistribution through global aggregation can be adequately forecast, be it by suppliers in a scenario where the volume or cost is allocated, or by a central body in the tariff scenario.

There are a number of items that feed into the global aggregation figure. These include differences between ex-ante forecast and out-turn TLAfs and DLAFs, errors in demand profiles, unmetered generation and supply and theft. The TSOs observed in their response that the relative materiality of each component has not been analysed and presented in the Consultation Paper. While it has not been possible to break these costs down at this time, the SEM Committee does not consider that this precludes consideration of the three options set out within the Consultation Paper, and the overall approach for I-SEM is not dependant on the relative level of each of the component elements of the global aggregation figure.

It would appear to be the case that the components of global aggregation are not necessarily forecastable by suppliers. Customer demand, for example, is a key area where suppliers can invest in forecasting tools and can develop solutions to cover out any exposure for them. This does not appear to be the case for the Global Aggregation components. For example, there does not appear to be a direct correlation between a customer's demand and the volumes reallocated through Global Aggregation. As noted above the components of global aggregation are not broken out individually. If they were it may be much more appropriate to allocate certain components to suppliers (e.g. theft and, potentially, profile errors).

It is also the case, however, that the complexities in forecasting the volumes for global aggregation would be as difficult for a central body as it would for individual

suppliers. Parameters such as TLAFs and DLAFs are set ex-ante as an expectation of their out-turn values. In developing an ex-ante forecast, the central party would be asked to develop an approach to quantifying the level of the differences between forecast and outturn losses. This is not insurmountable as, for example, an error forecast could be based on historic variances. In addition, the central body could work with the organisations behind the various components to establish a methodology for forecasting.

The final consideration concerns which central party might be best placed to develop any forecast tariff methodology. In practice it is difficult to envisage this being any other party than the TSOs/Market Operator while all the components of Global Aggregation remain bundled. The TSOs/Market Operator has a relationship with all suppliers and will be levying an imperfections charge type tariff on suppliers in any case. If it was possible that the components of global aggregation could be split out with greater granularity then it might be possible for each relevant body (e.g. MDPs and TSOs) to look after each component.

The SEM Committee notes the response from the TSOs regarding financeability and the potential impact of carrying the costs associated with global aggregation. The SEM Committee is not immediately persuaded that the TSO acting as central party for global aggregation significantly changes their risk profile and financeability but accepts that the issue warrants consideration. The data presented earlier in this section suggests that the total cost of global aggregation in 2013 and 2014 was €30-€35m. This in itself would represent a significant cost, and to put it in context, the total forecast DBC costs tends to be €150-€200m. However, the total financial figure is not the key figure to consider; the key figure is the difference between the forecast used for the tariff and the actual tariff. This difference should be much smaller and would be carried as a correction factor.

The TSOs should be able to make an ex-ante forecast of the costs of global aggregation and convert this into a tariff. If the TSOs are firmly of the view that financeability is a significant issue for them, then a possible solution would be to adopt the option in the Consultation Paper where a volume is forecast ex-ante rather than a monetary amount and suppliers proceed to buy this in the market. This should reduce the working capital requirements on the TSOs and should give predictability to suppliers. However, the establishment of a profile of expected error volumes across each trading period is not straightforward and the difficulties may not outweigh the potential cash flow complications.

The SEM Committee further notes the comment from the TSOs that the global settlement solution was given significant consideration in the current market and that solutions similar to Option 3 in the Consultation Paper were ruled out then. The TSOs further state that the first option proposed in the Consultation Paper is closest to the current implementation and best reflects the principle of the least change from the current SEM arrangements.

The SEM Committee largely accepts the point from the TSOs that Option 1 in the Consultation Paper is the closest implementation of current policy for global aggregation and further reflects its own position that current arrangements should be maintained unless incompatible. However, the SEM Committee has decided that this is one area where there is merit in reconsidering the current implementation. In particular, there is significant support from suppliers for such a change based on their experience of the current practice. In addition, there do not appear to be significant knock-on effects of making changes to the implementation such that reconsidering the issue requires a significant opening up of wide ranging issues which might challenge the overall delivery of I-SEM. Consequently, the SEM Committee has decided that the I-SEM should implement a solution to global aggregation which moves the risks associated with its magnitude from the individual supplier to a central underwritten body, in this case the TSO.

The SEM Committee notes the response that the central body could seek to tender for supply of the residual error volume to achieve best price for consumers. However, it is not clear how this might work and in particular it would appear that many of the arguments put forward by suppliers against Options 1 and 2 apply here. A tender in this case would require a party to provide a fixed price and be allocated a volume in the BM that will not be known until ex-post. The SEM Committee has decided not to include such a requirement/provision in the detail design of the ETA arrangements unless to the extent it is already a feature of BM software solutions for implementation at a later date.

Finally, the SEM Committee wishes to address the comment from ESB Networks regarding the detail of Option 3. Option 3 (a) should not require any significant changes for MDP processes with the key differences relating to the Market Operator side. Option 3(b) however, would require a process to be put in place to calculate an ex-ante estimate of the volumes to be distributed through global aggregation for each trading period (for a number of days or for a year) of the year. The SEM

Committee accepts that this would not be a straightforward exercise and is not the first preference option. Rather Option 3(b) should be implemented if the cash-flow requirements associated with Option 1 are not workable for the TSO/Market Operator. The MDPs and the TSOs would need to work together to put a process in place to develop Option 3(b). Alternatively, it may be possible for the TSOs and MDPs to work together under Option 3(a) to somehow share the cash-flow issue.

The SEM Committee has decided that the current allocation of volumes through global aggregation to interval and non-interval metering can continue and the proportion of allocation to each can continue to be parameterised. The MDPs already have processes in place to provide the required information to the market operator and they should be able to continue to do so.

10.2.4 SEM COMMITTEE DECISION

The SEM Committee's decision is that Option 3a or Option 3b from the Consultation Paper be implemented for I-SEM. Option 3a is the preferred option owing to the potential complexity with the development of Option 3b. However, Option 3b remains a viable option if the TSO needs to reduce the working requirement associated with Option 3a and if they can develop a solution to allocate the forecast error across each trading period.

With regard to developing the tariff forecasting methodology, the SEM Committee has decided that this should be undertaken by one central party, and that this should be either the TSOs or the Market Operator.

10.3 LOCAL MARKET POWER

Transmission constraints arise where the network is unable to transmit the power that would have been supplied, e.g. resulting from the economic schedule of generation, to the location of demand. Such limitations can arise due to either thermal or voltage limits. Where constraints arise, the TSOs need to take dispatch actions to increase or decrease the amount of electricity being generated (or, in the case of demand side response, consumption) at different locations on the network.

The TSOs may also have to dispatch plant to ensure the security of the system, e.g. to carry reserve to cover the possibility of a generator or interconnector trip.

In the SEM, a unit whose dispatch quantity output is adjusted either up or down from its Market Schedule Quantity (MSQ) is compensated. Specifically, units that are constrained up receive their offer price for the portion of their dispatch quantity that is above their MSQ. Units that are constrained down receive the difference between the system marginal price (SMP) and their offer price, i.e. they retain their infra-marginal rent for the portion of their MSQ that is above their dispatch quantity.

Where constraints exist, generators may be able to benefit from local market power whereby, a generating unit that is constrained up would benefit by raising its offer price (as it is paid the offer price), whereas a generating unit is that constrained down, would benefit by reducing its offer price (as it retains the difference between SMP and the offer price).

10.3.1 LOCAL MARKET POWER MITIGATION IN I-SEM

The Markets Consultation Paper discussed the concept of local market power in I-SEM and recognised that the I-SEM design, and the reliance on certain generation assets to support the system in a market with increased levels of variable generation, presents significant challenges in ensuring that participants cannot exploit the opportunities across market timeframes either on a portfolio basis, or in the specific context of market local power on a unit or station basis.

The Consultation Paper posed the question as to whether there should be provision made in the market systems procurement for local market power mitigation measures. In particular, the paper set out a number of possible measures including utilising RA approved cost curves for units with local market power to replace a generator's bid-offers where local market power exists, and submitted bid-offers fall outside of a defined tolerance band. It also invited comment on whether there were any specific issues in relation to market power that need to be considered at this stage.

10.3.2 SUMMARY OF RESPONSES RECEIVED

Of the responses received, approximately two thirds of respondents made some specific comment on local market power in the I-SEM. The comments on this section of the Consultation Paper were broad in scope and covered approaches to addressing local market power, including the need for specific forms of bid controls to mitigate the risk of local market power abuse; alternative approaches that do not require bid controls; and whether market power controls should fall outside of the central market design. Respondents also commented on the most appropriate forum for addressing local market power within the I-SEM detailed design workstreams. Some respondents noted that they could not comment on specific proposals without more detail on how bidding and associated market arrangements would work.

A minority of respondents also specifically commented on the issue of whether the systems procurement should include provision for ex-ante market power mitigation measures.

Additionally, two respondents commented on the eligibility for constraint payments within the existing, and envisaged, I-SEM trading arrangements.

Approaches to addressing local market power

Respondents expressed a range of views on potential approaches to address local market power mitigation measures, and the extent to which aspects of the market design do, or should, form part of the approach.

One respondent noted that the proposed imbalance settlement algebra is “essentially building local market power mitigation measures into the arrangements”. However, it observed that it was not clear that the implications of such rules have been considered. However, it was not sure of the practicalities of such rules, as revenues are dynamic and dependent on other streams such as DS3 and Capacity Remuneration Mechanism. Other respondents stated specifically that the SEM Committee should not design the market with a presumption of market power abuse, with another commenting that market power issues around re-trading and reverse trading should be dealt with outside the market design.

Several respondents also addressed the form of local market power mitigation measures that should be considered in the I-SEM. A number of respondents

commented favourably on the effectiveness of the existing BCoP arrangements. One respondent stated that the *“BCoP works well as a very simple, elegant solution”* but said that it considered that the bid mitigation measures set out in the consultation paper have merit for consideration as part of the market power workstream. Another respondent supported the direct regulation of bids and argued that a regulated bid methodology for import-constrained located plant must be a priority for the market power workstream. However, it considered that such direct bid controls formed only part of the solution, and that long-term market power must be tackled through the roll out of network upgrades to resolve constraints. Another respondent suggested that a BCoP-type approach should (with other options) remain on the table for consideration by the market power workstream. Conversely, one respondent suggested that there should be less direct control of bids, and proposed that there should be consideration of, and consultation on, a BETTA-style approach which would have limited impact on central market systems other than the need for reporting transparency. Another respondent observed that REMIT should effectively deal with local market power.

An area that elicited a contrasting range of views concerned whether out-of-market arrangements such as the contracting of plant with local market power would be desirable. One respondent stated that long-term contracting solutions to address long-term local market power situations should not be ruled out at this point. It argued that this approach would avoid the TSOs needing to manage such plant over short timescales in the balancing market. However, two other respondents argued strongly against long-term contracting, arguing that opaque contracts should be avoided.

A number of respondents commented on the requirement for long-run generation revenue adequacy. One of these respondents expressed concerns about ensuring sustainable LRMCs and argued that, in this context, bidding price floors may need to be considered alongside any measures that would mitigate higher prices. Others highlighted that measures to encourage cost reflective bidding would need to ensure that revenues not covered by capacity market and other revenue streams could be recovered through the energy trading arrangements. One of these respondents cited an example of a generator that did not secure a capacity contract and received only minimal DS3 revenues, and stressed that it would be perfectly legitimate for such a generator to recover both its fixed and variable costs, and achieve a reasonable rate of return, via I-SEM spot energy markets.

Addressing Market Power within the I-SEM workstreams

A number of responses specifically commented on the role of the market power workstream in considering issues of local market power in the I-SEM. All these respondents supported the work being taken forward under the market power workstream, with a number suggesting areas that the workstream should concentrate on. Some respondents stated that they were not making comments on local market power issues at this stage, but would do so when it is addressed as part of the market power workstream.

Several respondents were keen to stress the need for local market power mitigation measures to be considered fully in the context of other elements of the I-SEM design as well as the ETA, including suggesting that the focus should not be on local market power, and that the major objective of the market power workstream should be the management of ESB market dominance across I-SEM energy, capacity and ancillary services markets in order to sustain term competition. Others were concerned that market power needed to be considered within each relevant workstream, notably the forwards market, capacity remuneration mechanism and DS3, as well as in the Energy Trading Arrangements workstream. It was suggested that each of the I-SEM workstreams should address market power issues within its own scope of work, as well as feeding into the market power workstream, which would take a holistic view of the arrangements. One respondent stressed the importance of considering market power implications as part of the Balancing Market design.

System Procurement

Several respondents commented on the specific issue of whether there should be provision made in the market systems procurement for local market power mitigation measures and whether provision should be included to implement the range of options discussed in the Consultation Paper. All of these respondents considered that this would be prudent, citing reasons such as the need, at this stage, to retain the option to adopt a range of market power mitigation options, and that procuring systems with these capabilities reduced the risks of large change requests at a later date.

Constraint payment eligibility

Two respondents commented on the issue of constraint payment eligibility. One respondent pointed out that there is no eligibility for constraint payments for plant connected to the distribution system rather than the transmission system. It sought

clarification that comments in the ETA markets consultation paper regarding constraint payment eligibility related solely to constraints on the transmission system and not those on the Distribution System. Another suggested that the existing eligibility arrangements needed to be reconsidered and suggested that the I-SEM design should allow for transmission and distribution constraints to be separately identified, with only transmission constraints being compensated through the TSO's Dispatch Balancing Cost mechanism.

10.3.3 SEM COMMITTEE RESPONSE

The SEM Committee agrees with the view expressed by a number of participants that the market power workstream should take the lead on developing specific measures to address local market power as required. In doing so, it needs to be cognisant of the need for any specific market power arrangements in the ETA to allow for the recovery of efficiently incurred long-run costs. Notwithstanding this, there will clearly be the potential for locational market power to be exercised within the I-SEM, with the potential for this, if unchecked, to have a detrimental impact on end customer prices. The SEM Committee notes the comments that Balancing Market revenue requirements are potentially fluid, and that careful consideration will need to be given to the specific form of any measures that may be required to limit the Balancing Market bid-offers of all units participating in the Balancing Market. Consequently, any specific market power controls relating to the Balancing Market need to be developed in the light of the development of other aspects of the I-SEM design. The market power workstream should take the lead on this issue.

In respect of the specific question as to whether the systems procurement process should include the option for local market power mitigation measures, the SEM Committee concurs with the view of respondents on this issue, that it would be prudent to keep a broad range of ex-ante bid mitigation measures within the scope of the market system procurement. The SEM Committee stresses that keeping this option open does not pre-judge whether such measures would be necessary or appropriate under the I-SEM.

The Markets Consultation Paper included a number of potential options for bid-offer mitigation for comment. At this stage the SEM Committee is of the view that no one option should be given any particular weight at this stage nor should it be assumed that the options in the Consultation Paper are the only ones that should be considered as this would preclude systems that are successfully in operation

elsewhere. Instead the TSOs, when engaging with vendors, should establish what is available in terms of local market power mitigation and seek to leave this area sufficiently open that options will be available as the market power mitigation work stream develops its thinking towards the end of 2015.

10.3.4 SEM COMMITTEE DECISION

The SEM Committee has decided that matters relating to local market power are considered within the scope of work being undertaken within the market power workstream. This will provide the most effective forum for considering market power issues across the I-SEM arrangements and for the development of a holistic approach.

The SEM Committee notes the concerns regarding the potential use of out-of-market contracts to mitigate local market power. The SEM Committee has decided that, at this stage, the use of out-of-market contracts should also remain open, and subject to further consideration within the market power workstream. The SEM Committee has decided that the TSOs should include ex-ante bid-offer mitigation functionality within the scope of their Balancing Market system requirements as a prudent step to minimise future costs if such an approach is determined to be required. The functionality included in the system requirements should not be limited to only the examples included in the Consultation Paper. The inclusion of such functionality in the market systems specification should not be interpreted as a decision to adopt such an approach.

10.4 METERING IN I-SEM

The I-SEM will require a robust framework to ensure that meter data for generation and demand is delivered to the imbalance settlement process. The metering framework in place for the current SEM market was put in place by the meter data providers under governance structures put in place with the RAs. This was called the SIMDRACS program.

Metering in I-SEM will involve the four Meter Data Providers (MDPs). The Consultation Paper put forward a proposed approach to metering.

- Workshops with the SEM meter data providers

- Requirements of each meter data provider to be considered and discussed
- Detailed requirements to be documented and communicated
- Work will be under the governance of the RAs
- Most issues relate only to meter data providers and not the wider industry
- High impact issues (e.g. timelines of data provision) subject to full consultation

The four MDPs will work together under the governance of the RAs and develop the required approach. This required approach will involve any interactions with the retail markets in Ireland and Northern Ireland. Any market facing issues will be subject to consultation. The governance structure for the metering project will include a strategy for communicating the project to the wider stakeholder group.

10.4.1 SUMMARY OF RESPONSES RECEIVED

More than half the responses received provided no specific comment on the treatment of metering for I-SEM.

Of the responses that did address metering, the majority of these supported the approach set out in the Consultation Paper. A number of these responses suggested that there should be industry involvement through workshops at opportune times. A number of responses stressed the need for timely accurate information.

Two respondents had specific questions, one on dual-polling and potential differences between jurisdictions and one on potential requirements for hybrid plant.

ESB Networks, in their response stated that the metering group needs to consider the changes arising from all workstreams and not just the Energy Trading Arrangements. ESB Networks also stated that there needs to be a consideration of any follow on changes to the retail markets in terms of timings. ESB networks also suggested that registration is a key area that needs consideration in preparing for I-SEM.

One respondent did not support the proposed approach to metering set out in the Consultation paper. It stated that the current arrangements for metering have not worked well in SEM and in particular that there is not a universal approach among MDPs. It also stated that delivery of data needs to be to the participants and SEMO

rather than just SEMO as it is now; it believed that this is a requirement for the new market arrangements.

On the approach put forward, the same respondent was of the view that greater industry involvement is needed and that any outputs need to be properly codified. It also set out its concern that the approach set out in the Consultation Paper could see the MDPs dictate a workstream in which they define their own obligations to the market.

10.4.2 SEM COMMITTEE RESPONSE

As per above, there was general support for the process outlined in the Consultation Paper. One respondent, however, was of the view that a different approach is needed, an approach which seeks to carry out a more fundamental review of practices and processes across the MDPs.

At a high level, the SEM Committee is of the view that the overall metering framework put in place for SEM will endure for I-SEM. The approach in place has worked in terms of providing meter data provision to underpin the functioning of the market. There are of course differences in the underlying approaches across the MDPs. This has been highlighted to varying degrees through the Agreed Upon Procedures (AUPs) carried out by the SEM market Auditors.

The SEM Committee is of the view that the I-SEM development is not the appropriate place to address any differences in practices and processes within the MDPs. In particular, MDP regulation is not a SEM matter but sits under the two regulators separately. It will be the case that the data submitted to the market operator will be harmonised but not necessarily its derivation.

As per the Consultation Paper, it will be necessary to review the provision of meter data to the market operator in I-SEM and to ensure any required changes are identified. The general thrust of the ETA work stream has been that as much as possible of current arrangements are maintained. The SEM Committee is therefore of the view that as much as possible of the timings and processes for the balancing market should be maintained as per SEM.

The detailed implementation and market rules development will provide an opportunity to review the workings of the current processes and within that there

should be opportunity to identify with industry where any improvements can be made. The SEM Committee is of the view that this process to improve and refine the existing arrangements will prove more useful than a project which seeks to address the issues from scratch.

10.4.3 SEM COMMITTEE DECISION

The SEM Committee is of the view that the process set out in the Markets Consultation Paper for metering should be adopted. The process is set out below.

- Workshops with the SEM meter data providers
- Requirements of each meter data provider to be considered and discussed
- Detailed requirements to be documented and communicated
- Work will be under the governance of the RAs
- Most issues relate only to meter data providers and not the wider industry
- High impact issues (e.g. timelines of data provision) subject to full consultation

The SEM Committee will seek to have greater industry awareness and involvement of the metering work also. This is likely best facilitated through periodic industry workshops. In addition, where any changes are required to agreed procedures these will be progressed through the TSC Modifications Committee.

10.5 INSTRUCTION PROFILING

10.5.1 INTRODUCTION

The TSOs operate the power system by issuing dispatch instructions to generator units. These dispatch instructions are issued as close to real time as possible, and typically take the form of a spot instruction for the generator unit to move to a certain MW output level at a certain time, and to hold this MW output level until a new instruction is issued.

For purposes of settlement it is necessary to assess actual delivery, measured as metered output, against these dispatch instructions. As metered output is measured in terms of MWh delivered over a trading period, it is necessary for settlement purposes to translate dispatch instructions into these terms. Instruction Profiling is the process whereby these spot instructions are converted into an integrated MWh value for each settlement period. The integrated MWh values are calculated using the TOD submitted in respect of generator units (or demand-side units), which describe the output profile that can be produced by the relevant unit given its warmth state, etc. at the time of the instruction.

10.5.2 CONSULTATION PAPER PROPOSALS

The Consultation Paper did not put forward any specific proposals for instruction profiling but rather sought comment on the information presented and, in particular, sought comment as to whether or not it is feasible to more accurately model the precise loading of units and whether or not extra technical characteristics should be accommodated in the TOD submitted by units.

10.5.3 SUMMARY OF RESPONSES RECEIVED

Ten respondents to the consultation provided comment on the instruction profiling rules and suggestions as included in the paper. Of these respondents, there was no clear consensus, with four stating that the current characteristics were sufficient and four noting that the limitations of the current design in the SEM should not persist into the I-SEM.

With respect to the limitations discussed, some participants agreed with the suggestions in respect of modelling of additional heat states with nine heat states being proposed in place of the current three. It was also noted that the current SEM technical offer data sets limit the capability of some generators to offer the full flexibility of their assets. This was noted by different participants both in respect of multi-mode generators as well as with respect to coupling new assets to existing turbines. These limitations have reduced the capability of some operators to interact with the market systems.

Some respondents particularly noted the importance of balance responsibility and the application of uninstructed imbalance charges and/or information imbalance charges. In this respect, it was noted that the accuracy of profiling tools and rules is

very significant, given that inaccuracy could lead to imbalance charges being imposed.

10.5.4 SEM COMMITTEE RESPONSE

The SEM Committee notes that this issue has been explored previously through Grid Code modifications although it was considered not appropriate to take further at that time. However, with the development of I-SEM it is appropriate to give consideration to the calculation of Dispatch Quantities.

It is noted in one response that a high volume of queries in relation to SEM settlement calculations have related to the limitations on technical data submissions to the SEM resulting in dispatch quantity calculations that did not fully reflect the actual physical capability of generators. This is an area that should be addressed where possible for I-SEM.

10.5.5 SEM COMMITTEE DECISION

Having considered the views of respondents, and recognising the current state of play of the I-SEM project in terms of systems procurement, etc., the SEM Committee is of the view that the finer detail of instruction profiling is best dealt with in the detailed implementation and market rules development phase.

In general, it is important that the instruction profiler can as far as possible represent the capabilities of the units on the system. In particular, any issues with the current profiler should be kept to the fore in developing the I-SEM solution.

The SEM Committee is unsure at this stage as to whether any more can be specified on instruction profiling until both systems procurement and the detailed rules development have progressed further.

10.6 UNITS UNDER TEST

10.6.1 INTRODUCTION

During both its commissioning and over its lifetime, there is a requirement for a unit to undergo tests to confirm its technical capability. It is possible that a generator undergoing testing may be generating even though it would not normally be so

doing under the prevailing market conditions. Nevertheless, the generator's output still needs to be accounted for in the market systems and in particular in settlement to ensure appropriate payment. Currently, the testing of units can also impact market prices, system constraints, dispatch balancing costs and hence all other users connected to the system (including those with priority dispatch). There are currently processes in place for test requests, approvals, market treatment and operational procedures to manage these impacts. These processes should remain in the I-SEM where possible. However it will need to be considered how units under test will be treated in I-SEM, especially across the day-ahead and intraday timeframes.

10.6.2 CONSULTATION PAPER PROPOSALS

The Markets Consultation Paper put forward two options with regard to how units under test could be treated in I-SEM. Both approaches largely maintain the current SEM treatment of units under test. The difference between the options related to the treatment of the unit in the BM under a generator initiated test.

- Under the first approach, the unit is treated in a similar fashion to priority dispatch plant. The generator does not necessarily submit PNs, although it does submit to the TSO a testing profile. The generator is free to sell the intended output in the ex-ante markets and is cashed out for any differences between the metered output and these ex-ante trades.
- Under the second approach the unit remains as price-maker and submits FPNs to reflect the intended testing profile. It must also submit the incremental offers and decremental bids, as normal, but can set these to PCAP and PFLOOR to ensure that the unit is almost certain to be dispatched to follow the intended profile.

10.6.3 SUMMARY OF RESPONSES RECEIVED

While the questions put forward in the Consultation Paper focused on the treatment of units under test in the BM and whether their FPN is best respected by explicit price-taker treatment or by a price-maker with incremental offer prices and decremental bid prices at price cap and floor respectively, a number of participants raised additional comments in connection with the unit under test process itself.

A number of respondents highlighted that the existing process is overly complex with prescriptive notification periods along with other inflexibilities such as the requirement for a full day test and limitations in within day testing. It was suggested

that the I-SEM design should seek to address these items and consider reduced notice times on test dates, within day testing and early completion of testing to facilitate further market trading.

Some participants also raised the issue of whether testing tariffs should still apply, noting the intent to retain these as part of the I-SEM design. While one participant suggested they should be removed as a result of new charges considered under the balance responsibility requirements of the I-SEM, others suggested a review should be conducted to ensure their application and setting was consistent with the market arrangements, particularly with respect to payments relating to the BM.

With respect to the options proposed for treatment of units under test in the BM, of the respondents who expressed a preference, the first option of explicit price taking was favoured by more while two respondents considered that participants could better manage the risk by including appropriate incremental and decremental prices with their FPN submission. Specifically one respondent considered that the participant was best positioned to manage their own risk while the other considered that the flexibility afforded under the second approach could more easily facilitate early completion of testing and return to commercial activity which would ease their commercial risk. However, a number of respondents felt they were unclear on the implications of the two options put forward and suggested more clarity was needed, specifically with respect to how the options varied with respect to how generators would be held to their testing profile.

10.6.4 SEM COMMITTEE RESPONSE

On the wider issues associated with units under test, the SEM Committee is of the view that these are best dealt with through the appropriate market code and governance structure, in this case the Grid Code. It would not be appropriate for the SEM Committee to make decisions on any changes to the Grid Code as part of this consultation process as the Grid Code has its own modifications process. However, the SEM Committee is of the view that consideration needs to be given to the Grid Code in the context of the evolving market arrangements. In particular, issues such as notice times for tests and also any considerations reflecting the fact that generators will be submitting physical notifications should be taken into account. However, it is not clear what changes need to be made for I-SEM Go-Live; it may be

that only minimal changes should be made for the market transition in order to give a fuller consideration to any issues after Go-Live.

Another issue raised in the responses was whether it is appropriate for units under test to pay testing tariffs and whether the imbalance settlement arrangements are a sufficient framework to allow generators carry out any testing requirements. The SEM Committee is of the view that there continues to be a role for testing tariffs and their rationale is consistent with their presence in SEM. Where a generator seeks to go on test it can impose costs on the system. The level of cost imposed has been assessed and allocated through different bands of testing tariffs.

There is a different question as to the levels and banding of the testing tariffs and whether these should be reviewed with the move from SEM to I-SEM. The SEM Committee is of the view that this should be reviewed but is not necessarily of the view that it needs to be done prior to I-SEM implementation. The TSOs consult from time to time on testing tariffs and as part of any such review the appropriateness of their structures will arise. It is likely that a more fundamental review of testing tariffs is best carried out after I-SEM starts as it will allow actual experience of the new market to feed into the review.

On the issue of the model to be adopted for units under test the SEM Committee notes the response from a number of respondents that there is little difference between the two options in the Consultation Paper other than whether the unit requesting the test submits a profile only or whether it is obliged, as normal, to submit accompanying incremental offers and decremental bids. The SEM Committee is of the view that once this is the only distinction between the two options then the decision on which to use can be based on the ease of implementation and costs.

It is likely that the systems are being put in place for both options in the Consultation paper in any case. For example, price-taker abilities will be put in place for priority dispatch generation and the other option consulted upon simply uses the bid-offer process. Both approaches may require the ability to put a unit under test flag in place.

10.6.5 SEM COMMITTEE DECISION

The SEM Committee is of the view that there is not any significant difference between the options put forward in the Consultation Paper and that the decision on

the approach to adopt is best taken in the detailed market rules drafting and implementation phase. It would appear that both options in the Consultation Paper will be facilitated in the systems procurement in any case.

10.7 DEMAND SIDE UNITS

10.7.1 CONSULTATION PAPER PROPOSALS

The Consultation Paper did not contain specific proposals concerning demand side units. The general presumption in I-SEM is that the demand side should be able, wherever appropriate, to compete with generation on an equal footing. The Consultation Paper observed that demand side response could have an equal role in the management of constraints; and that instructions profiling would apply equally to demand side units as to generation. The Consultation Paper also observed that the publication of prices close to real time potentially could facilitate greater demand side participation and innovation in the retail market.

10.7.2 SUMMARY OF RESPONSES RECEIVED

A number of responses were received concerning the demand side.

One respondent commented that there was little within the Consultation Paper that specifically addressed how Demand Side Units and dispatchable demand will participate in the markets and urged the RAs to consider how to encourage demand side response.

Two other respondents made detailed comments on how demand side may participate in I-SEM. These respondents suggested that DSUs could participate in the DAM, IDM and Balancing Markets. They suggested that DSUs would receive physical notifications and be dispatched in the normal way. They further suggested that when a DSU responded to a dispatch instruction then the Supplier of each customer would be likely to have contracted for the unreduced demand and hence was likely to find itself long. Further, the DSU, having been dispatched to provide energy would also be long; and that the dispatch would have occurred as a result of some other participant being short. This would result in two parties being long but only one being short.

The respondents then proposed two approaches to facilitating DSU. In one, the DSU would have a balanced position but Suppliers of the customers involved could be left

long. In the alternative option, the DSU would submit a list of customer MPRNs and the quantities of demand response they could provide. The DSU would be charged for the reducible demand at the DAM price and receive the balancing price (or offer price) through the Balancing Market. The respondents emphasised that it should not be necessary for DSUs to have to seek and reach agreement with the Suppliers of all customers involved in each DSU.

10.7.3 SEM COMMITTEE RESPONSE

The SEM Committee acknowledges the comment that the Consultation Paper did not provide detail specifically addressing how dispatchable demand will participate in the markets. Nevertheless, the SEM Committee remains of the view that the implementation should afford dispatchable demand the ability to compete on an equal basis with generation at every appropriate opportunity. This principle should permeate through the entire I-SEM.

The SEM Committee acknowledges and welcomes the views and ideas on the participation of DSUs in I-SEM. The SEM Committee does not agree that there is a fundamental issue created by DSU of two parties being long and one being short. It is the intention in I-SEM that a party having the TSO accept and then itself delivering a balancing action remains in balance⁸. In the same way that a participant contracting ex-ante with another participant and subsequently delivering (or taking) energy in accordance with its ex-ante position is not in imbalance then a participant contracting with the TSO (by way of a bid-offer acceptance) and subsequently delivering in accordance the bid-offer acceptance is not imbalance. This applies equally to DSU, such that in the example given DSU would not be long.

The SEM Committee agrees with the respondents that there are two basic approaches to implementing DSU. In one, Suppliers continue to purchase (and presumably sell to their customers) the unreduced demand, with the DSU selling the reduceable demand back to the system. In the other, Suppliers purchase the level of demand after the reduction has taken place, and the DSU must buy the reduceable demand at some market-related price in order to sell it back through a balancing action. The SEM Committee's view is that the first approach might be regarded as being more consistent with the treatment of DSU in the current SEM, but is of the view that both approaches should be considered in implementation. Nevertheless,

8 Subject to not being in imbalance *before* the balancing action is called.

the SEM Committee agrees that the DSU should not have to reach agreements with the Suppliers of all customers included in any DSU.

10.7.4 SEM COMMITTEE DECISION

The SEM Committee intends that the implementation of I-SEM will permit the participation of DSUs on an equal footing with generation at all instances where this is appropriate.

Both the approach to facilitating demand reduction involving the Supplier buying the reducible demand and the approach involving the DSU buying the reducible demand should be considered in implementation.

DSUs should not be required to seek and reach agreement with the Suppliers of all customers included in any DSU.

11 NEXT STEPS

This Paper forms the decisions of the SEM Committee in relation to I-SEM ETA Markets issues.

The SEM Committee is also making decisions on the I-SEM ETA Building Blocks issues and on the Aggregator of Last Resort.

This Decision Paper provides a basis for the detailed market rules development that will commence following the publication of this paper. Appendix A of this Decision Paper contains a list of issues to be addressed in the implementation phase arising from this paper. The implementation of this detailed design will then be the subject of decisions to be taken in line with the amending legislation proposed in each SEM jurisdiction.

12 APPENDIX A. MARKETS ISSUES FOR THE DETAILED RULES AND IMPLEMENTATION PHASE

	Issue	Lead Responsibility	Timeframe for Decision/Implementation
1	Decisions out-turning from EUPHEMIA trialling	Working Group recommendation with possible RA consultation	2016/17
2	Decision on Governance structure for BM Principles Document	TSOs/Industry/RAs	2015/16
3	Industry Working Group on BM Principles Statement	Chaired by RAs	2015/16/17
4	BM Principles Statement approval	RAs	2016/17
5	Transitional arrangements for gate closure	Detailed rules drafting	2016/17
6	Guide path to 1hr gate closure (if required)	TSO document approved by RAs	2017
7	Develop DAM Fall-back procedures	TSOs	2015/16
8	Report on IDM interim solutions	TSOs/NEMO	2015/16
9	Interim IDM solution decision	RAs	2015/16
10	Codification of “linking” of ex-ante trades and FPNs including consideration of enforcement issues	TBC	2016/17
11	Tolerances for “linking” of ex-ante trades and FPNs to be defined	TBC	2016/17
13	Information Imbalance Charge	Detailed rules drafting	2016/17

	details			
14	Trading Site rules	Detailed drafting	rules	2016
15	Further refinement of start cost solution	Detailed drafting	rules	2015/16
16	Mechanism to ensure units recover, but do not over-recover, explicit start costs	Detailed drafting	rules	2016
17	Interaction of explicit start costs with settlement algebra, substitutive IDM trades, etc	Detailed drafting	rules	2016
18	Development of Detailed Tagging + Flagging Arrangements	Detailed drafting	rules	2015/16
19	Tagging + Flagging Parameters Decision	RAs		2017
20	Nature and timing of publication of forecast BM data	Detailed drafting	rules	2016/17
21	Work on the final, detailed settlement algebra	Detailed drafting	rules	2016
22	What “average” to use under option (iii) in QH vs HH vs H (if implemented)	RA decision		2016/17
23	Parameters, Tolerances, etc. for DOG and PUG	TSO document approved by RAs		2017
24	Details of Global Aggregation rules	Detailed drafting	rules	2015/16
26	Global Aggregation Tariff Approval	TSO document approved by RAs		2017
26	Meter Data Provider Workshops	Detailed drafting	rules	2015/16
27	Consultation on market facing metering issues	Detailed drafting	rules	2015/16

28	Details of Instruction Profiling	Detailed drafting rules	2016
29	Development of units under test rules	Detailed drafting rules	2015/16
30	Details of Local Market Power Mitigation	Within Market power Workstream	

13 APPENDIX B ACRONYMS

BM	Balancing Market
BOA	Bid-Offer Acceptance
CACM	Capacity Allocation and Congestion Management
DAM	Day Ahead Market
DBC	Dispatch Balancing Cost
DS3	Delivering a Secure Sustainable Electricity System
EBNC/NCEB	Electricity Balancing Network Code / Network Code on Electricity Balancing
ETA	Energy Trading Arrangements
EUPHEMIA	Pan-European Hybrid Electricity Market Integration Algorithm (Price coupling algorithm, used to calculate energy allocation and electricity prices across Europe, maximising the overall welfare and increasing the transparency of the computation of prices and flows)
FPN	Final Physical Notification
IDM	Intraday Market
ISP	Imbalance Settlement Period
MDP	Meter Data Providers
NEMO	Nominated Electricity Market Operator
NIV	Net Imbalance Volume
OBK	Order Book
PAR	Price Average Referencing
PN	Physical Notification
RLG	Rules Liaison Group
RoCoF	Rate of Change of Frequency
SNSP	System Non-Synchronous Penetration
STOR	Short Term Operating Reserve
TSO	Transmission System Operator
XBID	Cross-Border Intraday