

SINGLE ELECTRICITY MARKET COMMITTEE

FASS: Market Power and Market Participation

Consultation Paper

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EXECUTIVE SUMMARY

The FASS Parameters and Scalars Decision Paper was published in December 2025. This publication largely brought the detailed design of the Day Ahead System Services Auction (DASSA) for go-live to a conclusion. The suite of SEM Committee DASSA Design Decisions to date include a number of measures to refine the market which require consultation to finalise policy design ahead of go-live for post go-live implementation, however the SEM Committee considers there are now sufficient design decisions to proceed with delivery of a market for go-live. With a clearer understanding of the day 1 market design, this allowed the team to begin exploring potential market power issues and mitigants.

As part of the development of the FASS arrangements, the SEM Committee recognises that the SEM is, in general, a small and relatively concentrated market. This creates the potential for abuse of market power in the DASSA. The SEM Committee therefore considered options to mitigate the risk of abuse of market power.

This paper sets out the SEM Committee's considerations in terms of options to address potential market power abuses in System Services Markets as part of the Future Arrangements for System Services (FASS) project. The System Services Markets include the DASSA, the DASSA secondary market, the secondary bilateral trading mechanism for DASSA contracts, the Residual Availability Determination (RAD) mechanism, the Layered Procurement Framework (LPF) and the Fixed Contracts Framework.

The paper considered more targeted interventions to mitigate the risk of abuse of market power. These include market design changes, unit-specific controls, financial interventions, and a System Services Bidding Code of Practice (SS BCoP).

The SEM Committee is minded-to introduce the SS BCoP, to which all participants in the System Services Market would be required to adhere. The SEM Committee considers that a principles-based SS BCoP is a relatively limited intervention that offers guidance to service providers while also allowing flexibility for a new and evolving market.

This consultation paper sets out draft plain English (i.e., non-legal) text for the SS BCoP. The draft plain English SS BCoP sets out principles to which service providers participating in the System Services Markets are expected to adhere. It sets out a non-exhaustive list of costs that units may reflect in their bids and explains how service providers are expected to justify their bids to the SEM Committee if asked to do so.

The SS BCoP could be combined with other measures considered in this paper. That the SEM Committee is minded-to introduce an SS BCoP does not preclude that it may recommend adoption of some of the other options considered in this paper, as a result of responses to this consultation, future changes to the design, or new information about participation that arises before or after go-live of the System Services Markets.

Additionally, the paper seeks to address concerns around market participation requirements. It sets out a range of options for accession to the System Services Code, participation in the DASSA and participation in the RAD. It is important that participants have clarity on the requirements for market participation in order to make investment decisions in terms of both the DASSA and the RAD. The paper also discusses guiding principles for any delivery incentive to be placed on RAD participation. The TSOs will be consulting on the derivation of the incentive, but it is important that market participants have a greater understanding of what the SEM Committee considers to be reasonable in this regard ahead of detailed consultation.

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1 INTRODUCTION

The SEM Committee's Decision on the DASSA Parameters and Scalars, published in December 2025, largely closed out the required detailed design elements to enable the FASS project to move to the implementation phase for go-live of the DASSA. Following the publication of the paper, the SEM Committee considered it the appropriate time to carry out an assessment of potential market power abuse risks given a more detailed understanding of the design elements is now available.

The SEM Committee along with its consultants NERA commenced a review of potential market power issues in the DASSA and this led to the development of a number of options to address potential market power abuses. These options are set out in Section 2 of this paper.

Additionally, the SEM Committee has given consideration to market participants' concerns with regard to a lack of clarity around market participation requirements. How units participate in the DASSA and the RAD will be important in the context of ensuring sufficient liquidity to dampen the impact of any market power scenarios, and also to ensure that pivotal market players appropriately submit their available volumes into the System Services Markets. Considerations of these points are set out under Section 3 of this paper.

This paper sets out the SEM Committee's considerations and minded to positions in relation to market power and participation. The paper is structured as follows:

- Section 2 sets out options on market power abuse mitigations;
- Section 3 sets out considerations for market participation;
- Section 4 sets out consultation questions; and
- Section 5 sets out the next steps.

1.1 Background

The System Services Markets include:

- The Day Ahead System Services Auction (DASSA);
- The DASSA secondary market;
- The secondary bilateral trading mechanism for DASSA contracts;
- The Residual Availability Determination (RAD) mechanism;
- The Layered Procurement Framework (LPF); and
- The Fixed Contracts Framework.

The System Services Markets have four key attributes that the SEM Committee took into consideration when assessing the risk of abuse of market power:

1. **Demand for system services is inelastic.** The TSOs set a volume requirement for each product at the day-ahead stage and will pay up to the scarcity price to achieve this

volume. Service providers who face limited competition might attempt to take advantage of this inelasticity to increase the price of DASSA products without diminishing the volume sold, therefore increasing revenues.

2. **The TSOs have locational requirements for system services.** These constraints fragment the System Services Markets into smaller sub-markets. For example, the TSOs will procure reserves on a locational basis, with procurement areas defined in line with jurisdictional boundaries. This means System Services Markets are more fragmented than energy markets that operate on an all-island basis—the Day-Ahead Market (DAM), the Intraday Auctions (IDA1, IDA2, and IDA3), and the Intraday Continuous Market (IDM).
3. **The market is concentrated.** Much of the capacity that can provide system services, particularly within Northern Ireland, is controlled by a small number of companies.
4. **Service providers bidding into System Services Markets may submit bids across multiple interrelated markets, products, and trading periods.** In many cases, the incremental cost of providing a system service product is low or zero where the service provider is already operating to provide energy or another system services product (i.e., service providers face cost synergies). However, where service providers face limited competitive pressure, they might bid at the standalone cost of supplying each individual product regardless of the cost synergies they face.

These attributes increase the risk of abuse of market power. This in turn increases the need for action by the SEM Committee to mitigate that risk. The SEM Committee is particularly concerned about two potential forms of abuse, as explained below.

First, the SEM Committee is concerned about the risk of strategic withholding in the System Services Markets. Strategic withholding is a form of abuse of market power whereby large service providers choose either (a) not to offer all available capacity or (b) to offer part of their capacity at a price above their marginal cost, such that the offer price exceeds the market clearing price and the capacity does not clear in the market. Large service providers may engage in this form of abuse of market power to increase the market clearing price and obtain excess profits by clearing a smaller volume at a higher price.

Second, the SEM Committee is concerned about the risk that service providers do not reflect expected cost synergies in the System Services Markets.

As mentioned above, the incremental cost of providing a system service product can be low or zero when a service provider is already operating to provide energy or another system services product. For example, a provider might face an opportunity cost of clearing a MW of capacity for upward reserve products in the DASSA for a given half-hour, which is the profit that could have been obtained by using that capacity to provide energy. However, service providers can usually provide multiple DASSA products with the same MW of capacity; therefore, they face cost synergies across products. In some cases, service providers also face a common opportunity cost to provide system services over a longer period than a half hour and therefore face cross-period cost synergies. For example, a battery that forgoes a single charging and discharging cycle in a day faces cross-period cost synergies.

Since the DASSA is an unlinked auction and service providers must submit separate bids for each service in each half-hour, service providers may not reflect cost synergies in bids due to concern that they will only win a subset of the products across which they have spread common costs. This concern was explicitly raised by some respondents to the Parameters and Scalars (P&S) consultation. Service providers may respond to this risk by including a “risk premium” in their bids. For example, a provider might set its bids such that it would recover its common costs even if it cleared for one product fewer than the number for which it expected to clear.

In a competitive market, service providers would face pressure to reduce the risk premium in their bids to a competitive level. However, if service providers in the DASSA have market power, they may face limited competitive pressure to lower their risk premia. As a result, service providers might bid at the standalone cost of supplying each individual product regardless of the synergies across products and of their degree of risk aversion, since they would not significantly decrease their chance of winning products by bidding at a higher price. This would lead to artificially high DASSA prices (i.e., prices above the competitive level).

The SEM Committee aims to identify mitigation measures to (a) reduce the risk of strategic withholding in System Services Markets and (b) encourage service providers to account for cost synergies that it expects to face across products and periods.

The SEM Committee considered two broad categories of measure to mitigate the risk of abuse of market power.

- First, the SEM Committee considered more targeted interventions to mitigate the risk of abuse of market power. These include market design changes, unit-specific controls, financial interventions, and a System Services Bidding Code of Practice. The SEM Committee’s assessment of these options is provided in Section 2.
- Second, the SEM Committee considered whether all or some service providers should be mandated to participate in any element of the System Services Markets. Mandatory participation could increase the available supply in a market, which can reduce the potential for abuse of market power. However, it imposes costs on service providers, which could discourage them from participating in the Markets or investing in new units. This could, in the long-term, reduce the available supply in the market and increase the potential for abuse of market power. The SEM Committee’s assessment of options for mandatory participation is provided in Section 3.

The discussion in the following sections reflects the SEM Committee’s current assessment of options to encourage market participation and mitigate the risk of abuse of market power, given the design of the System Services Markets and expectations regarding the participation of different service providers in these Markets. However, the SEM Committee may re-assess these options as a result of responses to this consultation, future changes to the design, or new information about participation that arises before or after go-live of the System Services Markets.

2 Market Power Mitigations

The SEM Committee considered four categories of measure to mitigate the risk of abuse of market power:

1. Market design changes;
2. Unit-specific market participation controls;
3. Financial interventions; and
4. A Bidding Code of Practice for System Services Markets.

Specifically, the SEM Committee has sought to identify measures that can mitigate the risk of strategic withholding and the risk of service providers failing to reflect cost synergies in their bids.

Table 2.1: Options and Proposals to Mitigate Abuse of Market Power

Option Considered	Minded-to Position
Market Design Changes	
Allowing linked bids in the DASSA	Not feasible ahead of go-live
Changing DASSA procurement volumes by phasing in DASSA procurement over time, and/or adopting an all-island market instead of separate locational markets	The SEM Committee do not have a minded-to position at this time and welcome input from market participants
Disallowing bilateral trades in secondary trading	Not proposed ahead of go-live
Lowering the price cap and scarcity price	Consider introducing either: (i) a “circuit breaker” under which the existing scarcity price (€650/MW/h) applies in normal conditions but a lower scarcity price is triggered during sustained high-price or high-expenditure conditions; or (ii) a lower scarcity price from go-live that increases to the long-term scarcity price once indicators of more competitive market participation are met
Unit-Specific Controls	
Unit-specific bid caps	Consider establishing infrastructure prior to go-live so that controls can be introduced at go-live or post go-live quickly, if there is evidence to suggest they are needed
Unit-specific minimum volume requirements	
Market making obligations in the secondary market	
Financial Interventions	

Financial contracts (contracts for difference, CfDs) to reduce the incentive for units with market power to engage in abusive conduct	The SEM Committee do not have a minded-to position at this time and welcome input from market participants
System Services Bidding Code of Practice	
Prescriptive	Not proposed
Non-prescriptive	Proposed

2.1 Market design changes

The SEM Committee first considered whether any market design changes could reduce or eliminate the scope for market power abuse in System Services Markets. The design changes the SEM Committee considered include:

- Allowing linked bids in the DASSA;
- Changing DASSA procurement volumes by phasing in DASSA procurement over time and/or adopting an all-island market instead of separate locational markets;
- Disallowing bilateral trading; and
- Lowering the price cap and scarcity price.

2.2 Allowing linked bids in the DASSA

This design change would make it easier to ensure that service providers reflect cost synergies across products, as they would not face the risk of only winning a subset of the products over which they have spread common costs. This reduces the opportunity for service providers to engage in abuse of market power by bidding with inefficiently high-risk premiums.

This design change has two advantages. It would make it easier for service providers to reflect cost synergies across their products, as they would not have to make assumptions about the number of markets in which they might clear. As a result, service providers could submit lower bids. Additionally, it would simplify the process for the SEM Committee to monitor bidding and identify excessively high bids.

The barrier to implementing this design change is that the TSOs have advised that linked bids are not feasible for DASSA go-live. The TSOs have committed to consider the introduction of linked bids in a separate consultation as directed by the SEMC. This consultation on bundling and linked bids is expected to take place prior to go-live, with a view to implementing any solution that is an outcome of that consultation post go-live, and as soon as reasonably possible. Until this TSO consultation has taken place, and at the current stage of development of the System Services Markets, the introduction of linked bids prior to go-live is infeasible.

2.3 Changing DASSA Procurement Volumes

The SEM Committee have considered whether changes to the volumes procured in the DASSA, either at go-live or on an enduring basis, could help to mitigate market power concerns.

The risks of strategic withholding and of units failing to reflect cost synergies in bids arise if a provider holds significant power in the market. A market participant is more likely to hold significant power in the market if the ratio of supply to demand is small. The SEM Committee have identified two options to increase the ratio of supply to demand and therefore alleviate the risk of abuse of market power:

- **Phasing in DASSA procurement volumes (demand) over time.** This option would involve the TSOs initially procuring a smaller volume of balancing capacity through the DASSA, with a defined glide path to increase volumes over time towards the enduring target level.
- **Adopting an all-island market instead of procuring reserves on a locational basis, with procurement areas defined in line with jurisdictional boundaries.** This option would remove locational requirements in the DASSA (i.e., introduce all-island auctions for balancing capacity).

Both of these options share several advantages. They are market-based options to reduce the risk of abuse of market power. They may be easier to implement than some other options considered (e.g., unit-specific controls or financial interventions) and carry less risk of distortion to bidding behaviour than some other options (e.g., unit-specific controls).

In addition, the all-island option would align system services and energy markets, which may simplify both participation for units and monitoring for the SEM Committee.

We discuss the potential disadvantages of these options separately.

There are two concerns about **phasing in DASSA procurement volumes over time**, but mitigations may be available for both:

- First, procuring a smaller volume through the DASSA would require the SEM Committee and TSOs to determine how any residual balancing capacity requirement would be managed outside the DASSA during the transition period.
 - Mitigation: SONI's Operating Security Standards (OSS), which establish a requirement for available reserves, apply in real-time. Therefore, it is not essential to procure balancing capacity at the day-ahead stage to ensure the OSS are met. The TSOs currently use non-energy actions in the BM to ensure the OSS are met in real-time and could continue to do so post DASSA go-live. The SEM Committee and TSOs could also use the RAD to procure any additional volumes required beyond those procured in the DASSA.

- Second, procuring a smaller volume through the DASSA in the initial period would reduce the total size of the DASSA as a market. This may reduce the attractiveness of the DASSA for new entrants and for existing providers deciding how to bid across energy and System Services Markets.
 - Mitigation: This concern could be reduced by setting out, ahead of go-live, a clear glide path for increasing volumes over time, so that market participants have greater certainty on the future size of the market.

Similarly, there are two concerns about **adopting an all-island market instead of separate locational markets**, but mitigations exist for both:

- First, the TSOs would not be able to ensure, at the day-ahead stage, sufficient balancing capacity to secure the Irish and Northern Irish systems against a system separation event, caused by a trip of both circuits of the existing N-S tie-line. The SEMC previously approved the adoption of separate locational procurement in the DASSA in line with jurisdictional boundaries to support the TSOs to ensure that they meet SONI's Operating Security Standards (OSS), which require the TSOs to operate the transmission system in real-time in a manner that secures against a system separation event.
 - Mitigation: As discussed above, SONI's OSS apply in real-time. Therefore, it is not essential to procure balancing capacity at the day-ahead stage to ensure the OSS are met. The TSOs currently use non-energy actions in the BM to ensure the OSS are met in real-time and could continue to do so post DASSA go-live.
- Second, all-island procurement would mean a single all-island price applies to all system service providers. A disadvantage of introducing an all-island market is therefore that the DASSA price would no longer provide locational investment signals.
 - Mitigation: Alternative mechanisms, for example under the LPF, could be introduced to incentivise long-term investment if there is a locational need for specific technologies.

The SEMC Committee welcomes comments from industry on both of the options set out above.

2.4 Disallowing bilateral trading

The SEMC could disallow bilateral trading and mandate that all secondary trades happen through the centralised secondary market. This would mitigate the risk abuse of market power in the form of strategic withholding in the secondary market.

The advantage of this market design change is that it would promote efficient trading with the lowest-cost providers.

However, the concern with this market design change is that it may impose costs on portfolio providers which could lead to higher priced bids or reduced bid volumes. Under the current DASSA design, bilateral trading allows portfolio providers to quickly adjust both energy and system services positions within their portfolio, without needing to wait for secondary market

batches and without the risk that a buy/sell offer in the secondary market is partially met. Removing the ability to trade bilaterally could increase the risk of an unmet or a partially met order for portfolio providers. In response to this risk, providers may reduce the volume or increase the price of their DASSA bids, putting upward pressure on the clearing price TSOs pay in the DASSA.

In the absence of real market data, it is difficult to determine whether the system benefits of bilateral trading outweigh the risk of market abuse through bilateral trading. The data that will be available after DASSA go-live should allow the SEM Committee to analyse the potential benefits of closing bilateral trading (primarily increased liquidity in the open secondary market) and assess whether it is likely that these benefits outweigh the cost of large service providers losing the ability to manage risks across their portfolio.

For the reasons discussed, the SEM Committee does not propose this design change ahead of go-live but will review after the markets become operational. This proposal aligns with the SEMC decision to allow bilateral trading alongside the secondary market but keep it under ongoing review.

2.5 Lowering the price cap and scarcity price

By lowering the price cap and scarcity price in the DASSA, the SEM Committee could reduce service providers' ability to increase the market clearing price and obtain excess profits through strategic withholding, and therefore the incentive to engage in abuse of market power.

There are different ways in which the price cap and scarcity price could be lowered.

One option is that the SEM Committee could implement a "circuit breaker" which would apply a lower DASSA scarcity price during periods of sustained high prices. Under this option, prices would be capped at the existing scarcity price (€650/MW/h) under normal market conditions. The SEMC could define a lower scarcity price which applies under specific market conditions, and define a mechanism for it to be triggered. For example, the lower scarcity price might apply if the DASSA clears at the scarcity price for one or more products for Y periods in N consecutive days, or if TSO expenditure on a given DASSA product exceeds a predefined threshold. The lower scarcity price could apply to the specific DASSA product(s) that activated the trigger, or it could apply to all DASSA products. If the market conditions for the lower scarcity price are triggered on day D, then the lower scarcity price could apply from the following day, D+1. The lower scarcity price could remain in place until the exit conditions to return to the existing scarcity price are met.

A second option would be to apply a lower scarcity price from go-live, and allow it to increase to the long-term scarcity price of €650/MW/h once certain indicators for competitive market participation are met. An example of such indicators could be if DASSA clears at the lower

scarcity price for fewer than Z periods in N consecutive days, or if TSO average daily expenditure on a given DASSA product remains below a predefined threshold.

Under both options, the SEM Committee could also define exit conditions for the price cap to return to the existing scarcity price (€650/MW/h). For example, the SEM Committee could define the exit condition as the TSO average daily expenditure on a DASSA product falling below the same (or a lower) threshold. In such a case, the lower scarcity price could expire on the trading day following the SEM Committee's determination and public notification that the administered pricing period has ended.

This market power mitigation has similarities to the Administered Price Cap that applies in the National Electricity Market (NEM) in Australia. In the NEM, the Administrative Price Cap applies if the seven-day cumulative sum of any of the reserve prices or electricity spot prices exceed a certain threshold (the Cumulative Price Threshold, currently set at AUD 1,823,600/MWh, i.e. an average price of AUD 905/MWh). The Administered Price Cap for reserve products is currently set at AUD 600/MWh.

There are two advantages of the "lower price cap" option. Firstly, it does not require an extensive design change, as it only adjusts the value of an existing market parameter. Secondly, it allows flexibility for the SEM Committee and TSOs to adjust the triggers for administered pricing and the level of the lower price cap over time.

However, the disadvantage of lowering the price cap is that for some service providers, a lower price cap may not allow them to bid to reflect the entirety of their costs to provide system services. This might deter participation or new entrants in the DASSA.

The SEM Committee is engaging with the TSOs to understand the feasibility of applying a lower price cap either in response to certain market conditions or from go-live. This aligns with the SEMC's previous statement in the Parameter and Scalars decision paper that there may be "future reviews of the bid price cap".

2.6 Unit-specific controls

The SEM Committee also considered whether the risk of abuse of market power in the System Services Markets could be mitigated by introducing unit-specific controls or obligations. The interventions considered include:

- **Unit-specific bid caps in the DASSA.** The SEM Committee could apply unit-specific bid caps, for example, to units controlled by suppliers identified as being in a position of market power based on some standardised metric. The New York Independent System Operator (NYISO) adopts this approach in its month-ahead capacity auctions in the New York Control Area. Each month, upon receipt of certification data for its capacity auctions, NYISO identifies suppliers that may be pivotal, and applies bid caps to these suppliers which may either be based on reference level prices or unit-specific cost estimates.

- **Unit-specific minimum volume requirements.** The SEM Committee could require certain units to bid minimum, pre-defined volumes into the DASSA. This requirement would likely apply to units controlled by suppliers identified as being in a position of market power based on some standardised metric.
- **Market making obligation (MMO) in the DASSA secondary market.** The SEM Committee could introduce an MMO that requires units engaging in high levels of bilateral trading to offer a certain volume of trades in the open secondary market. For example, an MMO could specify that if a unit trades more than X MW per hour bilaterally over a time period, it would be required to make Y MW per hour available on the secondary market (where X and Y are volumes that would need to be pre-specified by the SEM Committee). For ease of implementation, we would expect an MMO in the DASSA secondary market (if introduced) to be monitored and enforced ex post. MMOs are used commonly in energy markets to improve liquidity and competition. For example, the Australian Securities Exchange (ASX) and the European Energy Exchange (EEX) have relied on MMOs to improve liquidity and increase entry.

The benefit of these unit-specific controls is that they target service providers in a position of market power, rather than imposing restrictions on all suppliers. As mentioned above, there is also precedent for some of these measures from other jurisdictions.

However, the concern with these interventions is that they require the SEM Committee to define prescriptive standards and enforce them ahead of market clearing. Defining standards formulaically and precisely ex ante for system services is a complex exercise, in particular ahead of go-live and in the absence of market data.

Since there are both benefits and disadvantages of imposing unit-specific controls, in the first instance the SEM Committee could establish the infrastructure required to impose these controls. This would preserve the option for the SEM Committee to choose to apply or not apply unit-specific controls closer to go-live, when there is more information about the extent to which the DASSA may be at risk of abuse of market power.

Overall, the SEM Committee would be more likely to introduce unit-specific controls at go-live if there is evidence that providers are likely to be able to abuse market power. If the SEM Committee does not introduce unit-specific controls at go-live, the SEM Committee may reconsider the introduction of these measures if there is evidence post go-live that providers are abusing market power. In general, market data will make the SEM Committee better equipped to assess whether abuse of market power is taking place and to define bidding standards for specific service providers.

2.7 Financial interventions

The SEM Committee also considered whether financial interventions that sit outside the market itself could reduce the risk of abuse of market power, by altering the incentives of market participants to engage in abusive conduct.

One financial intervention the SEM Committee considered is the use of Contracts for Difference (CfDs).

There is precedent for the use of CfDs to mitigate market power in the SEM. Both Directed Contracts and the Reliability Option (RO) in the Capacity Remuneration Mechanism (CRM) are forms of CfD. To implement this intervention, the SEM Committee could identify providers that are likely to be pivotal in System Services Markets, for example on the basis of forward-looking simulations. The SEM Committee could then require these providers to sign a CfD. We refer to providers who are subject to a CfD as “CfD providers”.

Under a CfD, payments between a provider and a counterparty depend on the difference between a strike price and a reference price.

- The strike price is the “target” final remuneration level the provider receives for provision of services, after the financial intervention. It can be set administratively, competitively through an auction, or set to be equal to a market benchmark (e.g., the price in the DAM).
- The reference price is a benchmark price that is intended to capture the provider’s actual or potential market revenues, absent the financial intervention (e.g., the DASSA price).

The SEM Committee considered CfD options where the strike price limits the remuneration CfD providers receive for provision of system services. Where the reference price exceeds the strike price, CfD providers must pay to the counterparty the difference between the strike price and the reference price. This reduces the incentive that CfD providers have to exercise market power to increase the reference price. If the reference price is the DASSA price, this reduces the risk of market abuse in the DASSA.

The term “RO-style CfDs” is used to refer to this form of CfD throughout this consultation, since this mechanism is similar to the RO for capacity providers in the CRM. The benefit of an RO-style CfD is that it avoids direct intervention in the market. It serves to modify the incentives market participants have to exercise market power, rather than directly controlling their bidding behaviour. A further benefit is that, because it sits alongside the market rather than within the market, it would not require changes to the DASSA IT design.

The SEM Committee identified a number of design dimensions for the development of a CfD, each of which gives rise to distinct trade-offs. The SEM Committee developed three CfD options, each reflecting a different combination of design choices and offering a different balance of trade-offs, which are summarised below. Other combinations of design choices are possible and may be subject to further consideration by the SEM Committee.

1. Administratively set strike price: The first option is an administratively set strike price for each system service product. Under this option, CfD providers would need to pay the counterparty in trading periods where the DASSA price for a given product exceeds the administratively set strike price for that product. CfD providers could also receive fixed payments, similar to reliability option payments, to compensate for the potential loss of

DASSA revenue in periods of genuine high prices in the DASSA (rather than high prices as a consequence of market abuse).

2. Limit DASSA and RAD revenues to DAM price: Option 2 limits the revenues that CfD providers can earn from balancing capacity markets (the DASSA and the RAD) to the revenues that could have been earned in the DAM. Under this design, a single CfD would apply across all system service products.

3. Reliability Option for efficient dispatch: The third option is a CfD which applies to volumes deemed to be available in real time rather than to volumes cleared in the DASSA. Under this option, a provider could be required to pay the counterparty in periods where the DASSA price exceeds the reference price, even if the provider did not clear in the DASSA. CfD providers could receive fixed payments to compensate them for this risk, as in Option 1.

Each of these options has potential advantages and disadvantages.

- The benefit of Option 1 is that it may be the simplest option to implement. However, Option 1 may provide weaker incentives for efficient dispatch. CfD providers may have limited incentives to make volumes available during periods with high prices since the CfD is based on volumes cleared in the DASSA; if a unit faces a high opportunity cost to provide system services, it may simply not offer those volumes into the DASSA.
- The benefit of Option 2 is that it may do the most to reduce costs for consumers, since it does not include a fixed payment to CfD providers and it caps revenues across both the DASSA and the RAD. Moreover, the strike prices encourage efficient dispatch, since CfD providers have an incentive to make volumes available even during periods with high DAM prices (and thus potentially high opportunity costs). However, Option 2 may be more complex to implement than Option 1. It also carries the risk that CfD providers could exercise market power to increase clearing prices for individual DASSA products whilst respecting the broader cross-product cap.
- Finally, Option 3 preserves incentives for CfD providers to participate competitively in the DASSA when it expects prices to be high. Option 3 also incentivises units to remain available in real time, because it is defined over “deemed” output. However, Option 3 is likely the most complex to implement, due to the need to define a deemed output.

A more detailed discussion of the three CfD options, including the key trade-offs identified by the SEM Committee, is set out in Appendix A.

To inform a decision on whether some form of CfD should be introduced to mitigate the risk of abuse of market power in system services, the SEM Committee welcomes comments from stakeholders on the overall costs and benefits of CfDs for system services. The SEM Committee further welcomes comment on the relative advantages and disadvantages of the

options set out in this paper, and whether there are additional CfD design options that the SEM Committee should consider.

2.8 System Services Bidding Code of Practice

A System Services Bidding Code of Practice (SS BCoP) would define ex ante standards for how service providers should participate in the System Services Markets to guard against abuses of market power.

Within the SS BCoP, System Services Markets are currently defined to include the DASSA, the DASSA secondary market and secondary bilateral trading mechanism, and the RAD. As the System Services Markets evolve and additional products are procured through the LPFs or Fixed Contracts, the SS BCoP would be reviewed and amended as required.

The benefits of establishing an ex-ante definition of bidding standards in the form of an SS BCoP are that it could give:

- The SEM Committee a clearer mandate for ex post enforcement than it has under existing frameworks; and
- Service providers guidance on the SEM Committee's expectations for bidding, making it easier to avoid conduct that the SEM Committee would deem abusive.

The SEM Committee considered whether an SS BCoP should prescribe specific rules for all unit types or provide more general principles to which providers should adhere.

An example of prescriptive guidance is that provided by the regional transmission organisation in the Pennsylvania-New Jersey-Maryland region (PJM). The PJM's Cost Development Guidelines describe how it expects market participants to set bids that are cost-reflective for energy and reserve products. The Guidelines are 125 pages long and include specific formulae to calculate bids based on certain cost types.

The benefit of a prescriptive SS BCoP is that it could make compliance simpler for service providers, since they would have access to clear guidelines on expectations and the rules against which the SEM Committee could assess bids.

However, the SEM Committee has three concerns with establishing a prescriptive SS BCoP:

1. A prescriptive approach may fail to adequately capture idiosyncrasies across units. System Services Markets are made up of units differentiated by technology type and size. If the rules do not accurately reflect costs across unit types, this could lead the TSOs to systematically procure reserves from units that are not the lowest-cost available, thereby hindering efficient dispatch and increasing system costs.
2. Prescriptive rules may deter participation from existing units, either because compliance with the rules is disproportionately onerous relative to certain units' expected DASSA gains, or because the formulae do not enable the units to fully recover their costs. If existing units do

not participate, this may create the appearance of need for new units on the grid which is artificial. This in turn could distort efficient investment.

3. Prescriptive rules might create barriers for new unit types, for example by not enabling them to fully recover their costs, hindering innovation.

These concerns are exacerbated by the particular challenge of estimating costs to provide system services in standalone System Services Markets. In the SEM, the energy and reserves markets run sequentially. In the PJM, energy and reserves are co-optimised, which arguably makes it easier to define specific cost-reflective formulae for different unit types.

A more general, principles-based SS BCoP would instead allow some flexibility for service providers to develop bidding strategies that reflect the costs associated with the unit types they manage, as well as their operational size and maturity. This type of SS BCoP would be similar to the SEMC's general BCoP for the SEM which sets out "principles of good market behaviour" rather than prescriptive bidding formulae.

Since the System Services Markets are new, the SEM Committee considers that, in principle, units could incur costs of which the SEM Committee is not yet aware. Additionally, some units that choose to participate in the new System Services Markets may not currently provide system services; consequently, there may be uncertainty regarding these units' bidding constraints or costs. A non-prescriptive SS BCoP would allow service providers the opportunity to explain their units' costs and constraints, as well as their subsequent bidding behaviour if asked to do so by the SEM Committee. For these reasons, the SEM Committee considers that a non-prescriptive SS BCoP would be preferable to a prescriptive SS BCoP at go-live.

2.8.1 Proposed System Services Bidding Code of Practice

The SEM Committee is considering the introduction of a non-prescriptive SS BCoP which sets out general principles to which service providers participating in the System Services Markets are expected to adhere. The document published alongside this paper provides a draft plain English version of the non-prescriptive SS BCoP for review and comment as part of this consultation.

The draft SS BCoP establishes standards of bidding for service providers participating in the System Services Markets. This includes a set of principles service providers are expected to follow when setting their bids. The draft SS BCoP includes principles regarding the following:

1. How service providers set the price at which they bid in the System Services Markets;
2. The circumstances under which service providers are expected to set bids to be divisible and the circumstances under which the SEM Committee consider service providers might set indivisible bids;
3. The capacity that service providers are expected to make available;
4. Expectations that service providers attempt to sell their DASSA contracts in secondary markets if they become unable to fulfil the obligations of those contracts;

5. Units' responsibilities when bidding for mutually incompatible commitments in System Services Markets; and
6. Expectations for service providers to keep their bidding strategies across system services and energy markets under regular review.

The draft SS BCoP also sets out a non-exhaustive list of costs that service providers may reflect in bids for each market. Since the SS BCoP is non-prescriptive, the code is limited to specifying categories of acceptable costs and providing examples that might fall into these categories for each System Services Market; it does not provide detailed instruction on how service providers should calculate those costs.

The draft SS BCoP also details how service providers are expected to justify their bids and demonstrate compliance with the SS BCoP to the SEM Committee if requested to do so ex post.

The SEM Committee could also consider publishing further guidance on how service providers can apply the principles laid out in the SS BCoP when calculating bids, including examples of compliant market behaviour, if that would be useful to market participants.

3 MARKET PARTICIPATION

3.1 Market Participation in System Services Markets

To ensure sufficient supply in System Services Markets to both meet demand and ensure competitive market conditions, the SEM Committee considered whether participation should be mandatory for service providers in relation to six elements of the System Services Markets.

Table 3.1: Mind-to Position on Participation Requirements for System Services

Element of the System Services Markets	Minded-to Position
System Services Code	Mandatory accession aligned with existing Trading and Settlement Code participation thresholds. Below defined thresholds, accession will be mandatory in order to participate in the DASSA, secondary market for DASSA contracts, RAD, or any future Layer Procurement Frameworks (LPFs) or Fixed Contracts that are governed by the System Services Code.
DASSA	No mandatory participation for most units. The SEM Committee will consider whether there should be a requirement to participate for some units (e.g., those controlled by providers in a position of market power) to mitigate the risk of abuse of market power.
Buy orders in the DASSA secondary market	No mandatory participation.
Sell orders in the DASSA secondary market	Service providers who become unable to fulfil obligations taken on in the DASSA will be mandated to submit sell orders in the secondary market.
Entry into the RAD as price taker	As stated in SEMC's decision paper on the RAD as a DASSA top-up mechanism, service providers that did not submit ex-ante bids into the RAD but nonetheless are available in real time and are acceded to the System Services Code will be entered into the RAD at a price of zero and treated as price-takers in the RAD.
Active participation in the RAD	No mandate for active participation in the RAD.

3.1.1 Accession to the System Services Code

At present, the Grid Code requires units to maintain and declare availability in line with that demonstrated at initial testing. Some units' capabilities to receive and respond to TSO instructions are also directly controlled by the TSOs. However, it is possible that the Grid Code may change in the future, or that new technologies that are capable of providing system services may not be captured by the Grid Code requirements. In that case, requirements to deliver reserves and respond to TSO instructions may, where relevant, be set out in the System Service Code. The

SEM Committee therefore considered for which units accession to the System Service Code should be mandatory.

The advantage of mandatory accession to the System Services Code is that it provides an avenue to impose requirements that ensure the TSOs have access to sufficient capacity to meet system needs.

The disadvantage of mandatory accession to the System Services Code is that it might force small units to face administrative or legal costs.

For these reasons, the SEM Committee proposes that, similar to the Trading and Settlement Code, accession to the System Services Code should be mandatory above a defined threshold.

The SEM Committee considers that, for the time being where the System Services Markets only cover reserve services, this threshold can be defined based on MW of capacity. In line with the Trading and Settlement Code, the SEM Committee is minded to set the threshold at 10 MW of maximum export capacity, measured at the generating station level (stations for the generation of electricity, which may comprise a number of smaller units within them). That is, generating stations with a maximum export capacity exceeding 10 MW would be required to accede to the System Services Code.

In the future, where the System Services Markets are extended to include non-reserve services, the SEM Committee would need to define the threshold based on capabilities relevant to those services (such as capabilities to provide voltage support). This is particularly true for technology types, such as synchronous condensers, that may have no meaningful export capability.

For smaller units that fall below the capability and capacity threshold, the SEM Committee do not propose mandatory accession to the System Services Code. However, the SEM Committee proposes that accession to the System Services Code be mandatory if they wish to participate in the DASSA, secondary market for DASSA contracts, RAD, or any future Layer Procurement Frameworks (LPFs) or Fixed Contracts that are governed by the System Services Code.

3.1.2 DASSA

The DASSA will comprise a number of sub-markets designed to procure different system service products and reflect any relevant locational constraints. Market concentration is anticipated in some sub-markets of the DASSA. Resultantly, there is a risk of strategic withholding by service providers in a position of market power.

One benefit of mandatory participation in the DASSA is that it would directly prevent physical strategic withholding (i.e., not offering capacity into the DASSA). Another is that it could reduce the risk of economic strategic withholding (i.e., offering capacity at a high price to prevent the unit from clearing). Mandatory DASSA participation could reduce the risk of economic strategic withholding because a higher level of supply reduces the risk of providers being in a position of market power that allows them to benefit from economic withholding.

However, the disadvantage is that for some service providers, expected revenue from the DASSA may not cover their costs of participation, for example, if there are fixed costs associated with

participation. As a result, mandatory participation in the DASSA could be burdensome and impose inefficient costs on providers. This is particularly true for those providers that do not operate at sufficient scale to engage in strategic withholding.

On balance, the SEM Committee considers that the disadvantages outweigh the benefits. Therefore, the SEM Committee's minded-to position is not to introduce mandatory participation in the DASSA at go-live for most units. However, the SEM Committee is considering whether there should be mandatory participation for some units owned by providers likely to be in a position of market power to mitigate the risk of strategic withholding, and would welcome comment from market participants on this option. Such a measure would constitute a unit-specific minimum volume requirement, which we discuss further in Section 2.6.

3.1.3 Secondary market

3.1.2.1 Submission of buy orders in the DASSA secondary market

The DASSA secondary market also carries a risk of strategic withholding. If providers with technically available capacity withhold buy orders in the secondary market, units who become unable to fulfil obligations taken on in the DASSA may be unable to trade out of these obligations.

The benefit of requiring service providers to submit buy orders in the secondary market is that it mitigates the risk of strategic withholding and helps to ensure that units that become unable to fulfil obligations can trade out of these obligations.

However, this benefit may be limited since, at go-live, providers are likely to be cautious about taking on DASSA commitments that they may not be able to meet, as there will be uncertainty about the liquidity of the secondary market. This suggests there may be few providers who would need to trade out of their DASSA positions and find themselves unable to do so. Therefore, the adverse effect of withholding buy orders in the secondary market may be small.

There are two disadvantages of requiring service providers to submit buy orders in the secondary market. First, it may be burdensome for providers with small trading desk operations. Second, as discussed above in relation to the DASSA, some service providers' expected revenue from the secondary market may not cover their costs of participation.

In this case, the SEM Committee consider that the disadvantages are likely to outweigh the benefits. Therefore, the SEM Committee's minded-to position is not to mandate service providers to submit buy orders in the secondary market at go-live. If the SEM Committee find evidence that units are withholding buy orders and that, consequently, other units are repeatedly unable to trade out of their obligations, the SEM Committee will reassess the need for rules around market participation.

3.1.2.2 Submission of sell orders in the DASSA secondary market

The SEM Committee also considered whether it should be mandatory for all service providers that hold DASSA orders to submit sell orders in the secondary market.

The advantage of mandatory sell orders would be increased liquidity in the secondary market. Lower-cost providers, which may not have been available at the day-ahead stage, would be afforded the opportunity to buy obligations.

However, this advantage may be limited since there are already strong economic incentives for service providers to submit sell orders in the secondary market. This is particularly the case since the price formation mechanism at go-live allows sellers to capture a substantial portion of the gains from secondary trade. At go-live, the SEMC has decided that the TSOs will implement a “simple batch matching solution”, under which the TSOs will match the buy orders with the highest price with the sell orders with the lowest price, sequentially in order of decreasing buy price, until there are no sell or buy orders left that can be matched. The price will therefore be set by each buy order in a pay-as-bid format. This is beneficial for sellers in the allocation of gains from trade.

For the avoidance of doubt, the DASSA clearing price will apply to all DASSA orders. The secondary trading clearing price is established on a pay-as-bid basis and determines the price paid by the buyer to the seller for the transfer of a DASSA order in the secondary market.

The disadvantage of a requirement to submit sell orders in the secondary market for all DASSA orders, similar to requiring buy orders, is that it may be burdensome for service providers with small trading desk operations.

Noting that the strong incentive for DASSA order holders to submit sell orders where it is economic to do so mitigates the risk of low liquidity, and cognisant of the potential burden mandatory participation would impose on small providers, the SEM Committee considers that submitting sell orders in the secondary market should not be mandatory for all service providers.

However, where service providers become unable to fulfil their obligations, the SEM Committee proposes that it be mandatory to submit sell orders into the secondary market. The justification for mandating market participation in this case is to give the TSOs better information ahead of real-time about which units will be available to provide reserves in real-time. Mandating service providers who become unable to fulfil obligations to submit sell orders may reduce the number of non-energy actions the TSOs take to ensure enough balancing capacity is available to meet real-time system requirements.

The RAs are considering various options for the specific obligation that will apply to units that become unable to fulfil their DASSA obligations.

One option would be to require that such service providers attempt to sell the obligation in at least the two secondary market batches immediately after the unit learns that it will not be able to meet its DASSA obligation, or submit a single sell order and hold it open for at least those two secondary market batches. After two secondary market batches, the service provider could either cancel its sell order and immediately advise the TSOs that it will be unable to meet its DASSA commitment, or continue to attempt to sell the obligation in subsequent batches.

The SEM Committee would consider a requirement to submit sell orders for more than two batches if the liquidity benefits outweigh the burden to service providers. Similarly, the SEM

Committee would consider reducing the requirement if the burden to service providers outweighs the liquidity benefits.

The SEM Committee welcomes views from service providers to inform its decision on the requirement for submitting sell orders in the secondary market in instances where services providers become unable to fulfil their DASSA obligations.

The SEM Committee would also consider introducing exemptions from the requirement to attempt to sell DASSA obligations a unit is unable to fulfil. For example, the SEM Committee might consider exemptions if:

- There are insufficient secondary trading batches (depending on the requirement) between the time at which the unit learns that it will not be able to meet its DASSA obligation and the DASSA delivery period; or
- The unit's trading desk will not be active at any point between the time at which the unit learns that it will not be able to meet its DASSA obligation and the DASSA delivery period.

3.1.4 RAD

The RAD pays system services providers that make residual capacity, net of other commitments (including the DASSA), available in real-time, if that capacity is needed to meet the real-time reserve capacity requirement.

The SEM Committee considered both whether providers that did not actively bid into the RAD should nonetheless be required to be available as price-takers in the RAD, and whether it should be mandatory for providers to actively bid into the RAD.

3.1.3.1 Requirement to be available as price-takers in the RAD

The advantage of requiring providers to be available as price-takers in the RAD would be to ensure that units maintain availability to provide services in real time where it is compatible with their energy commitments (e.g., by continuing to receive and respond to TSO instructions) and that they declare this availability to the TSOs. This could help the TSOs to ensure they have access to sufficient capacity to meet system needs.

This advantage is limited so long as service providers are required under the Grid Code or System Services Code to keep their units available where they are technically capable of doing so, and declare that availability to the TSOs. As mentioned in 3.1.1 and described in further detail in Appendix B, the current Grid Code requires that all grid-connected units notify the TSOs of their availability to deliver reserves and respond to TSO instructions. Therefore, under the current Grid Code arrangements, the TSOs may have access to sufficient capacity to meet system needs even if there is no requirement for providers to be available as price-takers in the RAD.

However, it is possible that the Grid Code or System Services Code may change in future, or that new technologies that are capable of providing system services may not be captured by the Grid Code requirements.

The disadvantage of requiring providers to be available as price-takers in the RAD is that providers may consider that they are exposed to an excessive increase in risk, if the delivery incentives units face in the RAD are material. In line with the SEMC's Parameters and Scalars Decision Paper, the compensation payment and post gate availability incentive will not apply in the RAD. Nonetheless, units may face a service delivery incentive in the RAD, the design of which is still under review.

The RAs consider that because the RAD procures reserves ex post, based on service providers' deemed availability, the circumstances under which a service provider would be subject to the service delivery incentive in the RAD are relatively rare.

A unit may be subject to the service delivery incentive in the RAD if all three of the following conditions apply:

1. The TSOs call upon the unit to provide balancing energy, or it receives an automatic activation to provide balancing energy;
2. The unit does not provide balancing energy; and
3. The unit clears in the RAD.

The SEM Committee have identified three scenarios where, in principle, these conditions may arise:

- A. A unit faces opportunity costs for the provision of balancing energy. For example, a storage unit may not have enough energy stored to both provide balancing energy now and meet its DASSA obligations in subsequent periods. To avoid these opportunity costs, the unit chooses not to respond to the TSO instruction or automatic activation;
- B. A unit is not available to provide balancing energy despite being deemed to be available by the TSOs, for example because the product delivery duration runs into the next period and the unit's energy commitments for the next period are incompatible with the service delivery; or
- C. A technical problem prevents a unit from being able to provide balancing energy.

The SEM Committee considers each of these scenarios to be relatively unlikely to occur. Moreover, there are mechanisms for units to reduce their risk exposure to each of these scenarios:

- Scenario A: Under the Grid Code, units are generally required to respond to TSO instructions and automatic activations. Units receive payment through the BM for balancing energy provided in response to TSO instructions or automatic activations. To the extent units incur opportunity costs from complying with TSO instructions or automatic activations, for many units it is currently possible to reflect these costs in BM bids. Certain units have previously advised the SEM Committee that it is not feasible for them to recover all balancing energy costs in their BM bids, but it may be possible for them to do so in the future.

- Scenario B: Under DS3, units are expected to be able to signal their real-time availability to provide system services to the TSOs. If this continues to be the case under DASSA arrangements, units should be able to reduce the likelihood of Scenario B.
- Scenario C: The SEM Committee expects units to introduce measures to limit the likelihood of technical problems arising in real time. Units have the option to bid a non-zero price into the RAD, which could reflect the cost to mitigate the risk of technical problems arising in real time.

Overall, the SEM Committee considers there to be a relatively low risk that service providers face the service delivery incentive in the RAD, and that service providers can introduce measures to mitigate this risk further. Therefore, this seems unlikely to be a source of material disadvantage associated with requiring service providers to participate as price-takers in the RAD.

However, the SEM Committee welcomes industry comment on whether there are any scenarios in which units may be exposed to the RAD delivery incentive which raise additional concerns not discussed in this paper.

To further limit the risk that service providers face from being required to participate as price-takers in the RAD, the SEM Committee proposes to ensure that the service delivery incentive in the RAD is less substantial than the incentive for non-delivery in the DASSA. There is arguably less need for substantial incentives in the RAD, because any service providers who fail to keep their units available where they are technically capable of doing so and declare that availability to the TSOs will already be non-compliant with the Grid Code and subject to the associated incentives.

Based on the arguments laid out above, the SEM Committee considers that the advantage of requiring providers to be available as price-takers in the RAD likely outweighs the disadvantages.

As such, in line with the SEMC's decision paper on the RAD as a DASSA top-up mechanism, service providers who choose not to actively participate in the RAD but nonetheless make units available in real time in line with Grid Code requirements will be entered into the RAD at a default bid price of zero. If those units are required to meet RAD demand, they will be paid at the RAD clearing price.

This allows units who do not want to incur the costs associated with active participation in System Services Markets, but provide reserves that the TSOs rely on in real time as a consequence of their other activities, to be paid according to the market value of that real-time reserve provision. Units will need to be acceded to the System Services Code to receive payment under the RAD.

3.1.3.2 Active participation in the RAD

The advantage of requiring providers to actively bid into the RAD is that it could improve price discovery in the RAD. If all providers with availability bid into the RAD in line with their costs to provide balancing capacity ex post, then the clearing price of the RAD better reflects the value to the system of the marginal provider.

The disadvantage of mandatory active participation in the RAD, as discussed above in relation to the DASSA and the secondary market, is that it may be burdensome for service providers with small trading desk operations.

The SEM Committee considers that the benefits for price discovery do not outweigh the cost of the burden imposed on small providers, and therefore do not propose that it be mandatory for service providers to actively bid into the RAD.

4 CONSULTATION QUESTIONS

The SEM Committee is seeking feedback on the topics covered in this paper and would appreciate commentary on the specific questions provided below.

Table 4.1: Consultation Questions

Options Considered
<i>Market Design Changes</i>
1. Would the respondent make use of the option to submit linked bids, if it were available? Why or why not? 2. What are the respondent's views, if any, on phasing in DASSA procurement volumes over time? 3. What are the respondent's views, if any, on moving from locational procurement to all-island procurement in the DASSA, where the minimum requirement constraints defined in line with jurisdictional boundaries are removed from the market clearing optimisation? 4. What are the respondent's views, if any, on whether the benefits associated with bilateral trading outweigh the risks? 5. What are the respondent's views, if any, on measures to lower the price cap and scarcity price? 6. Are there additional benefits or disadvantages to the SEM Committee introducing any of the market design changes mentioned that are not considered in this consultation paper?
<i>Unit-Specific Controls</i>
7. Are there additional benefits or disadvantages to the SEM Committee introducing unit-specific controls in the System Services Markets that are not considered in this consultation paper?
<i>Interventionist Measures</i>
8. What are the respondent's views, if any, on whether the benefits associated with introducing any of the proposed CfD options outweigh the costs? 9. Are there alternative CfD design variants that may better mitigate market power concerns in the DASSA?
<i>System Services Bidding Code of Practice (SS BCoP)</i>
10. Would the respondent prefer a non-prescriptive BCoP or prescriptive bidding rules? Please explain your response.
Proposed SS BCoP
<i>Bidding Principles</i>
11. Is the rational response to incentives in competitive, pay-as-clear markets, such as the DASSA and the RAD, to bid based on marginal costs? If not, please provide clear reasoning. 12. Is the rational response in competitive, pay-as-bid markets, to bid either (a) based on marginal costs or (b) based on an expectation of the costs of the marginal cleared buyer in that secondary market batch? If not, please provide clear reasoning. 13. Under which circumstances would service providers need to set bids to be indivisible? 14. Are there any barriers to service providers making available all capacity that units expect to be capable, technically, of delivering for both upward and downward reserve, consistent with the units' expected schedules in energy markets?

15. Under which, if any, circumstances would service providers who become unable to deliver their DASSA obligations be unable to submit a Sell Order in the secondary market?
Costs that May be Reflected in Bids
16. Are there any costs associated with providing balancing energy that cannot be recovered through the Balancing Market?
17. Are there any actual or opportunity costs to take on obligations in the DASSA or in secondary trading that are not currently listed in the draft SS BCoP?
18. Are there any actual or opportunity costs faced to take on obligations in the RAD that are not currently listed in the draft SS BCoP?
Justification of Bids
19. Does the respondent have any concerns about the guidance in the draft SS BCoP regarding justification of bids?
Further Guidance
20. Are there particular areas of the SS BCoP that require further explanation through guidance?
Market Participation in System Services Markets
21. What costs does the respondent expect to incur for its units to participate in the DASSA? Please provide information on costs that are (a) shared across all units in the respondent's portfolio (b) specific to certain types of unit. The SEM Committee would welcome information on the approximate magnitude of those costs, if available.
22. What costs, if any, does the respondent expect to incur for its units to participate in secondary trading? Please provide information on costs that are (a) shared across all units in the respondent's portfolio (b) specific to certain types of unit. The SEM Committee would welcome information on the approximate magnitude of those costs, if available.
23. What costs, if any, does the respondent expect to incur for its units to participate in the RAD? Please provide information on costs that are (a) shared across all units in the respondent's portfolio (b) specific to certain types of unit. The SEM Committee would welcome information on the approximate magnitude of those costs, if available.
24. In cases where a service provider becomes unable to fulfil its DASSA obligations, in how many secondary market batches should it be required to submit sell orders? What barriers, if any, would prevent service providers from submitting sell orders in more secondary market batches?
25. Are there any additional risks or cost-recovery concerns participants anticipate under the proposed RAD design that combines mandatory participation and a service delivery incentive?
Further comments
26. Do you have any further comments on this consultation?

5 NEXT STEPS

The consultation will be open for a period of 8 weeks and will close on 25th September. Following this the SEM Committee will consider responses and make a decision. If the decision is made to proceed with the SS BCoP the detailed drafting of this will be consulted on alongside the System Services Code.

5.1 Next Steps

Should stakeholders have any queries or comments, please contact the CRU Flexibility and System Services Team (flexibility@cru.ie) or Bronagh McKeown (bronagh.mckeown@uregni.gov.uk).

To support stakeholder engagement on this consultation paper, the SEM Committee intends to hold an industry workshop. Further details, including timing and participation arrangements, will be communicated in due course.

Appendix A

A.1. Introduction

This Annex sets out further detail on the three Contracts for Difference (CfD) options the SEM Committee considered as possible financial interventions to mitigate the risk of abuse of market power. See Appendix A for an introduction to the three CfD options.

The purpose of this Annex is to explain, at a high level, how these options could be structured and the principal trade-offs they raise. The three options discussed below do not represent the full range of possible CfD designs. Other design variants exist, and the SEM Committee welcomes comments from interested parties on the options set out below and on whether other CfD designs should also be considered.

A.2. Key design dimensions in development of CfD

The SEM Committee identified eight key design dimensions that determine the structure of a CfD scheme for pivotal providers. These are as follows:

1. Should the CfD be two-way, one-way, or RO-style?
2. To which system service products does the CfD apply?
3. What is the reference price?
4. What is the strike price?
5. Over what "output" is the CfD defined?
6. Do CfD providers receive additional fixed payments, to compensate for taking on the CfD?
7. Over what time horizon does the CfD apply?
8. To which service providers does the CfD apply?

Each design dimension is described in more detail below, and the trade-offs between the options on each dimension are considered.

A.2.1. Design dimension 1: Two-way, one-way, or RO-style CfD?

The SEM Committee has considered three ways to structure the CfD: a two-way CfD, a conventional one-way CfD, and an RO-style CfD.

Under a two-way CfD, the provider always receives the strike price. If the reference price exceeds the strike price, the provider pays the difference to the counterparty; if the strike price exceeds the reference price, the counterparty pays the difference to the provider. Two-way CfDs insulate providers from risk, which may mean providers that are not pivotal also want access to CfDs. If many providers sign CfDs, this could distort price formation in the DASSA and dilute the ability of the DASSA price to act as an effective market signal for relative scarcity.

Figure 2.1 displays the payments due between the provider and the counterparty under a two-way CfD. The SEM Committee do not propose a two-way CfD because it is not necessary to fully insulate pivotal providers from risk and to avoid the potential dilution of market signals if other providers want access to CfDs.

Figure 2.1: Illustration of Two-way CfD

Source: NERA illustration.

Under a one-way CfD, the provider is guaranteed to at least receive the strike price, and retains the upside when the reference price exceeds the strike price. **Figure 2.2** displays the payments due between the provider and the counterparty under a one-way CfD. Such a mechanism does not protect consumers from the risk of abuse of market power, and has therefore not been considered further.

Figure 2.2: Illustration of One-way CfD

Source: NERA illustration.

Under RO-style CfDs, the remuneration received by the provider is limited by the strike price. Where the reference price exceeds the strike price, the provider must pay to the counterparty the difference between the strike price and the reference price. Where the reference price is below the strike price, no payment is made between the provider and the counterparty.

Figure 2.3 displays the payments due between the provider and the counterparty under a RO-style CfD. RO-style CfDs may help reduce the incentive for CfD providers to increase DASSA clearing prices.

Figure 2.3: Illustration of RO-style CfD

Source: NERA illustration.

All three CfD options proposed by the SEM Committee take the form of an RO-style CfD.

A.2.2. Design dimension 2: To which system service products does the CfD apply?

The products over which the CfD is defined determine how much flexibility the SEM Committee has to set reference prices and strike prices in a way that creates the desired incentives for CfD providers.

- A CfD per product allows for product-specific pricing. This may enable more targeted market power mitigation if the SEM Committee is particularly concerned about market power for individual system service products.

- A CfD across products allows the SEM Committee to cap total revenues across all products. This may enable the SEM Committee to set the strike price based on an estimate of the shared “opportunity cost” across products, whilst allowing service providers the flexibility to make commercial decisions on how to spread this opportunity cost across products.

This design dimension may also affect the mechanism the SEM Committee relies on to identify which service providers they deem to be pivotal. If the CfDs are on a product-by-product basis, the SEM Committee may assess pivotality on a product-by-product basis. If the CfDs apply across products, different options exist for how the SEM Committee may assess pivotality. For example, the SEM Committee may determine a provider to be pivotal if it is pivotal for the provision of *any* product, or alternatively if it is pivotal for the provision of *select* system services products for which the ratio of supply to demand is relatively small.

A.2.3. Design dimension 3: What is the reference price?

The SEM Committee has considered the following options for the reference price, depending on the products over which the CfD is defined:

- For product-specific CfDs, half-hourly product-specific prices are the default reference price, since they capture the reference market price at which the providers can sell that product in the DASSA. Alternative approaches (for example based on an average DASSA price for that product across a longer time horizon) may create better incentives to time output when prices are high, but are more complex both for the SEM Committee to implement and for CfD providers operationally.
- For CfDs defined across products, total revenues across the DASSA, or across the DASSA and the RAD, may be used as the reference price.

A.2.4. Design dimension 4: What is the strike price?

The SEM Committee has considered the following options for the strike price, depending on the products over which the CfD is defined:

- Administratively set, product-specific strike prices may reflect the value to the system of different products, but require calibration.
- For CfDs defined across products, the DAM price could be used as the strike price. This would limit revenue across all system service products to the maximum DAM opportunity cost (since the opportunity cost of providing system services is forgone DAM *profits* rather than DAM *revenues*, the DAM price sets an upper bound on the DAM opportunity cost).
- A third option involves spreading the DAM price across system service products. This option can help provide a market signal to CfD providers to participate in the DASSA when the DAM price is high (which is expected to be correlated with instances where the DASSA price is high). However, it requires a methodology to distribute the DAM price across individual products.

A.2.5. Design dimension 5: Over what "output" is the CfD defined?

The “default” approach would be to define output as a percentage of volumes cleared in the DASSA. This would be relatively simple to implement, compared to some of the other options for the definition of output. However, using volumes cleared may distort incentives to participate in the DASSA, since CfD providers face no payment obligations if they do not clear in the DASSA.

An alternative design considered involves defining output by reference to a deemed profile. This deemed quantity could, for example, be based on a technology-specific expected availability profile, or on a measure derived from the provider’s position in the DAM. Such a design may increase the incentive for providers to bid competitively in the DASSA, especially during periods where it expects DASSA prices to be high. However, this approach may introduce new distortions if the deemed profile does not accurately reflect true availability, or if providers can influence the deemed quantity through their DAM bidding behaviour.

The deemed approach is similar to the design of existing CfDs in the SEM to mitigate market power. Directed Contracts require the provider to sell a fixed volume of MWh in all hours, regardless of whether the provider clears in the energy markets; likewise, the RO under the CRM requires the provider to make payments whenever the reference price exceeds the strike price, again regardless of whether the provider clears in the energy markets.

A.2.6. Design dimension 6: Do CfD providers receive additional fixed payments, to compensate for taking on the CfD?

If a CfD exposes providers to disproportionate risk, providers may require compensation through additional payments. This would be particularly true under a design that could constrain a provider to receive less than their marginal cost of providing a system service product without allowing the provider to choose not to supply the product in that period (for example, an option which combined a low administratively set strike price with a deemed profile).

A.2.7 Design dimension 7: Over what time horizon does the CfD apply?

A CfD with a shorter duration would allow the SEM Committee to periodically assess which providers are expected to be pivotal and apply the measure in a targeted manner to those pivotal providers.

By contrast, a CfD with a longer duration could reduce the administrative burden of the scheme. The options considered below use a medium duration of up to 12 months, in line with the duration of contracts under the Layered Procurement Framework (LPF).

A.2.8. Design dimension 8: To which service providers does the CfD apply?

A CfD could be mandatory for providers the SEM Committee deems to be pivotal, for example on the basis of forward-looking simulations. Depending on the design, other providers may also wish

to opt in. Allowing this may be more equitable, but may reduce the strength of market signals in the DASSA.

The three options considered below all assume mandatory application for pivotal providers, with an option for other providers to opt in.

A.3. Factors taken into consideration for CfD options

In assessing the options described below, the SEM Committee took the following factors into consideration:

- Effect on efficient dispatch;
- Feasibility and transparency;
- Value for money;
- Effect on efficient investment;
- System security.

No single CfD design performs best against all of these considerations. The assessment of CfD options therefore involves balancing competing objectives and associated trade-offs.

The SEM Committee do not expect any of the three options to affect system security. First, the CfDs are not expected to alter the incentives of most providers to offer to supply system services. Second, even if under some designs some providers with CfD contracts may have less incentive to offer to supply system services, the TSOs will still retain the option to redispatch units through non-energy actions in the BM to ensure sufficient capacity is online to meet system services requirements, if necessary.

A.4. CfD options considered

A.4.1. Option 1: Administratively set strike price

The first option under consideration is an administratively set strike price. Under this option, a separate contract would apply for each system service product.

The reference price would be the DASSA price for the relevant trading period, and the strike price would be administratively set for each product. For example, the strike price could be set as a multiple of DS3 tariffs. In trading periods where the DASSA price for a given product exceeds the administratively set strike price, payments would be due from CfD providers to the counterparty. The contract would apply to a percentage of DASSA-cleared output in each trading period, possibly 100 per cent. A share less than 100 per cent could preserve incentives at the margin to for the unit to offer into the DASSA, since it would still obtain the full DASSA clearing price for the residual portion of its cleared output not subject to the CfD.

Under this option, CfD providers could receive fixed payments, similar to reliability option payments, to compensate the providers for the potential loss of DASSA revenue.

Table 2.1 summarises the key design choices across the eight design dimensions under CfD Option 1, where choices that do not vary across Options 1-3 are displayed in grey.

Table 2.1: Summary of CfD Design Option 1

Design Dimension	Option 1 Approach
Two-way, one-way, or RO-style CfD?	RO-style CfD
Does the CfD apply to all system service products?	One contract per system service product
What is the reference price?	DASSA price for relevant trading period
How is the strike price set?	Administratively set strike price for each product
Over what "output" is the CfD defined?	Percentage of DASSA cleared output in each trading period (possibly 100 per cent)
Do CfD providers receive additional payments?	Yes—fixed payments to CfD providers, similar to Reliability Option payment
Over what time horizon does the CfD apply?	LPF duration
What service providers does the CfD apply to?	Mandatory for pivotal with option to opt in

The advantage of this option is that the static strike price is administratively simple to implement and predictable for market participants. This supports the feasibility and transparency of the CfD scheme.

However, the disadvantage of this option is that it may perform less well against some efficiency-related considerations. In particular, providers subject to the CfD may have limited incentives to make volumes available during periods with high prices, which may reduce the efficiency of dispatch. In addition, because the option limits maximum revenues from DASSA participation, it may limit efficient investment into new units by CfD providers.

Overall, the SEM Committee considers that Option 1 may perform well against feasibility and transparency considerations, but less well against some efficiency-related considerations.

A.4.2. Option 2: Limit DASSA and RAD revenues at DAM price

The second option under consideration is to limit the revenues that a provider can earn from balancing capacity markets (DASSA and RAD) to the DAM price, per unit of capacity.

Unlike Option 2, a single CfD contract would apply across all system service products. The reference price would be total revenues from DASSA and RAD in the relevant trading period. The strike price would be the DAM price for the relevant trading period.

The contract would apply to total DASSA and RAD cleared output in the relevant trading period across products.

Under this option, providers would not receive additional compensation, since revenues would be limited to the DAM clearing price, which should be an upper bound on the opportunity cost for service providers participating in balancing capacity markets.

Table 2.2 summarises the key design choices across the eight design dimensions under CfD Option 2, where choices that do not vary across Options 1-3 are displayed in grey.

Table 2.2: Summary of CfD Design Option 2

Design Dimension	Option 2 Approach
Two-way, one-way, or RO-style CfD?	RO-style CfD
Does the CfD apply to all system service products?	Single CfD contract for all system service products
What is the reference price?	Total revenues from DASSA and RAD in relevant trading period
How is the strike price set?	DAM price for relevant trading period
Over what "output" is the CfD defined?	Total DASSA and RAD cleared output in relevant trading period across products
Do CfD providers receive additional payments?	No compensation since revenues capped at DAM clearing price (opportunity cost)
Over what time horizon does the CfD apply?	LPF duration
What service providers does the CfD apply to?	Mandatory for pivotal with option to opt in

One advantage of this option is its potential to deliver value for money. This is because it does not include an additional fixed payment for providers and because it applies to revenues from both DASSA and RAD. A further advantage is that a single contract across products may offer feasibility benefits relative to a more disaggregated design involving a large number of contracts. In addition, linking the strike price to the DAM price may support efficient dispatch by giving providers an incentive to make volumes available during periods with high DAM prices, which are likely also to be periods with high DASSA prices.

However, the main disadvantage of this option is that CfD providers may still have an incentive to increase clearing prices for certain products within the broader cross-product strike price. This may limit the extent to which the option improves efficient dispatch.

Overall, the SEM Committee considers that Option 2 may perform relatively well against value for money considerations, while also providing stronger efficiency incentives than Option 1.

A.4.3. Option 3: Reliability Option for efficient dispatch

The third CfD option the SEM Committee considered is a reliability option designed to support efficient dispatch. Under this option, the CfD would apply to volumes deemed to be available in real time, rather than volumes cleared in the DASSA. If a unit operated by a CfD provider were to not clear in the DASSA despite being deemed to be available, then the provider would still be required to pay the counterparty (despite not earning DASSA revenue) if the reference price exceeds the strike price.

This option would involve a separate contract for each system service product. The reference price would be the DASSA price for the relevant trading period. Providers would receive fixed payments, similar to reliability option payments, to partly compensate them for the risks associated with the CfD.

Under the proposed design for Option 3, the strike price would be based on the DAM price for the relevant trading period, apportioned across products.

Table 2.3 summarises the key design choices across the eight design dimensions under CfD Option 3, where choices that do not vary across Options 1-3 are displayed in grey.

Table 2.3: Summary of CfD Design Option 3

Design Dimension	Option 3 Approach
Two-way, one-way, or RO-style CfD?	RO-style CfD
Does the CfD apply to all system service products?	One contract per system service product
What is the reference price?	DASSA price for relevant trading period
How is the strike price set?	DAM price for relevant trading period apportioned across products
Over what "output" is the CfD defined?	Deemed output (i.e., not volumes cleared in DASSA)
Do CfD providers receive additional payments?	Yes—fixed payments to CfD providers, similar to Reliability Option payments
Over what time horizon does the CfD apply?	LPF duration
What service providers does the CfD apply to?	Mandatory for pivotal with option to opt in

One advantage of this option is that, because the contract applies to volumes deemed to be available in real time rather than only to DASSA-cleared output, it may better preserve incentives for units with CfDs both to participate in the System Services Markets and to remain available in real time. For this reason, the option may support efficient market participation, efficient dispatch, and efficient investment.

However, the concern with this option is that it is more complex than the other options considered. In particular, defining volumes deemed to be available in real time and allocating the DAM price across products may create feasibility and transparency challenges. This approach may introduce

new distortions if the deemed profile does not accurately reflect providers' true availability or if providers can influence the deemed quantity through their DAM bidding behaviour.

Overall, the SEM Committee considers that Option 3 may perform particularly well against efficiency-related considerations but may involve greater implementation complexity than the other option.

Appendix B

B.1. Introduction

This Annex sets out further detail on the current requirements under the Grid Code, based on information provided to the SEM Committee by the TSOs.

B.2. Grid Code Requirements

The Grid Code currently requires that conventional generators, power park modules (PPMs) and DSUs do not at any time declare availability for active power, ancillary services, and technical parameters at levels different from those they can actually achieve at the relevant time (EirGrid Grid Code OC.10 and SONI Grid Code OC.11). The relevant TSO can reject declarations to the extent that they do not meet these requirements (SDC1.4.3.2 and SDC1.4.3.4, both Grid Codes).

Centrally dispatched generating units (including conventional generators) are required under SDC1.4.4.2 and SDC1 Appendix A Part 2 to submit an Additional Grid Code Characteristics Notice to the TSO, where they declare what ancillary services they are available for, including all relevant categories of operating reserve for each imbalance settlement period.

Dispatchable PPMs, e.g., batteries, do not submit the Additional Grid Code Characteristics Notice. This obligation is covered by "standing" Electronic Dispatch Instruction Logger (EDIL) declarations and Energy Management System (EMS) Supervisory Control and Data Acquisition (SCADA).

For dispatchable users, SDC 2.4.2.3 specifies that Dispatch Instructions shall be deemed to include an automatic instruction of Operating Reserve, the level of which is to be provided in accordance with the Declared Operating Reserve Availability under SDC1 and the Ancillary Service Agreement. This applies unless otherwise specified by the TSO at the time of giving the Dispatch Instructions.

Furthermore, the Grid Codes currently require users to operate at all times under the control of a frequency control system, the settings of which are specified in the Grid Code or the Grid Code states that the settings and parameters will be specified by the TSO.

- Conventional generators must operate at all times under the control of a Governor Control System, unless otherwise specified by the TSO, with characteristics within the appropriate ranges as specified in Connection Conditions.
- Interconnectors, when energised, must operate at all times in Frequency Control mode, unless otherwise specified by the TSO.
- For PPMs, the relevant TSO specifies the settings and parameters for power frequency response curves and frequency response systems. The PPM is required to make it

possible for the TSO to remotely enable/ disable the Frequency Response System and to set the governor droop.

B.2. Incentives to comply with Grid Code requirements

Other System Charges (OSCs) are applied to units to incentivise compliance with Grid Code, separate to DS3 and any contractual arrangements. All participants are subject to OSCs. The charge is linked to the system costs imposed on the system due to users of the system not being compliant with their Grid Code obligations.

In addition to OSCs, a user violation of a connection condition would permit the TSO to de-energise the relevant unit (OC.4.5.6.1). For example, if a user restricted frequency response without consent or instruction from the TSO, and not in response to a safety issue, and the user reflected this restriction in its availability declarations, the relevant TSO is permitted to de-energise the relevant unit.