

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

**High Level Design for Ireland and Northern  
Ireland from 2016**

**Draft Decision Paper**

**SEM-14-045**

**9 June 2014**

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## 1 INTRODUCTION

The European Union (EU) is building an internal market for electricity and gas, one of the key pillars to complete the European single market. Free trade across borders and non-discrimination between internal and cross border transactions are the foundations of the single market. The EU's Third Energy Package has given fresh impetus to the process of market integration in electricity and a European Target Model has been developed under the aegis of the Third Package that will harmonise cross-border trading rules and coordinate national and regional market designs.

In Ireland and Northern Ireland the Department of Communications, Energy and Natural Resources (DCENR) and the Department of Enterprise Trade and Investment (DETI) respectively have charged the SEM Committee (SEMC) with responsibility for developing a new set of electricity trading arrangements that will meet requirements of the EU Target Model and deliver tangible short and long term benefits to all island consumers by ensuring that existing and future assets and infrastructure are used in the most efficient ways to deliver electricity to consumers at lowest cost.

In March 2013, the two Departments endorsed the recommendation in the "Next Steps Decision Paper" (SEM-13-009) published by the SEMC in February 2013 that the SEMC should proceed to develop a High Level Design (HLD) of the wholesale market arrangements on the island of Ireland. The Integrated Single Electricity Market (I-SEM) HLD Consultation Paper (SEM-14-008) was published by the SEMC on 5 February 2014 outlining options for Energy Trading and Capacity Remuneration Mechanisms for Ireland and Northern Ireland from 2016.

Meeting the requirements of the Target Model is a necessary but not sufficient condition of a successful market design and there are many aspects of market design that, under the subsidiarity principle, come under the jurisdiction of national regulatory authorities. In preparing this Paper, we have therefore undertaken wider ranging policy and technical research on issues raised by respondents to the Consultation and design issues that have come to the fore as the project progressed.

In parallel the RAs have reflected on the lessons learned since the implementation of the SEM and this paper sets out what has been successful in the current market and identifies the key challenges that the I-SEM must address. The SEM has been a success on many fronts, notably attracting aggregate investment, mitigation of abuse of market power, providing transparent and liquid short term markets and promoting the penetration of renewable energy sources, all in the interests of consumers. However, it has fallen short in some other notable areas such as providing locational investment signals, incentivising efficient cross border trade, engendering forward market liquidity, encouraging active competition between generators through competitive bidding and sending efficient exit signals. Our intention is that the I-SEM will build on the successes of the SEM and address its shortcomings.

## 2 PURPOSE OF THIS DOCUMENT

This paper forms part of the process for implementing a new High Level Design (HLD) for the Integrated Single Electricity Market (I-SEM) in Ireland and Northern Ireland by the end of 2016. The purpose of this document is to present the proposed decisions of the Single Electricity Market Committee (SEMC) on the High Level Design (HLD) of the I-SEM and to consult interested parties on these proposals.

The SEM Committee is committed to evidence based decision making and this paper sets out the process that the RAs have gone through in recommending these proposed decisions to the SEM Committee, including extensive and in depth multilateral and bilateral stakeholder engagement with market participants and system and market operators as well as with wider stakeholders and colleagues across Europe including Ofgem, DECC, ACER, and various power exchanges.

This Draft Decision Paper describes the SEMC proposed decisions on:

- The features of the new Energy Trading Arrangements (ETA),
- The need for a Capacity Remuneration Mechanism (CRM) in the new market and
- The proposed type of CRM to be introduced.

It also presents a summary of the responses to the Consultation Paper on the I-SEM High Level Design (SEM-14-008) followed by the reasoning behind the proposed decisions. The SEM Committee invites consumers of electricity, market participants and other interested parties to respond with their views on the SEM Committee's proposed decisions. Following a review of the responses the SEM Committee will publish its final decision on the proposals set out in this paper. This final decision will then be formally submitted to the authorities in Dublin and Belfast for their consideration and incorporation into legislation as they see fit.

This document consists of the following sections:

**Section 3:** Summary of the Proposed Decisions.

**Section 4:** An update on the process for reaching these proposed decisions on the implementation of a new HLD in the All-Island Market.

**Section 5:** A review of the lessons learned since the implementation of the SEM, setting out what has been successful and identifying the key challenges for the I-SEM.

**Section 6:** The proposed decisions with respect to the energy trading arrangements. This section includes a summary of the consultation responses and the reasoning behind the SEM Committee proposed decisions.

**Section 7:** The proposed decision with respect to the need for a Capacity Remuneration Mechanism. This section includes a summary of the consultation responses and the reasoning behind the SEM Committee proposed decision.

**Section 8:** The proposed decisions with respect to the type of Capacity Remuneration Mechanism. This section includes a summary of the consultation responses and the reasoning behind the SEM Committee proposed decisions.

Alongside this consultation document, the SEM Committee is also publishing:

- I. a Non Technical Summary of the proposals for the new market design;
- II. an Initial Impact Assessment which includes a mixture of qualitative and quantitative assessments of the relative cost and benefits of different market arrangements;
- III. a report from EirGrid/SONI on a number of further sensitivities to those studied in the GCS in an effort to estimate the implications for Generation Adequacy in an energy only market.

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## 2.1 CONSULTATION RESPONSES

The Regulatory Authorities (RAs) welcome the level of active engagement shown by market participants – in workshops, in bilateral meetings and in the written consultation responses. The RAs will facilitate further engagement by holding at least one open stakeholder forum during the consultation period to discuss the issues raised in this Draft Decision Paper and the details of this forum can be found on the All-Island project website [www.allislandproject.org](http://www.allislandproject.org).

Responses to this paper are requested by **17.00 on 25th July 2014**. Following a review of the responses the SEM Committee will publish its final decision on the proposals set out in this paper in early September 2014. Responses should be sent to Jean Pierre Miura ([jeanpierre.miura@uregni.gov.uk](mailto:jeanpierre.miura@uregni.gov.uk)) and Philip Newsome ([pnewsome@cer.ie](mailto:pnewsome@cer.ie)). Please note that the SEM Committee intends to publish all responses unless marked confidential.<sup>1</sup>

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<sup>1</sup> While the SEM Committee does not intend to publish responses marked confidential. Please note that both Regulatory Authorities are subject to Freedom of Information legislation.

### 3 SUMMARY OF DECISIONS

The proposed decisions set out within this paper provide a high level market design for electricity trading on the island of Ireland. The proposed high level design of the I-SEM was developed to deliver security of supply, promote renewable energy sources, establish a level playing field in which competition can flourish and provide a sound investment climate that is based upon a stable and predictable regulatory framework<sup>2</sup>. The achievement of these SEM Committee's objectives and compliance with European energy policy through a stable market design is integral to our role as regulators.

Implementation of the European Electricity Target Model has been the main driver for the change from the SEM to the I-SEM. However, there are a number of emerging issues with the SEM design that the I-SEM will also address, notably efficient cross border trade, short term market incentives for flexibility, efficient exit signals and liquid forward markets.

The design of the I-SEM is characterised by:

- I. Liquid financially traded forward contracts to provide effective hedging for short term prices.
- II. Liquid and transparent short term physical markets that are coupled with European trading mechanisms.
- III. Balance responsibility for all participants.
- IV. Access to I-SEM marketplaces for all technologies and size of participants.

Having considered the views expressed by respondents on the four energy options consulted upon, the SEM Committee has arrived at the proposed decision, and is submitting this proposed decision to public consultation. This sub-section summarises the proposed decisions regarding the Energy Trading Arrangements and the Capacity Remuneration Mechanism.

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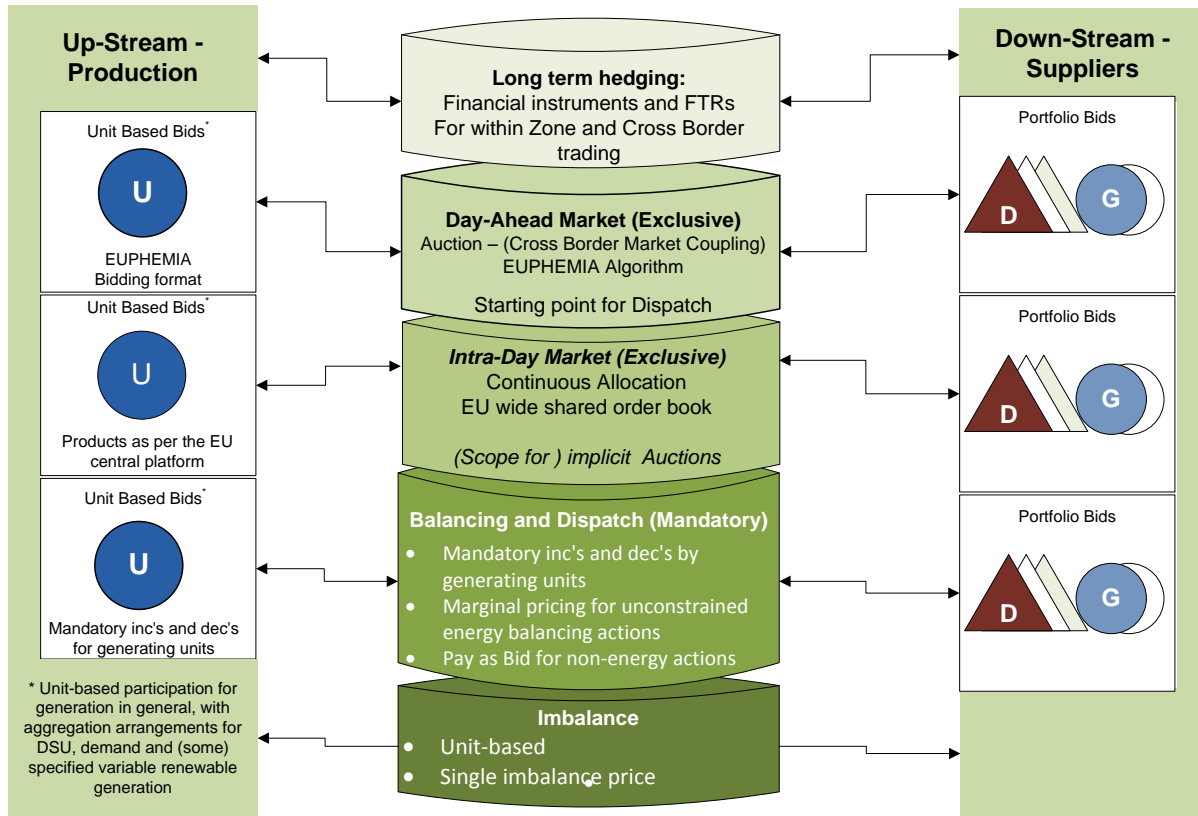
#### 3.1 DECISION ON THE I-SEM ENERGY TRADING ARRANGEMENTS (ETA)

The SEM Committee Proposal for the I-SEM trading arrangements is close to Option 3 consulted upon, although there are a number of modifications to the design which are intended to strengthen the performance of the HLD against the assessment principles. The key change from the original proposal is that, following assessment of consultation responses the SEM Committee has considered the potential difficulties relating to the enforcement of mandatory participation in the DAM. The SEM Committee now proposes relaxation of the requirement for mandatory participation in the Day Ahead Market. Participation in the centralised markets (Day Ahead and Intraday) will be exclusive but not mandatory. However, participation will be mandatory in the balancing market. The following subsections will summarise the key proposed features of the I-SEM Energy Trading Arrangements. The figure below presents the key features of the proposed Energy Trading Arrangements for the I-SEM.

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<sup>2</sup> [http://www.acer.europa.eu/Official\\_documents/Public\\_consultations/Documents/PC\\_2014\\_O\\_01%20-%20A%20Bridge%20to%202025%20-%20Public%20Consultation%20Paper.pdf](http://www.acer.europa.eu/Official_documents/Public_consultations/Documents/PC_2014_O_01%20-%20A%20Bridge%20to%202025%20-%20Public%20Consultation%20Paper.pdf)

**Figure 1 I-SEM Energy Trading Arrangements**



### Trading in Forward Timeframe

The SEM Committee recognises the concerns raised by participants around forward liquidity for energy contracts. Arguments have been made by respondents that the existence of a liquid spot market and transparent spot price in SEM has not engendered a liquid forwards market to enable market participants to hedge and that the absence of physical forward trading in the SEM was the cause of the lack of liquidity.

However, given the relatively small size of the all-island market and historically high levels of market concentration, emphasis was given to centralised physical trading in the spot market (i.e. Day Ahead and Intraday markets) and this should maximise liquidity and competition in these timeframes. The European Target Model also emphasises trading in the day-ahead and intra-day markets as mechanisms to ensure coupling of the separate electricity markets in order to bring about a single European market. The SEM Committee will also consider additional measures to foment liquidity of financial instruments in the forward timeframe within the detailed market design phase of the I-SEM.

In relation to cross border trading, the Target Model provides for several forms of risk hedging instruments, both physical and financial. Given the importance of day ahead market coupling and the competitive pressure that the interconnector can put on the market, the SEM Committee is of the view that Financial Transmission Rights (FTRs) will allow efficient trading across the interconnector without 'locking out' 20% of the market from the DAM that might arise from use of Physical Transmission Rights (PTRs). The SEM Committee therefore proposes financial trading for within zone and cross border trading in the forward timeframe.

### ***Day Ahead Market (DAM) and Intraday Market (IDM)***

The SEM Committee proposes that the centralised DAM, IDM and Balancing Markets will be the exclusive routes for physical contract nomination and physical scheduling of generation. The day Ahead Market will be based on the European Price Coupling initiative. Further consideration has been given to the question of whether EUPHEMIA would act as a robust algorithm for establishing the day ahead unconstrained schedule. The Project Team within the Regulatory Authorities (members of the RAs staff supported by Pöyry Management Consulting) has held discussions and workshops with SEMO and European Power Exchanges. It has been concluded that the EUPHEMIA algorithm is fit for purpose to serve as the means of unit commitment and scheduling of generation in the I-SEM DAM. This proposed decision is based on discussions held with expert parties, international best practice and the responses received to the consultation.

Furthermore, the proposed decision of the SEM Committee is that unit based bidding should be the default design for I-SEM. Unit based bidding will deliver significant transparency in the offers of individual units and in the context of the industry structure within the I-SEM will help deliver a more competitive market place for participants and help attract new entrants. The SEM Committee has concluded that unit based bidding will best meet the objectives of the I-SEM while it is also recognised that there should be some scope for allowing portfolio bidding in specific circumstances.

The Intraday Market in I-SEM will employ the products available through the EU central platform and will take place on a continuous basis, although periodic intraday auctions could be accommodated if developed further at European and regional level. Market participants can commence trading in the IDM once the DA schedules and INC/DEC offers to the Balancing Market are in place. In the medium term these are expected to be quite simple bidding structures but may develop more in the future to more sophisticated products as foreseen by the CACM Network Code. From a regulatory perspective, market participants can bid into the centralised market places (be they continuous only or combined with auctions) to deliver a desired operating pattern (subject to market power mitigation measures).

### ***Balancing Market (BM)***

In relation to the Balancing Market, this will employ a marginal pricing mechanism. This means that the last unit employed to provide balancing energy will set the price for all activated balancing energy. Marginal pricing is in line with the thrust of the EU target model for balancing.

The I-SEM balancing market will link into the EU balancing market arrangements through the Coordinated Balancing Area (CoBA) in the medium term and through the EU common merit order in the longer term. The identification of energy and non-energy balancing actions will be a key feature of the balancing market. Non-energy bids will be taken by the TSO from the same merit order as energy balancing but will be subject to pay as bid pricing. Therefore the TSOs will need to put in place a system to identify energy and non-energy actions.



## ***Imbalance***

The I-SEM will necessarily require the implementation of an imbalance settlement mechanism given the existence of ex-ante physical trading. Imbalance settlement will be related to differences between a balance responsible party's contracted positions (sum of DAM and IDM trades) and their ex-post allocation (i.e. metered generation, load and adjustments for any subsequent BM trades by the TSO). All market participants will be balance responsible. This means that all physical volumes not settled through the DAM and IDM are settled at the single marginal ex-post price for each settlement period reflecting the marginal costs of energy balancing actions taken by the TSO.

The SEM Committee is proposing a single imbalance pricing regime. This will mean that Balance Responsible Parties (BRPs) with a long position in imbalance settlement (contracted position > allocation) will pay the same imbalance price as BRPs with a short position (contracted position < allocation) in the same imbalance settlement period (i.e. there will be no spread upon the imbalance price).

### ***Further issues to be addressed***

Other aspects of market design will require further development. The topics below set out some of the key areas that the RAs will determine within the detailed market design phase:

- Given I-SEM structural changes and the new interactions at EU level it is likely that aspects of the current market power mitigation measures will change. The Bidding Code of Practice (BCoP) has been a key feature of the SEM design. It is unlikely that the BCoP will be maintained, at least in its current form, in the I-SEM, given the EUPHEMIA bid structures where generators have to actively format bids in order to recover start up and no load costs. This is not to say that ex-ante bidding principles would not be a part of some or all timeframes. The market surveillance activities in the I-SEM will also include the activities under the Regulation on Energy Market Integrity and Transparency (REMIT)<sup>3</sup> that is being implemented at a European level (and will therefore apply to the I-SEM). It is based primarily on ex-post market surveillance but also sets in place provisions for transparency and reporting of the various markets.
- The SEM Committee intends to implement a transitional mechanism for renewable generators to access the market. Responses to the SEM Committee Consultation Paper (SEM-14-008) indicated concerns that provision should be made for an efficient route to market for small renewable generation. The purpose of a transitional mechanism would be to ensure that small renewable generation would have a back stop route to market at the changeover between the SEM and I-SEM while aggregators establish themselves in the market. However, any mechanism implemented must ensure that it does not inhibit creation of a market solution for aggregation.

- It is the SEM Committee's intention that underlying SEM Committee policy on specific matters such as losses, firm access, priority of dispatch, etc will remain in place in the I-SEM where possible and will only be changed where material inconsistencies make any such policy incompatible with the I-SEM design. These issues will be dealt with in the Detailed Design Phase.

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## 3.2 SEM COMMITTEE DECISION ON I-SEM CAPACITY REMUNERATION MECHANISM (CRM)

### ***The need for a CRM***

While cognisant of the need to avoid distortions in the European Internal Electricity Market, the SEM Committee also recognises the potential shortcomings of energy-only markets. Such potential market failures are particularly acute for a small island system with high penetration of variable renewable generation.

Consequently, the SEM Committee considers that an energy only market will not in practice deliver long term generation adequacy on the island of Ireland. The SEM Committee therefore have concluded that there should be some form of explicit capacity remuneration mechanism (CRM) in the I-SEM and that this can be implemented in such a way as to avoid distorting cross border trade in the EU Internal Energy Market.

In addition to the analysis of generation adequacy by the TSOs, the Impact Assessment published with this Draft Decision Paper considers the justification for a CRM both qualitatively (measured against the I-SEM objectives) as well as additional quantitative analysis of some issues for generation adequacy in an energy only market driven by the changing nature of challenges faced by generation (such as lower running hours and major shifts in operating patterns) as the increasing levels of low carbon technologies come on the system.

Having considered the rationale for a CRM in the I-SEM and having taken into account wider European developments on public interventions to ensure generation adequacy as well as the views of respondents, the SEM Committee's proposed decision is that a CRM is required in the I-SEM.

### ***Five High level CRMs consulted upon***

The SEM Committee Consultation Paper proposed five forms of CRM that could be adopted as part of the I-SEM High Level Design which can broadly be categorised as to whether they are price based or quantity based mechanisms.

At a high level, a quantity based capacity market involves an administrative determination of the capacity required to give an adequate level of reliability. Market participants then compete to offer that required level of capacity at lowest price. A price based capacity market involves determining centrally the price to be paid for capacity and the market chooses how much to supply. A price based capacity market employs a demand curve, i.e., a price that all suppliers will be paid based on an aggregate amount of eligible capacity.

The SEM Committee's proposed decision is that a quantity based scheme is in the best interests of all-island consumers. This proposal followed a long process of assessment of various design options and consultation responses. Consideration was also given to international best practice and academic research. Having made the decision to implement a quantity based CRM; the next question is to consider the key quantity based options put forward in the Consultation Paper, which were Capacity Auctions and Reliability Options.

The SEM Committee's proposed decision is that Centralised Reliability Options (ROs) issued by a central party is the form that a CRM will take, which corresponds to Option 5a in the Consultation Paper. Reliability Options are a market based mechanism, which is a key consideration at EU level and provide for a market based valuation of capacity and a market based mechanism for non-delivery on obligations.

At a basic level a Reliability Option is a financial one way CfD issued by a centralised party, such as the TSO, to all successful bidders in a competitive auction. The ROs have a strike price and a reference price. If the reference price goes above the strike price the holder of the RO pays the difference back to the TSO. The RO holder receives an option fee, set in a competitive auction, in return for handing back the difference between the reference and strike prices when the reference price is higher. The option fees will be paid by consumers, as the beneficiaries of the generation capacity.

The Reliability Options should not unduly affect the spot electricity price which encourages efficient cross border trade. Reliability Options do not specifically require plants to bid in a certain way in the market and therefore do not distort cross border trades.

The Capacity Requirement determines the amount of capacity to be auctioned by the TSO. The Capacity Requirement in the current SEM CPM is determined by the TSOs and has a number of inputs including an adequacy standard. The adequacy standard in the current CPM is 8 hours.

The detailed market design phase will establish the following features of the Reliability Options:

- Capacity Requirement;
- Strike Price;
- Reference Price;
- Additional Penalty Arrangements;
- Eligibility
- Auction Rules
- Delivery Timeframe and Contract Length
- Secondary Trading Arrangements
- Collateral Arrangements
- Supplier Interactions and customer payment

### 3.3 I-SEM PROPOSED HIGH LEVEL DESIGN

The following tables summarise proposed decisions of the SEM Committee on the I-SEM energy trading arrangements and Capacity Remuneration Mechanism:

#### **DECISION 1: I-SEM ENERGY TRADING ARRANGEMENTS:**

##### **Forward Market**

- i. The I-SEM will have only financial trading instruments for within zone trading.
- ii. Subject to further discussions and agreement with other neighbouring markets, Cross-Zonal trading will be supported only by Financial Transmission Rights (FTRs).

##### **Day-Ahead Market**

- iii. The European Day Ahead Market will be the 'exclusive' route to a physical contract nomination.
- iv. Unit-based participation for generation in general, with (gross portfolio) aggregation arrangements for DSU, demand and (some) variable renewable generation.

##### **Intraday Market**

- v. Continuous intraday trading will be the exclusive route to Intraday physical contract nominations (with scope to introduce periodic implicit auctions as/if these develop at the European level)
- vi. Unit-based participation for generation in general, with (gross portfolio) aggregation arrangements for DSU, demand and (some) variable renewable generation.

##### **Balancing (or process for reaching feasible dispatch)**

- vii. Starting point for dispatch is detailed and feasible production plans required for all market participants following DAM.
- viii. Mandatory participation in Balancing Mechanism (BM) after DA stage
- ix. Unit-based participation in BM for generation in general
- x. Marginal pricing for unconstrained energy balancing actions
- xi. Pay as Bid for non-energy actions (possibly combined with local market power mitigation measures)

##### **Imbalance**

- xii. Unit-based
- xiii. Single imbalance price
- xiv. Route to market for small players

##### **Other complementary actions to support I-SEM efficiency:**

- xv. Encouragement of forward financial market liquidity
- xvi. Facilitation of centralised forward trading platform

## **DECISION 2: THE I-SEM WILL INCLUDE A CRM**

The SEM Committee proposes that a CRM is required in the High Level Design of the I-SEM and developed in parallel to the energy market detailed design in light of:

- The economic rationale for an explicit capacity remuneration mechanism given the market failures associated with energy only markets giving rise to the missing money problem
- The magnification of these market failures meaning that the missing money problem is particularly acute in an small island system with high levels of variable generation
- The Impact Assessment of need for a capacity remuneration mechanism against the I-SEM primary and secondary assessment criteria
- Evidence from the TSOs Generation Adequacy reports (the Generation Capacity Statement and the Adequacy Report for an Energy Only Market)
- Pöyry modelling analysis on the impact of the changing system dynamics on the running patterns and hours of conventional generation as a result of the increased penetration of low carbon renewable technologies.

## **DECISION 3: QUANTITY BASED CRM**

The I-SEM will have a quantity based Capacity Remuneration Mechanism.

## **DECISION 4: THE I-SEM CRM WILL BE BASED ON RELIABILITY OPTIONS**

The form of CRM will be Reliability Options issued by a central party. The SEM Committee's proposed decision for Reliability Options has considered the following:

- Reliability Options are a market based mechanism consistent with the underlying principles of the EU Internal Market and the I-SEM philosophy
- Reliability Options do not unduly affect the spot electricity price which encourages efficient cross border trade.
- Reliability Options are a straightforward and understandable mechanism
- Reliability Options will act to remove supplier exposure to scarcity rents and can encourage increased liquidity in certain market timeframes.

## 4 DEVELOPMENT OF THE I-SEM HIGH LEVEL DESIGN – PROCESS TO DATE

### 4.1 PROGRESS TO DATE ON THE I-SEM PROJECT

- 4.1.1 The creation of a pan-European internal market for electricity, one of the key pillars of the single market, has been given fresh impetus by the European Union’s Third Energy Package. This requires implementation of the EU Target Model that will harmonise cross-border trading rules.
- 4.1.2 In Ireland and Northern Ireland the Department of Communications, Energy and Natural Resources (DCENR) and the Department of Enterprise Trade and Investment (DETI) respectively have charged the SEM Committee (SEM Committee) with responsibility for developing trading arrangements that will be compliant with the EU Target Model.
- 4.1.3 In March 2013, the two Departments endorsed the recommendation in the “Next Steps Decision Paper” (SEM-13-009) published by the SEM Committee in February 2013 that the SEM Committee should proceed to develop a High Level Design (HLD) of the wholesale market arrangements on the island of Ireland.
- 4.1.4 The SEMC has conducted extensive stakeholder engagement beginning with the Integrated Single Electricity Market (I-SEM) HLD Consultation Paper (SEM-14-008) was published by the SEM Committee on 5 February 2014 outlining options for Energy Trading and Capacity Remuneration Mechanisms for Ireland and Northern Ireland from 2016.

### 4.2 INDUSTRY STAKEHOLDER ENGAGEMENT

- 4.2.1 Since the publication of the I-SEM HLD Consultation Paper, the Regulatory Authorities (RAs) have been focused on stakeholder engagement to inform this Draft Decision Paper.
- 4.2.2 An industry wide stakeholder forum took place on 25 February 2014. This gave the RAs an early opportunity to present a detailed overview of the I-SEM consultation paper including; the energy trading arrangement options, options assessment and CRM. The open floor discussions conducted at this forum provided a helpful environment for understanding initial stakeholder views at an early stage in the consultation process.
- 4.2.3 Following the industry wide stakeholder forum a series of bilateral meetings were held over 3 days in March. The RAs met with 24 individual stakeholders and stakeholder groups, allowing more focused discussions on the I-SEM consultation paper from each participant’s own unique perspective. The objective of the bilateral meetings was to answer participant's queries and to clarify understanding and to help to inform responses to the Consultation paper.

- 4.2.4 The bilateral meetings also afforded the RAs a further opportunity to gain an early indication of the key concerns of participants in advance of formal submissions. The main issues included:
- the need for a capacity remuneration mechanism in the HLD of the I-SEM;
  - liquidity in forwards markets;
  - efficient interconnector flows; and
  - the continued need for appropriate market power mitigation measures.
- 4.2.5 Some concern was also expressed about wind curtailment and the effect of exposing wind to imbalance pricing. As a result of the feedback received from stakeholders through these engagements, the RAs published a set of worked examples<sup>4</sup>. These worked examples sought to illustrate the trading arrangements across the different timeframes for the various HLD options set out in the I-SEM consultation paper.

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### 4.3 OTHER KEY STAKEHOLDER ENGAGEMENT

- 4.3.1 The Consultation Paper was formally presented by the Project Board to the Departments, OFGEM and DECC at a joint Ministries meeting in advance of the industry wide stakeholder forum in February. Since then, the Departments have been kept frequently informed on developments in the project through the regular meeting with the RAs.
- 4.3.2 In April, the Project Board met with representatives from the European Commission and ACER, at which a briefing was provided on the overall project progress along with a summary of the Energy Trading Options and CRM options being consulted on. The Commission and ACER indicated they were satisfied with the development of the project at that point. A follow up meeting is scheduled for September to inform the Commission and ACER of the RAs' Final Decision on I-SEM.

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### 4.4 POLICY AND TECHNICAL RESEARCH

- 4.4.1 A significant amount of technical and policy research has taken place since the publication of the Consultation paper on 5th February 2014. Topics examined in detail have included:
- exploring the differences between PTRs and FTRs;
  - market participation over different timeframes;
  - establishing the DA contractual schedule through EUPHEMIA;
  - near time system operations and the balancing market;
  - market power in general and bidding controls in particular; and
  - Capacity Remuneration Mechanisms.

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<sup>4</sup> [http://www.allislandproject.org/en/wholesale\\_overview.aspx?article=d3cf03a9-b4ab-44af-8cc0-ee1b4e251d0f](http://www.allislandproject.org/en/wholesale_overview.aspx?article=d3cf03a9-b4ab-44af-8cc0-ee1b4e251d0f)



4.4.2 These areas of research were informed by the extensive stakeholder engagement as outlined above and two specific additional workshops were conducted as follows:

- As part of the information gathering, the Project Team met with SEMO and the TSO over two days in March for workshops exploring the capabilities of EUPHEMIA, near time operations and the balancing market.
- A workshop with East-West Interconnector and Moyle Interconnector took place in April exploring the differences between PTRs and FTRs.
- A technical meeting with Euhpemia developers to clarify the capabilities of the linked block bids to represent different scenarios of generation outputs and required revenue recovery.

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#### 4.5 DEVELOPMENT OF PROPOSED DECISIONS

4.5.1 Following the end of the consultation period on the 6th April, the Project Team reviewed the consultation responses in detail. This, and the extensive engagements outlined and the policy and technical research conducted, have formed the basis for this Draft Decision Paper.

## 5 EXPERIENCE AND KNOWLEDGE ACCUMULATED WITH THE SEM

### 5.1 OVERVIEW

5.1.1 This section reviews the experience of the SEM, from inception in 2007 to date, in order to inform design of the new market. It therefore aims to establish some of the lessons learned and focuses on the following topics:

- changes in installed capacity and the capacity of the interconnectors;
- price formation;
- competition and market power;
- forward liquidity;
- profitability and entry/exit; and
- impact of more wind.

5.1.2 A number of changes have been made during the lifetime of the SEM, such as the introduction of intra-day trading however overall the design of the market has remained relatively stable.

### 5.2 CHANGES IN INSTALLED CAPACITY AND INTERCONNECTION

5.2.1 The period from November 2007 to date has seen significant changes to generation and interconnection capacity on the Island of Ireland with over 2000MW of investment in new conventional generation<sup>5</sup>. This includes investment in conventional generation technologies such as two new CCGTs at Aghada and Whitegate and OCGT units at Kilroot and Edenderry. A further CCGT plant is in advanced stages of development by SSE at Great Island. There has also been significant investment in refurbishing the pump storage units at Turlough Hill, and investment in other technologies including CHP, aggregated generator units and energy from waste.

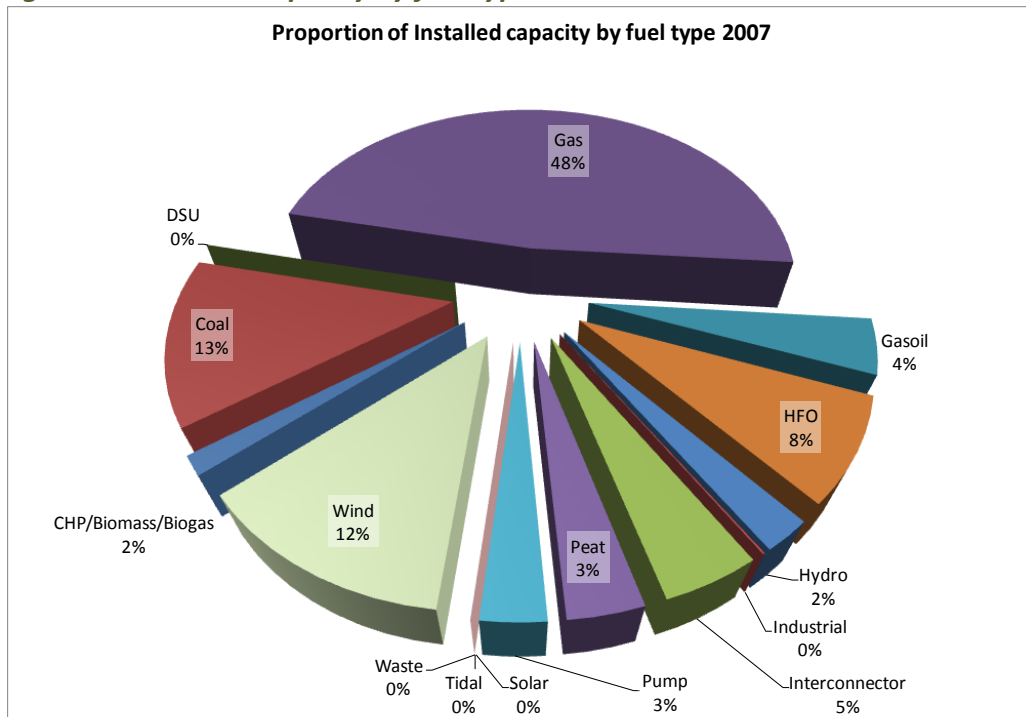
5.2.2 The SEM has also facilitated the emergence of demand side units with over 100MW of demand response available to the market and more in development. Figures 2 and 3 show the changes to the installed capacity in Northern Ireland and Ireland since the beginning of SEM, showing the proportion of installed capacity by fuel type in 2007 and 2013 respectively.

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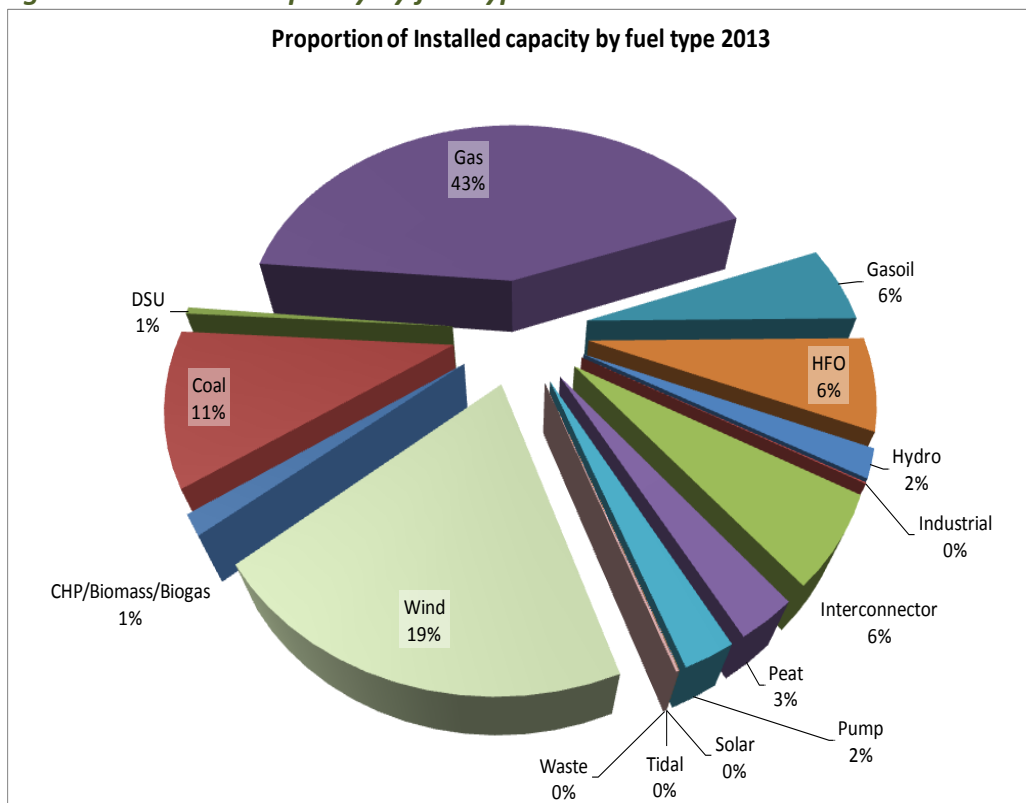
<sup>5</sup> For further information please see:

SONI: "Generation, Seven Year Capacity Statement, 2007 – 2013", EirGrid: "Transmission Forecast Statement 2007 – 2013" and SONI & EirGrid: "Ten year transmission forecast statement 2013"

**Figure 2 – Installed capacity by fuel type 2007**



**Figure 3 – Installed capacity by fuel type 2013**



- 5.2.3 The All-Island Generation Capacity Statement published by EirGrid<sup>6</sup> (January 2014) indicates that there is an overall surplus of generation on the island of Ireland. However some generation capacity is likely to be mothballed or closed in the near future. Were this to happen, it would put stress on the electricity system, in particular in Northern Ireland where the Generation Capacity Statement has indicated that there is potential for an energy deficit from 2016 to 2020. This would result in a security of supply issue for Northern Ireland<sup>7</sup>. The SEM was established with the expectation that an additional North-South interconnector would be in place and this infrastructure would mitigate the anticipated security of supply issue within Northern Ireland<sup>8</sup>.
- 5.2.4 Interconnection between the all-island market and the GB market has grown substantially since the start of the SEM. Moyle interconnector was initially the only import/export capacity on the island with a maximum import capacity of 400MW and a maximum export capacity of 80MW. The export capacity of the Moyle interconnector increased to over 300MW in 2011 although Moyle is currently reduced to 250MW of import and export capacity owing to a technical fault. In 2012, an additional 500MW (import and export) of interconnection between SEM and GB became operational with the commissioning of the East West Interconnector.
- 5.2.5 The SEM has also seen significant increases in renewable generation. This has been prompted by European Commission targets to reduce carbon emissions by 20% of 1990 emission levels by 2020. To meet this in Northern Ireland and Ireland both governments have set a target of 40% of generation coming from renewable sources by 2020. This will require a significant amount of investment in renewable generation, which is expected to be predominantly wind. The new electricity trading arrangements will continue to be consistent with achievement of these government targets through facilitating the necessary investment in renewable generation by means of efficient market signals.
- 5.2.6 In conclusion, there has been substantial investment in generation during the last 7 years. However, there are concerns that the location and type of investment may not have been optimal. Long term security of supply on the island of Ireland is a challenge and the I-SEM will be required to take account of the changing generation mix as a result of the increased level of renewable generation as well as the impact of increased demand side participation. It will be important to ensure that the right investment signals are in place to ensure that future energy needs are met.

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<sup>6</sup> All-Island Generation Capacity Statement for 2014-2023.

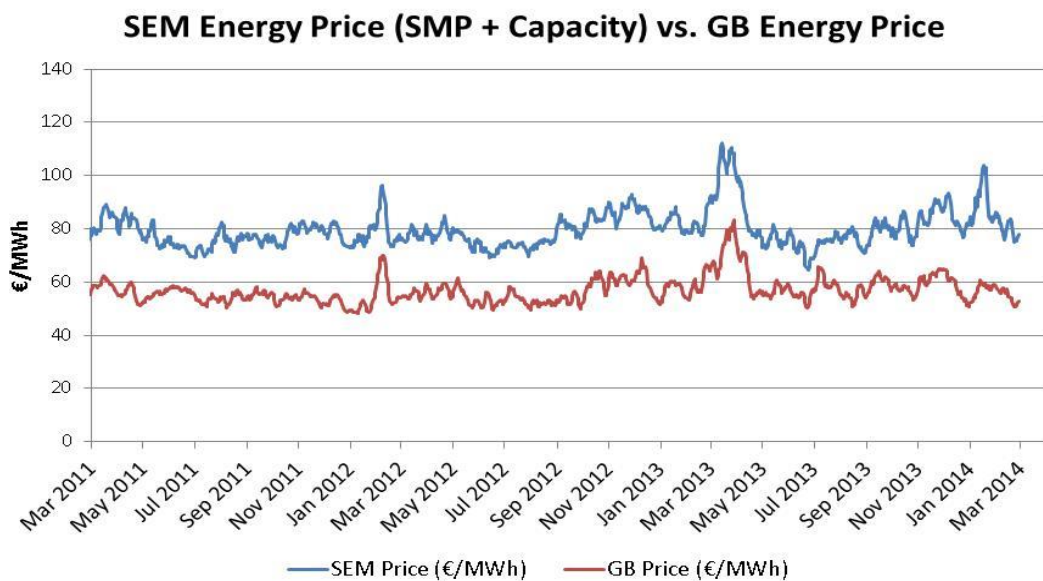
<sup>7</sup> DETI UR paper on security of supply

<sup>8</sup> CBA for SEM

## 5.3 PRICE FORMATION

5.3.1 The trend of market prices in the SEM has been in line with price trends in other markets (e.g. GB) and with underlying fuel costs. This is illustrated in figure 4 below. The SEM still has amongst the highest wholesale electricity prices in Europe. This however is not altogether surprising given the very high reliance on imported fossil fuels and that their importation incurs cost of carriage which is reflected in prices to consumers. An example of this is natural gas consumed in the SEM, which incurs the additional cost of transportation on the subsea interconnectors.

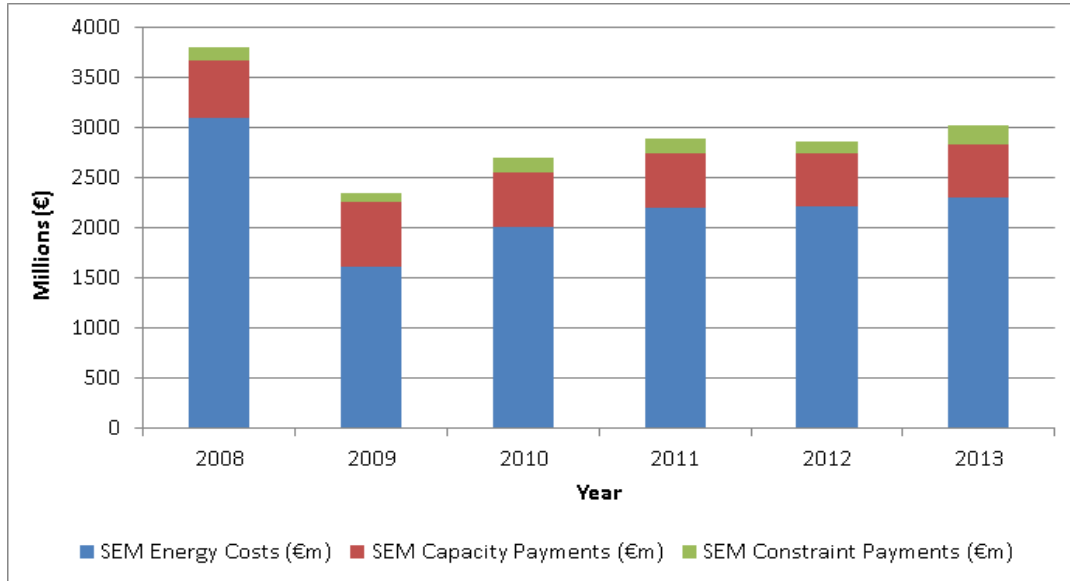
**Figure 4 – SEM wholesale price (SMP + Capacity) v GB BETTA wholesale price**



5.3.2 Increased interconnection with GB should permit greater price harmonisation between the two markets, insofar as the level of (and access to) interconnection allows. In an efficient market energy flows would be from the high price zone to the low price zone. This has not always been the case in the SEM (with respect to flows to/from GB) for a number of reasons, including long gate closures, the specific mechanisms for recovering start-up and no-load costs in the SEM (i.e., the uplift component of prices), and participants' trading strategies. This presents an area for improvement for the new I-SEM arrangements.

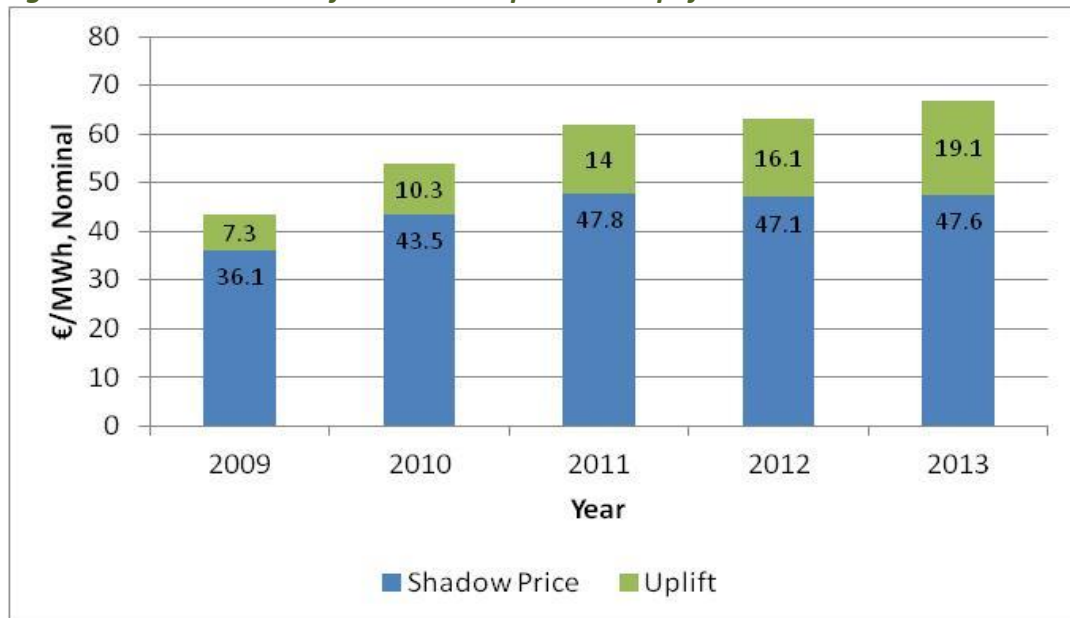
5.3.3 The System Marginal Price (SMP), which is mainly composed of the cost of fuel is only one part of the overall wholesale cost of energy in the SEM. This is made up of a number of elements including the SMP, Capacity Payments and Constraint Payments. The cost of these component parts by year (in € millions) since start of the SEM is illustrated in figure 5.

**Figure 5 – SEM Annual Wholesale Electricity Costs**



5.3.4 SMP is itself made up of a Shadow Price and Uplift, which is designed to cover costs of starting and part-loading generation units. Uplift has become a larger component of the overall System Marginal Price over the past few years, as shown in Figure 6 and accounted for 19% of the SMP in 2013. In itself this is not necessarily a problem, but it indicates the importance of the Uplift calculation in determination of the wholesale cost to consumers.

**Figure 6 – Contribution of the shadow price and uplift to the SMP in the SEM**



Source: SEMO data

5.3.5 The *ex post* nature of price formation in the SEM limits the ability of demand participants to respond to high prices. There is provision for Demand Side Units to be registered in the SEM and influence price and Demand Side Units are required to provide offers significantly before the time of delivery but with scheduling decisions taken close to delivery. The RAs have previously cited the lack of a firm day-ahead

schedule as a barrier to active demand side participation<sup>9</sup>. This has the effect of most demand customers being price takers but without firm prices on which to base consumption decisions. Facilitating increased participation for demand side will be important in the I-SEM arrangements and the existence of day ahead prices will facilitate demand side participation.

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## 5.4 COMPETITION AND MARKET POWER

- 5.4.1 Competitive markets tend to provide appropriate investment and operational signals resulting in efficient entry and exit from the market. There have been long-standing concerns about market concentration within the All-Island Market and in particular the potential for market abuse from a participant with market power, which can be general market power or local market power.
- 5.4.2 To address this, the RAs introduced a market power mitigation strategy as part of the development of the SEM. This included (but was not limited to) *ex ante* measures of directed contracts and short-run marginal cost bidding principles, with *ex post* market monitoring. These market power mitigation measures are considered to have restricted the ability of market participants to exert market power in the spot market.
- 5.4.3 However the exercise of market power remains a concern to many market participants and market power mitigation measures in the SEM may not have facilitated the development of competition as expected. For example, bidding principles employed may have restricted the development of competition between certain types of generators by restricting their ability to compete through their bidding profile, such as start-up costs. Market power mitigation therefore remains an important issue that will be addressed in the detailed design of the I-SEM.
- 5.4.4 Another key feature of a competitive market is transparency. The SEM has been successful in ensuring data transparency in relation to the prices paid in the pool. All generators are paid a single SMP for their energy. This information is published alongside the information on the technical characteristics of their plant. In addition to this the commercial offer data relating to the structure of the bids from each generating set is also published, along with all relevant price formation information. This transparency of data facilitates competition enabling participants and interested stakeholders to understand the price formation process, and relevant market signals. Transparency is therefore an effective mechanism in mitigating market power abuse and will be a feature that is maintained and developed in the I-SEM. Transparency helps facilitate competition and is increasingly seen as an essential feature of competitive electricity markets (with increased weight being placed on it at the EU level).

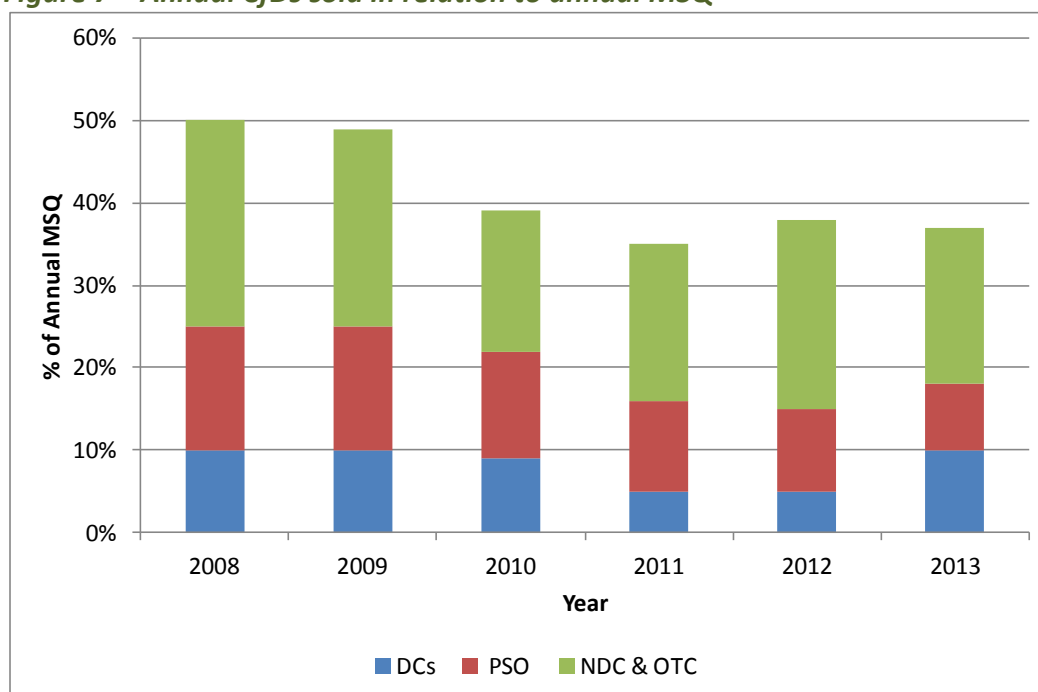
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<sup>9</sup> 'Demand Side Vision for 2020. Decision Paper. SEM/11/022', 27 May 2011. SEM Committee'

## 5.5 FORWARD MARKET LIQUIDITY

5.5.1 The SEM has not been successful in developing a forward hedging contracts market. Cambridge Economic Policy Associates (CEPA) were employed by the SEM Committee to conduct an independent review on market power and liquidity in the SEM in December 2010<sup>10</sup>. This paper provided evidence in relation to hedging contract levels in the SEM and provided an analysis of liquidity in other European energy markets. It found that liquidity in hedging markets was low in comparison to other European markets (although the report noted that such contracts markets are constantly evolving). An illustration of the volumes of forward contracts offered is set out in figure 7 below. This shows the proportion of CfDs offered under three categories (Non Directed Contracts & Over the Counter Contracts, PSO backed CfDs and Directed Contracts) in relation to market schedule quantities of total generation.

**Figure 7 – Annual CfDs sold in relation to annual MSQ**



5.5.2 Although price formation in the spot market is transparent, the framework for the ex post calculation of prices (e.g., BCoP, calculation of uplift) presents risks for generators offering long-term hedging contracts. A generator may not be able to guarantee that it will be in the schedule on the required day increasing the risk of offering a long term hedging contract. However, suppliers and generators require sufficient liquidity in short-term hedging contracts to be able to trade out of a position where necessary.

5.5.3 Another key issue has been the prevalence of directed contracts. These are hedging contracts in which the price and volumes are determined by the Regulatory Authorities. The evidence gathered by CEPA indicated that in 2010-11 just under

<sup>10</sup> CEPA: "Market Power and Liquidity in SEM, a report for the CER and the Utility Regulator" 15 December 2010



12TWh of hedging contracts were made available, and of these just under 2TWh were from directed contracts. The volume of directed contracts offered had been in decline until 2010-11. It has increased in subsequent years owing to the horizontal integration of ESB Power Generation and ESB International. Other barriers to forward contracting, including vertical integration and high collateral requirements, also exist and will be taken into consideration in the design of the I-SEM.

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## 5.6 PROFITABILITY AND ENTRY/EXIT

- 5.6.1 The SEM Committee has published two reports relating to the financial performance of generators in the SEM<sup>1112</sup>. These have indicated that net profitability for generators in the SEM is approximately 13%, with only coal plants exhibiting net profitability for 2011 below 10%. It is worth noting that in calculating the Best New Entrant costs for the purposes of the capacity mechanism in the SEM, the weighted average rate of return on capital is set at 6.6%. Further analysis on clean and dark spark spreads indicate that generation in the SEM earns a higher rate of return than that of its GB counterpart. However, there are a number of factors that should be considered, other than efficient allocation of resources, given structural differences in the generation portfolios and differences in market designs between the electricity market in GB and the SEM.
- 5.6.2 The significant investment in generation and infrastructure over the lifetime of the SEM has been discussed. In addition, there has been large scale IPP entry as well as international companies being attracted into the market, for example SSE and Centrica. The SEM has also been successful in providing a route to market for small players, particularly renewable generation, demand side units and aggregated generation units. All of these participants provide value to the system and changes to the market design will enable them to participate effectively in the new trading arrangements.
- 5.6.3 The SEM has not experienced significant exit from the market. There is no universal metric for efficient market exit and the costs of overly sharp exit signals may be significant. So, for example, in the winter of 2010/11 many of the oldest plants on the system were operational, keeping the lights on when some newer plants were unavailable. However, exit signals may have been dulled because the price per MW of available capacity is relatively stable either side of the capacity requirement. In some schemes the price per MW will drop off quite significantly when installed capacity exceeds the amount of capacity required to meet the loss of load expectation security standard. This issue is discussed later in this paper. To ensure a competitive market the new trading arrangements will ensure that efficient entry and exit from the market can be facilitated.

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<sup>11</sup> SEM Committee Publication: "Generator Financial Performance in the Single Electricity Market, RAs' Market Modelling Group (MMG) Financial Analysis Report" May 2013

<sup>12</sup> SEM Committee Publication: "Generator Financial Performance in the Single Electricity Market, RAs' Market Modelling Group (MMG) Financial Analysis Report" May 2012

5.6.4 Retail markets have become more competitive in Ireland since 2007. In addition, the roll-out of smart metering will change the dynamics further, which should bring more competitive pressure on the wholesale market. The new trading arrangements should also support the strong development of retail competition, which will drive innovation and liquidity.

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## 5.7 THE IMPACT OF VARIABLE GENERATION

5.7.1 There has been significant investment in renewable generation since the start of the SEM. The majority of this renewable generation has come from variable generation such as wind. Meeting the 2020 renewable generation targets will require a significant amount of further investment in renewable generation, which is again expected to be predominantly wind.

5.7.2 This volume of wind will increasingly affect price formation within the market. Significant levels of zero or negative short run marginal cost generation (whether acting as price-takers, or bidding zero or negative prices into the market) has an effect on the volume of dispatchable generation that determines the price for the whole market<sup>13</sup>. These issues are faced across the EU where higher deployment of variable generation (wind and solar) is increasing the number of trading periods with very low prices. These periods of lower prices and resultant reduced running hours for conventional generation is generally considered to contribute to the ‘missing money’ problem in energy-only markets.

5.7.3 In meeting the target of 40% of total electricity system demand on average, there will need to be periods of very high variable generation to offset periods of low variable generation. The SEM has seen a number of zero prices over the last number of years but the SEM plant mix, the optimisation nature of the SEM algorithm and the uplift mechanism has meant that the number of zero prices has been low. The new market arrangements will be required to accommodate the renewable generation on the Island of Ireland in line with existing policy decisions. But the challenges around price formation will remain for the I-SEM arrangements.

5.7.4 The increased amount of installed wind capacity in the All-Island Market has necessitated changes in the way the system is operated. The higher levels of variable non-synchronous generation have and will continue to bring new challenges. For example:

- there needs to be fast acting back-up generation when the wind is not blowing; and
- new system services are required for operating a lighter system.

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<sup>13</sup> In practice, much of the renewable generation is exposed to market prices (even though it is a ‘price-taker’ in the pool, e.g., renewables receiving RO support in Northern Ireland). Even in Ireland, REFIT-supported generation (as well as any out-of-AER contract generation) has been exposed to market prices when the market price has exceeded the REFIT.

5.7.5 To address the increased penetration of renewables on the system the TSOs have begun a programme of work on Delivering a Secure Sustainable System (DS3)<sup>14</sup>. This programme aims to evaluate the impact on the system of this increased penetration of renewables as well implementation of policies to accommodate high levels of renewable energy. A new range of ancillary services has been approved by the SEM Committee (SEM-13-098) and the mechanism for the procurement of these services is currently being developed by the Regulatory Authorities. The new market arrangements will need to consider the potential impact of DS3 system services on revenue streams to ensure no double payments by consumers.

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## 5.8 CONCLUSIONS

5.8.1 The SEM has been successful in a number of areas. The new market design should build upon the experiences of the SEM, making improvements in areas where it is possible to do so. The key challenges for I-SEM are:

- To ensure that the right investment signals are in place to ensure that future energy needs are met;
- To take into consideration the changing generation mix as a result of the increased level of renewable generation, as well as the impact of increased demand side participation;
- improve the efficiency of the use of the interconnector;
- facilitate increased participation of demand-side;
- to have effective market power mitigation measures in place, with consideration of the balance between relying on competitive pressures and regulatory restrictions (which may not allow appropriate competition to develop);
- maintain and develop transparency;
- ensure that consumers can capture the benefits of competition between generation owners;
- ensure that efficient entry and exit from the market can be facilitated;
- enable effective participation of a range of market players, including single generating unit owners, owners of generation portfolios, renewable generators and non physical participants;
- support the development of retail competition, which will drive innovation and liquidity;
- accommodate renewable generation on the Island of Ireland in line with existing policy decisions, whilst addressing the challenge for price formation and system operation.

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<sup>14</sup> Further information on the DS3 project is available at [http://www.allislandproject.org/en/transmission\\_decision\\_documents.aspx?article=06c22cd8-a936-426b-ac21-ed28b5292566](http://www.allislandproject.org/en/transmission_decision_documents.aspx?article=06c22cd8-a936-426b-ac21-ed28b5292566), or at <http://www.eirgrid.com/operations/ds3/>

## 6 PROPOSED DECISION - ENERGY TRADING ARRANGEMENTS

### 6.1 INTRODUCTION

#### 6.1.1 This section:

- Lists the four options for different energy trading arrangements that were presented in the February 2014 Consultation Document on the I-SEM HLD;
- Summarises responses in relation to the preferred form of energy trading arrangements, including suggestions for changes to particular features of the options presented in the Consultation Document;
- Addresses the points raised in the consultation and provides the SEM Committee's rationale for its proposed decisions.
- Sets out the SEM Committee's proposed decision on the form of energy trading arrangements for the I-SEM; and

### 6.2 OPTIONS CONSULTED UPON FOR ENERGY TRADING ARRANGEMENTS

#### 6.2.1 The February 2014 I-SEM HLD Consultation Paper (SEM-14-008) presented four options for the HLD of energy trading arrangements:

- Adapted Decentralised Market (Option 1 - ADM);
- Mandatory *ex post* Pool for Net Volumes (Option 2 - MPNV)
- Mandatory Centralised Market (Option 3 - MCM); and
- Gross Pool – Net Settlement Market (Option 4 - GPNS).

#### 6.2.2 The Consultation Paper noted that there was scope to refine the specific design of each option as a part of the feedback given through the consultation process. Any refinements should however not alter the overall objective of the option.

#### 6.2.3 Table 1 summarises how each of the options is built up through the choices for each of the design topics identified in the Consultation Paper. It is colour-coded to illustrate the difference in the 'philosophies' underpinning the options. It describes how the options range from market arrangements where market participants have both greater responsibilities and risk mitigation opportunities (coloured in blue), to ones in which there is much greater central control of market participants' activities (coloured in orange). Further information on the four energy trading options is available in the Consultation Paper.

**Table 1 – Overview of options for energy trading arrangements**

		Adapted Decentralised Market	Mandatory <i>ex post</i> Pool for Net Volumes	Mandatory Centralised Market	Gross Pool - Net Settlement Market	
Participation in European markets for trading of energy in DA and ID timescales	DA	Portfolio vs. unit bidding	Gross portfolio bidding	Portfolio bidding	Unit bidding	Portfolio bidding
		Mandatory vs. voluntary	Voluntary participation [plus specific liquidity promoting measures]	Voluntary participation [with volume limitation measures]	Mandatory participation	Voluntary participation
		Bid format	Simple, block (or sophisticated unit) bids	Simple, block (or sophisticated unit) bids	Simple, block or sophisticated bids	Simple, block (or sophisticated unit) bids
	ID	Portfolio vs. unit bidding	Gross portfolio bidding	Unit bidding	Unit bidding	Unit bidding
		Exclusive vs. Non-exclusive	Non-exclusive	Non-exclusive [with same volume limitation measures]	Exclusive	Non-exclusive
		Bid format	Simple, block [or sophisticated] bids	Simple, block [or sophisticated] bids	Simple, block [or sophisticated] bids	Simple, block [or sophisticated] bids
Process for reaching feasible dispatch position	Starting point of dispatch	- DA nomination is the starting point (updated in the IDM) - Maintaining absolute priority dispatch	- DA nomination is the starting point (updated in the IDM) - Maintaining absolute priority dispatch	- DA nomination is the starting point (updated in the IDM) - Maintaining absolute priority dispatch	- IC volumes determined by DAM and IDM - Maintaining absolute priority dispatch	
	Bids to the TSO for balancing and dispatch	Voluntary i incs and decs up to IDM GC (mandatory i incs and decs for generating units after IDM GC)	Mandatory net (+/-) complex bids for generating units	Mandatory i incs and decs for generating units	Mandatory complex bids for generating units	
	Timing of bid submission	At DA and then updated continuously	At DA and then updated continuously	At DA and then updated continuously	At DA and then updated at specific windows	
Imbalance/Pool settlement		Marginal imbalance price applied to all market participants based on (+/-) energy balancing actions	Net <i>ex post</i> unconstrained market schedule to minimise production cost that determines the <i>ex post</i> prices paid to/by all market participants (prices may vary by direction)	Marginal imbalance price applied to all market participants based on (+/-) energy balancing actions	Full <i>ex post</i> unconstrained market schedule to minimise production cost that results in a single marginal price paid for all scheduled volumes	
Arrangements for long-term trading	Internal	Both physical and financial trading	Both physical [with volume limitation measures] and financial trading	Financial trading	Financial trading	
	Cross-border	PTRs to support bids for interconnector capacity	PTRs to support bids for interconnector capacity	FTRs to support bids for interconnector capacity	FTRs to support bids for interconnector capacity	

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## 6.3 SUMMARY OF CONSULTATION RESPONSES ON ENERGY TRADING ARRANGEMENTS

6.3.1 The Consultation Paper set out an overarching consultation question on the choice between the different options for energy trading arrangements:

***Which option for energy trading arrangements would be your preferred choice for the I-SEM market, and why?***

6.3.2 This was supplemented by additional detailed questions on topics used to describe the HLD of the I-SEM:

***Are these the most important topics to consider in the description of the HLD for the revised energy trading arrangements for the single electricity market on the island of Ireland?***

***Are there other aspects of the European Internal Electricity Market that should form part of the process of the High Level Design of energy trading arrangements in the I-SEM?***

6.3.3 The Consultation Paper asked for evidence specifically in relation to the assessment criteria of security of supply, efficiency and adaptability.

***What evidence can you provide for the assessment of the HLD options with respect to security of supply, efficiency and adaptability?***

6.3.4 For each of the four options for the HLD of energy trading options, three detailed questions (Q7-Q18) were asked in relation to:

- whether there are any suggested changes to the design to make the option more effective;
- respondents' views on the initial assessment presented of the CRM; and
- how the option measures against the primary duty of the SEM Committee to protect the long and short-term interests of consumers on the island of Ireland.

### OVERVIEW

6.3.5 The Consultation Paper received ninety-five responses, demonstrating the importance of the new design to all stakeholders in the electricity industry, including market participants, consumers and other interested parties.

6.3.6 Option 1 is preferred by a number respondents who consider it to be fully aligned with the principles of the Target Model. It was also stated that this option is the most similar to those existing in other European markets and is the set of trading arrangements that allows market participants most freedom to determine their own trading strategy. However a large number of respondents also state that this option

gives rise to significant concerns about the potential exercise of market power, stating that it favours vertically integrated undertakings.

- 6.3.7 Option 2 is the least favoured of the options with its design seen as novel, untested and attendant with significant risk. It is not viewed as a coherent design with tension arising from the need for adequate liquidity in the forward timeframes and also in the balancing market (ex-post) pool. There is potential for competition for this liquidity and for it to move either to the pool, thereby reducing the efficiency of price formation in the DAM and interconnector schedules, or to concentrate in the forward timeframes so reducing the liquidity required for an efficient pool market.
- 6.3.8 Option 3, with greater or fewer changes is favoured by a number of participants, including by a section of wind generation (subject to a number of amendments). This option is seen as providing a strong DAM and the concentration of liquidity required by the relatively small I-SEM, generating efficient and transparent price formation. It is seen as providing robust compliance with the European Target Model.
- 6.3.9 Option 4 is favoured by a number of respondents who see it as providing minimum change from the current SEM. It is also favoured by smaller wind generation owing to the relatively clear route it provides to market entry and participation for these generators. However a number of respondents raise questions over this interpretation of the option and its strict compliance with the Target Model.
- 6.3.10 A number of market participants state that it is not possible to say definitively which is the optimum solution for energy trading without also knowing the choices that will be made in relation to Renewable Energy Sources (RES) integration/payments and ancillary services/flexibility payments and mechanisms.
- 6.3.11 Other respondents state that not enough detail has been provided on how the different options will affect them to make a judgement on the energy trading options.

## **MARKET POWER**

- 6.3.12 A large number of respondents raise concerns about the exercise of market power in the forward and spot markets. Two responses state that such power is evidenced in the current low levels of liquidity and high prices in the forward market. Respondents comment that efficient forward markets drive retail pricing and that measures to mitigate market power in the forward market have not been given sufficient consideration in the consultation paper. Forward physical trading can introduce a market mechanism for addressing market power concerns, including by increasing liquidity. The need for regulatory measures to support liquidity e.g., a market maker in the forward market is supported by other respondents. The potential effect of market power is also a concern in other timeframes, including balancing, and its possible effect on wind generation.

**FTRs AND PTRs**

- 6.3.13 One respondent stated that it would like to see physical trading allowed in the forward market for cross border trades. It believes that there is lower risk from using PTRs owing to the ability of interconnector users to lock in a price for an energy nomination with a counterparty. The respondent queries which entity would underwrite the firmness of FTRs and PTRs and states that a cap on exposure to congestion rents is necessary. The TSOs also note that PTRs are the norm across Europe and cautions against moving in a different direction without extensive analysis to demonstrate the benefit. One other respondent also expresses support for the use of PTRs while another states that there is little difference between FTRs and PTRs but that PTRs are consistent with what is offered in other NWE interconnectors and the market design should look for commonality.
- 6.3.14 One market participant believes that FTRs should result in the same practical outcome as PTRs with use it or sell it (UIOSI) requirements but that the benefit of FTRs is that physical capacity of the interconnector in the forward market is not used up, that that capacity is therefore available in the day ahead (DAM) and intraday markets and that this will assist liquidity in these timeframes. Concern is expressed that PTRs would mean taking interconnector capacity out of the market and reducing liquidity.

**LEAST COST DISPATCH AND USE OF EUPHEMIA**

- 6.3.15 One response argues that the dispatch schedule determined by the TSO is likely to be very different from contractual nominations (based on market results from the EUPHEMIA price coupling algorithm); that this difference will be relatively higher in the I-SEM and that the balancing costs will not be fully cost representative. This means that the starting point of dispatch would not be economically efficient and neither would the balancing mechanism, which would affect the efficiency of Option 3. A separate response states that the extent of re-dispatch should be established as early as possible and its effects calculated, and that operational constraints have been ignored in the design.
- 6.3.16 A number of respondents raised concerns over the operation of the EUPHEMIA algorithm and the potential risks associated with its use. The ability of the algorithm to accommodate commercial and technical bid parameters, including start-up and no-load costs, and how these provide outturn prices is questioned. EUPHEMIA cannot produce feasible least cost dispatches that will meet operational constraints on the system within Ireland and Northern Ireland and significant re-dispatch by the TSO will be required. It is consequently uncertain if this will result in a least cost dispatch for the island. It is argued that there is significant risk of sub-optimal schedules and price outcomes which in turn affects the efficiency of interconnector flows. One market participant argues that this concern relates only to the use of EUPHEMIA in Option 3 and not to use of the algorithm in the other options. Concerns over market power have been raised through manipulation of prices by use of sophisticated offer formats.



6.3.17 The TSOs state that it can operate any of the design options from the point of view of both a power system and a market. It states that use of the algorithm for the starting point for system dispatch will lead to unit positions further from physical dispatch than today. However it states that more clarity around the nomination process could help resolve this potentially less efficient dispatch. Another response emphasises the need for cost recovery of start-up/shut down costs and no load/part load costs and states that their analysis confirms that commercial and technical operational characteristics can be catered for in block bids and its variations. Market participants should also be required to submit technically feasible bids.

6.3.18 A further question has been raised over the governance arrangements for EUPHEMIA and the restrictions this may put on the RAs in making changes that might be considered necessary for the all-island market but which may not be a priority for other stakeholders in the algorithm.

### **BALANCING AND IMBALANCE ARRANGEMENTS**

6.3.19 A number of respondents to the consultation have expressed concern at the exposure of wind and other renewable generation to imbalance charges. It is stated that it is not appropriate that wind generation should be penalised based on the nature of the resource. The system is likely to be short when there is little wind and long when there is lots of wind, and this will lead to large volumes of wind selling when the spot price is low and buying when the spot price is high, compared to prices in the DAM. Another respondent states that balancing costs should fall on all parties responsible for balancing costs, including wind.

6.3.20 The measures proposed by respondents to address these concerns include that:

- day-ahead participation should not be mandatory;
- there should be mandatory provision of incs/decs into the balancing market for all generation;
- only wind should be treated on a portfolio basis for balancing purposes;
- TSO wind forecasts should be published for all participants;
- an aggregator of last resort should be provided for;
- appropriate market power measures be put in place to prevent undue imbalance costs being imposed; and
- that an “unpredictable margin” within which wind would not be subject to balancing costs should be set.

6.3.21 One respondent proposes that a separate pricing approach to physical balancing actions as opposed to physical imbalances be adopted.

## **RENEWABLES**

- 6.3.22 Various respondents state that the new market design should be able to accommodate renewable energy subsidies. Another recommends that the new market should be designed in such a way that existing schemes can seamlessly transition into the new arrangements. The need for a clear REFIT reference price is raised by a number of respondents and consideration of post-REFIT regulation should be taken into account in the new market design.
- 6.3.23 A number of respondents state that existing de minimis levels should be retained as part of the new market while others state that this should be increased to 20MW.
- 6.3.24 One response recommends that the following questions be considered in evaluating the design options. If a particular design requires renewable generators to act as price-makers how would this be reconciled with the principle of priority dispatch? If a particular design requires bidding rules based on short run marginal cost principles, how would this apply to interconnectors? If a particular design option would not result in transparent, achievable daily reference prices for renewable generators, how would the regulatory authorities validate the incurred cost of any public service obligation?

## **COLLATERAL AND CREDIT COVER**

- 6.3.25 One response states that consideration should be given to a single collateralisation structure across all markets and that collateralisation should be set at the minimum possible level.

## **TRANSITIONAL ARRANGEMENTS**

- 6.3.26 A number of respondents to the consultation have proposed some transitional arrangements in the move from the SEM to I-SEM. These include proposals that the arrangements involve a softer introduction of balancing pricing or imbalance settlement arrangements; non-exclusivity of the intra-day market and that the duration of the trial of the new market should be extended.

## **CONSULTATION AND ASSESSMENT PROCESS**

- 6.3.27 A large number of respondents asked for additional clarification of the energy trading options. One respondent states that it would not be appropriate to proceed by picking a 'hybrid' option of an energy trading arrangement or CRM without this being consulted upon. Others state that the energy trading arrangements, CRM and operation of system services proposed under DS3 should be considered together. A number have requested that consultation with industry stakeholders continue in the detailed design phase, similar to the HLD Review Group.

One respondent stated that there is insufficient focus on affordability for consumers and that there is a need for evidence through modelling of the effect of the options on prices paid by customers.

- 6.3.28 One consultation response states that it is imperative that a thorough cost benefit analysis (CBA) accompanies the proposed decision (including system costs) referenced against a scenario where compliance is achieved with minimal change to the existing SEM. It states that Option 4 appears to reflect this latter scenario. Other responses believe that a Regulatory Impact Assessment should be carried out on each of the four options and that in particular a CBA is required. Another respondent does not support a CBA with the SEM as the counterfactual, which it says is irrelevant in the context of the new market, and proposes that two favoured options should be directly compared. Another stated that the terms of reference of the CBA should be consulted upon.
- 6.3.29 One respondent states that the proposed decision should be accompanied by a Regulatory Impact Assessment incorporating quantitative modelling of plausible market outcomes under different interconnector flows. The counterfactual in each modelling run should be as close as possible to the current *ex post* pool design.

#### **OPTION 1**

- 6.3.30 Some respondents have stated that this option will deliver a liquid forward market for suppliers and that this option (and Option 3) reward flexibility, which should support RES deployment. Another argues that Option 1 allows for effective market power mitigation measures and because other European markets allow for some sort of bilateral physical trading it would be prudent to allow this alignment in the I-SEM. Another respondent also argues that Option 1 is more compatible with the GB market and that bilateral trading is typical of how most products and services are traded in open economies. It recognises that market power concerns arise from this option and suggests controls are applied on an equal basis to all participants.
- 6.3.31 Respondents who did not support Option 1 have stated that it favours portfolio players and raises problems of transparency and of market power. One argues that the choice of timeframes in which to trade may cause problems of liquidity while another states that because of the diversity of trading options there is likely to be low liquidity, low transparency and a poor reference price in the residual markets not covered by physical bilateral contracts. It stated that the size of the system in Ireland is too small for this type of market arrangement, while another respondent stated that the regulatory interventions required to make the option work competitively negate any potential strength.
- 6.3.32 The TSOs state that the volume of re-dispatching and reserve required is difficult to quantify while another respondent states that the extent of this intervention makes the option difficult to assess. It is argued that this option would encourage renewable generation to improve forecasting ability and would support exporting interconnector flows at times of high renewable generation.

**OPTION 2**

- 6.3.33 One response states that this option would be a good fit for wind if REFIT made wind whole up to the pool price. However a large number of respondents have stated that this option is not practical and that division of the market between *ex ante* trading and an *ex post* pool would lead to tension and competition for liquidity between the two markets. This may lead to the option moving either towards Option 1 or to Option 4. A number of responses therefore state that they do not see this option as viable.
- 6.3.34 Concern is expressed that Option 2 will lead to competitive tension between two markets leading either to negating the benefit of a pool or impairing the quality of the DAM, resulting in inefficient flows on the interconnectors.

**OPTION 3**

- 6.3.35 Option 3 is regarded by a number of respondents as providing a high degree of liquidity and transparency in the DAM, ensuring compliance with the Target Model, fair access to the market and a robust reference price. This option rewards flexibility and would deliver the greatest efficiency when taking into account expected interconnector flows.
- 6.3.36 A number of market participants favour Option 3 subject to additional elements being incorporated into the design. One states that this option requires the least modification to retain and enhance the positive elements of the existing SEM. The suggested modifications include provisions to support forward liquidity, provision for BCOP-type rules across all market timeframes, cost recovery provisions, periodic auctions, and a separate pricing approach to balancing energy actions and imbalance prices as provided for in the Electricity Balancing Network Code.
- 6.3.37 One response argues that use of the EUPHEMIA algorithm is integral to this option and that it should not be adopted without rigorous ‘proof of concept’ testing while another also suggests that rigorous testing should be completed.
- 6.3.38 One market participant proposes non-exclusivity and a mandatory format for bids while another suggests exclusivity of trading on approved platforms and a single platform for participants including in the forward market.
- 6.3.39 A number of submissions support the principles behind option 3 with significant amendment, which include the following:
- Financial Transmission Rights in the forwards timeframe and no long-term physical contracts
  - Non-mandatory participation for wind generation in an exclusive DAM
  - Mandatory provision of INCs/DECs into the balancing market for all generation

- Wind generators may choose to bid on a unit or portfolio basis with imbalance settlement across a participant’s portfolio
- An imbalance mechanism and price suitable to wind generation
- No undue barriers to market entry and participation
- Measures to facilitate trading, including publication of TSO wind forecasts and an aggregator of last resort.

6.3.40 Some respondents support Option 3 on the basis that it best promotes transparent liquidity and rewards flexibility. It is argued that Option 3 has a higher compliance with the EU Target Model reducing risk of substantial redesign later; that it would encourage the efficient use of interconnectors; provide price transparency and the opportunity to participate in price formation.

6.3.41 Others also support Option 3 but with changes such as BCOP-type rules to ensure cost reflective bidding, provisions for cost recovery e.g. start up and no load costs; non-mandatory participation of wind in the DAM and a non-penal imbalance price.

#### **MANDATORY PARTICIPATION IN THE DAY AHEAD MARKET**

6.3.42 A large number of market participants support an effective DAM which can provide liquidity and a strong reference price. On this basis many support Option 3 or some variation of it. Mandatory participation is supported while allowing wind generation to participate on a portfolio basis and the TSOs suggest consideration be given to a balancing aggregator. Another market participant supports aggregation of wind generation at least in the medium term. Others state that wind generation forecasting can be expected to improve closer to real time and is manageable.

6.3.43 A number of respondents state that forcing participation in the DAM for wind would add additional and unnecessary risk to their businesses. It is stated that independent wind generation would be forced out of business because it does not have the skills or resources to trade in the DAM and intra-day. One response states that other small renewable generation should be exempted from mandatory participation for similar reasons. One market participant believes that enforcement of wind participation based on “best endeavours” is ambiguous and can result in unrealistic obligations while another expresses concerns that mandatory participation could lead to gaming of bids for generators who wish to preserve capacity for the intraday market.

6.3.44 A number of respondents state that it is not necessary to insist on wind participation in these markets, as such participation will be based on incorrect wind forecasts, at least some wind will have to be exempted from the market and that which does participate will undersell to avoid imbalance charges. Uncertainty of wind output cannot be removed by market design and in all options decisions on interconnector flows will have to be made ahead of time based on the same lack of reliable information about actual wind output. A number of respondents state that mandatory participation in the DAM could result in taking positions that may be

inaccurate and setting of interconnector flows and dispatch for conventional generation on that basis.

- 6.3.45 A large number of respondents, including most wind energy respondents, reject mandatory participation for wind because they do not have the resources or capabilities, such as wind forecasting tools, to do so. Mandatory participation would impose significant and unnecessary risks and would impose prohibitive transaction costs.
- 6.3.46 A number of measures are put forward by a range of respondents to mitigate these concerns including publication of TSO wind forecasts, including a forecast margin for wind within which it is not exposed to the balancing market and the pricing of balancing energy actions separate from imbalance pricing. Balancing energy actions should receive the marginal price of balancing energy actions while there would be a non-penal imbalance price.

#### **OPTION 4**

- 6.3.47 A number of respondents support Option 4 on the basis that it most resembles the existing SEM and will represent minimum change, including retention of a Bidding Code of Practice (BCoP) and existing uplift arrangements. Other market participants do not agree that Option 4 can be interpreted as most similar to the existing SEM as novel measures and regulatory intervention may be required to encourage liquidity into non-pool markets. Doubts have been raised over its compliance with the Target Model and there are concerns that this option may give rise to a requirement for financial regulation.
- 6.3.48 A number of respondents state that this option does not ensure efficient flows over the interconnector and express concern that this will lead to the incentivisation of imports over exports to the I-SEM. This option also does not provide a good incentive for demand side participation.
- 6.3.49 The representative of small wind generation and the respondents who endorse its submission express support for Option 4. They believe this option could provide for a fully liquid and transparent market that would ensure all generators, including small participants, could participate equally. It could also ensure a reference price for forward pricing appropriate to interconnector flows and demand side management. It is argued that it cannot be assumed that the existence of a day ahead price and intra-day market would be a good basis for making interconnector and demand management decisions as these will be based on incorrect wind forecasts; at least some wind will have to be exempted from the market and the wind that participates will undersell to avoid imbalance charges. Uncertainty of wind output cannot be removed by market design.

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## 6.4 RATIONALE FOR DECISION MAKING.

6.4.1 The key points raised in the consultation responses are addressed in this section, which also provides a rationale for the decision on the Energy Trading Arrangements for the I-SEM.

### Forwards Timeframe

- *Internal I-SEM Hedging of Energy Transactions*

6.4.2 The SEM Committee is cognisant of the concerns raised by participants around forward liquidity for energy contracts. Arguments have been made by respondents that the existence of a liquid spot market and transparent spot price in SEM has not engendered a liquid forwards market to enable market participants to hedge, and that the absence of physical forward trading in the SEM was the cause of lack of liquidity.

6.4.3 The SEM Committee remains of the view that, in the context of I-SEM, physical contracts in the forward timeframe are not necessary to allow generators and suppliers to hedge price risks. Financial contracts can achieve everything that can be achieved by physical forward contracts in terms of hedging short term spot prices, which is the main purpose of all forward contracting. While the SEM Committee does acknowledge the importance of a liquid forward market, it does not deem the introduction of bilateral contracts for physical delivery in the forwards timeframe to be a proportionate or appropriate response to address this issue.

6.4.4 Indeed, the SEM Committee is of the view that physical forward contracting could aggravate rather than mitigate liquidity concerns by reducing the volumes of trades in the short term markets that are used to reference financial contracts, thereby making the spot market price less robust, less transparent, and less predictable. The lack of a predictable spot price would discourage market participants from referencing long term contracts against this price.

6.4.5 Therefore, the SEM Committee proposes that all forward contracts will be financial in nature, i.e. Contracts for Differences (CfDs). This proposed decision maintains consistency with the current SEM but is distinct from the arrangements in most, if not all, other markets in Europe, though the Iberian and Italian markets currently require all forward contracts to be nominated into the DA power exchange and the 15 zone Nord Pool market only allows intra-zonal physical contracts.

6.4.6 The SEM Committee is of the view that the detailed design phase should consider specific measures for promoting forward market liquidity, which could ultimately include a centralised trading platform (to address collateral and credit cover concerns raised by respondents). To address this, the Regulatory Authorities (RAs) will establish a workstream to investigate forward liquidity-promoting measures in the forward energy markets.

- *Cross Border Transmission Rights*

6.4.7 Long-term cross-border risk hedging tools are a central feature of the EU Target Model and allow for price differentials between spot markets caused by inter zonal congestion to be managed through cross border risk hedging.<sup>15</sup> As discussed in the Consultation Paper, the Target Model provides for several forms of cross border risk hedging instruments, both physical and financial, from the current physical transmission rights (PTRs) sold on SEM interconnectors and elsewhere in Europe, to financial transmission rights (FTRs) that prevail in the United States and in the Italian and Iberian markets, to financial contracts for difference between the Nord Pool price zones.

6.4.8 The main arguments put forward by respondents and interconnector owners in bilateral discussions to maintain the current form of Physical Transmission Rights (PTRs) were:

- The current status quo in Europe and the NWE region is for TSOs to auction PTRs
- Traders and TSOs are used to and prefer dealing with PTRs
- FTRs should only be used when market coupling arrangements, and the resulting day-ahead spot market prices are reliable and well established
- FTR payouts are based on day ahead market price spreads, which introduces greater risk to capacity pricing and hence revenues
- Resulting reduced value attributed to interconnector capacity would reduce social welfare
- PTRs with Use It Or Sell It (UIOSI) are the equivalent of FTR Options

6.4.9 Market efficiency and liquidity in the short term coupled markets are key objectives of the I-SEM design. FTRs on the interconnectors will be one important means of increasing liquidity in the day ahead market in the I-SEM by ensuring that the generation resources offering the lowest bid prices are scheduled in the day-ahead market, rather than those that have physical rights to nominate flows across the interconnectors.

6.4.10 In making a proposed decision on the type of transmission rights to be issued for both interconnectors, the key objective for the SEM Committee is to ensure that consumers gain the maximum benefit from market participants trading across the interconnectors. Since the energy market is approximately five times larger than the capacity of the interconnectors, ensuring that access to the interconnector facilitates competition in the I-SEM energy markets will indirectly deliver greater value to consumers by maximising the scope of competition in the I-SEM. This is the primary objective, rather than trying directly to maximise revenue from the sale of transmission rights<sup>16</sup>.

<sup>15</sup> See: [http://www.acer.europa.eu/Official\\_documents/Public\\_consultations/Pages/PC\\_2012\\_E\\_13.aspx](http://www.acer.europa.eu/Official_documents/Public_consultations/Pages/PC_2012_E_13.aspx)

<sup>16</sup> In both Ireland and Northern Ireland, revenues from the sale of transmission rights on the East West And Moyle interconnectors flow through to respective end consumers customers by netting off against TUOS charges



- 6.4.11 The SEM Committee does not consider the points raised by respondents to be strong enough or sufficiently material to favour PTRs and is of the view that FTRs are a more appropriate enduring model for the I-SEM. Though FTR Options are equivalent to PTRs with UIOSI, FTR Options have the key advantages of not requiring nominations of physical forward contracts into the I-SEM or harmonised physical nomination rules with neighbouring zones in the region or at pan European level.
- 6.4.12 Given the size of the I-SEM market relative to interconnection capacity, issuing PTRs would risk 'locking out' 20% of the market (i.e., the entire capacity of the cross border lines relative to the size of the all island system) from the day ahead energy market clearing process. The objective of the SEMC proposed decision is to ensure that the I-SEM day-ahead price reflects the full competitive value of the entire capacity of both interconnectors.
- 6.4.13 Furthermore, in addition to the advantages of FTR Options, FTR Obligations would allow for netting of interconnector capacity, thereby increasing competition between generators and suppliers in both markets, e.g. by offering CfDs combined with an FTR obligation to a company in the SEM, a GB generator can directly compete with SEM generators, and if SEM generators respond to their loss of local sales by offering into the GB market, their flows will net to produce the same outcome as if each had supplied into their local market.
- 6.4.14 FTRs are in line with the overall principles of the Target Model and the I-SEM proposed decision on energy and capacity, i.e. liquid physical short term markets complemented by liquid forward financial hedging instruments. A consultancy report to the European Commission from 2011 recommended that FTR Obligations be adopted throughout the Target Model mainly because of the competition promoting attributes described in the previous paragraph.<sup>17</sup>
- 6.4.15 The recent implementation of day ahead market coupling across the EU may mean that FTRs replace PTRs on an increasing number of interconnections across the EU in the coming years. Requiring that only FTR Options and/or Obligations are auctioned on the I-SEM interconnectors is a progressive step forward in promoting cross border competition between the all island and GB markets. This should translate into direct benefits for all island consumers through a more liquid DAM, greater efficiency of cross border trade as well as concomitant benefits to GB consumers.
- 6.4.16 FTRs (Options and Obligations) are the preferred model for allocating transmission capacity and hedging congestion in many markets in the United States (such as PJM, ERCOT, New York ISO, New England ISO and California ISO) so international best practice outside Europe suggests that FTRs are far from untested in market designs and are part of the FERC Standard Market Design<sup>18</sup>. FTRs are also implemented between zones in the Italian and Iberian markets. The SEM Committee is not aware of any evidence that there are any material drawbacks to implementing FTRs; or any

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<sup>17</sup> [http://ec.europa.eu/energy/gas\\_electricity/studies/doc/electricity/2012\\_transmission.pdf](http://ec.europa.eu/energy/gas_electricity/studies/doc/electricity/2012_transmission.pdf)

<sup>18</sup> FERC (Federal Energy Regulatory Commission) is the federal energy regulatory authority in the United States.

bespoke concerns with the two HVDC interconnectors currently in place between the all island and GB systems.

6.4.17 Furthermore, in order for the all island market to integrate further into the European Internal Market it is important that the existing interconnectors are used optimally. This will not only ensure that consumers in Ireland and Northern Ireland who have funded these assets receive adequate return on their investment but also that efficient signals are sent for future cross border investment, through competitive energy market prices on both ends of the interconnector. The SEM Committee believes that FTRs best achieve these objectives.

6.4.18 Regarding risk, the SEM Committee does not share the view that FTRs would increase revenue risk to interconnector owners as:

- Under the current approach to TUOS Interconnector owners face no revenue risk from the sale of transmission rights, as the costs of the interconnectors are covered in the TUOS charges. All revenue from the sale of transmission rights flows through to consumers as a reduction in TUOS.
- If no transmission rights were sold, the interconnector owners in the I-SEM (and ultimately consumers) would receive the full congestion income based on the actual price spread in the day ahead coupled market.
- The value of a transmission right, whether a FTR or a PTR + UIOSI, is based on the market participant's expectation of the Day Ahead price spread between the SEM and GB bidding zones. Hence, if the market for transmission rights is efficient, the expected revenue from sale of transmission rights is the same under either model. Therefore, the interest of consumers is best served by the type of transmission rights that brings the greatest efficiency to the energy market.
- Even with PTRs plus UIOSI, the value of the Transmission Right is based on the market participant's expectation of the Day Ahead price spread, as expected revenue from the sale of transmission rights is the same under both approaches.
- Under either FTRs or PTRs the firmness rules under the draft Forward Capacity Allocation Network Code are largely the same - i.e. fully financially firm up to a monthly or yearly cap of the congestion revenue received. There is therefore no greater exposure for interconnector owners with FTRs, compared to PTRs

6.4.19 In conclusion, the SEM Committee's proposed decision is that the I-SEM High Level Design entails the auctioning of Financial Transmission Rights on the Moyle and East West interconnectors. Whether these are FTR Options or Obligations will be determined at the detailed design stage as well as the auction rules.

6.4.20 In terms of the process for making the final decision on transmission rights, any decision on the choice of transmission rights will need to be made in accordance with the Network Code on Forward Capacity Allocation. This will entail joint decision making with Ofgem and so the SEM Committee's preference for FTRs is conditional on Ofgem agreement. This proposed decision on FTRs will be progressed with Interconnector owners and market participants as part of the detailed phase.

## Day Ahead, Intraday Markets and Balancing Markets

- *Day Ahead Market Participation*

6.4.21 Option 3 in the consultation paper put forward the concept of making the DAM mandatory for all I-SEM participants. Respondents generally supported Option 3, but concerns were raised over certain aspects of the mandatory provisions and how they would work. Many participants questioned how mandatory participation would work in practice and pointed to difficulties with forecasting, particularly variable resources, at the day ahead stage. Some questioned the purpose of requiring market participants to trade in the DAM when some of these trades would have to be unwound later owing to, for example, inaccuracies in forecasting for some variable technologies and demand. Questions were also raised about how such mandatory participation would be enforced.

6.4.22 Participants with wind interests raised additional specific concerns about the appropriateness of mandating their participation at the DA stage. Many pointed to the difficulty of forecasting up to 18-36 hours in advance of actual operation, and that the mandatory nature of participation could be discriminatory against a certain subset of technologies. The SEM Committee's intention behind Option 3 was that mandatory participation at the DA stage would be on a best endeavours basis. The intention was not to make participants trade in a way that was counterproductive to overall efficiency of the system and social welfare, nor was it to unduly discriminate against specific technologies. However, the responses have allowed the SEM Committee to consider the matter further.

6.4.23 The reasoning behind making the DAM mandatory was that the fullest possible participation at the DA stage would increase liquidity and confidence in the day ahead market. In particular, if there were significant volumes of close to zero marginal cost RES available, they should participate on a "best endeavours" basis to ensure the integrity of the DAM price where it is based on the cost of the marginal price flexible generator scheduled to meet demand, taking into account best estimates of available RES. Allowing RES to exclude itself and participate only in the balancing market could see a higher DAM price than would occur were wind to participate. This could increase costs to consumers and lead to inefficient cross border flows, for example where the TSO is required to countertrade to reverse cross border flows set by the day ahead EUPHEMIA algorithm to accommodate wind that did not participate at the day ahead stage; or indeed where the TSO is required to curtail wind at times when countertrading was not possible.

6.4.24 Another related point concerns the starting point of dispatch. If participation is low in the DAM, its use in forming the starting point of dispatch is potentially less efficient. For example, if wind generation was to completely excuse itself from the DAM, then there could be a potential for the initial schedule to be entirely composed of non-renewable generation which would subsequently need to be backed down given the priority that wind enjoys in dispatch. This could lead to higher costs for the consumer and is not seen as an efficient outcome.

- 6.4.25 On further consideration of the matter the SEM Committee sees merit in responses received that argue that a relaxation of mandatory participation in the DAM could be appropriate. The SEM Committee also recognises the potential difficulties relating to the enforcement of mandatory participation. In light of this the SEM Committee proposes that participation in the centralised markets be exclusive, but not mandatory in any particular timeframe. However, participation will be mandatory in at least one timeframe – the balancing market.
- 6.4.26 The SEM Committee is of the view that all market participants will have an incentive to move to the market where they see the highest value and that the ability to arbitrage between timeframes will facilitate efficient scheduling and dispatch of generators. At the same time this will make it easier for variable renewable generation to participate in the DAM (see route to market for small players). Some of the issues raised with respect to the potential problems with the starting point of dispatch can be addressed by requiring participants to notify their expected production schedules after the DAM as proposed by the TSOs. This is a common feature among markets across Europe. This requirement will encourage participation in the DAM as participants will need to be acquiring certainty on output at the DA stage in any case. Detailed market design rules will ensure that participants have incentives to meet these production schedules
- 6.4.27 The SEM Committee remains of the view that a high level of participation in the DAM is important. Other aspects of the markets rules will be developed to encourage participation in the DAM through minimising financial risks associated with participation such as setting the DA price as the strike price for directed contracts and as the reference price for financial reliability options, implementing Financial Transmission Rights on the interconnectors and potentially setting the DA price as the reference price for renewable support schemes.
- 6.4.28 Specific liquidity promoting measures are common in other European energy markets and where the implementation of mandatory participation in the DAM is not required participation can be incentivised by using market makers such that it achieves the same outcome as a mandatory rule. This can take various forms:
- Voluntary participation either by negotiation, or more commonly the market operator will arrange a public auction;
  - Mandatory on some market participants (like on the eight biggest generation companies in GB<sup>19</sup> or on the Big 4 in California); or
  - Mandatory for some volumes from all generators.
- 6.4.29 The SEM Committee is seeking comments from respondents on this matter and in particular whether it is appropriate not to have mandatory participation in the DAM for generation and demand. Comment is also sought on the alternatives put forward to mandatory participation or whether consideration should be given to mandatory provision on a transitional basis from market start.

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<sup>19</sup> <https://www.ofgem.gov.uk/publications-and-updates/wholesale-power-market-liquidity-decision-letter>

- *Day Ahead Bidding Structure*

- 6.4.30 Further consideration has been given to the question of whether EUPHEMIA would act as a robust algorithm for establishing the day ahead unconstrained schedule. As part of this the project team within the Regulatory Authorities (RAs) has held discussions and workshops with SEMO and European Power Exchanges. It has been concluded that the EUPHEMIA algorithm is fit for purpose to serve as the means of unit commitment and scheduling of generation in the I-SEM DAM. This proposed decision is based on discussions held with expert parties, international best practice and the responses received to the consultation. Concerns were raised by some participants about the use of EUPHEMIA to price and settle the majority of the I-SEM DAM and these concerns have been considered. At the heart of the concerns appear to be questions over whether the EUPHEMIA algorithm is comparable to the current SEM pool algorithm.
- 6.4.31 The SEM Committee would point out that the new I-SEM arrangements are not a pool type arrangement in the way that the current SEM is. With I-SEM and EUPHEMIA much of the control over a participant's commercial and physical positions will move from the SEM algorithm back to the participant who will need to ensure the recovery of all their costs of generation, including start up and no load, through their offers, and who will be responsible for submitting offers that are technically feasible.
- 6.4.32 The offer submission can be Simple Orders (in the sense of price and quantity pairs) or Block Orders (i.e., Profiled Block Orders, Linked Block Orders, Exclusive Groups and Flexible Orders) or Complex Orders (simple orders with constraints such as Minimum Income Conditions, Load Gradients, etc) but the three part bids and related uplift calculation of the SEM algorithm are not features of EUPHEMIA. The role of block and complex orders is to allow generators to bid and recover fixed generation costs over a trading day, mimicking the role played by separate start up and no load costs in the SEM to minimise the risk that a generator will be scheduled at a loss. It is expected that through repeated daily participation in the DAM, generators will 'learn' how to bid to achieve a consistently efficient outcome.
- 6.4.33 Market participants in I-SEM will take responsibility for their own start-up and no load cost recovery and will internalise their own risks of commitment and scheduling through their offer decisions. Some market participants have suggested that EUPHEMIA could produce schedules with generators running in patterns that are not technically feasible or achievable. The RAs together with SEMO and other power exchanges, have explored the range of possible offer structures that can be accepted by EUPHEMIA and how these offer structures can accommodate likely I-SEM requirements.<sup>20</sup> The specific offer structure to be employed in the I-SEM will be considered further as part of the detailed market design but at this stage the SEM Committee does not see any impediment to use of EUPHEMIA as the DAM algorithm.

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<sup>20</sup> Further information on these order formats is available in the EUPHEMIA Public Description [https://www.n2ex.com/digitalAssets/89/89745\\_euphemiam---public-description---nov-2013.pdf](https://www.n2ex.com/digitalAssets/89/89745_euphemiam---public-description---nov-2013.pdf)

- 6.4.34 Another key aspect of the offer format is the basis on which offers are submitted. The SEM Committee's proposed decision is that unit based offers should be the default design for I-SEM. Unit based offers will deliver significant transparency in the offers of individual units and in the context of I-SEM industry structure should help deliver a more competitive market place for participants and help attract new entrants. The SEM Committee recognises that, as an exception to the default position on unit based bidding, there may be some scope for allowing portfolio bidding in specific instances.
- 6.4.35 The proposed decision of the SEM Committee is therefore that it will be appropriate to allow portfolio bidding in certain circumstances. Portfolio bidding for demand will necessarily be allowed as to do otherwise would mean prohibitive transaction costs for suppliers. In addition the SEM Committee sees merit in allowing the continuation of portfolio bidding for aggregated generator units and for demand side units (both of these participant categories can employ portfolio bidding in the current SEM).
- 6.4.36 The SEM Committee also considers it beneficial to allow portfolio bidding for variable generation. This will allow the aggregation of individual wind farms and other variable renewable technologies, such as solar generation, into single units that can participate in the market. While likely not an absolute necessity in the new arrangements, the SEM Committee is of the view that this will bring efficiency benefits for consumers, ensure that there is not undue discrimination between licence holders (the equity principle) and promote renewable generation sources through providing flexibility. Portfolio bids will include only one generation technology and will not allow aggregation of generation and demand. As part of the detailed design, the SEM Committee will consider further the specific rules around the use of portfolio bids.

#### *Intraday Market*

- 6.4.37 Intraday trading will be exclusively through the European market coupling arrangements and will be on a continuous basis, although periodic intraday auctions might be accommodated. Market participants can start trading in the IDM once the DA schedules and INCs/DECs are in place.
- 6.4.38 The Intraday Market in I-SEM will employ the products available through the EU central platform. In the medium term these are expected to be quite simple bidding structures but may develop more in the future to more sophisticated products as foreseen by the CACM Network Code.
- 6.4.39 From the start of the European intraday platform, products are expected to be traded on an hourly basis. However, there are national intraday markets where products are traded at a granularity less than hourly. For example the German Intraday market has traded 15 minute contracts since 2011. In a system such as I-SEM with significant amounts of variable generation, the use of such shorter contracts has merit.

- 6.4.40 Another area of interest for the SEM Committee is the potential for implicit intraday auctions at a regional or European level. This has been discussed previously at EU level and was the subject of a dedicated workshop run by the European Commission and ACER in December 2013. While the CACM Network Code wording is not yet finalised the SEM will remain involved with the issue through ACER with other NRAs across Europe and in particular will be engaged in the development of a solution for pricing intraday capacity.
- 6.4.41 From a regulatory perspective, market participants can bid into the centralised market places (be they continuous only or combined with auctions) to deliver a desired operating pattern (subject to market power mitigation measures). The detailed design of the intraday market will be developed in the detailed design phase.

#### *Balancing Market (BM)*

- 6.4.42 There will, of necessity, be a balancing market created in the I-SEM for deviations between actual metered generation and demand and what has been traded in the forward markets. The balancing market will open after the DAM results have been published and the TSOs have initial physical nominations following EUPHEMIA.
- 6.4.43 The balancing market will remain open until at least one hour before real-time with detailed market timings to be established as part of the detailed market design.
- 6.4.48 Balancing Service Providers (BSPs) will submit incremental bids (incs) and decremental bids (decs) to the TSO who will in turn use these to move generation and load from their nominated position should they need to do so, using a common merit order of BSP bids.
- 6.4.44 The SEM Committee proposed decision is that the balancing market will employ a marginal pricing mechanism. This means that the last unit used to provide balancing energy will set the price for all activated balancing energy. Marginal pricing is in line with the thrust of the EU target model for balancing.
- 6.4.45 The I-SEM balancing market will link into EU balancing market arrangements through the Coordinated Balancing Area (CoBA) in the medium term and through the EU common merit order in the longer term. The identification of energy and non-energy balancing actions will be a key feature of the balancing market. Non-energy bids will be taken by the TSO from the same merit order as energy balancing but will be treated differently in pricing. Therefore the TSOs will be required to put in place a system to identify energy and non-energy actions. This process is known as tagging and flagging in the current GB market.
- 6.4.46 The SEM Committee's proposed decision is that actions taken by the TSO for non-energy reasons will be subject to a pay as bid pricing regime. This is proposed because of the potential local market power capabilities held by participants called for non-energy actions and the likely lack of competition in providing these non-energy services.

### *Imbalance Settlement*

- 6.4.47 The I-SEM will necessarily require the implementation of an imbalance settlement mechanism given the advent of *ex ante* physical trading in the DAM and IDM. Imbalance settlement will be related to differences between a balance responsible party's contracted positions and their *ex post* allocation (i.e. metered generation, load and adjustments for any subsequent BM trades by the TSO).
- 6.4.48 All market participants will be balance responsible (although some market participants may discharge the accounting for imbalances through aggregation agents). This means that all physical volumes not settled through the DAM and IDM are settled at the single marginal *ex post* price for each settlement period reflecting the marginal costs of energy balancing actions taken by the TSO.
- 6.4.49 The SEM Committee's proposed decision is that there will be a single imbalance pricing regime. This will mean that Balance Responsible Parties (BRPs) with a long position in imbalance settlement (contracted position > allocation) will pay the same imbalance price as BRPs with a short position (contracted position < allocation) in the same imbalance settlement period. The key rationale for a single imbalance price is that:
- It reflects the costs of actions taken by the TSOs;
  - It signals an incentive to balance rather than imposes a penalty for not doing so
  - A dual imbalance price risks creating an arbitrary wedge between imbalance prices that promotes the interests of traders rather than consumers
  - The problems with dual balancing prices in BETTA where dual cash out prices have favoured large market participants at the expense of smaller players.
- 6.4.50 The detailed requirements for balance responsibility will be considered further in the detailed design phase.

### **Reduced Curtailment through Efficient cross border flows**

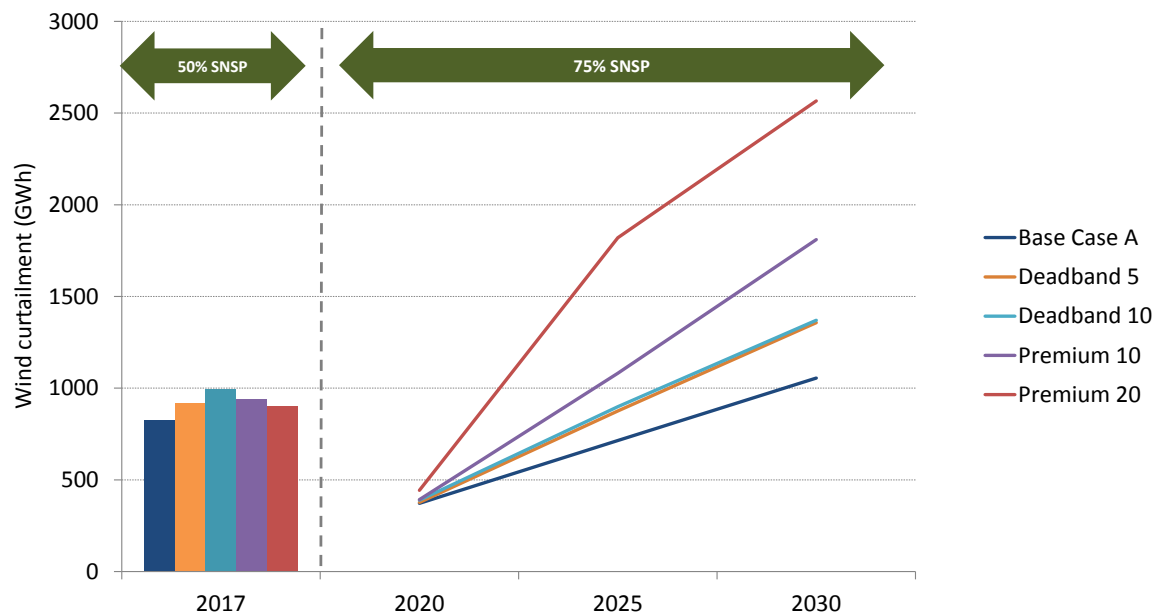
- 6.4.51 Some respondents expressed a preference for Option 4 over other Options on the basis that it provides a route to market, in particular for small variable generation, and provides a fairer price to such generation in the ex-post pool balancing mechanism. The SEM Committee has considered this point but is of the view that any protection offered by balancing arrangements in Option 4 is more than offset by the potential for increased curtailment of variable renewable generation compared to the variant of Option 3 proposed in this Draft Decision Paper.
- 6.4.52 We have set out the evidence for this in the Impact Assessment which is illustrated by the Figure 8 below which shows how the efficient use of interconnection can greatly reduce the level of wind curtailment in future years.
- 6.4.53 In this graph, the blue line represents Wind curtailment in Base Case A. In this base case the current relativity of fuel prices continues into the future and Wind generation continues to increase after 2020, reaching over 50% of total generation by 2030. Base Case A assumes the efficient use of interconnection in terms of flows



being consistent with the price difference between the I-SEM and GB on an hourly basis. This reflects the assumption that implicit market coupling should in theory deliver optimal use of interconnection.

6.4.54 Barriers to trade (for example due to market design misalignments) leading to uneconomic cross border flows have been modeled under two types of sensitivities to quantify the impact of such inefficient flows. The orange and light blue lines represent the Wind curtailment when ‘deadbands’ are applied to this base case. These ‘deadbands’ only allow the interconnectors to flow, in either direction, when the price differential between the markets, in either direction, exceeds €5/MWh and €10/MWh respectively. The purple and red lines represent the Wind curtailment when ‘premiums’ are applied to the base case. These ‘premiums’ only allow the interconnectors to flow from I-SEM to GB once GB prices are significantly higher. Exports from I-SEM to GB only occur when the [GB minus I-SEM] price difference is greater than the value of the ‘premium’, which is €10/MWh and €20/MWh respectively. The graph shows that curtailment increases from 2020 to 2030 in all scenarios due to increasing levels of absolute wind.

**Figure 8 Wind curtailment under ‘deadband’ scenarios**



6.4.55 The SEM Committee is of the view that high levels of participation in the day ahead and intraday markets by variable renewable generation will better deliver optimal use of the interconnectors. In this respect, the proposed I-SEM design incentivises high participation in these short term markets through balance responsibility and exclusive physical trading in the centralized and coupled market places.

**Starting Point Of Dispatch and TSO Interactions**

6.4.56 As discussed previously, the SEM Committee considers that EUPHEMIA will be a robust and reliable means of developing an unconstrained day ahead schedule in I-

SEM. The contracted volumes from EUPHEMIA are notified to market participants and the TSO with hourly granularity. A process will be required by which all hourly products from EUPHEMIA are converted into a more granular nomination profile, which the TSO can utilise for system dispatch, based on generator physical constraints, such as ramp rates. Further work is required to establish the respective roles of market participants and the TSO in this process. There are two potential ways to convert hourly products into profiles of greater granularity. The first is that the participant is best placed to carry out this process, especially in the case of portfolio bidding. The alternative would be for the TSO to carry out this process through a pre agreed methodology.

- 6.4.57 A further area for consideration in the detailed design phase is the degree to which participant schedules should – at the DA stage – reflect actual contract positions from EUPHEMIA or expectations of a final position.
- 6.4.58 The TSO is responsible for ensuring a feasible dispatch based on minimising costs of deviating from the results of the DAM and IDM. The TSO will assess the system feasibility of the detailed production schedules for each generator, take relevant actions if necessary and issue dispatch instructions for ensuring system security, while respecting absolute priority dispatch. The TSO will take into account its own forecasts for generation availability (including renewables) and demand in issuing dispatch instructions.
- 6.4.59 The TSO will reserve constrain the DA unconstrained nomination schedule once all DA nominations are received. The precise methodology for carrying out this reserve constrained process will be considered as part of the detailed design phase but will likely involve one of the following:
- The TSO would utilise a dispatch algorithm which utilises EUPHEMIA format bids. Such an algorithm would allow the initial reserve constraining of the system to be completed using the same bids submitted to EUPHEMIA. Initial discussions with the TSOs suggests that such an algorithm may not be in existence but this is being considered further. This may also require a mandatory DAM.
  - The TSO would reserve constrain the system using incremental and decremental bids from the balancing market. This will involve opening the balancing market early but this is not seen as an issue at this stage. Consideration may also need to be given to instances where the TSO needs to move a plant before the balancing market opens.

### **Market Power Mitigation**

- 6.4.60 The SEM Committee considers that to ensure that consumers are protected from the abuse of market power, the I-SEM HLD must facilitate a sufficiently robust market power mitigation strategy. The topic of market power mitigation was raised by a large number of consultation respondents and the SEM Committee agrees that it remains a key part of market arrangements. The detailed design phase will address the issue of market power mitigation and a new I-SEM compatible Market Power

Mitigation Strategy will be developed, taking into account the proposed energy trading arrangements and CRM proposals.

- 6.4.61 Transparency will be an important market power mitigation measure, as it will act to help market participants or other stakeholders support formal market surveillance activities. Transparency has been a key requirement of the SEM and will be equally important for I-SEM.
- 6.4.62 Given the nature of proposed I-SEM arrangements and consistency with the current SEM, the SEM Committee will seek to maintain the underlying fundamentals of the current market power mitigation strategy in so far as possible.
- 6.4.63 However, given I-SEM structural changes and the new interactions at EU level for energy trading it is likely that aspects of the strategy will change. The Bidding Code of Practice (BCoP) has been a key feature of the SEM design. It is unlikely that the BCoP will be maintained, at least in its current form, in the I-SEM given the EUPHEMIA bid structures in which generators take the risk of recovering start up and no load costs. This is not to say that *ex ante* bidding principles will not be a part of some or all timeframes, or for specific generators that may have local market power.
- 6.4.64 Since the SEM was established in 2007 there have been developments at EU level in relation to detection of market abuse and market surveillance. The detailed design of the I-SEM will incorporate these new developments in a way that delivers benefits to the all-island market.
- 6.4.65 Ireland and Northern Ireland have signed up to the revised Market Abuse Directive<sup>21</sup> (MAD). This essentially establishes minimum rules for criminal sanctions for insider dealing, for unlawful disclosure of inside information and for market manipulation to ensure the integrity of financial markets in the Union and to enhance investor protection and confidence in those markets.
- 6.4.66 Market surveillance activities in the I-SEM will also include activities under the Regulation on Energy Market Integrity and Transparency (REMIT),<sup>22</sup> which is being implemented at a European level (and will therefore apply to the I-SEM). It is based primarily on *ex post* market surveillance but also sets in place provisions for transparency and reporting of the various markets. Further commentary and background information on market power mitigation in I-SEM and Europe is available in Annex 1

## Governance

- 6.4.67 Arguments have been put forward that the governance arrangements of the EUPHEMIA algorithm and EU marketplaces would pose a challenge for *the* I-SEM in terms of influencing changes to the algorithm in the future. As part of this, it was

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The MAD directive can be found at

<http://register.consilium.europa.eu/doc/srv?l=EN&f=PE%208%202014%20REV%201>

<sup>22</sup>

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:326:0001:0016:en:PDF>.

stated by respondents that the enduring governance arrangements are not yet in place or fully known.

- 6.4.68 The governance arrangements for the EU markets are under development at EU level. However, the intention is that a robust set of governance arrangements will be put in place through the CACAM NC. This Network Code is currently under development. The governance arrangements will involve Member States, NRAs, TSOs and Nominated Electricity Power Exchanges (NEMO). Within this governance there will be a designation process which will ensure those acting as NEMO are fit to do so. The functions of the NEMO will be set out in the Governance arrangements, which shall include three committees.
- 6.4.69 These will include an Operational Committee of NEMOs and TSOs; a NEMO Coordination Committee that will deal with coordination issues between NEMOs, and finally a stakeholder committee which will discuss and give advice regarding day-to-day operation and development of single day-ahead coupling and single intra-day coupling. ACER will have at least observer status on all these Committees.
- 6.4.70 This demonstrates that there will be a significant governance arrangement in place at EU level. All markets will have an input to these arrangements. The governance arrangement will allow for changes to be made to the DAM and intraday trading arrangements should the I-SEM require this. It is expected that where changes sought are in line with the general thrust of the current coupling arrangements changes will be accommodated. Were the changes to be outside the scope of the current arrangements it is expected that there may be difficulties in making changes given the potential impacts. The SEM Committee does not believe this to be a major issue however given that the I-SEM HLD is very much in line with the spirit and direction of the target model. The representatives of the SEM Committee will remain active in this process at EU level.

#### **Access to I-SEM Market Places**

- 6.4.71 The SEM Committee sees merit in the implementation of a transitional mechanism for renewables generators to access the market to reduce the financial risk of participation without distorting the market outcome. There was significant commentary in responses regarding an efficient route to market for small renewable generation. The implementation of such a measure is in line with approaches taken in other markets in Europe.

6.4.72 Denmark has implemented an aggregator of last resort for variable renewable generation and GB is currently considering implementing an off-taker of last resort for smaller RES participants. Similar measures are in place in Germany and France.

6.4.73 In the I-SEM, the concept of an aggregator of last resort might resemble the following;

- An entity would be identified to carry out the function of aggregator of last resort
  - Ideally this should be done without any underwriting although there may be costs to be carried in the short-term. The service provision costs should be charged out to users of the service in the short to medium term.
  - In the first instance the entity is likely to be the TSO given the experience of other markets. A competition could be considered or the TSO could choose to contract the function out as they do now with TSO counter trading.
- The entity would bid in wind generation to the DAM based on its forecasts and manage its imbalance in the IDM and Balancing Market.
- The market participant would receive the market price achieved by the entity in the various market timeframes.
- The participating generators would then pay a fee for having this balancing carried out on their behalf and would share any resulting imbalance exposure.
- There would be no interactions between the service provision and the Feed In Tariff contracts in place in Ireland and Northern Ireland in that the reference price will remain the same for all contracts and would not be changed to reflect the average market price achieved by the aggregator of last resort.

6.4.74 The purpose of this transitional mechanism would be to ensure that small renewable generation would have a back stop route to market at the changeover between the SEM and I-SEM while aggregators establish in the market. However, any mechanism implemented would have to be set up in a way that does not inhibit a market solution for aggregation from starting up. The detailed design of an aggregator of last resort in the I-SEM will be considered as part of the detailed design phase.

### **Next Steps and Further Consultation**

6.4.75 The proposed ETA was designed to be capable of implementing the market design independently of whether a future zonal review will divide the all island market into more than one price zone. In addition, the market design is intended to be compliant with any future decision with respect to the geographical scope of balancing arrangements under the European Network Codes – e.g. the creation of a Coordinated Balancing Area (CoBA) covering a number of different markets and/or the size of control areas. There are a significant number of issues, the details of which will be progressed in the detailed design of the I-SEM, which will commence in

the coming months. The key areas for progression in the detailed design are set out below.

- Day Ahead Market considerations
- Intraday Market
- Forward Capacity Allocation
- Balancing Market Design
- Imbalance Settlement
- Collateral Requirements
- Treatment of Transmission Constraints
- Treatment of Currency
- Treatment of Losses
- Treatment of Firm Access
- Treatment of Priority Dispatch
- Metering Policy

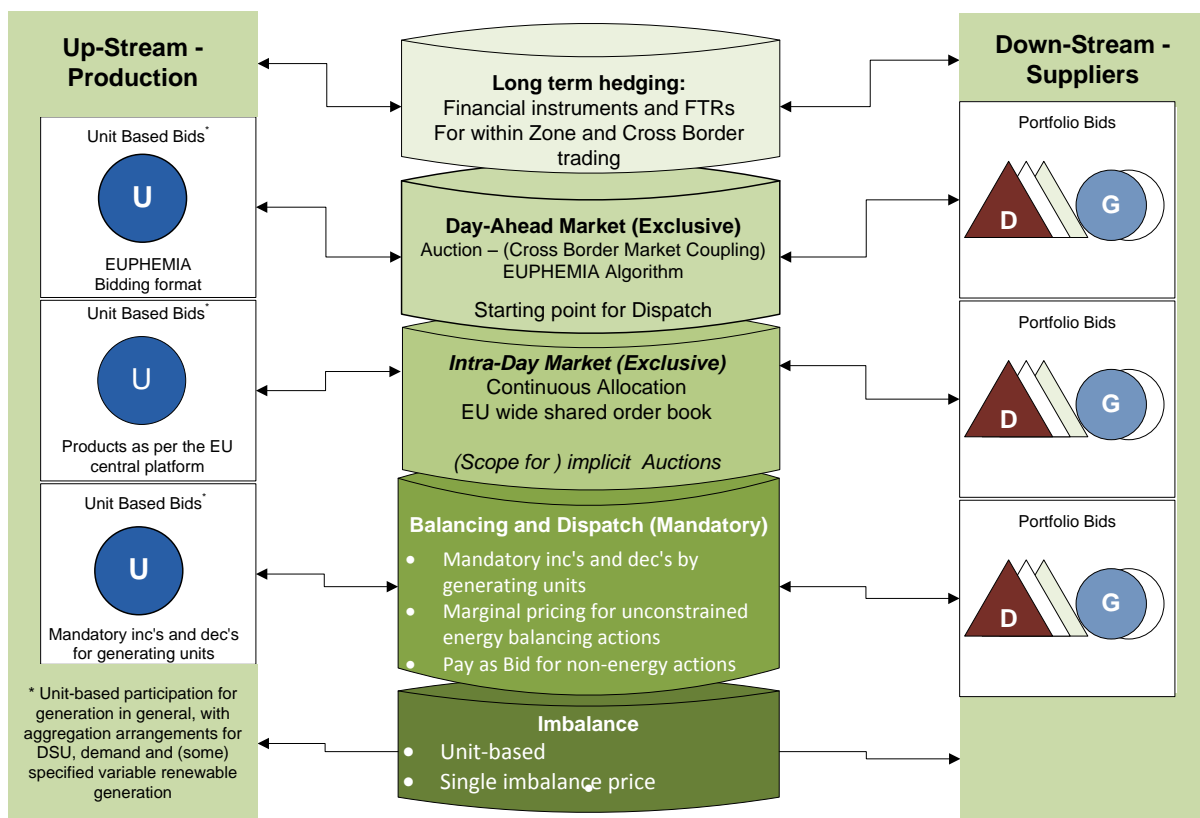
6.4.76 In approaching the Detailed Design Phase the SEM Committee considers that, where possible, the existing SEM Committee policy on specific matters such as losses, firm access, priority dispatch etc. will remain in place and would only be changed where material inconsistencies make it incompatible with the I-SEM design.

6.5 SEM COMMITTEE PROPOSED DECISIONS.

6.5.1 The SEM Committee proposed decision is that the centralised DAM, IDM and Balancing Markets will be the exclusive routes for physical contract nomination and collectively are exclusive routes for the physical scheduling of generation. This confirms that physical bilateral contracts will not be permitted in the forwards timeframe and that imbalances will be traded out on public market places rather than vertically integrated participants balancing within their own portfolio.

6.5.2 The SEM Committee is of the view that these features of the short term market design will promote liquid and transparent trading arrangements in the I-SEM. This proposed decision is closest to Option 3 in the Consultation Paper, although there are a number of modifications/clarifications which are intended to strengthen the performance of the HLD against the assessment principles.

Figure 9 I-SEM Energy Trading Arrangements



**DECISION 1: I-SEM ENERGY TRADING ARRANGEMENTS:****Forward Market**

- I. The I-SEM will have only financial trading instruments for within zone trading.
- II. Subject to further discussions and agreement with other neighbouring markets, Cross-Zones trading will be supported only by Financial Transmission Rights (FTRs).

**Day-Ahead Market**

- III. The European Day Ahead Market will be the 'exclusive' route to a physical contract nomination.
- IV. Unit-based participation for generation in general, with (gross portfolio) aggregation arrangements for DSU, demand and (some) variable renewable generation.

**Intraday Market**

- V. Continuous intraday trading will be the exclusive route to Intraday physical contract nominations (with scope to introduce periodic implicit auctions as/if these develop at the European level)
- VI. Unit-based participation for generation in general, with (gross portfolio) aggregation arrangements for DSU, demand and (some) variable renewable generation.

**Balancing (or process for reaching feasible dispatch)**

- VII. Starting point for dispatch is detailed and feasible production plans required for all market participants following DAM.
- VIII. Mandatory' participation in Balancing Mechanism (BM) after DA stage
- IX. Unit-based participation in BM for generation in general
- X. Marginal pricing for unconstrained energy balancing actions
- XI. Pay as Bid for non-energy actions (possibly combined with local market power mitigation measure)

**Imbalance**

- XII. Unit-based
- XIII. Single imbalance price
- XIV. Route to market for small players

**Other complementary actions to support the I-SEM efficiency:**

- XV. Encouragement of forward financial market liquidity;
- XVI. Facilitation of centralised forward trading platform



6.5.3 The SEM Committee has also published a detailed initial impact assessment alongside this Draft Decision Paper. The impact assessment includes a cost-benefit analysis and qualitative assessment of the Options in the Consultation Document. The Impact assessment results are not reproduced in this Draft Decision Paper and the Initial Impact Assessment Document should be read in conjunction with this Draft Decision Paper. However the table below summarizes the key conclusions of the Impact Assessment of the Proposed Energy Trading Arrangements.

***Summary of qualitative rationale for preferred option against each assessment criteria***

		<b>Rationale for preferred option</b>
<b>Primary Assessment Criteria</b>	<b>Internal Electricity Market</b>	Supports most efficient implementation of the Target Model in the All-Island Market because of emphasis on centralised and transparent arrangements to concentrate physical trading in the DAM and IDM.
	<b>Security of Supply</b>	Delivers the DAM is both a strong reference market for forward trading, and a robust starting point for dispatch (with full integration of physical interconnector capacity). This is supported by liquid IDM and mandatory BM
	<b>Competition</b>	Facilitates strongest competitive pressures through focus on unit-based bidding by generation into liquid centralised market places with full integration of physical interconnector capacity
	<b>Environmental</b>	Provides the best overall package in terms of delivering market signals to reduce curtailment, and facilitating greater ex-ante trading opportunities for variable renewables (particularly with modification to allow aggregation for small renewable generation)
	<b>Equity</b>	Emphasis on centralised market places ensures market access for all participants, with imbalance arrangements delivering sharper targeting of cost and benefits of (in) flexibility.
<b>Secondary Assessment Criteria</b>	Stability	Retains the strengths of the SEM whilst being much more closely aligned with the prevailing design of European electricity markets
	Adaptive	Benefits of easier coordination of changes to trading arrangements because of emphasis on trading in centralised (European) markets
	Efficiency	Offers a number of advantages for the All-Island Market because that the starting point for dispatch is based on a centralised unit commitment process that fully integrates the available physical interconnector capacity
	Practicality/Cost	Allows aggregation for small renewable generation whilst still maintaining high physical liquidity in centralised ex-ante markets

## 7 PROPOSED DECISION - REQUIREMENT FOR A CRM

### 7.1 INTRODUCTION

7.1.1 This chapter:

- Discusses the issues around whether or not there is a need for a CRM as part of the HLD of I-SEM;
- Summarises the consultation responses received on this issue, particularly on the two specific consultation questions on the rationales for and against the retention of some form of CRM; and
- Sets out the SEM Committee’s proposed decision to include a CRM in the HLD of the I-SEM.

### 7.2 ISSUES RAISED IN CONSULTATION DOCUMENT

7.2.1 In the February 2013 Next Steps Decision Paper (SEM-13-009), the SEM Committee stressed the importance of total remuneration from energy payments, capacity payments and ancillary services being sufficient to ensure security of supply.

7.2.2 In 2011 the RAs’ Medium Term Review of the CPM<sup>23</sup> concluded that the SEM Committee considered the CPM to be a key feature of the SEM design. It was mindful that capacity should be rewarded in accordance with performance, and that the CRM should provide signals for new entry/investment and exit if required. It was also acknowledged that the CRM had been broadly successful in meeting its objectives.

7.2.3 The Medium Term Decision Document stated that future elements of the CPM should be discussed in the context of the European Market Integration Workstream.

7.2.4 The February 2014 I-SEM HLD Consultation Document stated that as part of the development of the High Level Design for the I-SEM, it is appropriate to review the form and scope of any CRM, in light of:

- the potential changes to the energy trading arrangements;
- the developments in system services procurement; and
- the incompatibility of the current SEM CRM with market coupling,

7.2.5 The February 2014 Consultation Document discussed a number of issues in relation to the long term remuneration of capacity in an energy-only market (i.e. with no CRM). The issues discussed were as follows;

- There is a risk of intervention by central agencies whether political, regulatory or by the TSO that act to dampen the high energy prices needed in

<sup>23</sup> [http://www.allislandproject.org/en/cp\\_decision\\_documents.aspx?article=5ce2db5f-6c79-4454-9779-53dd7fae8dba](http://www.allislandproject.org/en/cp_decision_documents.aspx?article=5ce2db5f-6c79-4454-9779-53dd7fae8dba)

periods of scarcity to provide incentives for new investment. For example, there may be a regulatory risk that a cap would be introduced if prices spiked to significant levels. Where this threat of intervention exists, the level of remuneration for investment may be insufficient. This is often referred to as the 'missing money' problem.

- The inability of individual consumers to signal the value of security of supply. This means the market does not address the fact that reliability is a quasi-public good. It is non-excludable in the sense that customers cannot choose their desired level of reliability, since the system operator cannot selectively disconnect customers and provides the same level of reliability to all customers.
- Demand side participation may not be sufficiently strong to allow prices to reflect customer valuation of shortage of supply.
- There may be an inability of market participants to find long-term hedges for the price and volume risk that they are exposed to in short-term markets, which could increase the cost of capital for investment in capacity. This may be exacerbated by increased RES penetration further reducing the number and predictability of operating hours of dispatchable plant which can increase revenue volatility (highlighted by the European Commission).
- There may be an issue of indivisibility of plant size, particularly in a relatively small system where the capacity margin/deficit (and hence energy prices, particularly at peak) can be sensitive to a small number of investment decisions. Notably, the indivisibility issue is an issue for exit as well as entry.

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### 7.3 SUMMARY OF CONSULTATION RESPONSES ON WHETHER OR NOT CRM IS NEEDED

7.3.1 The February 2014 I-SEM HLD Consultation Document set out an overarching consultation question on the topic of whether or not a CRM was needed in the I-SEM:

***Is there a requirement for a Capacity Remuneration Mechanism (CRM) in the revised HLD, and why?***

7.3.2 This was supported by an additional question:

***What are the rationales for and against the continuation of some form of CRM as part of the revised trading arrangements for the I-SEM?***

7.3.3 The majority of respondents to the consultation support the retention of a CRM, and give the following reasons:

- To provide capacity adequacy
- High levels of wind generation reduces the ability of an energy only market to provide conventional generation with revenue adequacy
- The large unit size of efficient generation might lead to new entry creating prolonged periods of surplus generation, reducing prices and revenues so creating a ‘missing money’ problem
- A CRM can reward flexible generation
- To reward predictable and reliable plant
- To support lower cost financing of generation
- To reduce price volatility
- It is necessary to reward demand side capacity
- No evidence has been provided that the concerns giving rise to the current CRM have disappeared

7.3.4 A number of respondents argue that the current CRM should be retained with minimal change and believe it can be made compatible with the Target Model and EU State Aid requirements. A number of other respondents argue that if the CRM is integral to the market design it does not constitute state aid.

7.3.5 A number of respondents support a CRM because income for conventional generators is not sufficient in a system with high levels of variable generation. Other respondents support a CRM to protect consumers against price volatility in the balancing market and state it should be accompanied by regulation of energy market prices to exclude long-term costs, similar to current practice.

7.3.6 Some respondents believe that a decision on the CRM should be deferred until a decision on the energy trading option is made or its interaction with DS3 remuneration is evaluated. Other respondents believe more detail should be provided on the CRM including worked examples while others believe a dedicated workstream should be devoted to it in the detailed design phase of the market integration project. One respondent believes that it is not clear whether a CRM is required and that the objectives of one need to be clarified.

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## 7.4 RATIONALE FOR THE SEM COMMITTEE DECISION ON WHETHER A CRM IS NEEDED

### Introduction

- 7.4.1 The SEM Committee recognises that an energy-only market may be prone to market failures that make it difficult for such a market to value the reliability of supply to electricity consumers<sup>24</sup>. The SEM Committee is of the view that these market failures, which are set out below, are acute for a small island system with high penetration of variable renewable generation.
- 7.4.2 Consequently, the SEM Committee remains of the view that an energy only market will not in practice deliver long term generation adequacy on the island of Ireland. The SEM Committee's proposed decision is therefore that there should be some form of explicit capacity remuneration mechanism (CRM) in the I-SEM and that this can be implemented in such a way as to avoid distorting cross border trade.

### Energy Only Markets are Prone to Market Failures

- 7.4.3 In a properly functioning energy-only market there will be periods where prices should rise above the variable operating costs of peaking units that are running at full capacity. These prices would reflect scarcity under constrained capacity with the incremental value of demand defining the system opportunity cost<sup>25</sup>. This should result in extreme peak prices being allowed to occur should they need to in order for peaking plant to recover their fixed and operating costs.
- 7.4.4 In reality however, given the traditionally unique characteristics of electricity as a good (non-storability, inelastic demand), electricity markets struggle to fulfill the conditions of perfect competition and as a result are susceptible to a number of market failures. The principal market failure associated with an energy only market is that reliability is a public good – electricity is non excludable as customers cannot choose their desired level of reliability and the TSOs cannot selectively disconnect customers. This means that such a market does not provide a mechanism for customers to reveal the value that they place on reliability. So consumers who value reliability more than their neighbours cannot receive the benefit of increased reliability by paying more at times of system stress. Conversely, consumers who value reliability less (and who cannot be individually interrupted) have no incentive to reduce consumption at times of high prices. This is often referred to as the 'free rider' problem, where some consumers take advantage of the higher utility value that others attribute to a good or service.

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<sup>24</sup> By market failure we mean a situation where the free market fails to efficiently allocate resources between supply and demand such that the quantity of a product demanded by consumers does not equate to the quantity supplied by suppliers. Examples of market failures include extraneous environmental costs that often require government intervention to ensure that the marketplace internalises their value to society, thus completing the market and correcting the failure.

<sup>25</sup> See William W. Hogan: On an "Energy Only" Electricity Market Design for Resource Adequacy

- 7.4.5 While economic theory suggests that an energy only market can in part deal with this by allowing prices to rise to the value of lost load and thereby allowing generators to recover resulting scarcity rents, there are a number of other market failures with an energy only market that create what is known as the ‘missing money problem’.

### **The Missing Money Problem**

- 7.4.6 It is an unrealistic expectation that electricity markets will have no explicit or implicit price cap (that is, respectively, an *ex ante* cap on the price or an *ex post* intervention to avoid an extreme price being paid by consumers). This is particularly true in markets with high levels of concentration, as it is difficult to differentiate between high prices due to shortages or due to exercise of market power. There is a danger that the authorities will intervene to impose price caps or could threaten to impose caps. TSO actions can also act as a proxy price cap: if a TSO holds pre-contracted reserves and these are activated to reduce demand this will stop the market price going to a level it needs be at to recover total producer costs. Moreover, other TSO actions taken to avoid rolling blackouts, such as reductions in voltage, will have the effect of reducing peak demand and thereby preventing energy prices from reflecting the true value of lost load.
- 7.4.7 The missing money problem is exacerbated in a system where there is little or no response by demand to high prices and where there are large amounts of variable generation benefitting from out-of market support. In such systems the variable generation is driven only by the need to produce MWhs and is essentially a price taker in the market. Since the opportunity cost of variable generation can in these circumstances be zero or even negative, energy prices on average will be lower than they otherwise would be, but more importantly the volatility of energy prices will be greater. Thermal plant on the system will therefore have fewer hours at high prices in which to recover its fixed costs. This means that in a properly functioning energy-only market thermal plant would need peak prices to be higher than in a market dominated by dispatchable plants.
- 7.4.8 In general demand can be considered in two segments: inflexible and flexible demand. Inflexible demand in general refers to non-interval metered customers. Inflexible demand either does not have the capability to receive close to real-time price signals or does not have the ability to react to them. Flexible demand has the ability to receive close to real time prices and the ability to react to them.
- 7.4.9 The demand profile in Ireland and Northern Ireland tends to be largely inflexible. It is evident that the economies in Ireland and Northern Ireland do not have a large constituency of heavy industry compared to other regions in Europe. As at May 2014 there was circa 80MW of demand side participation in the SEM market. In the medium term it is possible that more responsive demand will appear, but this will take time and will appear through the implementation of technology advances like smart meters and smart industrial energy systems.

- 7.4.10 The general inability of demand side to react to half-hourly spot prices effectively sets no limit to the degree to which spot energy prices will rise at times of system stress. The lack of an effective response on the part of load at times of system stress will mean that, to protect consumers, energy prices may be capped administratively since there is nothing to stop them from rising without limit. This means that regulatory intervention (i.e., capping prices at the ‘average’ value of lost load) may generally be expected in order to ensure that consumer welfare is protected from extreme pricing events.
- 7.4.11 Capacity remuneration mechanisms provide a greater level of certainty over revenue and risk management than an energy-only market. For generators the CRM can provide a more predictable revenue stream, which translates into lower risk and cost of capital, thereby encouraging investment in the market. Derisking of investment and the avoidance of boom and bust cycles is a key rationale for maintaining an explicit CRM in the I-SEM. Certain explicit capacity remuneration mechanisms can provide regulators with a tool which can be used to target decision-making around both the timing of investment and the type of plant. A CRM can be designed to provide a degree of confidence that efficient entry and exit occurs in an appropriate manner, thus contributing to regulatory goals.
- 7.4.12 The concept of indivisibility has been referred to in consultation responses in relation to introducing a CRM. Indivisibility in this context refers to the size of individual units compared to the total market demand. Historically, the entry of one new plant could satisfy demand growth for a number of years and so new investments could depress market revenues in the short term making the case for new investment more difficult. The issue of indivisibility for market entry has changed due to changes in the size of minimum efficient plant and there are now smaller plant sizes available. In I-SEM however, the indivisibility issue may be more relevant to market exit, i.e. the closure of relatively large generation could create security of supply issues that would not exist in larger markets.
- 7.4.13 The SEM Committee recognises the importance of ensuring that the overall HLD of the I-SEM is compatible with other policy measures designed to support generation adequacy, including encouraging demand-side response, facilitating the development of interconnection and ensuring efficient cross-border trading. The CRM should be able to evolve in response to changes in the market.

### **The State of Generation Adequacy on the All Island System**

- 7.4.14 There is increasing emphasis at European level on regional generation adequacy assessment to ensure that national decisions and policy do not distort the European Market. The SEM Committee intends to fully engage and participate in this to develop more regional coordination of adequacy assessments including coordinated sensitivity scenarios. The latest public report on generation adequacy in the all island system is the January 2014 All-Island Generation Capacity Statement for 2014-2023 (GCS), which projects a generation surplus out to 2023 on an unconstrained All-

Island Market basis. The capacity margin is expected to tighten in the period to 2023 as demand growth erodes excess capacity on the system.

7.4.15 The capacity assessment is based on the notifications of generators, which are underpinned by the assumption that the existing capacity regime will remain in force. Based on these assumptions, the assessment suggests that there is no real shortage of capacity on an All-Island basis in the first few years of the operation of the I-SEM. However, there are some limitations to the adequacy assessment methodology, including being based on notifications provided by generators, which do not reflect the impact of possible policy changes such as removing a CRM where it exists. Given these limitations the Regulatory Authorities asked EirGrid/SONI to carry out analysis of generation capacity adequacy in the absence of a CRM as part of the I-SEM design. The EirGrid study conducted a number of further sensitivities to those studied in the GCS in an effort to estimate the implications for Generation Adequacy in an energy only market.

7.4.16 The Generation Adequacy Study finds in its central scenario that there is no shortage of supply in 2017, but that there are material supply shortages in 2020 and 2023<sup>26</sup>. The results are broadly similar, with some differences emerging for the three study years, under the various combinations of sensitivities that include interconnector availability, higher demand and the tighter security standard (3 hours). It is only in the ‘no price cap’ scenario, in which only plants that are not run at all are removed that surpluses appear in the majority of scenarios to 2023. The results of the central scenario are set out below:

Table 2 – Generation Adequacy in 2017, 2020 and 2023

Name	Capacity Adequacy (MW)			Load Forecast	LOLE (hrs/yr)	IC Reliance (MW)
	2017	2020	2023			
Median Demand (O&M costs only)	208	-109	-13	Median	8	690
Median Demand (Capital + O&M costs)	120	-109	-500	Median	8	690

Table 2 Adequacy results for the three study years, assuming a median load forecast, full reliance on interconnector imports, and a security standard of 8 hours LOLE/year. Results are shown for scenarios where only O&M costs need to be recovered by generator units, and both Capital and O&M costs need to be recovered.

7.4.17 The Generation Adequacy Study is subject to a number of caveats and limitations in its methodology and should not be relied on as a standalone assessment of future generation adequacy for the All-Island system. Rather, it should be seen as an important sense check on other quantitative elements of the Proposed Decision on CRMs, notably the most recent GCS ( for the period 2014-2023) and Pöyry modelling undertaken as part of the Impact Assessment.

<sup>26</sup>The central scenario consists of median demand forecast, with full reliance on interconnector imports, and a Loss of Load Expectation of 8 hours per year



## Impact Assessment – Rationale for Capacity Remuneration Mechanism

7.4.18 In addition to the analysis of generation adequacy by the TSOs, the Impact Assessment published with this Draft Decision Paper considers the justification for a CRM, providing additional quantitative analysis of some issues for generation adequacy in an energy only market driven by the changing nature of challenges faced by generation, such as lower running hours and major shifts in operating patterns, as increasing levels of low carbon technologies come on the system.

7.4.19 Alongside the modelling results, the Impact Assessment also sets out in a qualitative assessment a more detailed rationale for a CRM based on the I-SEM Objectives. The SEM Committee considers that maintaining a CRM as part of the all island market better meets the I-SEM primary objectives of security of supply, competition, environment and equity than would be the case of an energy only market.

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## 7.5 SEM COMMITTEE DECISION

7.5.1 Having fully considered the rationale for a CRM in the I-SEM and having taken into account wider European developments on public interventions to ensure generation adequacy as well as the views of respondents, the SEM Committee sets out its proposed decision below:

### **DECISION 2: THE I-SEM WILL INCLUDE A CRM**

The SEM Committee proposes that a CRM is required in the High Level Design of the I-SEM and developed in parallel to the energy market detailed design in light of:

- The economic rationale for an explicit capacity remuneration mechanism given the market failures associated with energy only markets giving rise to the missing money problem
- The magnification of these market failures meaning that the missing money problem is particularly acute in a small island system with high levels of variable generation
- The Impact Assessment of need for a capacity remuneration mechanism against the I-SEM primary and secondary assessment criteria
- Evidence from the TSOs Generation Adequacy reports (the Generation Capacity Statement and the Adequacy Report for an Energy Only Market)
- Pöyry modelling analysis on the impact of the changing system dynamics on the running patterns and hours of conventional generation as a result of the increased penetration of low carbon renewable technologies.

**8 PROPOSED DECISION - HIGH LEVEL DESIGN OF CRM**

**8.1 INTRODUCTION**

8.1.1 This chapter:

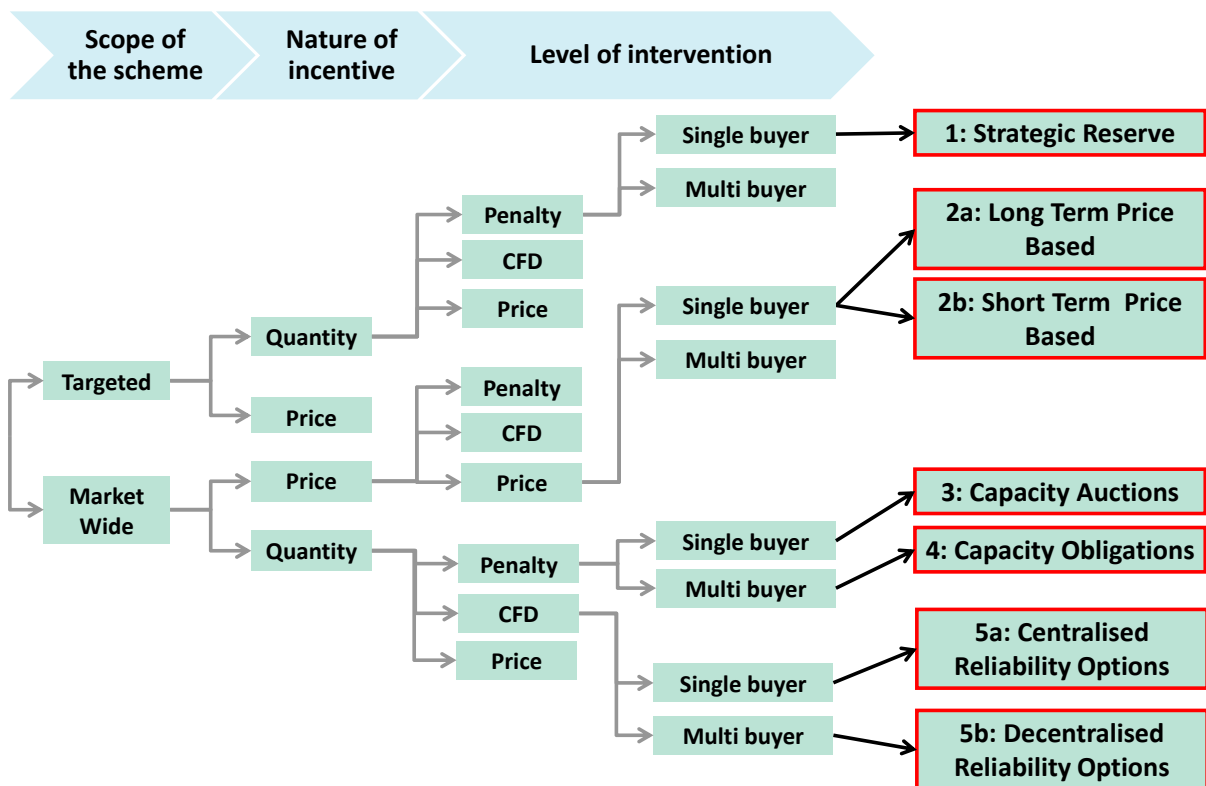
- Describes briefly the options for different Capacity Remuneration Mechanisms (CRMs) that were presented in the February 2014 Consultation Paper on the I-SEM HLD;
- Summarises responses in relation to the preferred form of CRM;
- Sets out the SEM Committee’s proposed decision on the form of the CRM to be included in the HLD of the I-SEM; and

**8.2 ISSUES RAISED IN CONSULTATION**

8.2.1 The February 2014 I-SEM HLD Consultation Paper presented a number of CRM options for consultation.

8.2.2 Figure 1010 summarises these options as presented in the Consultation Paper. These options are designed to illustrate the main differences between different approaches and there are a number of possible variations on each of these broad approaches.

**Figure 10 – Capacity Remuneration Mechanisms**



8.2.3 These options were presented independently of the four HLD options for energy trading arrangements as in principle each of the CRM options could be implemented alongside any of the energy trading arrangements.

8.2.4 Further information on the detailed options put forward for consultation can be found in the I-SEM Consultation Paper (SEM-14-008).

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### 8.3 SUMMARY OF CONSULTATION RESPONSES ON DESIGN OF CRM

8.3.1 The February 2014 I-SEM HLD Consultation Document set out an overarching consultation question on the topic of whether or not a CRM was needed in the I-SEM:

***If there is a requirement for a CRM in the revised HLD, what form would be your preferred choice for the I-SEM, and why?***

8.3.2 This was supported by an additional detailed question on topics used to describe the HLD of the I-SEM:

***Are these the most important topics for describing the high level design of any future CRM for the I-SEM?***

8.3.3 For each of the seven CRMs, three detailed questions (Q21-Q41) were asked in relation to:

- whether there were any suggested changes to the design;
- views on the initial assessment presented of the CRM; and
- whether the particular CRM would fit more effectively with a particular option for the energy trading arrangements.

8.3.4 Eight respondents explicitly supported a long-term price-based mechanism (Option 2a), with two supporting capacity auctions (Option 3).

8.3.5 A number of respondents from the wind industry believe a CRM should be focused only on a 'reasonable margin' of plant on the system and to periods of highest system load so that it would correspond to an energy only market single price at a time of system stress.

8.3.6 Other wind industry respondents stated that a CRM should be price-based or quantity -based with wind generation earning its capacity credit at the market rate for reasons of equitable treatment with other generation. They state that any other outcome would be discriminatory and would not comply with EU state aid guidelines. State aid for a CRM should be technologically neutral, fit the decarbonisation agenda, and be transparent and non-discriminatory. However they state that the objectives of a CRM should be defined and further information provided on restrictions of bidding behaviour before a final view on the CRM can be

determined. A number of respondents indicated negative views of a number of CRM options and a number did not express a preference.

### **OBJECTIVE OF CRM**

- 8.3.7 A number of respondents state that the objective of the CRM should be stated. Some state that this is necessary before a settled and fully informed view of the design of a CRM can be formed.
- 8.3.8 One respondent stated that cross border participation in a CRM should only be facilitated when reciprocal arrangements in neighbouring/interconnected markets' CRMs exist.

### **ASSESSMENT AND CONSULTATION PROCESS**

- 8.3.9 A number of respondents state that insufficient detail has been provided on the CRM options to come to a definitive view and recommend further consultation.

### **STRATEGIC RESERVE (OPTION 1)**

- 8.3.10 A number of respondents state that strategic reserve enables favoured generation of a particular type to displace other perhaps cheaper generation. Strategic reserve adds to political and market risk of the residual energy market and it is inappropriate for a small relatively isolated system with exceptional levels of variable generation that depends on energy market signals. It is essentially an ancillary service.
- 8.3.11 One respondent considers that while strategic reserve is not a feasible CRM on its own it could be used with some other mechanism for particular technology or location issues. Another response argues that location or temporary issues are best addressed by a limited duration system support contract with the TSO.

### **PRICE-BASED CRMS (OPTIONS 2A AND 2B)**

- 8.3.12 A number of market participants raise questions over who will qualify for this type of CRM and whether a short term mechanism might produce a capacity price that is volatile. Such a short-term mechanism could be vulnerable to the exercise of market power. It might also not necessarily be more favourable to flexible resources. One respondent states that using probability to determine the value of capacity ex post is flawed because ex post it is either zero or the difference between the energy price and VOLL. Under existing proposals for electricity market reform in Great Britain electricity exported from Ireland to Britain would not earn a capacity payment and there may be potential distortions caused.
- 8.3.13 Other respondents suggest that the long-term mechanism can be developed to incorporate elements that would make it more responsive to changes in the capacity margin. One favours a price based CRM because this recognises the value of the interconnector while another states that interconnector capacity must be subject to

the same penalty regime as ‘domestic’ capacity for non-delivery. Another respondent states that it presents challenges to cross-border participation that might be addressed by not paying capacity for interconnector flows. EirGrid state that it can be difficult to ensure that the price is not set either too high or too low leading to over or under investment. It considers that a long term CRM would share many of the short comings of the current CRM.

8.3.14 A number of respondents have stated that the current CRM has proved effective and that it could and should be modified to be made part of the new I-SEM market. This would have the advantage of easing the transition to the new market design.

8.3.15 Other participants including EirGrid state that the current CRM is extremely complicated and provides weak exit signals. It diffuses revenue across too much generation types so diluting entry signals and it does not provide locational incentives. Wind generation receives more capacity revenue than the capacity credit assigned to it. It also has no requirement to deliver capacity at a time of system stress. Finally, the model is different from GB which may cause difficulty in market coupling.

#### **QUANTITY-BASED CRMS (OPTIONS 3, 4, 5A AND 5B)**

8.3.16 Some respondents state that the strengths of the capacity auction option are that it would value reliable capacity, would oblige the delivery of capacity at times of system stress, would have strong exit signals, would reduce risk to investors and would be compatible with the mechanism being developed in GB. Capacity auctions should be accompanied by bidding restrictions for all parties, which will make the CRM part of the overall market design.

8.3.17 A number of respondents from the wind generation sector state that a quantity-based CRM does not appropriately remunerate wind generation. This sector would be unable to participate in a CRM auction or obligation because it would be unable to manage or bear the associated risk of penalties.

8.3.18 A number of respondents argue that capacity auctions and obligations raise concerns about the exercise of market power and because of their complexity are not suited to the all-island market. Concerns are also raised that the value of the CRM in capacity auctions or obligations could vary significantly and that this volatility could lead to difficulties for supply companies in hedging or exposure to significant losses. Credit cover requirements could also be onerous. A quantity based CRM would not be a good fit for demand side owing to the challenge of making long term commitments and varying capacity over the course of a day, week and year.

#### **RELIABILITY OPTIONS (OPTIONS 5A AND 5B)**

8.3.19 A number of respondents raise questions over who will qualify for this type of CRM and whether it could prove penal and so lead to potential users to opt-out. Some respondents argue that these options are unfair to wind as true system stress events

that wind resolves are automatically not priced into consideration. These options are not supported by some respondents on the grounds that they have a potential to be a liability in a system with high wind. Concerns about the scope for use of market power have also been raised. Others have asked for clarity as to whether some form of physical backing would be required by issuers. If this is the case it is asked how they are more attractive than a quantity based capacity auction. Concern is expressed that the scheme may be seen as a purely financial instrument divorced from physical delivery which could have long term implications for generation adequacy.

- 8.3.20 Other participants question whether these options add any value over expected energy prices and contribute any more revenue to generators. The assumption of receipt of revenue to repay the difference between SMP and strike price may not hold if the generator is scheduled as a result of a non-energy balancing action. It is argued that the strike price will effectively act as a price cap and that this price risks dampening short term energy prices if set too low. If set too high it will reduce the capacity revenue. EirGrid argue that reliability options do not represent a price cap as at a particular price the liability is independent of the output and for every extra MWh produced the generators' revenue will increase by the reference price. EirGrid state that reliability options may not work well with physical forward trading and require spot prices that reflect the value of scarcity in a similar fashion to energy only markets. Generators may not receive the high spot price while being exposed to the cost of the reliability option.
- 8.3.21 One response states that it is not possible to see how a market could develop organically or deliver sufficient capacity without a central obligation to purchase. Another expresses concern that centralised options may end up being a more targeted scheme where options are put in place with a few generators while decentralised reliability options add administrative complexity, have not been proved in other markets and involve experimentation. The level of complexity will present a barrier to market entry for all but vertically integrated undertakings. One respondent considers that the implementation risk is too high while another believes they may be implemented at a later stage as an evolution of quantity based auctions. One market participant requests worked examples particularly in deriving the value and subsequent remuneration wind capacity brings to the system. One response believes that reliability options would not encourage demand side participation.

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## 8.4 RATIONALE FOR THE DECISION ON THE DESIGN OF THE CRM FOR I-SEM

### QUANTITY BASED VS PRICE BASED MECHANISMS

- 8.4.1 CRM options in the consultation can broadly be categorised as to whether they are price based or quantity based CRMs. The SEM Committee has evaluated whether a price based or a quantity based mechanism would be most suited to the all island context. The distinctions between the two can be summarised as follows.<sup>27</sup>
- 8.4.2 At a high level, a quantity based capacity market starts with an administrative determination of the capacity required to give an adequate level of reliability. A common feature is that a descending clock action is run in which the price to be paid for each unit of capacity falls until the supply offered by existing and new units equals the required capacity
- 8.4.3 At price based capacity market is one in which the price to be paid for capacity is determined centrally and the market chooses how much to supply. A price based capacity market employs a demand curve, i.e., a price that all suppliers will be paid based on an aggregate amount of eligible capacity.
- 8.4.4 The Capacity Payment Mechanism (CPM) in the current SEM can be broadly categorised as a price based scheme in which the demand curve is determined by the SEM Committee through the Best New Entrant (BNE) Price and the Capacity Requirement.
- 8.4.5 Having considered the various design options for CRMs further, having taken on board the views set out in the consultation responses and having considered international best practice and academic research in this area, the SEM Committee's proposed decision is that a quantity based scheme is in the best interests of all-island consumers for the following reasons:
- 8.4.6 First, a quantity based scheme will provide a more competitive market based solution for the valuation of capacity than a price based scheme. Specifically, in a quantity based mechanism the value of capacity is typically determined in a competitive auction (potentially subject to market power mitigation measures). This means that the market determines the price and technology of capacity and the regulator determines the one thing that the market has no information on, that is the level of capacity adequacy that is socially optimal<sup>28</sup>. In the price based scheme in the current SEM the value of capacity is largely based on a desktop study into the value of new capacity without a competitive market test.

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<sup>27</sup> For further information on the distinctions between price and quantity based schemes see Capacity Markets: Prices vs. Quantities by Jonathan Falk. NERA Energy Regulation Insights Issue 38 November 2010.

<sup>28</sup> See: Forward Reliability Markets: Less Risk, Less Market Power, More Efficiency Peter Cramton and Steven Stoft, published in Utilities Policy, 16, 194-201, 2008:

8.4.7 Second, a quantity based CRM should provide a more proportionate response than a price based scheme to the issues being addressed by the CRM discussed in chapter 5. A number of features of the all-island market have changed since the CPM was introduced in 2007. For example there is increased import and export interconnection and increased competition within the market. However, one of the key differences is the amount of variable/non dispatchable generation on the system now with this trend expected to continue. As set out in Chapter 7, one key issue in relation to the continuation of a CRM is an increase in the missing money problem for thermal generation as a result of increased variable generation. A quantity based CRM will be better than a price based one at providing a response to this issue without necessarily having to address many other issues at the same time. This is a key concern of the European Commission and a requirement of the EU State Aide Guidelines on Energy and Environment.

*“A quantity based CRM will provide a more proportionate response to the issue being addressed through a competitive market based solution for the valuation of capacity”*

8.4.8 Third, in the I-SEM context a quantity based scheme can be designed more appropriately than price based schemes to mitigate against undue cross border trade distortions. The non-distortion of cross border trade is a key requirement of the I-SEM. Distortion of import trades can result in higher prices than would otherwise be the case and distortion of export trades could result in higher levels of RES curtailment than would otherwise occur. The SEM Committee is of the view that quantity based CRMs can be more easily designed in a way that would not distort the short term efficient use of interconnection. This is a key pillar of the EC's guidelines on the design and implementation of CRMs as well as a broader principle in establishing and developing an EU wide Internal Electricity Market.

- Quantity based schemes exhibit greater flexibility than price-based mechanisms in targeting the issue being addressed (i.e., a given security standard)
- Quantity based schemes are in line at conceptual level with other mechanisms under consideration in Europe, including capacity auctions in GB

8.4.9 Fourth, as discussed previously and as mentioned by respondents, the requirement for more flexibility in the generation fleet is an important issue which is linked to RES targets and meeting security of supply standards at least cost to consumers. The SEM Committee is of the view that quantity based schemes can be tailored to address issues such as flexibility more easily than price based schemes. In the current SEM potential investors in new flexible plants have argued that the current uniform distribution of the capacity pot makes investment decisions difficult and can keep older plants on the system, when no longer economically viable.

8.4.10 Finally, the EC and ACER have written on different CRM designs in the last number of years as the issue has gained prominence. In general it would appear that many of the mechanisms under consideration are quantity based schemes, for example, the



schemes under consideration in GB, France, Italy and Germany are all quantity based.

### **SPECIFIC CRM DESIGN**

- 8.4.11 Having considered the reasons for needing a CRM in the I-SEM and having taken into account the responses received, researched international experience and relevant peer reviewed academic literature in the area<sup>29</sup>, the SEM Committee's proposed decision is that the form of CRM should be Centralised Reliability Options (ROs) issued by a central party. This corresponds to Option 5a in the Consultation Paper.
- 8.4.12 Reliability Options are a market based mechanism, which is a key consideration at EU level, providing a market based valuation of capacity and also providing a market based mechanism for non-delivery on obligations. Reliability Options do not specifically require plants to bid in a certain way in the short term energy market and therefore, should not unduly affect the spot electricity price, which encourages efficient cross border trade.
- 8.4.13 Depending on their detailed design, Reliability Options can act to remove supplier exposure to scarcity rents and can encourage increased liquidity in certain market timeframes.
- 8.4.14 The centralised auction of Reliability Options will ensure transparency and a level playing field for new entrants and existing players alike, as well as ensuring that all consumers effectively pay the same price for the same capacity product. The centralised approach also facilitates the implementation of market power mitigation mechanisms.

### **DETAILED DESIGN OF CENTRALISED RELIABILITY OPTIONS**

- 8.4.15 The following section sets out the SEM Committee's proposed decision for CRM design in the I-SEM and the elements to be determined in the detailed design of the mechanism.
- 8.4.16 Essentially a Reliability Option (RO) is a one way CfD issued by a centralised party to all successful bidders in a competitive auction. ROs have a strike price and a reference price. If the reference price goes above the strike price the holder of the RO pays the difference back. The RO holder receives an option fee, set in a competitive auction.

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<sup>29</sup> See relevant academic papers:

*Forward Reliability Markets: Less Risk, Less Market Power, More Efficiency* Peter Cramton and Steven Stoft, published in *Utilities Policy*, 16, 194-201, 2008;

*Security of Supply in the Dutch Electricity Market: the role of Reliability Options*; Carlos Vazquez, Carlos Batlle, Michel Rivier, Ignacio J Perez-Arriaga; 2003

8.4.17 The following are the key elements of centralised ROs that will be determined in the detailed design phase.

- Capacity Requirement
- Strike Price
- Reference Price
- Additional Penalty Arrangements
- Eligibility
- Auction Rules
- Delivery Timeframe and Contract Length
- Secondary Trading Arrangements
- Collateral Arrangements
- Supplier Interactions and charging basis for consumers

8.4.18 The Capacity Requirement determines the amount of capacity to be auctioned. The Capacity Requirement in the current SEM CPM is determined by the TSOs and has a number of inputs including an adequacy standard. The adequacy standard in the current CPM is 8 hours. The capacity requirement for ROs will be evaluated during the detailed design phase.

8.4.19 The strike price will be determined by the Regulatory Authorities following a consultation process. Where ROs have been implemented to date they have been implemented with a single strike price which is set at a premium to the short run marginal cost of the most expensive provider on the system. Indexing may be used where there is a lag between auction and delivery. The specifics of the strike price and whether more than one is employed will be considered as part of the detailed mechanism design.

8.4.20 The reference price is the price against which the RO is settled. In general the reference price should be from a very liquid market, which in the I-SEM, might be the Day Ahead market. Consideration will be given as part of the detailed design on which is the best reference price and whether an intraday or balancing price could be used to incentivise greater flexibility from providers. .

8.4.21 Pure reliability options do not have additional penalty mechanisms for non-delivery other than the amounts paid back when the RO is called. However, other markets have considered combining reliability options with penalties for physical non delivery. The requirement for these in the I-SEM context is not clear at this stage and this will be an issue to be considered in the detailed design of the mechanism.

8.4.22 The eligibility rules will determine who can issue ROs, for example, whether option issuers will need to have physical plant capacity or a credible generation project, or what criteria demand side participants will be required to meet. The eligibility rules will also consider participation of cross border players and potentially demand

providers. The eligibility rules will be determined as part of the detailed design of the mechanism.

- 8.4.23 The auction rules will be an important feature of the RO mechanism and will be determined as part of the detailed design phase. The auction design itself will likely draw upon designs from other jurisdictions; however market power mitigation measures in the auctions will be a key consideration, including potential interaction with any Directed Contracts or similar market power mitigation obligations.
- 8.4.24 The delivery timeframe sets out the time lag between the RO auction and the commencement date of the RO contract. In the GB capacity mechanism this time lag is four years. The contract length is another important parameter. In the GB capacity auction, existing players get a one year contract while new entrants and retrofit plants get longer contract durations. The specific arrangements of the delivery timeframe and contract length will be considered as part of the detailed design of the mechanism.
- 8.4.25 Secondary Trading will allow participants who are successful in the initial auction to trade their obligations to another party before RO commencement date. This will allow a more efficient overall solution in which participants can trade obligations should a lower cost project become available or where permitted or unexpected outage etc. become an issue for a party which has issued an RO. Arrangements for secondary trading of obligations will be assessed by the RAs given the potential cost implications and the possibility for market power to be exerted.
- 8.4.26 The collateral arrangements associated with Reliability Options will be an important feature of the mechanism, which will impact on both provider and buyer. Providers may need to provide collateral arrangements to cover events where the reference price is higher than the strike price. Suppliers will need to post collateral to cover their exposure to the supplier charge, which will cover the advance option fee commitments to be paid to providers. Collateral arrangements will be considered as part of the detailed design of the RO mechanism.
- 8.4.27 The cost of the RO option fees will be spread across all suppliers in the market. This will be done in a way that sees the suppliers' best benefit from the payment they make through the option fee. The design of supplier and RO interactions will be considered in the detailed RO mechanism design phase.

8.5 SEM COMMITTEE DECISION ON THE CRM TYPE

8.5.1 The following tables summarise the SEM Committee’s proposed decisions on the form which the Capacity Remuneration Mechanism will take in the I-SEM.

**DECISION 3: QUANTITY BASED CRM**

The I-SEM will have a quantity based Capacity Remuneration Mechanism.

**DECISION 4: THE I-SEM CRM WILL BE BASED ON RELIABILITY OPTIONS**

The form of CRM will be Reliability Options issued by a central party. The SEM Committee’s proposed decision for Reliability Options has considered the following:

- Reliability Options are a market based mechanism consistent with the underlying principles of the EU Internal Market and the I-SEM philosophy
- Reliability Options do not unduly affect the spot electricity price which encourages efficient cross border trade.
- Reliability Options are a straightforward and understandable mechanism
- Reliability Options will act to remove supplier exposure to scarcity rents and can encourage increased liquidity in certain market timeframes.

8.5.2 The SEM Committee has also published a detailed initial impact assessment alongside this Draft Decision Paper. The impact assessment includes a qualitative assessment of the CRM Options in the Consultation Document and a quantitative assessment of the Draft Decision Option and the alternative Base Case. The Impact assessment results are not reproduced in this Draft Decision Paper and the Initial Impact Assessment Document should be read in conjunction with this Paper. However the table below summarizes the key conclusions of the Impact Assessment of the Proposed Decision to adopt the Reliability Option as the preferred approach for CRM in the I-SEM.

**Summary of qualitative rationale for centralised reliability options against each assessment criteria**

		<b>Rationale for centralised reliability options</b>
<b>Primary Assessment Criteria</b>	<b>Internal Electricity Market</b>	Compatible with general European drive towards competitive quantity-based CRMs; with reliability options more consistent with efficient short-term energy price signals needed for efficient market coupling
	<b>Security of Supply</b>	Transparent and flexible mechanism for providing efficient entry and exit signals (in line with the specified security standard), and more compatible than other CRM designs with efficient short-term energy price signals
	<b>Competition</b>	Provide transparent centralised platform for competition that facilitates efficient and coordinated entry and exit signals, whilst using competitive pressures to ensure that consumers don't overpay for adequacy. Centralised reliability options fit well with possible market power mitigation measures in the energy market.
	<b>Environmental</b>	CRM that is most compatible with efficient short-term energy price signals that should encourage the flexible resources that can help to reduce curtailment (e.g. interconnection, storage, demand-side response)
	<b>Equity</b>	Repayments by providers at times of high energy prices is a market-based mechanism to address double payments from capacity and energy markets. Centralised platform supports access for new entrants through a transparent market mechanism, with consumers all effectively paying the same price for the same level of generation adequacy.
<b>Secondary Assessment Criteria</b>	Stability	Offers good stability going forward, as fits well with the philosophy of the I-SEM design for energy trading arrangements, and with direction of travel on CRMs in Europe. This means that it is a timely change from the current scheme – the review of which has been signaled for a number of years.
	Adaptive	<i>To be determined by the detailed design phase</i>
	Efficiency	Most compatible with efficient short-term energy price signals that support a more efficient overall dispatch
	Practicality/Cost	Slightly higher implementation costs but the HLD would support more straightforward implementation than other quantity-based schemes

## ANNEX A MARKET POWER MITIGATION

### 1.1 INTRODUCTION

1.1.1 The February 2014 Consultation Paper confirmed that the new HLD must be capable of accommodating a sufficiently robust market power mitigation strategy. While it will not be necessary in the HLD phase to consider and determine detailed market power mitigation measures, it is useful at this stage to consider what measures could be used and how they could fit with the proposed set of energy trading arrangements.

### 1.2 ISSUES FOR THE ALL-ISLAND MARKET

1.2.1 The issue of market power has been a key topic in the all-Island market since its start in 2007 and the design and enforcement of market power mitigation measures has been one of the key areas of regulatory concern.

1.2.2 In general, the market power mitigation measures available in the I-SEM take three broad forms<sup>30</sup> (with examples being seen in the SEM and in many other European electricity markets):

- **Proxies for structural reform**, which can include ring-fencing and Virtual Power Plant (VPP) auctions or Directed Contracts that are targeted at parties deemed to have scope to exercise excessive market power (often incumbents but can also apply in cases of localised market power);
- **Ex ante bidding measures designed to alter pricing behaviour in advance of the determination of market prices and quantities**<sup>31</sup> – this can cover a number of different types of measures, including price caps and floors, checking of bids by a market monitor, detailed bidding rules and/or high-level bidding principles.
- **Ex post measures (such as sanctions) that are enforced after market prices and quantities are determined**<sup>32</sup> – (even if the date of delivery is still actually in the future). For example, *ex post* market surveillance may identify unusual results from the forward market before the date of delivery is reached.

1.2.3 These measures are not mutually exclusive and there is often an interaction, particularly between *ex ante* bidding measures and *ex post* sanctions, e.g., because compliance with some of the *ex ante* bidding measures is only checked on an *ex post* basis. Market monitoring/surveillance activities are an underpinning component of both *ex ante* and *ex post* market power mitigation measures<sup>33</sup>. Strengthening the

<sup>30</sup> This excludes structural reform, which is out of scope in the design of the I-SEM.

<sup>31</sup> In practice, this could also include a retrospective rerun of the market.

<sup>32</sup> Even if the date of delivery is still in the future.

<sup>33</sup> Indeed, market monitoring on an *ex post* basis may identify behaviour for which a new *ex ante* measure is then put in place (with no *ex post* action to change the previous market results). In practice in the SEM this has resulted in the evolution of the Bidding Code of Practice.

role of market surveillance is the focus of the REMIT measures that are currently being implemented at a European level.

- 1.2.4 Transparency is another important market power mitigation measure, as it will help market participants or other stakeholders support the formal market surveillance activities. Transparency has been a key requirement of the SEM and will be equally important for I-SEM.
- 1.2.5 Additional market power mitigation measures in the SEM have been focused on:
- **proxies for structural reform** (including vertical ring-fencing of ESB and Viridian and directed contracts); and
  - **ex ante bidding controls** (in the form of the Bidding Code of Practice which requires generators to bid in line with their short run marginal cost, and the restriction that generators can submit only one complex bid<sup>34</sup> to apply for the whole of the Trading Day<sup>35</sup>).
- 1.2.6 Generally, other European markets place a greater reliance on higher-level principles (e.g. through codes of conduct) governing how all market participants (generation and demand) are expected to behave in the markets (including in their submission of bids) than the more detailed provisions in the BCoP. This high-level guidance is supported by *ex post* measures taken to rectify any assessed breach of the guidance.
- 1.2.7 The issue for the design of I-SEM is two-fold as it moves to an increased number of timeframes for trading :
- The ‘inherent’ features of the proposed HLD that would reduce the scope for market power to be exercised to the detriment of customers (short-term and long-term). This informs the scope and need for additional market power mitigation measures across all timeframes, which would be determined after the HLD phase.
  - Compatibility of the proposed HLD with different additional market power mitigation measures; including EU regulations on market surveillance and monitoring.

### 1.3 RELEVANCE OF DRAFT HLD DECISION

- 1.3.1 It is important that stakeholders have confidence that the conditions are in place for effective competition (which helps to support efficient new entry for example). This includes promotion of transparency. The proposed set of electricity trading arrangements for the I-SEM include a number of design features designed to support effective market power mitigation. By concentrating spot physical trading into centralised DAM and IDM, the option:
- **fully integrates the interconnector into the market arrangements** (with FTRs maximising the amount of physical cross-zonal capacity available for the DAM

<sup>34</sup> Start costs, no load cost and price-quantity pairs

<sup>35</sup> The residual of the Trading Day for the last Intraday bid submission

and IDM, which can act as an important constraint on market power);

- **supports transparency of bidding and market outputs** (particularly combined with unit-based bidding as a default requirement for generation);
- **helps to provide a route to market for wide range of market participants;**
- **provides a reliable day ahead price to facilitate demand-side participation,** which can be an effective constraint on pricing, particularly in peak demand periods

1.3.2 Market power can be exercised over different timeframes. Therefore, the proposed set of arrangements also has an emphasis on supporting forward market liquidity as well as mandatory participation in the Balancing Mechanism before the gate closure of the IDM.

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## 1.4 OPERATION OF POSSIBLE ARRANGEMENTS IN THE I-SEM

1.4.1 We now briefly describe how some of the different types of market mitigation measure – (contractual) proxies for structural reform, *ex ante* bidding measures, *ex post* action – could work in the type of arrangements proposed for the I-SEM. We then provide an example of market surveillance activities across the different market timeframes that will be covered by I-SEM.

### CONTRACTUAL VERSIONS OF STRUCTURAL REFORM

1.4.2 Contractual versions of structural reform such as Directed Contracts (DCs), or VPP auctions are well-recognised market power mitigation tools found in other European markets. They fit well with a range of different market designs, including the chosen I-SEM option for energy trading.

1.4.3 The key design parameters for DCs and VPPs are:

- Form (option or Power Purchase Agreement )
- Price formation (auction or regulated price)
- Volume and nature of capacity covered (baseload, mid-merit, peak<sup>36</sup>);
- When the capacity is called (e.g. day-ahead or at some other time)
- Physical or financial nature of the contract

1.4.4 If these measures take the form of option contracts, they can also be used to encourage liquidity in different market timeframes. In the proposed I-SEM arrangements, this could mean having the DAM price as a reference price for the financial Directed Contracts. This would rely on a liquid DAM but would also reinforce the liquidity of the DAM.

### EX-ANTE BIDDING MEASURES

1.4.5 In many of the European markets, the *ex ante* bidding measures are generally

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<sup>36</sup> With an option, the nature of the capacity is defined by the strike price.



focused around high level principles for market behaviour and ‘soft’ *ex ante* checks of all bids through an automatic process called ‘bid reasonability check’.

- 1.4.6 The ‘bid reasonability’ check typically allows the market operator to check patterns of the bidding behaviour of market participants and raises warnings when there are concerns about changes in bidding behaviour between market timeframes. This is implemented as part of the market system with validation checks conducted automatically upon receipt of bids. These checks work as “warnings” that allow the market operator to contact the market participant and ask for clarifications on the different bidding behaviour. This measure could also help to spot ‘errors’ in bids as market participants gain experience in participating in the new market arrangements.
- 1.4.7 In some European markets, the operators of the DAM and IDM are the parties that administer the *ex ante* principles in relation to market behaviour (e.g., in the form of codes of conduct). RAs are generally involved in monitoring the process, and approving the rules.

1.4.8 The codes of conduct can cover a wide range of topics, including rules for bidding as well as general market conduct. Below is a list of topics covered in the market participant agreements used for EPEX Spot<sup>37</sup> and Nord Pool Spot<sup>38</sup>:

- Clear rules for transparency/information disclosure requirements
  - Some of these have now been formalised through REMIT
- Definition of (illegal) market manipulation including
  - False or misleading behaviour;
  - Collusion or the collusive cooperation of exchange members among each other or with third parties;
  - Price positioning behaviour (i.e. trying to influence the prices in one market to gain in another market).
- All orders submitted on the exchange must have a “due economic justification” or be based on “good business conduct”. The exchange is entitled to look for such justification by requesting explanations from the beneficiary of such orders.
- Insider trading is prohibited
- The market surveillance function has a right to audit the market participants at any time and to give warnings, fines and propose the suspension of a market participant, with the final decision on suspension taken by the regulator.

1.4.9 These principles are typically set out in the agreements that market participants have to sign to join the power exchange. These market participant agreements (with their sub-procedures) cover most of the functions of the current Trading and Settlement Code of SEM, including:

- Legal definitions;
- Empowerment of the Market Surveillance function;
- Admission;
- Definition of the market, products etc.;
- Technical bidding routines; and
- Settlement.

## **EX POST MEASURES**

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<sup>37</sup> <https://www.epexspot.com/en/extras/download-center>

<sup>38</sup> [https://www.epexspot.com/en/market\\_surveillance](https://www.epexspot.com/en/market_surveillance)  
<http://nordpoolspot.com/TAS/Rulebook-for-the-Physical-Markets/>  
<http://nordpoolspot.com/TAS/Market-surveillance/>

- 1.4.10 The scope of *ex post* measures will need to reflect the enforcement regimes available in both jurisdictions, including for example the interaction with the Competition and Consumer Protection Commission being set up in Ireland (as a result of the merger of the Competition Authority and the National Consumer Agency).
- 1.4.11 At a European level, both Ireland and Northern Ireland have signed up to the revised Market Abuse Directive (MAD)<sup>39</sup>. This essentially establishes minimum rules for criminal sanctions for insider dealing, for unlawful disclosure of inside information and for market manipulation to ensure the integrity of financial markets in the Union and to enhance investor protection and confidence in those markets. The proposed forward market in I-SEM will be subject to MAD, since it will be a financial market. MAD will in effect also cover most of the trading in the physical short term markets as in essence it will be the same information that applies to all markets for the I-SEM.

## MARKET SURVEILLANCE

- 1.4.12 The market surveillance activities in the I-SEM will also include the activities covered by the Regulation on Energy Market Integrity and Transparency (REMIT)<sup>40</sup> that are being implemented at a European level<sup>41</sup> (and will therefore apply to the I-SEM). It is based primarily on *ex post* market surveillance but also sets in place provisions for transparency and reporting of the various markets. For example REMIT sets the rules governing when a generator must inform the market before being allowed to trade out its positions in the case of a forced outage.
- 1.4.13 REMIT is supported by guidance from ACER, the third edition of which was issued in October 2013, together with fundamental data transparency guidelines on both electricity and gas. These specify the type and timing of information that should be released into the public domain.
- 1.4.14 A further requirement of REMIT is a central register of all market participants across the EU, and ACER published a proposed format for this data in June 2012. This requirement will be brought into effect by a further Implementing Act, a draft of which was published in late 2013, and is expected to be adopted via comitology in mid-2014. The registration itself will then need to be completed by energy companies within three months of the date of adoption.

<sup>39</sup> The MAD directive can be found at

<http://register.consilium.europa.eu/doc/srv?l=EN&f=PE%208%202014%20REV%201>

<sup>40</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:326:0001:0016:en:PDF>.

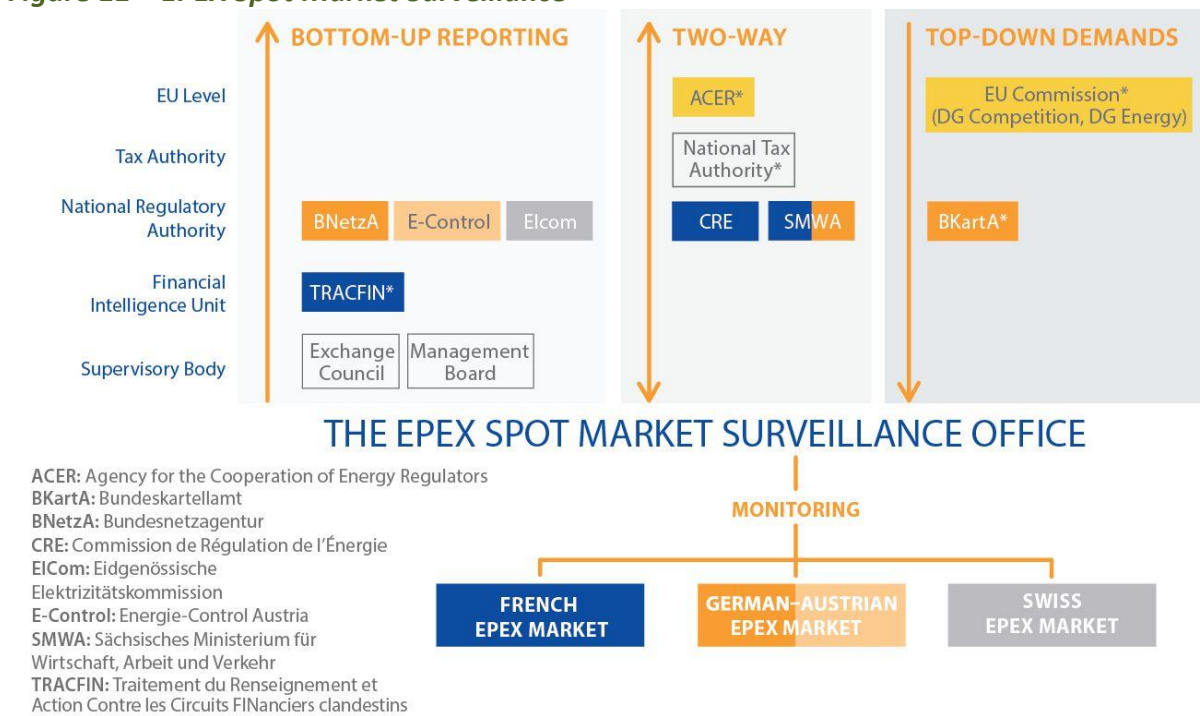
<sup>41</sup> The Regulation is directly applicable to member countries without transformation into national legislation, but does require certain national implementation measures, such as to give local regulators or competition authorities powers to enforce REMIT requirements, and to set up appropriate penalty regimes, which were due to be introduced by the end of June 2013

1.4.15 ACER also published recommendations to the EC in October 2012 and March 2013 on transaction reporting, and this has been developed into a draft Implementing Act to bring this into effect, which was issued in October 2013. This will now move into the comitology process which is also expected to be completed in mid-2014. Market participants will then have six months to put in place suitable reporting systems in conjunction with their national regulator and ACER.

1.4.16 Most of the operators of the DAM and IDM in Europe have implemented system support to assist in the *ex post* market surveillance. For example, ‘Smarts’ (the system to be used by ACER as part of REMIT) is also used at NASDAQ/Nord Pool Spot as part of the automated market surveillance of the financial and physical markets.

1.4.17 Therefore, by concentrating spot physical trading in the European day ahead and intraday markets, the proposed I-SEM HLD will also allow the power exchanges operating these markets to support the regulators’ market monitoring activities (including through the publication of their market surveillance reports). As an example, Figure 1 describes the interaction between the market surveillance carried out by EPEX Spot (the market operator in France, Germany, Austria and Switzerland) and the national and European regulatory bodies.

**Figure 11 – EPEX Spot Market Surveillance**



Source: EPEX Spot

1.4.18 Many of the breaches of market conduct rules investigated by market operators have related to attempts to arbitrage ‘illegally’ between the markets – for example, behaviour in the DAM intended to affect the prices in the forward financial market.

It is important that any market surveillance activity in the I-SEM considers consistency of behaviour between different market timeframes (as well as behaviour within a particular time frame).

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## 1.5 ISSUES FOR DETAILED DESIGN

1.5.1 The main issues to be resolved in the detailed design phase include:

- The mix and form of different market power mitigation measures;
- Responsibilities and processes for market surveillance;
- Specific measures to promote transparency, which could include a requirement for all forward contracts to be cleared through a central clearing house; and
- Interaction with European requirements (e.g. REMIT).

**ANNEX B EUPHEMIA AS THE STARTING POINT OF DISPATCH****8.6 INTRODUCTION**

- 1.5.2 A number of respondents to the Consultation Paper have raised concerns over the operation of the EUPHEMIA algorithm and the potential risks associated with its use. The ability of the algorithm to accommodate commercial and technical bid parameters, including start-up and no-load costs, and how these provide outturn prices has been questioned. Respondents state that this is particularly an issue for the operation of energy trading arrangements based on Option 3.

**8.7 ISSUES FOR THE ALL-ISLAND MARKET**

- 1.5.3 Since the Consultation Paper was published further consideration has been given to the question of whether EUPHEMIA would act as a robust algorithm for establishing the DA unconstrained schedule. As part of this the project team within the RAs held discussions and workshops with SEMO and European Power Exchanges.
- 1.5.4 The SEM Committee considers that the EUPHEMIA algorithm is fit for purpose to serve as the means of unit commitment and scheduling of generation in the I-SEM DAM. This view is formed on the basis of the discussions held with expert parties, international best practice and the responses received to the consultation.

**8.8 POSSIBLE OPERATION OF ARRANGEMENTS IN THE I-SEM**

- 1.5.5 Concerns were raised by some participants about the use of EUPHEMIA to price and settle the majority of the I-SEM DAM and these concerns have been considered. At the heart of the concerns appear to be questions over whether the EUPHEMIA algorithm is comparable to the current SEM pool algorithm. The SEMC would point out that the new I-SEM arrangements are not a pool type arrangement in the way that the current SEM is. With I-SEM and EUPHEMIA much of the control over a participant's position will move from the SEM algorithm back to the participant who will need to ensure the recovery of their costs of generation through their offers and who will be responsible for submitting offers that are technically feasible. The offer submission can be Simple Orders (in the sense of price and quantity pairs) or Block Orders (i.e. Profiled Block Orders, Linked Block Orders, Exclusive Groups and Flexible Orders) or Complex Orders (simple orders with constraints such as Minimum Income Conditions, Load Gradients, etc) but the three part bids and related uplift calculation of the SEM algorithm are not features of EUPHEMIA.
- 1.5.6 Participants in I-SEM will take responsibility for their own start-up and no load cost recovery and will internalise their own risks of commitment and scheduling through their bidding decisions. Some participants have suggested that EUPHEMIA could produce schedules with generators running in patterns that are not technically feasible or achievable. We do not agree and would stress to participants that the range of offer structures available in EUPHEMIA will accommodate the requirements of I-SEM generators. In particular, the RAs together with SEMO and other power

exchanges have explored the range of possible offer structures that can be accepted by EUPHEMIA and how these offer structures can accommodate likely I-SEM requirements.

- 1.5.7 The analysis undertaken suggests that there is significant latitude available to the I-SEM through the various types of Block Orders and that the requirements for sophisticated constraints such as the Minimum Income Condition may not be as important or as necessary as was previously thought. The various Block Orders would appear to exhibit sufficient flexibility to address issues such as start-up costs, ramp rates, etc.
- 1.5.8 Profiled Block Orders allow a unit to express its ramping restrictions (as well as start and shutdown periods and minimum on and off times) as part of its offer. This gives the same outcome as adding a ramping constraint but the responsibility is on the generator to submit a technically feasible profile. This also allows generators the flexibility to express different technical constraints between different hours or blocks of hours if this is the reality.
- 1.5.9 Block orders can be linked together, i.e. the acceptance of individual block orders can be made dependent on the acceptance of other block orders. The block whose acceptance is dependent on the acceptance of another is called the “child block”, whereas the block that conditions the acceptance is called the “parent block”. There are various rules for the acceptance of these Linked Block Orders. In an easy common configuration of two linked blocks, the rules are straightforward. The parent can be accepted alone, but the child needs the acceptance of the parent first before it can be accepted. The child can “save” the parent with its surplus, but not vice versa.
- 1.5.10 A simple example of the use of Linked Block Orders by a generator goes as follows. The generator first creates a Parent Block Order (which could either be a simple flat block order or a profiled block order) that is priced to reflect the costs that are made whole by uplift in the current SEM (startup cost, no-load cost and potentially others such as shutdown cost). The Parent Block order here would have a Minimum Acceptance Ratio of 1. The generator then creates a Profiled Block Order to reflect the desired production pattern of the unit; i.e. allowing for the time and ramping constraints to enable technically feasible ramping. This is the Child Block Order and is priced to reflect the hour-by-hour variable costs of production. It could have a Minimum Acceptance Ratio of less than 1. This construction will not allow the Child Order to be accepted unless it fulfills the requirement of its Parent Order, i.e. until its surplus compensates any loss of the Parent. The main difference from today in this example is that the generator is responsible for internalising its start and no load costs in its Parent Order to ensure cost recovery if it is scheduled. The generator is also responsible for ensuring it submits a technically feasible profile.
- 1.5.11 An Exclusive Group of Block Orders is a set of block orders for which the sum of the accepted Minimum Acceptance ratios cannot exceed 1. In the particular case of blocks that all have a minimum acceptance ratio of 1 this means that at most one of

the blocks of the exclusive group can be accepted. EUPHEMIA will choose the block which maximizes the optimization criterion. The exclusive block order allows the possibility for a single market participant/unit to submit “competing” bids while ensuring that only a feasible combination is chosen. This could for instance be used by a unit that has limited fuel that could offer this at either the morning peak or the evening peak, but not both. Note that Linked Block Orders cannot currently be offered in an Exclusive Group but Profiled Block Orders can be.

- 1.5.12 A Flexible Block Order is a block order with a fixed price limit, a fixed volume, a fixed duration (which may be 1 hour or more) and a Minimum Acceptance Ratio of 1. The key feature is that the timing of the block is not defined by the participant but will be determined by the optimization criterion (hence the name “flexible”).
- 1.5.13 Further information on these Order formats is available in the EUPHEMIA Public Description<sup>42</sup>
- 1.5.14 The specific bidding structure to be employed in the I-SEM will be considered further as part of the detailed market design but at this stage the SEM Committee does not see any impediment to the use of EUPHEMIA as the DAM algorithm.
- 1.5.15 The main difference between a power pool algorithm such as the current SEM and a power exchange such as EUPHEMIA is that the SEM algorithm provides for side payments (i.e. uplift) to ensure that a generator’s costs are recovered. Stephen Stoft argues in his book on electricity market design ‘Power System Economics’<sup>43</sup> that power exchanges using two part bids can perform unit commitment as well as power pools and that side payments are not required to remove DAM ‘volume’ risk to generators: *“An exchange sets the market price high enough to cover the costs of all accepted bids. No bid is accepted that loses money on its own terms. Any bid that does not lose money on its own term will, at worst, break even if accepted and fulfilled”*. The key point is that a centralised power exchange day ahead market can be used to solve unit commitment through market participants internalising start costs. While some generators may have difficulty doing this through simple bids, as Stoft notes *“a slight complication in power exchange bidding can help generators solve the unit commitment problem”*.
- 1.5.16 In addition, the behaviour of the market participants in I-SEM will be decided not by participation in one market as today, but by a combination of their participation in the Forward, DA, ID and Balancing timeframes. It is therefore important when assessing against today’s market not to only focus on the DAM, even though this will be the main market.

<sup>42</sup> [https://www.n2ex.com/digitalAssets/89/89745\\_euphemia---public-description---nov-2013.pdf](https://www.n2ex.com/digitalAssets/89/89745_euphemia---public-description---nov-2013.pdf)

<sup>43</sup> <http://stoft.com/metaPage/lib/Stoft-2002-PSE-Ch-1-3,4,5,6.pdf>



## ANNEX C LIST OF CONSULTATION RESPONSES

1.5.17 Responses to the consultation were received from the following stakeholders.

<ul style="list-style-type: none"> <li>• Activation Energy/EnerNOC</li> <li>• AES</li> <li>• Bord Gáis Energy, supply and thermal generation business</li> <li>• Bord na Mona</li> <li>• Climote</li> <li>• Dalkia Alternative Energy</li> <li>• EAI</li> <li>• EirGrid</li> <li>• Electron Energy</li> <li>• Energia</li> <li>• ESB</li> <li>• ESRI</li> <li>• Fingleton White</li> <li>• HgCapital</li> <li>• IBEC</li> <li>• Indaver Ireland (supported EAI)</li> <li>• iPower</li> <li>• Irish BioEnergy Association</li> <li>• IWEA</li> <li>• IWFA</li> <li>• Mainstream Renewable Power</li> <li>• Manufacturing NI</li> <li>• Mutual Energy</li> <li>• Power NI</li> <li>• Power Optimisation</li> <li>• PPB</li> <li>• Prepaypower</li> <li>• Private Citizen - Alan Mulcahy</li> <li>• Rusal Aughinish</li> <li>• Smart Power</li> <li>• SSE</li> <li>• SWS Natural Resources Holdings Limited (BGE)</li> <li>• Tynagh Energy Limited (supported EAI)</li> <li>• Vayu Limited</li> </ul>	<p style="text-align: center;"><b>Responses endorsing IWEA</b></p> <ul style="list-style-type: none"> <li>• Codling Wind Park Ltd.</li> <li>• Coillte</li> <li>• Ecopower Deveopments Ltd.</li> <li>• Enerco Energy Ltd.</li> <li>• ENERCON Wind Farm Services Ireland</li> <li>• Fehily Timoney &amp; Company Ltd</li> <li>• H Harbison &amp; Associates</li> <li>• Jennings O'Donovan &amp; Partners Ltd</li> <li>• John Sisk &amp; Son Holdings Ltd.</li> <li>• KBM Wind Farm Ltd.</li> <li>• Kirby Group Engineering</li> <li>• Malachy Walsh and Partners</li> <li>• NIRIG</li> <li>• NTR</li> <li>• OES Consulting</li> <li>• RES</li> <li>• TCI Renewables</li> <li>• TLI Group</li> <li>• W&amp;H Alexander (Civil Engineering) Ltd</li> <li>• Wind Prospect Ireland Ltd</li> <li>• Wind Connect</li> <li>• Windyfields</li> <li>• Wm. O'Brien Energy Services</li> </ul> <p style="text-align: center;"><b>Reponses endorsing IWFA</b></p> <ul style="list-style-type: none"> <li>• Aeolus Energy Ltd</li> <li>• ART Generation</li> <li>• Association of Irish Energy Agencies</li> <li>• Ballybay Windfarm Ltd</li> <li>• Ballycadden Windfarm</li> <li>• Beal na Blath Power Trading Ltd</li> <li>• Beam Wind Ltd.</li> <li>• Charlie Carlisle (Project Geologist)</li> <li>• CKEA</li> <li>• Cooperative Power</li> </ul>
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	<ul style="list-style-type: none"><li>• Corr na Gaoithe</li><li>• Courtstown Technologies Ltd.</li><li>• CRES</li><li>• Cronlea Windfarm Ltd</li><li>• CWIND LTD</li><li>• Dunmore Wind Power Limited</li><li>• Exodea Consulting</li><li>• First Electric Ltd</li><li>• Foyle Windfarm Ltd</li><li>• Galeforce Energy Ltd.</li><li>• GGT</li><li>• IERNE</li><li>• Killybegs Wind Power Limited</li><li>• Kilvinane Windfarm Ltd</li><li>• Lisdowney Windfarm Ltd</li><li>• Moneenatieve Windfarm Ltd</li><li>• Rathmacan Trading Ltd</li><li>• Saporito Limited</li><li>• Skehanagh WindFarm</li><li>• Standbury Ltd</li><li>• TOH Tawnaghmore Windfarm</li><li>• Tornado Electrical Ltd</li><li>• Thomas G Brennan</li><li>• Tradewinds</li><li>• West Clare Windfarm (Services) Ltd</li></ul>
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## ANNEX D REFERENCE DOCUMENTS ON THE EU TARGET MODEL

The following documents provide details on the requirements and contents of the EU Target Model.

- Next Steps Decision Paper on ‘Implementation of the EU Target Model for the Single Electricity Market’ (SEM/13/009)<sup>44</sup>;
- Framework Guidelines on Capacity Allocation and Congestion Management for Electricity<sup>45</sup>;
- Framework Guidelines on Electricity Balancing<sup>46</sup>;
- Draft Network Code on Capacity Allocation and Congestion Management<sup>47</sup>;
- Draft Network Code on Forward Capacity Allocation<sup>48</sup>;
- Draft Network Code on Electricity Balancing<sup>49</sup>;
- EUPHEMIA: Description and Functioning<sup>50</sup>;
- Price Coupling of Regions (PCR) initiative and the North West Europe (NEW) project<sup>51</sup>;
- Publications by Eirgrid and SONI on the Network Codes<sup>52</sup>.

<sup>44</sup> <http://www.allislandproject.org/GetAttachment.aspx?id=c23bdd02-bc49-4e21-af67-16bc0b30d994>

<sup>45</sup> [http://www.acer.europa.eu/Electricity/FG\\_and\\_network\\_codes/Electricity%20FG%20%20network%20codes/FG-2011-E-002.pdf](http://www.acer.europa.eu/Electricity/FG_and_network_codes/Electricity%20FG%20%20network%20codes/FG-2011-E-002.pdf)

<sup>46</sup> [http://www.acer.europa.eu/Electricity/FG\\_and\\_network\\_codes/Electricity%20FG%20%20network%20codes/FG-2012-E-009.pdf](http://www.acer.europa.eu/Electricity/FG_and_network_codes/Electricity%20FG%20%20network%20codes/FG-2012-E-009.pdf)

<sup>47</sup> <https://www.entsoe.eu/major-projects/network-code-development/capacity-allocation-and-congestion-management/>

<sup>48</sup> <https://www.entsoe.eu/major-projects/network-code-development/forward-capacity-allocation/>

<sup>49</sup> <https://www.entsoe.eu/major-projects/network-code-development/electricity-balancing/>

<sup>50</sup> [http://www.eirgrid.com/media/PCR\\_EUPHEMIA\\_CLARIFICATION.pdf](http://www.eirgrid.com/media/PCR_EUPHEMIA_CLARIFICATION.pdf)

<sup>51</sup> [http://www.eirgrid.com/media/PCR\\_NWE\\_MO\\_TSO\\_Review.pdf](http://www.eirgrid.com/media/PCR_NWE_MO_TSO_Review.pdf)

<sup>52</sup> <http://www.eirgrid.com/europeanaffairs/internalenergymarket/>

## ANNEX E GLOSSARY

**Allocated Volume:** relates to the metered volume of a Balance Responsible Party (whether injected or withdrawn)

**Position:** The Position relates to the contracted energy volumes (over a centralised exchange or between Balance Responsible Parties). Therefore, the final Position is the last contracted Position prior to intraday Gate Closure, but adjusted by any subsequent BM trades by the TSO.

**Imbalance:** an energy volume calculated for a Balance Responsible Party and representing the difference between the Allocated Volume attributed to that Balance Responsible Party and the final Position of that Balance Responsible Party and any Imbalance Adjustment applied to that Balance Responsible Party, within a given Imbalance Settlement Period.

**Balance Responsible Party** means a market participant or its chosen representative responsible for its imbalances

**Market Participant** means market participant within the meaning of the Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale market integrity and transparency.

**Unit Commitment** means scheduling of generation or load resource for each time interval representing among others: running state of unit; load generation level; and switching states of automatic regulation system. Unit commitment aims at scheduling the most cost-effective combination of dispatchable generation and demand resources to meet forecasted load and reserve requirements, while complying with resources and transmission constraints.

**Balancing Mechanism** means the entirety of institutional, commercial and operational arrangements that establish market-based management of the function of Balancing within the framework of the European Network Codes.

**Imbalance Settlement** means a financial settlement mechanism aiming at charging or paying Balance Responsible Parties for their Imbalances.

**Unit-based bid** means the bid submitted by a Market Participant that corresponds to potential output from a single generating unit.

**Portfolio-based bid** means the bid submitted by a Market Participant that could correspond to the combined output from one or more generating units that are part of the Market Participant's portfolio.

**Dispatch** means the process of determining individual output leading to the physical issuing of instructions to connect, disconnect, increase or decrease output of a generating unit.

**Nomination** means the market participant's desired position to inform the TSO about the anticipated output.

**Scheduling** means the process for disseminating the anticipated output of all generating units or portfolios.

**Market schedule** means the outcome of the scheduling process.

**Simple bid** means a simple price-quantity bid (i.e. 50MW for the price of 40€/MWh).

**Block bid** means a bid that refers to more than one hour, potentially with variable output over different periods and has to be accepted as a whole.

**Sophisticated bid** means a simple sub-order with additional complex conditions (i.e. Minimum income condition, load gradient, scheduled stop).

**Regulated bid** means a bid that is subject to bidding rules such as price caps and SRMC bidding principles.

**Unit-based bidding** means the process over which a Market Participant submits bid(s) that correspond to potential output from a single generating unit.

**Portfolio-based bidding** means the process over which a Market Participant submits bid(s) that correspond to the combined output from one or more generating units and/or the demand side that are part of the Market Participant's portfolio.

**Financial Transmission Right** means the financial instrument that market participants can use to hedge against price risk arising from congestion in the Day-Ahead Market. For FTR holders it forms an obligation to pay or a right to receive the congestion the Day-Ahead congestion price for the associated energy flow

**Physical Transmission Right** means the instrument that market participants can use to secure long-term physical access on an interconnector. For PTR holders it forms a right to use the associated interconnector capacity for energy trading

**Market maker** is a market participant that agrees to provide quotes (buy and sell) on a regular and continuous basis regarding various products in accordance with an agreement between the Member and the Market Operator (Market Maker Agreement).

## ANNEX F ABBREVIATIONS

AC	Alternate Current
ACER	Agency for the Cooperation of Energy Regulators
BM	Balancing Mechanism
BRP	Balance Responsible Party
CACM	Capacity Allocation & Congestion Management
CCGT	Combined Cycle Gas Turbine
CfD	Contract for Difference
CPM	Capacity Payment Mechanism
CRM	Capacity Remuneration Mechanism
DA	Day-Ahead
DAM	Day-Ahead Market
DC	Direct Current
DCENR	Department of Communication, Energy and Natural Resources
DCs	Directed Contracts
DETI	Department of Enterprise, Trade and Investment
DS3	Delivering a Secure Sustainable System
EC	European Commission
EU	European Union
FTR	Financial Transmission Right
FW	Forward
GC	Gate Closure
GCS	Generation Capacity Statement
HH	Half-Hour
HLD	High Level Design
HLD RG	High Level Design Review Group
IC	Interconnector
ID	Intraday
IDM	Intraday Market
LOLP	Loss of Load Probability
LRMC	Long Run Marginal Cost
M	Month
MCO	Market Coupling Operator
MIC	Minimum Income Condition
MIFID	Markets in Financial Instruments Directive
NC	Network Code
NEMO	Nominated Electricity Market Operator
NWE	North West Europe
PCR	Price Coupling of Regions
PTR	Physical Transmission Right
PX	Power Exchange
RA	Regulatory Authority
REMIT	Regulation on Energy Market Integrity and Transparency
RES	Renewable Energy Sources
SEM	Single Electricity Market

SMP	System Marginal Price
SO	System Operator
SoS	Security of Supply
SRMC	Short-Run Marginal Cost
TSO	Transmission System Operator
UIOLI	Use-It-Or-Lose-It
UIOSI	Use-It-Or-Sell-It
UTC	Coordinated Universal Time
VoLL	Value of Lost Load
Y	Year