Response to:

SEM-14-045 – Draft Decision Paper – Integrated Single Electricity Market (I-SEM) – High Level Design for Ireland and Northern Ireland from 2016

From: Alan Mulcahy (Private Citizen)

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Summary

Overview

The high level design states the following:

> "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**. 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."

Unfortunately, the assessment, that the proposed design meets these objectives, does not seem to be backed up by the detail.

The current SEM has delivered on these objectives and could be further developed to resolve its' key issues and continue to deliver on its objectives.

However, the proposed high level design falls short of the existing SEM on all of these objectives:

- **Deliver security of supply –** the proposed design is: more complex; has greater error in the DAM schedule; & can be changed by the market closer to real time
- **Promote renewable energy sources** – the proposed design creates additional barriers to entry for renewable generation; additional financial risk; increases the cost of capital and will either reduce the renewable capacity built out or require higher REFIT prices
- **Establish a level playing field in which competition can flourish** – the proposed design will make it difficult for independent suppliers and independent generators
- **Provide a sound investment climate that is based upon a stable and predictable regulatory framework** – the proposed design creates new barriers for participants; introduces further instability into the renewable investment environment and is not fit for purpose for a market with in excess of 50% wind.

The purpose of this document is to clarify the shortcomings of the draft decision and present an alternative design that:

- Meets the objectives above
- Improves on the existing SEM
- Has a clear financial benefit over the SEM
- Has a significantly lower risk of unintended consequences than the draft I-SEM.

This document is structured as follows:

- Assessment of current SEM market against the objectives
- Current SEM market challenges & issues
- Assessment of draft I-SEM
- Questioning of Assumptions

- Proposed SEM Evolution.

My assessment is that the two objectives that the draft I-SEM are least aligned with are:

- Promote renewable energy sources
- Establish a level playing field in which competition can flourish – the proposed design will make it difficult for independent suppliers and independent generators.

Promote Renewable Energy Sources

Wind generated electricity in Ireland is the least cost energy in the SEM (€64 / MWh in comparison to a market average of €78 / MWh (See Appendix A, using SEM-13-034 Report on Generator Financial Performance in the SEM). This is on account of a number of factors:

- Benign wind conditions
- A reasonable REFIT mechanism
- A market designed to facilitate wind
- A well operated system.

The **SEM** promotes renewable energy by:

- Allowing wind generators to participate in the market as a passenger, receiving the same price as other generators
- Giving responsibility to the TSO for wind forecasting; balancing of wind & priority dispatch
- Enabling stand-alone wind companies, Co-ops and farmers compete on an equal footing with the integrated energy companies

However, the promotion of renewables was somewhat withdrawn by the decision to discriminate against wind in relation to TSO curtailment in SEM 13-010 (Treatment of Curtailment in Tie-break situations).

The **Draft I-SEM** would create a significant barrier to renewable generation by:

- Forcing renewables to actively participate in the market (after the transitional arrangements cease)
- Making all participants balance responsible (rather than keeping this responsibility with the TSO for wind generation)
- Removing intraday auctions (removing the ability to trade out wind forecast change in a liquid market)
- Not allowing renewable energy aggregate with complementary technologies (for example pumped storage or CAES).

The cost to renewables seems to be acknowledged in the business case:

- An Increase in the cost of capital for wind generation
- Highlighting the likelihood of lower investment in wind

- Assuming very low growth in wind between 2020 and 2030 – which appears to reduce from 30% growth between 2010 and 2020 to growth of between 5% and 12% between 2020 and 2030.

Establish a level playing field in which competition can flourish

The **SEM** has created a level playing field in which competition has flourished in both generation and Supply. The SEM provided the platform for:

- The introduction of effective competition within 3 years of the establishment of the SEM
- A start-up consumer electricity supply company being able to develop from an idea to holding a 3% market share within 5 years.

The **SEM** playing field is significantly more level than the major European markets, allowing small companies to compete, innovate and develop the market.

The **Draft I-SEM** favours large integrated energy companies through:

- Forced participation in the day ahead trading for independent suppliers and wind generators
- Increasing the costs of being in the market
- Making all participants balance responsible
    - Unfair on suppliers as they do not know their share of the demand till days or months later
    - Unfair on wind generators as the portfolio effect makes it significantly cheaper to balance wind on an all island basis (by TSO or market design) than on an individual wind farm basis.

As a participant at the idea stage of PrePayPower (called NRGVend at the time), my assessment is that PrePayPower would not have been feasible (as a start-up) if the Draft I-SEM was in place in 2009 or 2010.

Deliver electricity to consumers at lowest cost

The introduction to the Draft Decision paper says that the SEM committee have been given the responsibility of "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".

Based upon the impact assessment model, it would appear as if the **Draft I-SEM** does not "deliver electricity to consumers at lowest cost".

It appears that the base case assumes that electricity costs will escalate by between 25% and 35% on a per unit basis, in spite of significantly increasing the proportion of the island's lowest cost generation (wind increasing to between 45% and 52% of generation). The cost of wind should remain stable over the period.

Alternative Design – Improved SEM

An alternative market, based on the existing SEM, can be designed that is aligned to the target model and is an improvement to SEM under all of the objectives (security; cost; facilitate renewables; level playing field; stable regulatory environment).

Such a market would include the following changes to the SEM:

- Interconnector Participants should not receive or pay Capacity Payments
- The Ex-Ante SEM market should be changed as follows:
    - Firm ex-ante prices
    - Open bidding – not regulated and no uplift
        - However, RAs may require regulated bidding for participants with market power
    - Block bids for active participants (in line with the I-SEM design)
    - The SEM Ex-Ante market to be timed to complete in advance of the Day Ahead market coupling run
- Market coupling to be fed into by calculated bids from the SEM ex-ante market outcomes and bids from Interconnector Participants who did not have the interconnector capacity in advance of the ex-ante market
- An intraday and balancing market and transparent mechanisms designed to:
    - Incorporate revised TSO wind forecast (with intraday auctions / coupling runs to balance)
    - Enable traditional generators to trade out of their positions, when required
    - Enable the TSO to create a Resource Constrained Schedule early enough to avoid unnecessary risk
    - Enable the TSO to effect trades in connected markets to facilitate priority dispatch or enhance system security.

Assessment of current SEM market against the objectives

The current SEM market should be assessed under the same objectives as the draft I-SEM:

- **Deliver security of supply –** the current design of the SEM has been very successful in providing for Security of supply. The Incentivisation of new generation and the facilitation of SO operations has put Ireland in a stronger situation than October 2007, whilst allowing for the increase in wind generation.
- **Promote renewable energy sources** – the current market is well designed to facilitate renewable energy, enabling stand-alone wind companies, Co-ops and farmers compete on an equal footing with the integrated energy companies
- **Establish a level playing field in which competition can flourish** – the current market has been very successful in allowing competition to flourish and may be unique in Europe in facilitating a start-up company progress from an idea to 3% market share within 5 years.
- **Provide a sound investment climate that is based upon a stable and predictable regulatory framework** – the current market has provided a sound foundation for investment (for both suppliers and generators).
- **Deliver reasonable costs to consumers** – as the SEM is favourable to generators (capacity & uplift), the price to consumers is higher than it could be. An improved market should resolve this "extra money" problem, without causing security of supply issues by getting into the "missing money" situation
- **Comply with the Target Market** – The SEM is not fully aligned with the target market at the day ahead stage or the Intraday stage (partly due to a European change of mind in relation to the Intraday market).

Deliver Security of Supply

Security of supply is the most important aspect of electricity systems and markets. A reliable electricity supply is the foundation of first world economies and is typically a key factor in major industrial investment decisions.

The current SEM and system operation has been designed to ensure that Security of supply is never threatened (both long term and operationally). The long term incentives, energy market design and system operation ensure capacity is available and the system can be operated in a way that the SO can deal with unexpected situations.

Given the very small size of the island system (a tenth the size of the next smallest European system with a functioning market) and the high level of wind penetration, it is necessary to have measures that are much tighter from a security of supply perspective than for other European markets.

The Incentivisation of new generation and the facilitation of SO operations has put Ireland in a stronger situation than October 2007, whilst allowing for the increase in wind generation to approximately 20% wind penetration.

Features of the market that contribute to security of supply include:

- In the long term:
    - A capacity mechanism that incentivises generation build out to be sufficient
    - A wholesale energy market that pays well for producing energy

- In the short term:
    - A Central Dispatch arrangement
    - A market that enables the SO take action in excess of 8 hours ahead of real time operations
    - A market that produces a feasible schedule (though not a safe schedule)
    - The market production of a least cost Resource Constrained Schedule
    - A market that integrates wind and demand in an efficient manner, limiting the forecast error in both
    - Interconnector ramping limited to a cautious level (based on SO recommendation)
    - Appropriate mechanisms for the TSO to perform cross border balancing trades with the UK market.

Promote Renewable Energy Sources

Wind generated electricity in Ireland is the least cost energy in the SEM (€64 / MWh in comparison to a market average of €78 / MWh – based upon SEM-13-034 Report on Generator Financial Performance in the SEM). This is on account of a number of factors:

- Benign wind conditions
- A reasonable REFIT mechanism
- A market designed to facilitate wind
- A well operated system.

The **SEM** promotes renewable energy by:

- Allowing wind generators to participate in the market as a passenger, receiving the same price as other generators (price taker)
- Ex-Post pricing, which evenly shares out the impact of any forecasting error with all customers
- Giving responsibility to the TSO for wind forecasting; balancing of wind & priority dispatch
- Enabling stand-alone wind companies, Co-ops and farmers compete on an equal footing with the integrated energy companies.

Unfortunately, a decision was made in SEM 13-010 (Treatment of Curtailment in Tie-break situations) that wind generators will not receive dispatch and balancing costs from 2018. This had the effect of shifting liability for curtailment from the Market (& TSO) to the individual wind farmer & investor.

- The market and the TSO have the power to influence curtailment levels (as can be seen in the latest paper on System Services "DS3: System Services Valuation Further Analysis")
- Small wind farmers have no influence on curtailment levels (or whether further wind generation is incentivised to disadvantage existing wind generators)
- This decision has unnecessarily disadvantaged the wind industry by shifting liability from those who can influence curtailment levels (SEM Committee, TSO, Departments) to those who cannot (wind generators)
- This decision seems unfair on wind, treating the dispatch down of wind differently to the dispatch down of other market participants (traditional generators)

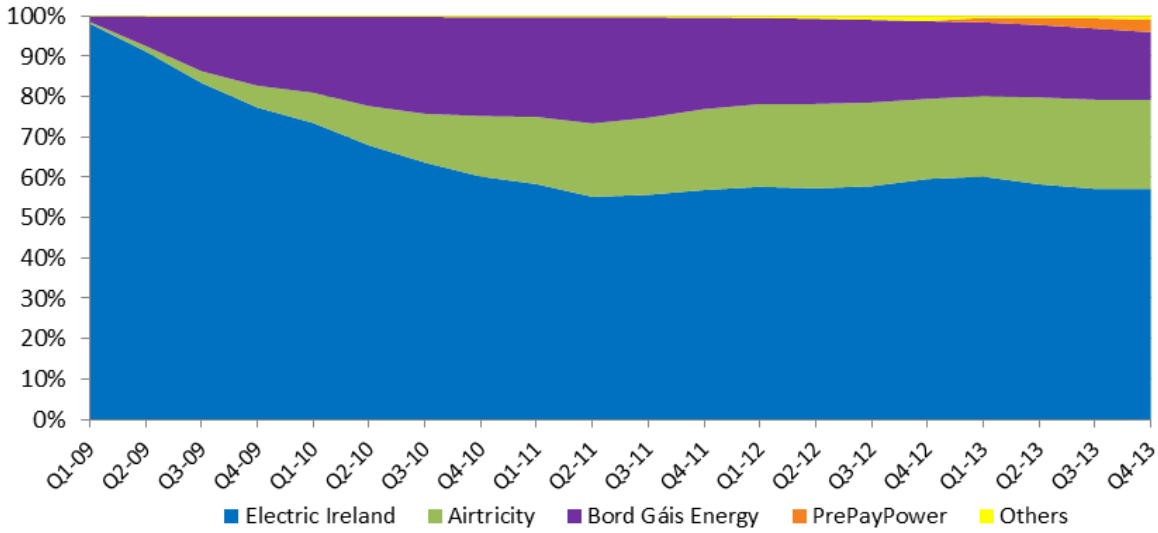
- The impact of this decision is to increase the cost of wind to the consumer by the addition of an unmanageable risk.

The new SEM should be designed in a way that either includes a reversal of this decision or provides wind generators the ability to influence the levels of their curtailment (e.g. allowing the coupling of wind with pumped storage or CAES, so that an aggregator could sell a product that includes firm access for associated wind).

Establish a level playing field in which competition can flourish

The **SEM** has created a level playing field in which competition has flourished in both generation and Supply. The SEM provided the platform for:

- The introduction of effective competition in all market within 3 years of the establishment of the SEM
    - In 2008, **CER/08/090**, stated that: "ESBCS remains the dominant supplier, with a market share of 99.71%." for the domestic market.
    - By the end of 2013, a vibrant market had emerged, with a healthy level of switching and new entrants entering with innovative offerings:, as can be seen in Figure 3.4 Domestic electricity consumption market share trend over time from CER/14/134:



- A start-up consumer electricity supply company being able to develop from an idea to holding a 3% market share (in the domestic market in Ireland) within 5 years.

The **SEM** playing field is significantly more level than the major European markets, allowing small companies to compete, innovate and develop the market.

- For example in Ofgem's report (State of the Market Assessment - 27 March 2014), it says "There are significant barriers to expansion in domestic energy supply. Despite high levels of entry, new suppliers have collectively remained below one per cent market share for most of the past decade, and no one supplier has achieved more than two per cent. Many small suppliers have exited the market over that time."

Deliver electricity to consumers at lowest cost

The SEM delivers electricity at a cost that is close to the lowest production cost. However, due to the design of the SEM, these efficiencies are not shared with consumers. The combination of capacity

payments and the uplift mechanism result in wholesale prices being higher than necessary and generator profitability being very high.

Capacity Payments

Capacity payments are designed to pay for the investment in necessary plant that may not be running regularly enough to be profitable in the energy market alone. The level of capacity payments make sense for plant that is on standby.

- For plant that is generally running, they are being overpaid for their availability through capacity payments, infra-marginal rent in the energy market and payments for system services
- For interconnector participants, they are being paid for the capacity that has been made available by interconnector owners. Although this feeds through to interconnector owners via the value of PTRs, it distorts the energy market (and the coupling of the SEM and GB markets).
    - If interconnector participants are considered as relevant to the Capacity Payments mechanism, then they should be included in the BNE calculation, at a cost of close to €0 / MW.

A new SEM must not have capacity payments for interconnector participants, if it is to avoid the distortion of cross border trade.

Uplift Mechanism

The uplift mechanism was assumed to balance out the requirement of participants to bid in at cost. Its application to all generators (at 100%) in the period is considered generous (particularly as generators are also paid capacity payments for the availability).

Uplift significantly distorts cross border trade and is not appropriate for a highly interconnected market. To remove this distortion, regulated bidding of Short Run Marginal Costs (SRMC) is also unsustainable.

Figure 6 (*Contribution of the shadow price and uplift to the SMP in the SEM*) of the High level design draft decision paper shows that the impact of uplift has been increasing, which increases the distortion of cross border trade.

A new SEM must not have regulated bidding and uplift, if it is to avoid the distortion of cross border trade.

Align with the European target model

The implementation of the interconnector Auction Management Platform (AMP) and Intraday trading were designed to bring the SEM closer to alignment with the European market.

- Unfortunately, the European target market changed in relation to intraday between the SEM intraday initial design stage and the implementation of intraday.

The Auction Management Platform has been successful in aligning with the European Interconnector market:

- Market rules are aligned on a regional basis
- The same auction platform is used for all interconnectors that are connected to GB (including Moyle & EWIC)
- On the introduction of AMP, a number of European market players entered (or started to enter) the market, given its transparency and alignment with the European market
- The primary discrepancy with the European market is the timeframe for a day (6am to 6am, rather than 11pm to 11pm).

There are a number of elements in the Day ahead and intraday markets that cause misalignment with Europe:

- Implications of Capacity Payment Mechanism and uplift calculation cause significant market distortion
    - Market premium / energy mainly flows in one direction / many exports are in the uplift zone (between Shadow price & SMP), increasing imperfections costs
- Price coupling at DAM needs to be introduced
- Continuous intraday market needs to be introduced
    - This may not have any economic value to Ireland, given trading patterns in larger markets
    - Removing the market distortions from the existing intraday market whilst aligning the intraday market to price coupling runs is more likely to be economically efficient
- Balancing market introduced that is more closely aligned with European market
    - Given Target model assumptions are so far out of line with the small island system, elements of the European IDM and balancing market may not make sense for Ireland
    - SO activity for priority despatch or other SO reasons should be included in a competitive open market.

Current SEM market challenges & issues

The following are considered by the author to be the primary issues with the current SEM design.

- Distortion of cross border trade
- Regulated price bidding
- Alignment with European market
- Application of Capacity Payments
- Overall prices too high.

Distortion of cross border trade

- **Capacity payments** – the application of capacity payments to interconnector participants provides a price premium for importing energy from GB to the SEM (and a penalty for export)
- **Uplift mechanism** – the uplift mechanism distorts cross border trade so that interconnector import trades below the SMP are excluded (based on the shadow price), whilst export trades can be in merit even though they are below the SMP (if they are above the shadow price)
- **Ex-Post pricing** – the ex-ante prices in SEM are indicative and not real except for interconnector participants. The real SEM price is set in the ex-post market.

Regulated price bidding

- Given the success of the SEM in mitigating market power and creating competition, regulated price bidding is no longer necessary
- The market should be changed to encourage active competition between generators through competitive bidding
- Market power should be controlled through other mechanisms (e.g. limitation on bidding strategy or parameters, for participants with market power)
- In a more integrated European market, regulated bidding might put SEM market participants at a disadvantage to their European competitors.

Alignment with European market

- DAM integration with regional price coupling
- Continuous trading in IDM.

There are a number of elements in the Day ahead and intraday markets that are misaligned with Europe and require action to align better:

- Implications of Capacity Payment Mechanism and uplift calculation cause significant market distortion
    - Market premium (referred to as Risk Premium in paper) / energy mainly flows in one direction / many exports are in the uplift zone (between Shadow price & SMP), increasing imperfections costs, etc.
- Price coupling at DAM needs to be introduced
- Continuous intraday market needs to be introduced
    - This may not have any economic value to Ireland, given trading patterns in larger markets

    - Removing the market distortions from the existing intraday market whilst aligning the intraday market to price coupling runs is more likely to be economically efficient
- Balancing market introduced that is more closely aligned with European market
    - An open market for balancing actions should be created that is aligned with Europe (whilst ensuring a secure system, without increasing the cost to the consumer)
    - Given that the underlying European Target model assumptions are so far out of line with the small island system, elements of the European IDM and balancing market may not make sense for the systems of Ireland and Northern Ireland
    - SO activity for priority despatch or other SO reasons should be included in a competitive open market.

Application of Capacity Payments

There are a few issues with the application of the Capacity mechanism:

- Eligibility – Capacity payments should only apply to participants who can definitely help the SO with capacity in stressful situations:
    - Interconnector participants are passengers on the interconnector (do not provide capacity) and should not be eligible for capacity payments
        - Capacity is provided by the interconnector owner and has less value than traditional generation, as another SO can turn it off (if their system is also short)
    - Interconnector demand should not be liable, as in stressful situations, the SO can turn off interconnectors to protect its system
- Reliability – Capacity payments should only apply to capacity that can reliably be used by the SO
    - Reduced payments should apply to generators that are: unreliable; intermittent; not usable in stressful situations due to location; or not connected through a single AC grid.

Overall prices too high

The Irish market is designed to pay generators too much for their services.

- The way that the uplift mechanism is designed is generous
- The capacity payments mechanism is generous
    - Not clawed back where there is energy market profitability
- Generator profitability is very high (which squeezes the supplier market)
- Removing the uplift mechanism (and allowing for open bidding) would probably result in generators receiving a fair profit margin, whilst the capacity mechanism (after improvement) would ensure that sufficient capacity is available
    - However, in designing a market that is structured to deliver lower prices, it is vital to ensure that prices are not reduced to a level that provides reasonable profit levels to generators where the state has already paid for the assets, whilst making it uneconomic for new entrants.

Additional Issues highlighted by the draft I-SEM paper

A few additional Issues were highlighted by the draft I-SEM paper. These are not considered of particular importance in the design of the new market in business case terms:

- Providing locational investment signals – within the island system, it may or may not make sense for the market to provide locational investment signals.
    - The Irish system has evolved by designing the transmission network to suit the appropriate location of generation
    - It may continue to make sense to continue with this approach
    - If locational investment signals are required, then they should be included in the capacity and system service mechanisms
- Engendering forward market liquidity (within SEM)
    - This is a good idea, but may not have a significant impact on the efficiency of the market
    - The Irish market is very small – each half hour can be considered as a separate market with a typical market value of €100k to €150k.
- Sending efficient exit signals
    - Market efficiency in electricity systems should not be an ideal goal, given the value of the system to the economy
    - It could be argued that a single operational event (resulting in Ireland's first ever blackout) could have an overall economic cost in excess of €10bn (i.e. 4 times the total annual value of the market)
    - It would be significantly more beneficial to both SEM economies to have a surplus of generation assets available than to have a shortage (given the high economic cost of an unreliable electricity system).

Assessment of draft I-SEM

High Level Assessment

Design Feature		Main Issues / Comments
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).	😐	• No reason to change from PTRs • Current arrangements working well • Interconnector trading & market rules should be consistent across FUI interconnectors • A change may cause unintended consequences, particularly if not aligned with a regional change • Existing arrangements can be made economically efficient by removing SEM distortions (Capacity payments for interconnector participants & the Uplift mechanism).
Day-Ahead Market		
iii. The European Day Ahead Market will be the 'exclusive' route to a physical contract nomination.	✘	• SEM market run in advance of European market coupling should be more efficient • SEM market run should be unit based for traditional generators; European market run should be portfolio, so all parties have fair participation in both • The European DAM is hourly – moving from a half hourly market to an hourly market would be economically inefficient.
iv. Unit-based participation for generation in general, with (gross portfolio) aggregation arrangements for	✘	• Significantly worse than existing market for independent renewable generators & independent supply companies

Design Feature		Main Issues / Comments
DSU, demand and (some) variable renewable generation.		• Renewables should not be forced to participate actively (current arrangement of TSO responsibility more efficient) • Demand should not be forced to participate actively (current arrangement of TSO responsibility more efficient) • Unit participation in European market puts SEM participants at a disadvantage to UK participants • There will be a greater "forecast" error in the DAM for Supply and wind generation. • Changing the transitional "aggregator of last resort" mechanism" for renewables to be a permanent option for any renewable generator and any supply company would be a significant improvement.
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)	✘	• Intraday implicit auctions (with market coupling) should also be included, to include updated TSO forecasts of wind and demand (otherwise forecast changes would have greater cost to consumers).
vi. Unit-based participation for generation in general, with (gross portfolio) aggregation arrangements for DSU, demand and (some) variable renewable generation.	✘	• TSO should take responsibility for passive renewables and demand forecasting (and therefore trading). • If the transitional "aggregator of last resort" mechanism" for renewables became a permanent option for any renewable generator and any supply company (and it traded in intraday auctions, it would be a significant improvement (and could help to create a liquid regional intraday market at specific times).
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.	✓	

Design Feature		Main Issues / Comments
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	✗	• Creates clear barrier for small players • Makes Day Ahead physical nomination schedule less accurate (increasing risk of system failure) • Small traditional generators should participate in the DAM & balancing market • Small renewable players should have the option of passive participation (TSO forecasting & trading) • Small demand players should have the option of passive participation (TSO forecasting & trading) • The permanent aggregator of last resort should participate in set intraday auctions with revised forecasts (in addition to the SEM DAM participation).
Other complementary actions to support I-SEM efficiency:		

Design Feature		**Main Issues / Comments**
xv. Encouragement of forward financial market liquidity	✓	
xvi. Facilitation of centralised forward trading platform	✓	

Aggregators

The aggregator of last resort proposal is a significant improvement from the original options paper. However, it should be improved further by:

- Making the arrangement permanent
- Extending to passive suppliers to retain the existing SEM level playing field.

There is no basis provided for the suggestion that a TSO role as an aggregator of renewables should be temporary.

- The TSO is the current expert in wind forecasting in the SEM
- Given the TSO's strong track record in forecasting wind and the fact that the TSO can aggregate across the entire wind portfolio, it makes sense to make the TSO (or another statutory body) responsible for forecasting and aggregating renewables in the day ahead and intraday timeframe.
- The TSO must take responsibility for forecasting wind in the intraday and balancing timeframes anyway, so will need to continue to strive to achieve the best forecasts possible, based on the available meteorological data and technologies.

It also makes sense for the TSO to play a role as a supplier's aggregator of last resort, as the TSO has the expertise in forecasting demand at day ahead and intraday timeframes.

The rationale for TSO aggregation of wind is well noted in the draft I-SEM decision paper:

> "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**."

- This reasoning does not provide any rationale for making the arrangement temporary
- The same reasoning can be provided to supplier participation and TSO aggregation of "passive" suppliers.

The restriction on aggregation across a single technology seems to also run against the objectives of promoting renewables and delivering a low cost electricity market.

- There are a number of complementary technologies that have been shown to reduce the overall system cost when there is significant variable renewable penetration
- Wind can be "made predictable" by coupling it with other technologies (e.g. pumped storage / CAES, etc.)
- By prohibiting the aggregation of renewables across complementary technologies (e.g. pumped storage), the market design may be creating an unnecessary barrier to the investment case for complementary technologies.

Questioning of Assumptions

There are a number of assumptions in the impact assessment that are questionable. The assumptions highlighted in this section are ones that the author does not agree with and considers likely to lead to poor decisions in relation to the draft I-SEM. These include:

- Low wind growth assumed for Base Case B
- Interconnectors are available when system security is threatened
- That the current price differential ("risk premium") is caused by "inefficiencies" (rather than the current SEM market design)
- The European market coupling mechanism will create a better economic result than market participants in an integrated market
- A well-functioning energy market will deliver sensible outcomes for the consumer
- Wind forecasting should be improved by incentivising generators to get their wind forecasts right
- The effect of the increased cost of capital for wind on reducing wind investment is not modelled
- No additional cost assumed for the draft I-SEM market favouring large integrated energy companies
- No cost is attributed to the movement from a half hourly market to an hourly market
- The escalation of costs under both base cases is assumed to be acceptable
- It is not clear whether an economically efficient level of pumped storage is assumed as part of the modelling.

1.1.6 In both Base Cases, the All-Island Market meets the 2020 renewable target of 40%. However, post-2020 growth in renewables is assumed to be much stronger in **Base Case A (52% renewables by 2030)** than in **Base Case B (45% renewables by 2030)**.

- If the assumption is that wind growth reduces from 3% per annum to 0.5% per annum then that seems unreasonable. Such a low growth in wind should only be considered under two outlier scenarios:
    - The assumption that Climate Change is a myth (Scenario F)
    - The assumption that new technologies (e.g. nuclear fusion) are introduced which are significantly cheaper than all other generation technologies (Scenario Z)
- Reasonable assumptions under the world scenarios described would be:
    - Case A: 52%
    - Case B: 60% (or higher)
    - The propose design should also be sense checked against other (non-central) scenarios (e.g. 40% wind and 70% wind)
- Case B: The fastest way to decarbonise heat and transport is to electrify heat and transport which might introduce a more benign demand curve compared to the current curve.

1.4.7 The main findings of the analysis are that projections of capacity adequacy are sensitive to assumptions about closure decisions – with capacity adequacy shortages in 2020 and 2023 in these

higher closure scenarios. In addition**, the availability of interconnector capacity in tight periods is particularly important** in determining the extent of capacity adequacy shortages in the higher closure scenarios.

- Tight periods in Ireland are likely to correspond to tight periods in GB
- Good system operator practice is to close down borders when there is a risk to system security
- A more appropriate assumption is that there is no interconnector available in tight situations (very low temperatures & low wind).

5.4.14 These **inefficiencies** may happen as a result of differences and perceived risks in the nature and timing of price formation in the two markets, and/or the mechanics and strategies of trading across the interconnector.

- The discussion on interconnector inefficiencies and risk premium is somewhat misleading:
- The so called risk premium is a rational market's response to the current design of the SEM:
    - Capacity payments
    - Uplift mechanism
    - Ramping limitations
- Interconnector participants bid in based upon calculations of the expected capacity payments and uplift
- Capacity payments and uplift create a premium of at least €15 (taking losses into account)
- In addition, the small market size adds to a natural imbalance, where Irish suppliers can fix prices based on interconnector capacity costs and UK energy forwards market, whilst the GB market is dominated by 6 Integrated suppliers, most of whom exceed the total size of the SEM market.

5.4.18 Notwithstanding the distribution of costs and benefits, **in the presence of market coupling overall, there will be an increase in the social welfare and a reduction in system costs**, taking the two (or more) interconnected markets together. Determining who benefits depends on market fundamentals (fuel costs, relative generation and load mix in the two markets, RES penetration in the two markets etc.). The benefits may transfer from one market to the other as market fundamentals change through time. The constant will be that optimal social welfare (taking the two (or more) interconnected markets) is achieved through market coupling. Distributional impacts will be assessed and set out in the final impact assessment.

- The assumption that market coupling (as designed) will be more economically efficient than alternatives may or may not have a justification.
- The current market (with intraday auctions) allows market forces to perform the coupling, which may be more effective than the use of a coupling algorithm.
    - There is a profit incentive in the current market for financial players to take advantage of arbitrage opportunities
    - The proposed design may reduce the rationale for financial players in the DAM & IDM, which may not be as economically efficient as the arrangements proposed in this paper.

5.4.62 A higher cost of capital may also lead to lower investment in wind generation with an impact on decarbonisation efforts. **We have not explored the effect of lower wind capacity being installed**, but calculated instead the impact on total wholesale market costs for delivering the same amount of wind capacity. The wholesale market cost increase will effectively be borne by end consumer in the form of increased support payments. A less risky environment for wind will mean lower cost of capital and thus lower requirement for support payments.

- Excluding the cost of the market design reducing wind capacity is bad maths
- Excluding the cost of reducing wind investment is ignoring a significant cost of the draft I-SEM design.
- Wind is the least cost generation resource in the SEM (with a cost of less than €64 / MWh compared to a market average of €78) – based on SEM-13-034 Report on Generator Financial Performance in the SEM, Table 2:

Financial Year - 2011	Total	Wind	Hydro	Gas	Coal	Peat	Distillate & Oil
Revenue	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**
SEM Pool	64.21	46.67	69.60	65.84	69.09	62.78	230.37
Total Revenue	**89.64**	**77.86**	**88.19**	**84.05**	**94.31**	**104.98**	**1,238.13**
Operating Costs	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**	**€ per MWh**
Fuel Related Op. Costs	43.61	2.74	-	51.30	**50.27**	65.52	553.65
Total Operating Costs	**60.01**	**16.30**	**33.63**	**63.27**	**71.37**	**65.52**	**553.65**
EBITDI	**29.63**	**61.57**	**54.56**	**20.78**	**22.94**	**39.46**	**684.47**
Dep. & Imp.	12.51	28.05	2.21	7.69	15.19	19.56	164.54
EBIT	**17.12**	**33.52**	**52.35**	**13.09**	**7.75**	**19.90**	**519.94**
Int & Tax	5.82	19.44	0.95	4.60	0.95	0.66	107.67
Net Profit	**11.30**	**14.08**	**51.40**	**8.48**	**6.79**	**19.24**	**412.26**

Costs (Rev. - Net Pro.)	**78.34**	**63.78**	**36.79**	**75.56**	**87.51**	**85.74**	**825.86**

See Appendix A for the full table and original source data.

- The reduction in wind investment could have significantly more costly implications (within the electricity market) under different 2030 scenarios, for example:
    - If the world decides it must take significant action to reduce emissions
    - Possible shortfalls in particular fuels (e.g. gas) could result in a non-functioning European cross border market (the banking crisis showed that national interests can override European arrangements in a crisis)
- The reduction in wind investment could have significantly more costly implications to both economies under different 2030 scenarios:
    - A reliable electricity market driven primarily by local renewable resources might result in significantly higher industrial investment than a market where renewables investment is curtailed (the draft I-SEM).

[Underlying assumption] – **Wind forecasting** should be **improved** by incentivising generators to get their wind forecasts right:

- Current TSO forecasting responsibility has been very successful in improving accuracy over the last 15 years
    - The average monthly "average absolute forecast error" has ranged from 4.7% to 11.8% over the last 12 months (averaging 7.7%) – based on the "All-Island Wind and Fuel Mix Report" on EirGrid's website).
- Multiple parties forecasting separately will significantly increase the forecasting error
    - The size of additional error and the cost of the error should be able to be forecasted (by the RAs or TSO), given previous studies
    - My guess is that this additional error will increase the forecast error by 3% to 5%
- The costs of forecasting expertise and software would be prohibitive for renewable generation companies.

[Not modelled] – There is a **significant cost to the market favouring large integrated energy companies** that has not been modelled:

- The draft I-SEM is not a level playing field, it favours suppliers that are also generators and would be a much more difficult market for a start-up supplier to enter
- The draft I-SEM is not likely to get any start up new entrant supply companies
- The innovation that is expected to take advantage of market changes (particularly smart meters) may not happen
- The reduction in competition due to the requirement for suppliers to balance (whilst not having an idea what their customers' demand actually is) will have a significant cost
- This should be clear, given that the GB market is twenty years old and has less effective supply competition than the six (and a half) year old SEM market
- The RAs should have a view of the cost of this reduction in competition
    - My guess is at a cost to the consumer in the range of 1% to 5%.

[Underlying Assumption]: A well-functioning energy market will deliver sensible outcomes for the consumer.

> "**4.2.7** The modelling of the reference cases for Base Cases A and B **assumes a well-functioning (ideal) energy-only market**. Although there is a price cap of €3000/MWh (to reflect the price cap in the NEW DAM), there is no restriction on price spikes up to that level1. **The energy market is assumed to be fully competitive, with perfect foresight of 'expected' future revenues**. There is no free-riding problem, the price elasticity of demand is low or zero and investment is coordinated to avoid over or under delivery and a cycle in wholesale prices. Once new entry is needed, the annual level of scarcity rent in the energy price is then assumed to remain new entry levels for the rest of the modelled period."

- The SEM energy market is very small (less than €150k / half hour)
- The market is likely to be dominated by a small number of integrated players who have reasonably balanced generation and demand across the FUI region
- As the energy market is only a part of the equation, the bidding "game" (in an open bidding market) is more likely to result in unexpected consequences than the idealistic market that was modelled

- Irish and UK experience is that out of market incentives (e.g. REFIT) are often required to deliver sensible electricity market outcomes
- Markets often follow a number of predictable dysfunctions
    - One of which is often an overreaction to short term price signals.
        - For example, an 11 year old's understanding of the "FIFA 14 XBox market" is sufficient to know that selling a world cup final goal scorer just after the final whistle is likely to get a significantly higher price than selling the same player the following day.

Escalation of costs under both base cases:

Table 12: Costs escalate from 2,407m to **€3,530m** for Base case A (47%)
Table 13: Costs escalate from 2,489m to **€3,9430m** for Base case B (58%)
Table 26: Demand increases from 37 TWh to 43.2 TWh (17%)

So the assumption appears to be that costs escalate by between 25% and 35% on a per unit basis, even though the wind penetration nearly doubles, increasing to approximately 50% of the market.

- Wind is the least cost generation technology in the SEM market (See Appendix A, based on SEM-13-034)
- There is no reason to believe that the cost of onshore wind should escalate in Ireland (apart from cost of capital increase due to I-SEM design)
- Which seems to indicate that the unit price of non-wind generation increases by 50% to 70%
- Even though wind typically has the effect of reducing market prices (as can be seen in the recently published DS3 paper ("DS3: System Services Valuation Further Analysis").

If the assumption is that this escalation only happens if there are no capacity payments, then the impact assessment is not helpful in assessing the proposed design. All costs and benefits should be modelled against:

1. The as-is base case scenario (e.g. from "DS3: System Services Valuation Further Analysis" Scenario C, full achievement of DS3 objectives (75% SNSP with 5.7GW of wind at 2020).
2. The draft I-SEM decision (both energy trading and capacity payments)
3. Incremental changes should be against either the as-is market or the draft decision or both.

If the model assumptions are for this escalation, then it would be extremely likely that market forces or political pressure will deliver a different result:

- If this cost escalation is primarily due to "taking one for the team" for European integration – then it is unlikely for the "bank guarantee generation" to accept this reality
- Political or economic pressure (or necessity) would insist on other mechanisms or state investment to deliver a lower cost electricity system
- Question: Have least cost portfolios from previous studies been considered ?
    - Has this included a scenario with significant pumped storage (e.g. 1 – 3 GW) ?
    - In the recent DS3 publication "DS3: System Services Valuation Further Analysis", Figure 5 (Average Payments (€) per MW Capacity per Technology Type and Fuel)

shows that pumped storage is more than 5 times more valuable than any other on island plant for the integration of wind (and 4 times more valuable than interconnection).

Table 29 – Generation costs and economic parameters for main technologies – **does not include Pumped Storage Costs**.

- Pumped Storage is known to reduce the costs of integrating wind significantly
    - In the recent DS3 publication "DS3: System Services Valuation Further Analysis", pumped storage is more than 5 times more valuable than any other on island plant for the integration of wind (and 4 times more valuable than interconnection).
- There is a clear business case for either private investors or the state to invest in at least 1GW of additional pumped storage on the island of Ireland.
- A SEM system and market modelled to include 1.5GW of interconnection and 1.5GW of pumped storage (with high wind) should deliver reliable electricity at a reasonable cost.

Table 30 – Variable cost of gas and coal generation in Base Case A – Coal costs vary from €40 / MWh to €55 / MWh.

- 2011 fuel related operating costs were €50 (based on SEM-13-034 Report on Generator Financial Performance in the SEM, see Appendix A)
- This is inconsistent with the assumption of the UK market following the National Grid gone green scenario.

[Not modelled] – No **cost** is attributed to the **movement from a half hourly market to an hourly market**.

- A significant inefficiency will be introduced by moving from a market with half hourly granularity to a market with hourly granularity. However, this is not noted or modelled in the impact assessment
- The estimated variance in SEM prices (EP2) for 2011, 2012 & 2013 in the 17:00 and 18:00 hours periods is in the 20% and 25% range (between the half hours in each hour period). This demonstrates that a single price for the two half hours in peak hours introduces a significant market inefficiency
- Overall half hourly price differentials are likely to increase with increased wind penetration
    - For example, December 2013 was a high wind period and the day time half hourly price differential averages out at 12% for December 2013.

Proposed SEM Evolution

The following are some of the key features of the proposed SEM evolution to integrate with the European market and to improve on the existing market.

Forwards Timeframe	
Forwards Timeframe – Within SEM	The financial market should continue to be developed to provide hedging opportunities: • Existing auctions should remain (or evolve to become more accessible / visible) • Continuous trading of CFDs should be made available • Forward market products should be aligned with the European market (including hours of day – 23:00 to 23:00).
Forwards Timeframe – Interconnectors	The interconnector market is currently aligned with Europe and should continue to be so • Interconnector participants should not be eligible for Capacity Payments • PTR products remain (as already aligned) • The day should move to align with the European day • On a European level, the common platform idea could be further developed to become a common trading portal for market participants (if beneficial).
Day Ahead Timeframe	
SEM Ex-Ante market (e.g. @ 9am)	There should be an evolved SEM Ex-Ante market: • Gross mandatory pool for generation • Firm prices (market becomes real, not notional for traditional generators) • Uplift mechanism and regulated bidding are removed • Generators free to bid at any price into the market • Block bids available (as per draft I-SEM) • Market retains half hour granularity but changes to the standard European timeframe (23:00 – 23:00 UTC) • Treatment of wind remains as is • Treatment of demand (& suppliers) remains as is • Treatment of interconnectors remains as is (market generates a valid schedule, with ramping & MIUNs) – however not to receive capacity payments.
European DAM coupling (e.g. @ 11am)	• The outputs of the SEM Ex-Ante market are to be used as an input to the European price coupling DAM • The SEM calculates hourly European bids from half hourly SEM Ex-Ante outputs • Interconnector participants can bid directly into the Price Coupling DAM (e.g. where they did not have PTR) • Price coupling algorithm generates a valid interconnector schedule (taking account of ramp rates).
Interconnector Daily Market (e.g. @ 6am)	• The interconnector Daily markets to change to align with European market timeframe

Intraday Timeframe	
Continuous market	Continuous market introduced that is connected to the European market.
Intraday auctions	Within zone intraday auctions to run (at least 2): • TSO revised forecasts for wind and demand included • Market is voluntary (not mandatory) • Generators bid in INCs & DECs • Open bidding with block bids • Interconnector participants free to bid in • Market retains half hour granularity but changes to the standard European timeframe (23:00 – 23:00 UTC) • Outputs of intraday markets should feed into a European price coupling market run (coordinated with regional markets).
SO Trading & Balancing market	It needs to be worked out whether there is an economically efficient way to deliver a safe schedule, whilst being fully compliant. SO Trading and balancing activities and markets should include: • Suppliers bid in INCs & DECs (mandatory for on island generators) – ideally aligned with system services fulfilment as well as forecast changes, Resource constrained schedule, outages, etc. • SO runs competitive Interconnector auction (off island) to get to a sensible SO schedule (incl. priority dispatch) – 4 hours (at least) before the operational window • SO runs an annual competition for a fall-back off island (GB / France) energy partner to provide a fallback for balancing interconnector trades and enable schedule adjustment closer to real time • SO continues to trade with other SOs for Cross border trades in the real time operational window May need to agree to go to Europe to show how we are using the target market to deliver (although may not be obeying each clause) to get to a market that will be more efficient and include more intermittent renewables than any other European system.

Renewables:

Within the energy market:

- Renewable generators can choose to be active or passive participants.
- Active Renewable participants can participate on a portfolio basis, unit basis or with aggregation
- A Renewable aggregator can aggregate across all renewables and can aggregate with a single complementary plant (e.g. CAES, or even a gas turbine built for fast response)
- For the purposes of aggregation, pumped storage should be treated as renewable
    - Up to the level of the aggregated renewable generation

- Passive participants are automatically bid in at zero, based upon the TSO forecast:
    - Full forecast for the DAM
    - Change in forecast for the intraday auctions
    - A reduction in wind forecast, is treated in a similar manner to an increase in the demand forecast.

However, the primary Incentivisation of renewables takes place outside the market. The current incentives have been proven to reduce the overall cost of electricity to the consumer, whilst enabling both jurisdictions to reduce carbon emissions and meet EU targets.

- The existing REFIT mechanism should continue.

Non-Market solutions should be considered to further facilitate renewables

- As a non market approach may be more efficient than market based approaches
    - Markets typically pay for what is scarce but will often underpay for something that reduces the overall cost.
    - For example, if pumped storage and interconnectors are built to meet the demand for their services, then the value to the system of the last MW of interconnection (or pumped storage) is low, so the marginal value is significantly lower than the real value.
- An optimal level of interconnection and pumped storage should be calculated
- An assessment done on whether the optimal level of interconnection and pumped storage should be incentivised by current market mechanisms or alternative means.

Demand & Supply Companies

Electricity Supply companies can choose to either participate in the market or have the TSO participate in the market on their behalf.

- For independent suppliers, it is not likely that they will be more efficient than the TSO in forecasting demand
- As supply companies in the retail market do not have real time information, the TSO forecast is likely to be more accurate than an independent supplier could arrive at (particularly in the near-time timeframe)
    - Given that the TSO must perform this forecasting activity anyway, it would be wasted effort for an independent supply company to try to duplicate this activity
- Integrated suppliers or suppliers providing a demand response or pass through pricing service can choose to participate in the market as active participants

Capacity Payments

The Capacity payment mechanism should be integrated with the procurement of system services:

- System Services & Capacity auctions should take place at least 5 years in advance (with intermediate “balancing” auctions each year).
- The Regulators & TSO to agree a capacity and system service requirement under appropriate scenarios (that facilitate renewable investment):
    - For example, Scenario C from “DS3: System Services Valuation Further Analysis”

- Capacity to be bid in as synchronous or non-synchronous
    - Synchronous requirement to be agreed between the RAs & TSO.

Similar to the assumed GB CRM market, new entrants are assumed to lock in the price from the first auction in which they participate in for 10 years upon commissioning.

An overall cost cap could be included (for each auction), to cap the overall Capacity & system services costs to the level of Best New entrant plus the DS3 calculated value of system services.

- If the cap is not met, then the participants who bid below the cap get their bids accepted, whilst the market remains open for new entrants to offer in additional capacity & services at the cap price for the year (until the required quantities are met).

Day Ahead Market

Day Ahead Timeframe	
Interconnector Daily Market (e.g. @ 6am)	• The interconnector Daily markets to change to align with European market timeframe
SEM Ex-Ante market (e.g. @ 9am)	There should be an evolved SEM Ex-Ante market: • Gross mandatory pool for generation • Firm prices (market becomes real, not notional for traditional generators) • Uplift mechanism and regulated bidding are removed • Generators free to bid at any price into the market • Block bids available (as per draft I-SEM) • Market retains half hour granularity but changes to the standard European timeframe (23:00 – 23:00 UTC) • Treatment of wind remains as is • Treatment of demand (& suppliers) remains as is • Treatment of interconnectors remains as is (market generates a valid schedule, with ramping & MIUNs) – however not to receive capacity payments.
European DAM coupling (e.g. @ 11am)	• The outputs of the SEM Ex-Ante market are to be used as an input to the European price coupling DAM • The SEM calculates hourly European bids from half hourly SEM Ex-Ante outputs • Interconnector participants can bid directly into the Price Coupling DAM (e.g. where they did not have PTR) • Price coupling algorithm generates a valid interconnector schedule (taking account of ramp rates).

The detail of the interconnector daily market should not change.

The rules of the SEM Ex-Ante market should change significantly:

- [As-Is] Gross mandatory pool for generation
- **Uplift** mechanism and regulated bidding are **removed**
- **Generators free to bid** at any price into the market
    - Market power restrictions on the bidding of participants with market power

    - Participants can choose to bid based on income streams that are not included in the energy market
- **Block bids** available (as per draft I-SEM)
    - Participants can choose to bid based upon costs or not, depending on their market strategy
- Market retains **half hour granularity** but changes to the standard European timeframe (23:00 – 23:00 UTC)
- Treatment of **Wind** (in the market) remains **as is**
    - **Wind** can participate as **active** participant **or passive** (price takers)
    - **TSO** responsible for **forecast**ing for **passive** participants
    - However, priority dispatch to be provided for all wind (active and passive participants)
- Treatment of **Demand** (& suppliers) remains **as is**
    - Demand (& suppliers) can participate as active participant or passive (price takers)
    - TSO responsible for forecasting for passive participants
    - Controllable demand can be an active participant
    - Large integrated suppliers (most of current market) can choose to be active participants (for example, if their demand forecasting is considered to be more accurate than the TSO's forecasting)
- **Firm prices** (market becomes real, not notional for traditional generators)
    - However, whether prices and quantities are fully firm depends on participation in the European Price coupling run (which is optional)
- Treatment of **Interconnectors** remains **as is** (market generates a valid schedule, with ramping & MIUNs)
    - Interconnector participants require a PTR to bid into the Ex-Ante SEM market.

The coupling of the markets starts with the bidding into the SEM Ex-Ante market.

The European DAM coupling market is fed into from the SEM:

- The outputs of the SEM Ex-Ante market are to be used as an input to the European price coupling DAM. Bids to indicate whether they are to be included in the price coupling run (or not)
    - E.g. Interconnector participant (with PTR) can choose to bid into the SEM only
    - Passive participants' bids to pass through to Price Coupling
    - Participants with market power must have pass through bids
    - Generators (without market power) can either have pass through bids or bid separately into the European DAM (with portfolio bidding)
    - Active Suppliers (without market power) can either have pass through bids or bid separately into the European DAM (with portfolio bidding)
- The SEM calculates hourly European bids from half hourly SEM Ex-Ante outputs.
    - Generation Offers are the lowest volume and the highest price for the two half hours
    - Demand Bids are the lowest volume and the lowest price for the two half hours
    - Interconnector participant (pass through) offers include any unfulfilled proportion of the offer into the DAM

- Interconnector participants can bid directly into the Price Coupling DAM (e.g. where they did not have PTR).

The Price coupling algorithm must generate a valid interconnector schedule (taking account of ramp rates).

IntraDay Market

Continuous market	Continuous market introduced that is connected to the European market.
Intraday auctions	Within zone intraday auctions to run (at least 2): • TSO revised forecasts for wind and demand included • Market is voluntary (not mandatory) • Generators bid in INCs & DECs • Open bidding with block bids • Interconnector participants free to bid in • Market retains half hour granularity but changes to the standard European timeframe (23:00 – 23:00 UTC) • Outputs of intraday markets should feed into a European price coupling market run (coordinated with regional markets).

The SEM is a very small market where individual market participants' UK and Ireland electricity businesses are larger than the total size of the SEM.

- The larger players in the Irish market (Centrica, SSE, ESB, Viridian) came from UK or Irish state enterprises and have significant market power (or are monopolies) in part of their businesses.
- As integrated energy companies, each can manage the risk of imbalances (in UK & Ireland) on a portfolio basis (even with unit based bidding).

To keep a level playing field (in an integrated market), it is the author's opinion that the TSO should continue to play an active role in balancing changes to forecasted wind and demand.

- On a regional level, this would make the market more efficient by creating liquidity in the intraday timeframe (and reducing near time imbalances in the SEM).

However, given that the TSO must also ensure that a dispatch schedule is set in line with constraints, priority despatch and other System Operator responsibilities, it makes sense to combine some of these TSO activities with the energy imbalance activities in intraday auctions that are timed to fit into the TSO's operational schedule and aligned to European price coupling runs.

The timing of these auctions may depend on the blocks that evolve in the European market (e.g. 4, 6, or 8 hours). Depending on the standard European blocks, the following schedule of intraday auctions might make sense:

Auction	Start time	Window
IntraDay auction 1	15:00	**23:00 – 23:00 (open market)**
IntraDay auction 2	19:00	23:00 – 07:00 (TSO actions only) **07:00 – 23:00 (open market)**

Within Day auction 3	23:00	03:00 – 11:00 (TSO actions only) **11:00 – 23:00 (Open market)**
Within Day auction 4	07:00	11:00 – 19:00 (TSO actions only) **19:00 – 23:00 (Open market)**
Within Day auction 5	15:00	19:00 – 23:00 (TSO actions only)

Each of these auctions should be connected to a price coupling run.

Balancing Market / SO Activities

SO Trading & Balancing market	It needs to be worked out whether there is an economically efficient way to deliver a safe schedule, whilst being fully compliant. SO Trading and balancing activities and markets should include: • Suppliers bid in INCs & DECs (mandatory for on island generators) – ideally aligned with system services fulfilment as well as forecast changes, Resource constrained schedule, outages, etc. • SO runs competitive Interconnector auction (off island) to get to a sensible SO schedule (incl. priority dispatch) – 4 hours (at least) before the operational window • SO runs an annual competition for a fall-back off island (GB / France) energy partner to provide a fall-back for balancing interconnector trades and enable schedule adjustment closer to real time • SO continues to trade with other SOs for Cross border trades in the real time operational window May need to agree to go to Europe to show how we are using the target market to deliver (although may not be obeying each clause) to get to a market that will be more efficient and include more intermittent renewables than any other European system.

Given that the primary changes from market schedule to the actual schedule are going to be driven by TSO activity (as the market design is for a balanced market), the focus of the TSO should be in ensuring value for money for TSO driven changes to market schedule, including:

- Priority despatch
- SNSP limitations
- System service requirements
- Ability to react to faults, outages, etc.

The TSO activities should be designed to deliver to the needs of each system (Ireland & Northern Ireland) in a way that is:

- Least cost
- Open market
- Aligned to and using the European integrated energy market.

It is the author's view that it is in the interest of the SEM consumer and the European integrated market that the TSO actively participates in the cross border intraday market to balance the Irish system and deliver to its system responsibilities.

Energy Partner

One of the market efficient (and proven) ways of the TSO engaging with the open market is to engage with an Energy Partner.

Step 1: SO runs an annual competition for a fall-back off island (GB / France) energy partner to provide a fall-back for balancing interconnector trades and enable schedule adjustment closer to real time:

- Based upon existing arrangements (which were based upon the EWIC Energy Commissioning Partner arrangement)
- Partner bids in prices for cross border trades dependent on the notice ahead of real time
- Prices can be based upon stable standard market prices (e.g. DAM price or even balancing prices of the connected market)
- Participants can include either a minimum energy traded condition or an annual service charge in their proposals.

Step 2: SO chooses the energy partner based upon the least cost proposal (calculated using a reasonable set of market models)

- As the competition is annual, changing circumstances (market & system) would be incorporated into the choice of partner each year
- The contract conditions are included in the competition, so there is not a significant effort involved in getting from a decision to contract signing
- The contract can be extended (if there are issues entering a contract the following year)
- Logistics need to be set up (e.g. a BETTA BMU).

Step 3: Reflect the Energy Partner contract in the TSO activities in intraday trading and balancing market activities.

Balancing Market & TSO Activities

The approach outlined in the draft I-SEM decision makes sense for balancing for traditional generators, on island demand (active participants) and wind (active participants).

For off island balancing and SO activities, it makes sense to integrate TSO activities into balancing auctions to adjust the schedule of interconnectors:

Auction	Start time	Window
IntraDay auction 1	15:00	**No TSO actions**
IntraDay auction 2	19:00	**23:00 – 07:00 (TSO actions only)**
Within Day auction 3	23:00	**03:00 – 11:00 (TSO actions only)**
Within Day auction 4	07:00	**11:00 – 19:00 (TSO actions only)**
Within Day auction 5	15:00	**19:00 – 23:00 (TSO actions only)**

For the "TSO actions only" auction periods, the bidding relating to the SEM is based upon:

- TSO Needs (e.g. SNSP; Priority dispatch; largest generator; inertia, resource constraints, etc.)

- Forecast changes (Demand and renewables)
- Balancing market bids from generators
    - It is optional for generators as to whether their balancing market bids, that are beyond TSO needs, pass through the price coupled market
- The price offered or bid (by the TSO) for cross border trades is dependent on the Energy Partner pricing, as well as the on island balancing market bids.

Given the fall-back of the Energy Partner pricing, the SEM TSO can be confident of obtaining an appropriate interconnector schedule to suit the needs of the system at fair market prices. So scheduling for the 23:00 to 07:00 timeframe can begin soon after the first intraday market closure of 15:00.

In the timeframe between these intraday auctions and real-time, if required, the SEM TSO countertrades with the Energy Partner (similar to current practice).

In the real-time timeframe, if required, the SEM TSO countertrades with counterparty TSOs using the existing mechanism (Cross Border Balancing trades).

The proposed approach should enable the SEM TSO to deliver its system operator responsibilities, at a least cost approach, whilst enhancing liquidity in the cross border intraday market.

If market distortions are removed (e.g. capacity payments for interconnector participants), then the TSO trades will primarily be for pure system operator reasons and change of forecast (wind & demand) reasons.

- If the energy market remains distorted across borders (e.g. from capacity payments), then the TSO actions might continue the current trend of countertrading to resolve interconnector flows.

Appendix A: SEM generating costs (SEM-13-034)

As published in: SEM-13-034 Report on Generator Financial Performance in the SEM - Table 2:

Financial Year - 2011	Total	Wind	Hydro	Gas	Coal	Peat	Distillate & Oil
Electricity Sold - MWh	26,568,867	3,258,317	629,587	16,939,566	3,503,588	2,164,282	73,528
Revenue	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**
SEM Pool	€ 1,706,118	€ 152,081	€ 43,819	€ 1,115,330	€ 242,068	€ 135,881	€ 16,939
CfD	€ 87,040	€ 38,650	€ 1,713	€ 30,584	€ 9,534	€ 6,559	€ -
Capacity	€ 397,893	€ 15,757	€ 7,385	€ 232,810	€ 53,231	€ 17,513	€ 71,197
Other	€ 190,551	€ 47,218	€ 2,606	€ 44,990	€ 25,580	€ 67,255	€ 2,901
Total Revenue	**€ 2,381,602**	**€ 253,705**	**€ 55,524**	**€ 1,423,715**	**€ 330,413**	**€ 227,208**	**€ 91,037**
Operating Costs	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**
Fuel Related Op. Costs	€ 1,158,646	€ 8,920	€ -	€ 869,020	€ 176,120	€ 97,637	€ 6,949
Non-fuel Op. Costs	€ 435,699	€ 44,181	€ 21,173	€ 202,738	€ 73,927	€ 44,176	€ 33,760
Total Operating Costs	**€ 1,594,345**	**€ 53,101**	**€ 21,173**	**€ 1,071,757**	**€ 250,047**	**€ 141,813**	**€ 40,709**
EBITDI	**€ 787,257**	**€ 200,605**	**€ 34,351**	**€ 351,957**	**€ 80,366**	**€ 85,394**	**€ 50,328**
Dep. & Imp.	€ 332,411	€ 91,386	€ 1,390	€ 130,264	€ 53,222	€ 42,325	€ 12,098
EBIT	**€ 454,846**	**€ 109,218**	**€ 32,961**	**€ 221,694**	**€ 27,144**	**€ 43,069**	**€ 38,230**
Int & Tax	€ 154,629	€ 63,337	€ 601	€ 77,995	€ 3,343	€ 1,436	€ 7,917
Net Profit	**€ 300,216**	**€ 45,881**	**€ 32,361**	**€ 143,698**	**€ 23,801**	**€ 41,633**	**€ 30,313**
Gross Margin - %	33%	79%	62%	25%	24%	38%	55%
Net Margin - %	13%	18%	58%	10%	7%	18%	33%

Calculated on a per MWh basis:

Financial Year - 2011	Total	Wind	Hydro	Gas	Coal	Peat	Distillate & Oil
Electricity Sold - MWh	26,568,867	3,258,317	629,587	16,939,566	3,503,588	2,164,282	73,528
Revenue	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**
SEM Pool	64.21	46.67	69.60	65.84	69.09	62.78	230.37
CfD	3.28	11.86	2.72	1.81	2.72	3.03	-
Capacity	14.98	4.84	11.73	13.74	15.19	8.09	968.30
Other	7.17	14.49	4.14	2.66	7.30	31.08	39.45
Total Revenue	**89.64**	**77.86**	**88.19**	**84.05**	**94.31**	**104.98**	**1,238.13**
Operating Costs	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**	**€,000**
Fuel Related Op. Costs	43.61	2.74	-	51.30	50.27	65.52	553.65
Non-fuel Op. Costs	16.40	13.56	33.63	11.97	21.10	-	-
Total Operating Costs	**60.01**	**16.30**	**33.63**	**63.27**	**71.37**	**65.52**	**553.65**
EBITDI	**29.63**	**61.57**	**54.56**	**20.78**	**22.94**	**39.46**	**684.47**
Dep. & Imp.	12.51	28.05	2.21	7.69	15.19	19.56	164.54
EBIT	**17.12**	**33.52**	**52.35**	**13.09**	**7.75**	**19.90**	**519.94**
Int & Tax	5.82	19.44	0.95	4.60	0.95	0.66	107.67
Net Profit	**11.30**	**14.08**	**51.40**	**8.48**	**6.79**	**19.24**	**412.26**
Gross Margin %	33%	79%	62%	25%	24%	38%	55%
Net Margin %	13%	18%	58%	10%	7%	18%	33%

Costs (Revenue - Net Profit)	**78.34**	**63.78**	**36.79**	**75.56**	**87.51**	**85.74**	**825.86**

Appendix B: Previous perspectives on the SEM

Over the last 8 years, I have looked at the Irish market from a number of perspectives:

- 2012 – Suggested Energy Partner approach to TSO Cross Border Balancing actions over the interconnector. Refined the proposed approach in 2013 (see below)
- 2011/12 – Assisted EirGrid in preparation for the East West Interconnector launch, including:
    - The auction management platform test and implementation and preparing to launch the first EWIC interconnector auctions.
    - Coordinating how EirGrid and the commissioning energy partner (Staatkraft) worked together
    - Helping the National Control Centre (NCC) be ready to operate the interconnector using the market schedule
- 2009 – As part of the Spirit of Ireland team, modelled the feasibility of delivering high levels of renewables (60%; 80% & 100%) at a reasonable cost, using wind, pumped hydro & interconnection
- 2008/09 – Working with Aidan O'Neill, designed the customer offering and developed the business case for NRGVend – since renamed to PrePayPower
- 2006 – 2008 – Investigated the potential for the batteries in electric cars to be used as system improving storage devices (requiring smart meter technology).

B.1 – Previous Perspective on TSO Balancing

The following is an extract from an April 2013 presentation on a proposed approach to TSO cross border balancing activities.

Problem Solving Approach to the Countertrading Question

- April 2013

Problem Solving Approach

1. What is the **Ideal Situation**?
    - Or the real requirements
2. What are the **Barriers** to the ideal situation?
    - Which barriers can be overcome without compromising the ideal
3. What are the **Ideal Options** (if any)
    - Advantages & Disadvantages
    - Challenges & Solutions
    - Recommended Approach
4. What are the **sub-optimal options**
5. Options **Assessment**
6. **Preferred** Approach

Ideal Situation – TSO Balancing

- **TSO** can **change** the **Interconnector schedule to suit its needs** (constraints, priority dispatch, etc.)
    - Any time from last SEM gate closure to real time
- **TSO** makes a **decision to trade** (or not) based upon **readily available information**

- TSO issues a "**Fire and Forget**" instruction to trade and receives a **good market price**
- **Systems and back office functions communicate** as required (Prices, PNs, DMVs, SEM SO Trades, etc.)
- Anything else?

Barriers / Challenges

- **National Grid restrictions** on CBB trades
  - Limited to 2 hours ahead
  - Limited to 200MW
- **Fire and Forget** challenges
  - National Grid might not agree a trade (current arrangements)
  - Market based solutions are not guaranteed to provide an answer every day
- **Market & possibly RA view** that trading before National Grid window should be market based
- The **existing Statkraft** contract is **not** a **long term** option as it was procured for commissioning, not ongoing TSO reasons
- Anything else?

Ideal Options

1. **Long term deal** with Energy Balancing partner
   - Same structure as Commissioning Energy Partner
   - Return to market every year for a new partner
2. **Create a market** (with interconnector participants) with mandatory participation and contractually committed minimum pricing
   - Market participation dependent on meeting minimum conditions which are set through a framework type tender process
   - Daily auction gates are based on bidding at or above the framework prices
     - Residual amounts based upon best priced framework
   - Emergency trades are fulfilled based upon the best priced framework
3. **Hybrid Model**
   - Daily auction gates for balancing based on standard RCUC runs
   - Tender for a long term deal with an energy balancing partner for the fallback option and emergency trades – and to set floor prices
4. Any other?

Possible Paths to Ideal Options

- **Long term deal** with Energy Balancing partner
  1. Amend & Novate existing contract
  2. Open procedure to a 1 year deal (extendable to 2, with 1 month termination)
- **Create a market** (with interconnector participants) with mandatory participation and contractually committed minimum pricing
  1. Amend & Novate existing contract
  2. Open procedure to an interim deal (as in Option 1)
  3. Consult on market design
  4. Agree design and implement it
  5. Run process to tender for frameworks
- **Hybrid Model**
  1. Amend & Novate existing contract

2. Open procedure to a 1 year deal (as in Option 1)
3. Consult on market design
4. Agree design and implement it
5. Get participants to sign up to market rules, BMUs, etc.

- Recommendation is that all options have the same steps 1 and 2
- Only Sub-optimal situation is the short term extension of the existing contract

Proposed Next Steps

1. Review and **agree approach with RAs**
2. Agree **Amendment & Novation** of existing contract
3. Workshop with **Participants to review plans and ideal options**
4. Issue **Request for Tender** and **implement novation** and amendment
5. Begin **design** of **daily market** (options 2 and 3)
6. Develop **plan & cost estimates** (project & operational) **to deliver market**
7. **Agree** with RAs which **Option** to pursue in the medium term (2014 to 2016)