

SEM Regional Integration

A Consultation Paper

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Executive Summary

Policy makers across Europe are considering how national electricity markets can be more closely integrated with one another to allow consumers to reap the benefits of an eventual internal European market for electricity.

European Union legislation requires that measures be put in place by regulators and system operators to ensure that cross border transmission capacity is allocated on a non-discriminatory basis using market basis mechanisms across the relevant time horizons, (longer term, day ahead, intra-day and balancing). While, this legislation – the Congestion Management Guidelines - comprises the main legal requirements on cross border electricity flows, a number of European initiatives are also currently focussed on progress towards increased market integration. The European Regulators' Group for Electricity and Gas (EREG) has established a framework for achieving the European Union's aim of a single European market in electricity, the first step of which is the establishment of seven regional electricity markets. The Single Electricity Market (SEM) comes under the aegis of the France-UK-Ireland (FUI) regional grouping. As the various regional groups have taken shape, markets have integrated and coordinated in a somewhat disparate manner and at different speeds. The experience of Nordpool and the Trilateral Market Coupling (TLC) initiative between Belgium, France and Netherlands illustrate that market integration is feasible and brings benefits. For markets such as the SEM and the British electricity market (the British Electricity Trading and Transmission Arrangements - BETTA), integration has been limited owing partly to lack of physical interconnection and partly to barriers to trade, as outlined in the SEM Committee's Interconnector Issues Paper published earlier this year (see SEM-09-042).

This consultation paper examines the question of how best to coordinate the allocation of available transfer capacity on interconnectors across various time frames - from long to medium term through to day ahead, intra-day and in balancing markets. The different ways in which this can be done include explicit auctioning, implicit auctioning (or 'market coupling') and intra-day trading. These means are looked at in detail and the wider, more strategic implications for the integration of the SEM with its neighbouring markets are also considered.

The paper discusses recent efforts by the European Commission, EREG and others to re-coordinate the development of regional markets. It also considers the particular characteristics of the Irish (i.e., SEM), GB (i.e., BETTA) and French markets, as well as interconnectors currently operating and shortly to come on line in the region (i.e., between Northern Ireland and Scotland, between the Republic of Ireland and Wales, between England and France and between England and the Netherlands).¹ The paper notes that the Regulatory Authorities (RAs) in Ireland (the Commission for Energy Regulation and the Northern Ireland Authority for Utility Regulation) are engaging with other policy makers at a European level with particular focus on interactions between the SEM, BETTA and the French market; and propose to develop with

¹ In this Consultation Paper, all references to 'Ireland' are to the island as a whole, not to the Republic of Ireland.

Ofgem a coordinated approach to congestion management across the interconnectors with BETTA, focussing initially on the explicit auctioning of capacity on ICs.

The costs and benefits of increased interconnection between the SEM and BETTA are set out, drawing on three recent studies of the costs and benefits of increased interconnection between Ireland and GB. The paper concludes that it is on balance in the interests of the SEM objectives and consumers in both its jurisdictions for the SEM Committee to ensure that future cross border flows are efficient, market based and compliant with European law. Effects of increased interconnection on wholesale prices are considered both in terms of average prices and price volatility, as are the consequences for the deployment of wind energy, market liquidity and the costs and benefits to society as a whole. The potential interactions between the building of a substantial amount of wind generation capacity between now and 2020 in the SEM and increased interconnection between Ireland and Great Britain (GB) are outlined. A key conclusion is that high levels of wind may make increased levels of interconnection a necessity. The curtailment of wind in the absence of increased interconnection could be costly.

The efficient use of available capacity of the interconnectors in the SEM is a key objective for the SEM Committee. The views of interested parties on how this can best be achieved across the various time frames (longer term, at the day-ahead stage and intra-day) are sought. The paper also sets out various options for ensuring that the East West Interconnector, once it comes into operation in 2012, will be compliant with the European Union's Congestion Management Guidelines (CMG). The paper looks at various options for amending the SEM's Trading and Settlement Code to facilitate compliance with the CMG requirements of intra-day allocation of interconnector capacity and of use-it-or-lose-it provisions.

The SEM Committee welcomes the views of interested parties on all the issues raised in this paper. All responses will be published. If any respondent wishes all or part of their submission to remain confidential, then this should be clearly stated in their response.

Comments on this paper should be sent to Philip Newsome and Jean-Pierre Miura, preferably electronically, to arrive no later than noon on 9th October 2009.

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1 Introduction

1.1 Introduction and Scope

At their March 2009 meeting, the SEM Committee discussed a paper on interconnector issues and the SEM.² The original request for a paper was prompted partly by a perception that use of the Moyle Interconnector had changed significantly after November 2007 and partly by a concern that the rules governing its use were contributing to security of supply concerns, particularly in Northern Ireland. The paper recognised that flows in both directions across the Moyle Interconnector had not responded as fully as they might have to price arbitrage opportunities between the SEM and BETTA and identified a number of reasons why this might be the case, including the availability of capacity on the Moyle Interconnector (IC) and its cost, the risks created by the misalignment of the SEM and BETTA (e.g., gate closure and ex-post pricing) and other factors such as the lack of liquidity in day ahead markets and network charging in GB.³ The paper noted that, with the prospect of increased interconnection in the medium term, the main barriers to increased IC use by participants and the promotion of intra day trading would need to be addressed. The SEM would also need to be developed to conform to European Union regulations and to maximise the benefits of increased interconnection. The paper concluded by recommending supporting the development of shorter term capacity auctions for the Moyle Interconnector and permitting more flexible use of unused capacity on the Moyle Interconnector by the system operators, working towards a full intraday trading solution. It was also recognised that identified market misalignments within and between the SEM and BETTA that frustrate interconnector usage would need to be addressed in the medium term and the consequences of increased interconnection in the future further investigated.

Following their discussion in March, the SEM Committee commissioned a paper on market coupling and the SEM; and on indicative proposals for intra-day trading on interconnectors between the SEM and its regional market. The SEM Committee asked that - in considering the latter - the costs and benefits of increased interconnection for the SEM should be considered.

This consultation paper responds to that request. It has benefitted from discussions with other parties, including Ofgem, National Grid, APX, ERGEG representatives, SEMO, EirGrid and SONI. Recent policy developments in Europe relating to increased regional integration of electricity markets in Europe, including the harmonisation of long term allocation of capacity on interconnectors and integration of day-ahead, intra-day and balancing markets, have been reviewed. Consultants were commissioned to undertake analysis of compliance with the European Union's CMG of the treatment on interconnectors in the SEM and to consider intraday trading options within SEM.

² See SEM-09-042.

³ The GB Market has hour ahead gate closure which means (among other factors) that liquidity is less likely to be concentrated at the day ahead point.

This paper is presented against a background of a desire on the part of the SEM Committee to ensure that barriers to the use of the Moyle Interconnector and future interconnectors with GB are minimised. The RAs are already pursuing options identified in SEM-09-042 that would give the system operators (SOs) greater ability to trade in the GB market after gate closure in the SEM. However, cost benefit analyses suggest that increased interconnection between Ireland and GB – and by extension greater trading on Moyle may be socially beneficial. This suggests that options for integrating the SEM with its neighbouring markets should be considered and views are welcomed on this. Options could include (but not necessarily be limited to):

- implementing piece-meal improvements in the SEM, which might include co-ordinating the explicit auctioning of capacity on the interconnectors with auctions on interconnectors between GB and France and the Netherlands, intra-day trading and applying use-it-or-lose-it principles to capacity left unused at the day ahead stage. The latter two options would ensure SEM compliance with the European Union’s congestion management guidelines (CMG), recognising that any new interconnectors linking the Republic of Ireland with Wales will be subject to European law;
- developing a more ambitious solution, which would likely take the form of loose market coupling; and, more radically
- redesigning the SEM so that it can more easily be price coupled with BETTA;⁴

This paper concludes by recommending that the medium term goal of the SEM Committee for ICs is to:

1. Engage with all stakeholders and policymakers at the European level to influence the development of policy on integration of electricity markets at a regional and European level, with specific emphasis on coordination of capacity allocation within regions at the annual, monthly and day-ahead stage. The relative benefit of implicit auctioning (market coupling) and explicit auctioning will be key to the direction of policy and future legislation in this area.
2. Develop a coordinated approach to congestion management with Ofgem, and in particular the explicit auctioning of capacity on ICs.
3. Develop SEM rules on UIOLI and IC trading to comply with the requirements of the CMG to maximise the benefits of interconnection and intermittent generation to customers. The policy options identified in Section 4 of the paper will be developed by the RAs in consultation with Ofgem and the recently established working group of the TSC Modifications Committee chaired by the RAs. In this context the RAs would be particularly interested in the views of interested parties on the options set out in Section 4.

⁴ Price coupling is the term used to describe the implicit auctioning of capacity along with trades in electricity organised through power exchanges and based on a firm day-ahead price. The implicit auctioning of capacity requires a degree of harmonisation of the key elements of market design. This may create difficulties for the SEM, the characteristics of which are sufficiently distinct from its neighbouring markets to rule out the emerging standard market coupling solution.

4. Depending on the response of interested parties to this Consultation Paper and in the light of their likely costs and benefits, further develop options for the market coupling of the SEM with neighbouring markets.

1.2 Paper Structure

Section 2 summarises three recent studies of the costs and benefits of increased interconnection between Ireland and GB and its efficient use.

Section 3 outlines the European Union policy background to any discussion on SEM and regional integration; sets out the legislative requirements as they affect interconnectors and markets; and describes progress towards regional market integration in Europe in terms of the harmonisation of the allocation of long to medium term interconnector capacity across regions, the allocation of capacity day ahead of real time, intra-day reallocation and balancing arrangements. How these trends relate to the SEM is then discussed.

Section 4 looks at the various options for integrating the SEM more closely with its neighbouring markets by increasing the efficiency with which interconnectors are used and how compliance with the Congestion Management Guidelines in the light of increased interconnection between the SEM and its regional market by 2012 could be achieved.

Section 5 sets out the conclusions of the paper and recommends some next steps.

2 Costs and Benefits of Increased Interconnection

The SEM Committee asked for the costs and benefits of increased interconnection between GB and Ireland to be taken into account in any further work on regional integration of the SEM or on the rules applying to interconnectors in the SEM. This section summarises the cost benefit analysis undertaken by EirGrid during the course of its development of the case for the East West interconnector; and two recent studies that address the implications of more or less interconnection between Ireland and GB in the context of increasing intermittent generation capacity in Ireland.

2.1 EirGrid's Business Case for the East West Interconnector

EirGrid undertook a cost benefit analysis of its planned East West interconnector (EWIC) early in 2008.⁵ At the time EirGrid identified the main benefits of developing an interconnector between the Republic of Ireland and Wales then as:

- *Enhanced security of supply* – EirGrid identified a need for additional generating capacity over the subsequent seven years to maintain supply security. EirGrid noted that there was significant capacity available in the British generating market to provide security of supply for Ireland, via the EWIC. In addition, Britain was also developing interconnectors with mainland Europe to further contribute to security of supply and market integration. Furthermore, there was a clear requirement for a fully-dispatchable source of energy supply, which could not only be used as required, but would also provide the capacity and stability that would be required to increase the extent to which increasing amounts of intermittent generation could be accommodated on the system. The EWIC would provide up to 500 MW of additional capacity at peak times. It would also diversify the fuel sources used to generate electricity available on the Irish system and provide the mechanism by which intermittent generated energy could be exported, in the event of surplus energy generation.
- *Promoting competition in the electricity market* – EirGrid argued that the EWIC would significantly increase the competitiveness of the SEM and would reduce the market power of participants. EirGrid also thought that third party access to the EWIC in a fair, consistent and transparent manner would put downward pressure on electricity prices. They estimated that each 1% point decrease in wholesale electricity prices would benefit consumers by around €20 million a year. For comparison, NIE had indicated that the largest industrial users in Northern Ireland had seen prices fall by 10% since the commissioning of the Moyle Interconnector. During that same period income from interconnector capacity auctions was sufficient to recover the capital costs associated with the Moyle interconnector.
- *Environmental benefits* – which would include:

⁵ Available at CER/09/073

- the facilitation of greater potential to export wind power;
 - the provision of operating reserve, which would result in a reduced need for carrying reserve in the event of unscheduled shutdowns or the loss of other generation;
 - reduced carbon emissions, resulting from the use of the EWIC to displace indigenous fossil fuelled generation. The benefit of these reduced emissions were valued at a price of €21.57/tonne, within the range of €20 to €22/ tonne at which cost of carbon credits had recently been traded.
- *Reduced wholesale prices for consumers* – EirGrid argued that the EWIC would result in an overall reduction for the consumer in the price of wholesale energy, since the price of energy from the interconnector was forecast at €65/MWh, which was lower than the cost of currently used gas, coal, oil and distillate in the SEM. The interconnector price was made up of an assumed portfolio of marginal plant in Britain to get a notional price of €65/MWh. This notional price was lower than the Irish gas price because British gas prices were slightly lower than Irish gas prices and because gas was not always assumed to be marginal.
 - *Non-quantifiable benefits* – EirGrid also pointed to a number of other benefits associated with the EWIC which have been identified and for which a financial value cannot yet be attributed. These included increased market confidence, stemming from a perception that the SEM would no longer be seen as isolated and would therefore be more attractive to foreign investors who might chose to invest directly in the market, for example through the provision of additional conventional or renewable generating capacity.

Table 2 below sets out the quantifiable benefits identified by EirGrid in respect of the EWIC.

Table 2: Annual Estimated Potential Benefits of the EWIC

Benefit	€million	Likelihood that full benefit arises
Security of supply (measured through replacement need for a peaking plant)	39.90	100%
Environmental – reduces wind curtailment	10.00	100% ¹
Environmental – reduces the need for carrying reserve	2.09	100%
Environmental – reduces carbon credit payments	28.30	50% ²
Total annual benefits	€66 million	
Market prices – 1% reduction	20.00	

Notes:

1. This benefit is not scaled back to reflect the fact that while 33% wind penetration is not expected by the time the EWIC becomes operational it will certainly exceed it, with possibly up to 42% penetration, possibly as early as 2020.

2. This benefit is scaled back to 50% to reflect the fact that the EWIC is not expected to be importing 100% of the time.

Source: EirGrid.

The present value of an annual benefit of €66 million, over an asset life of 30 years at EirGrid's allowed pre-tax weighted average cost of capital of 5.6%, was €946 million. When compared to the required capital investment of €596 million, including contingencies, this represented an overall benefit of about €350 million over the 30 year period. There were also a number of other benefits associated with the EWIC for which a monetary value could not be attributed, such as increased market confidence and improved competition.

2.2 The Pöyry study

A recent study by Pöyry Energy Consulting on intermittency looks at the effect on interconnection of energy flows between Britain and Ireland in the context of substantially increased amounts of wind on both the Irish and British systems.⁶ Their base scenario assumes that wind capacity in Britain will increase to 33 GW by 2020 and 43 GW by 2030. In Ireland the equivalent figures are 6.1 GW and 7.9 GW. Crucially, the assumed penetration of wind in Britain is proportionately less than that in Ireland.

Pöyry's modelling assumes that the capacity situation in Britain will tighten in 2016 with the closure of existing nuclear capacity (on safety grounds) and coal- and oil-fired plant (as a result of the restrictions imposed by the Large Combustion Plant Directive 2001/80/EC). In their base or 'core' case, they assume 1.4 GW of interconnection between Britain and Ireland. This comprises the existing Moyle IC between Northern Ireland and Scotland, the EWIC and an additional 500MW interconnection with Wales. Both of these additional interconnectors are assumed to be commissioned by 2015. Pöyry also assume that the existing 80 MW export capacity from Moyle into Scotland is increased to full capacity by 2015.

In addition to the core scenario, the study examines a range of other cases. These include an 'interconnector sensitivity' scenario where it is assumed that the Moyle export capacity of 80 MW remains in place and the 500 MW EWIC is the only new IC built between now and 2030.⁷ Modelling results for this scenario show that time-weighted wholesale prices in the SEM

⁶ Implications of Intermittency: A Multi-client Study, Pöyry Energy Consulting, Oxford, May 2009

⁷ It is built by 2015 in the interconnector sensitivity scenario, as in the core case.

are 1% higher in 2015 without the second 500 MW interconnector and with continuing restriction on exports across the Moyle, but between 1–5 % lower subsequently than in the core scenario. This reflects the fact that, with less interconnection capacity, the SEM is unable fully to export excess wind generation to Britain and prices in the SEM are suppressed.

Other results from the low interconnection scenario, compared with the core scenario, include:

- higher SEM system costs (i.e., fuel and other variable costs, fixed O&M costs, no-load and start costs), which together with lower wholesale prices results in lower returns for SEM plant across all classes of plant;
- almost 200 more periods annually of zero or negative prices and 400 more periods of €0-20/MWh prices in the SEM;
- more wind curtailment as a result of limited export capacity, with the number of trading periods of wind loss in Ireland increasing from 61 to 222 in 2020 and from 723 to 1177 (i.e., 13% of the time) in 2030, by comparison with the core scenario,⁸
- higher carbon emissions in the SEM, owing to lower imports from Britain and more de-loaded wind, requiring Irish thermal plant to run more often; and,
- a negligible effect on Britain prices.

The Pöyry study concludes that interconnection between Britain and the SEM becomes of critical importance as the volume of installed wind generation increases, with wind being a significant driver of interconnector flows. It is observed that the larger the geographic area that installed wind is spread over, the more constant and less intermittent the wind generation becomes, owing to the decline in correlation between wind speeds the larger the distance between points. It is expected that a sizable portion of future wind in Britain will be located in places such as the Dogger Bank, located off the east coast of England and with little correlation with Irish wind⁹.

The study finds that the pattern of flows between GB and Ireland will change over time. Currently flows are predominantly from East to West and by 2015, with expanded interconnection, the flow increases to 750MW on average East to West, with a broadly flat profile across the year. The tightening of the capacity situation in Britain in 2016 means that those flows fall by about half, but the predominant flow is still East to West. As the amount of wind on the systems increase with time, the pattern of flows changes, with higher net flows East to West in the summer, when the wind tends not to blow, and higher net flows West to East in the winter. By 2030, the net flows are from West to East in January and from East to West in August. Before then the predominant net flow is East to West across the whole year.

⁸ These results are based on runs of the market schedule. The de-loading of wind is likely to be much greater in dispatch.

⁹ Though the study notes that there is some relationship between SEM and GB wind, with a correlation (r^2) of 0.44

Thus, if there were to be less interconnection between GB and Ireland, the SEM would be disproportionately affected due to the relative importance of interconnection to Ireland¹⁰. With less interconnection, the interconnectors are congested more of the time and more wind has to be curtailed in Ireland. Curtailing wind imposes costs that have to be recovered, ultimately from consumers through subsidies or some other mechanism. These costs include:

- the fixed costs of the wind capacity itself;
- the costs of thermal capacity required to back up wind when the wind does not blow;
- the network connection and reinforcement costs to get the significant amounts of wind onto the system which cannot be recovered from wind itself if it is curtailed; and,
- The less that wind has to be curtailed, the greater the number of MWh over which these fixed costs can be spread, to the benefit of Irish consumers.

While wholesale prices might be lower, system costs could be higher and the returns to generation lower¹¹. Increased interconnection would allow Ireland to 'export' wind during high wind periods and import power from Britain when wind levels are low, with implications for renewable subsidies, security of supply and renewables targets.

2.3 The ESRI study

The Economic and Social Research Institute (ESRI), a Dublin-based research institute, has also recently conducted a study on the challenges facing the Irish electricity system over the period to 2020.¹² These challenges include the extensive deployment of wind generation in Ireland over the coming decade.

The study examines various scenarios of wind and interconnection under a range of fuel price scenarios, which are shown in Table 3.

¹⁰ The levels of IC between GB and Ireland and GB and the continental Europe envisaged in the study relative to the size of the GB market are such that significant effects on GB wholesale prices are limited. This may change as GB wind and IC levels increase.

¹¹ Note that capacity payments for IC users exporting from the SEM are negative and related to the volume of exports. Thus, larger exports would mean a greater monetary benefit to the SEM capacity pot and so incentivises SEM generators to be available at times of export. Restrictions on exports would limit these gains.

¹² Diffney, S., J. Fitz Gerald, S. Lyons, and L. Malaguzzi Valeri, 2009, Investment in electricity infrastructure in a small isolated market: the case of Ireland, *Oxford Review of Economic Policy*, forthcoming.

Table 3: Fuel and carbon price assumptions, 2007 currency

Scenario	Oil price (\$/barrel)	CO ₂ permits (€/tonne)
Low	60	20
Medium	110	38
High	160	60

Source: ESRI, *ibid*

Three levels of wind capacity in 2020 are examined: 2,000 MW, 4,000 MW and 6,000 MW. The ESRI consider that, since there are more than 2000 MW of wind generation capacity committed to connect to the system by 2010, 2,000 MW is likely to be achieved with no further incentives, even if some of the installations in the transmission connection queue do not actually materialise. In addition the study considers three different levels of interconnection with GB: 900 MW (comprising the Moyle and the EWIC), 1,400 MW and 1,900 MW¹³. Demand is assumed to be 20% higher in 2020 than in 2007.

The ESRI's simulations rely on an optimal dispatch model for the SEM, modelled as a mandatory pool market with capacity payments. In every half hour generation has to match demand, determined by an exogenous demand curve that is assumed to be price-inelastic. In line with the bidding principles of the SEM, generators bid their short run marginal cost, which includes the cost of fuel and carbon dioxide emissions. Plants are stacked according to their bids, from the cheapest to the most expensive, and the cheapest plants that are needed to meet demand in each half hour are dispatched. The most expensive plant that is dispatched determines the system marginal price (SMP) paid to all plants that are generating during that period. The model assumes that there are no transmission constraints, no costs to increasing and decreasing the level of production and no minimum down times. Wind is constrained off the system to ensure that base-load generating capacity is not forced to cycle on and off "too frequently."

To analyse the effects of interconnection a similar model is set up for the market in GB. It is assumed that the wholesale market in GB is governed by the same regulations as the SEM, i.e. that it is a mandatory wholesale market where generators bid their short run marginal cost of production. Whereas each plant on the Irish system is modelled separately, for the British system plants of the same type and similar efficiency are aggregated. The study abstracts from the actual trading arrangements in the GB market, which are based on voluntary bilateral arrangements between generators, suppliers, traders and end-customers. The study assumes the perfect operation of interconnectors with no barriers to trade.

The modelling results allow a comparison to be made of the total cost of the Irish electricity system under a variety of scenarios and to analyse how the costs and benefits are distributed between consumers, producers and interconnector owners. For each scenario the ESRI measure the short run and capital costs to generators, the costs of reinforcing or building transmission and the costs to consumers (based on the wholesale costs of electricity). The

¹³ The ESRI study assumes that the Moyle interconnector operates at full capacity in each direction.

costs of distribution and retailing of electricity to final consumers and the cost of excise and value added taxes are ignored. The yearly net benefit of the electricity system is defined as the sum of producer profits and interconnector profits, net of the costs incurred by consumers. Interconnector owners' profits comprise the price difference between the SEM and GB markets in each half hour times the amount of energy flowing across the interconnectors in that half hour and capacity payments, net of the annualised capital costs of building the interconnection. Annual consumer costs comprise the wholesale price of electricity (i.e., the SMP in each half hour weighted by the electricity demand in that half hour), annual capacity payments and the annual cost of transmission.

The results of the ESRI's modelling can be summarised as follows.¹⁴ In the *medium and high fuel price scenarios*:

- for a given level of wind on the system, the net costs of the Irish electricity system are always lower the greater the capacity of the interconnections with GB;
- the more wind there is on the system, the greater is the proportionate reduction in net costs as a result of more interconnection, which leads the ESRI to conclude that high levels of wind on the system (in particular the 6,000 MW as envisaged by the Irish government's renewable energy strategy (RES) targets) 'do not make sense unless it can be fully exploited' by increased interconnection with GB;
- the lowest absolute net costs in each of the high and medium fuel price scenarios occur with 6,000MW of wind and 1,900 MW of interconnection;
- consumer costs are similarly lower the more interconnection there is, whatever the level of wind on the system.

In the *low fuel price scenario*:

- in the 2,000 MW and 4,000 MW wind cases, net costs tend to be higher the greater the capacity of the interconnections;
- with 6,000 MW of wind, net costs are reduced by more interconnection;
- for a given level of interconnection, net costs are higher the more wind there is on the system;
- for a given level of interconnection, consumer costs tend to be lower the more wind there is on the system;
- for a given level of wind, consumer costs are relatively invariant to the level of interconnection.

¹⁴ All the results quoted here assume a CO₂ permit price of €38/tonne.

The report concludes that investment in interconnection is a *sine qua non* for high investment in wind; the former allows the latter to generate whenever it is available instead of being curtailed at times of low demand.

2.4 Conclusions

This section has summarised the findings of three recent studies of the costs and benefits of increased interconnection between the SEM and its neighbouring markets. Both the Pöyry and ESRI studies assume perfectly functioning interconnectors running at full capacity. Given the differences between BETTA and SEM that were identified in SEM-09-042 this does not reflect risks which market participants face in reality. These studies have shown that increased interconnection (or the increased efficiency of existing interconnections) between the SEM and neighbouring markets will likely be of net benefit to Ireland, even if at times wholesale prices in the SEM might be higher than would otherwise have been the case. While it is important to take the distribution of the net benefit between producers and consumers into account when considering policy options for interconnector rules in the SEM, other relevant factors cannot be ignored. These include:

- The EWIC will be built and operational by 2012. It will be subject to EU legislation. The relevant question is how it (and the Moyle) should be used (as described in rules) in the future.
- The benefits of a wholesale market and the potential to attract new entrants will be limited if the SEM remains relatively isolated from the rest of Europe. In particular a lack of liquidity in wholesale markets is both a barrier to entry and acts a competitive disadvantage to smaller players. Interconnection capacity is considered to be contributing factor for the development of liquidity.¹⁵
- It is unlikely that any new ICs will be built should Moyle and the East West IC be systematically underused.
- In the longer term, should Ireland not interconnect sufficiently with its neighbours, access to the wider European electricity market will be limited and efficiency gains from being part of a large interconnected system with a diverse portfolio mix (wind, nuclear etc.) will not accrue to Ireland.

Whilst acknowledging that increased interconnection is no panacea, this Consultation Paper takes the view that, on balance, the benefits of efficient and increased interconnection with GB and the FUI region are greater than the costs.

¹⁵ A recent Ofgem Discussion Paper on Liquidity in the GB Wholesale Energy Markets identifies increased interconnection as a means of increasing market liquidity.

3 European Union Initiatives

3.1 Legislative Context and ERGEG

European Legislation

In an effort to build on the successes of the single European market for people, goods, services and money, the European Union took initial steps in the 1990s to liberalise the electricity industry with the ultimate goal of creating a single European electricity market to serve the interests of customers.¹⁶ Following this, European governments and the European Parliament adopted in June 2003 Directive 2003/54/EC setting out the common rules for the internal market in electricity and Regulation (EC) No. 1228/2003 (the Regulation) setting out conditions for access to the network for cross border exchanges in electricity.¹⁷ While the former deals in the main with the opening up to competition of the electricity industry across the European Union, the latter specifically focuses on the treatment of electricity interconnectors between member states.

The Regulation sets out rules on inter-transmission system operator compensation, transmission tariffs and general principles on the management of cross border flows where transmission capacity is scarce.¹⁸ The Congestion Management Guidelines (CMG), which are annexed to the Regulation, lay down detailed rules on the management of congestion with the aim of ensuring effective access to transmission systems for the purpose of cross-border transactions.¹⁹ The CMG provide that network congestion is to be dealt with using non-discriminatory market-based solutions; that use-it-or-lose-it (UIOLI) or use-it-or-sell-it (UIOSI) is to be applied to any allocated cross border capacity; and that intra-day trading must be in place by 1 January 2008.²⁰ Given that the planned East West interconnector in 2012 will be subject to the Directive and the Regulation, a mechanism within the SEM whereby market participants have access to allocated capacity not used must be devised.

The EC has recently launched infringement proceedings against a number of member states, including the Republic of Ireland and the UK, for non-compliance with the provisions of the Regulation and in particular the CMG.²¹

¹⁶ 1st liberalisation package.

¹⁷ 2nd liberalisation package.

¹⁸ The European Commission have consulted on inter-TSO compensation and will be issuing a decision in late 2009/early 2010 on whether binding arrangements will be put in place and, if so, what the methodology will be.

¹⁹ The CMG became legally binding on 1 July 2004 and the revised guidelines came into force on 1 December 2006.

²⁰ Competition was slow to materialise in the electricity industry despite the changes engendered by the first two liberalisation packages, with markets remaining largely national and concentrated. The EC's DG Competition launched a sector inquiry in 2005 to identify the barriers preventing more competitive EU-wide energy markets that would provide fairer prices for final consumers and would more efficiently allocate resources. The results were published in early 2007. The level of cross-border trade was specifically identified as being insufficient to exert pressure on dominant generators in national markets. Based on the results of the sector inquiry, the EC tabled the 3rd legislative package in 2007.

²¹ While neither Moyle nor the North-South transmission line qualify as interconnectors, any future ICs between the Republic of Ireland and Britain would be subject to European law and to potential infringement proceedings of the European Commission.

The recently adopted 3rd package includes measures to strengthen the internal energy market including the establishment of an Agency for the Cooperation of Energy Regulators (ACER) and the European Network of Transmission System Operators for Electricity (ENTSO-E). These two bodies are intended to complement the work of national energy regulators by providing a more coordinated approach to the detailed rules applying to cross border electricity flows, including the development of network and technical codes.²²

European Regulatory Gas and Electricity Group and Regional Initiatives

To complement these legislative initiatives in the fields of electricity and gas and to ensure their implementation, the EC set up in November 2003 a formal advisory group of European energy regulators known as the European Regulators' Group for Electricity and Gas (ERGEG). In an effort to speed up the integration of national energy markets and owing to the disparate nature of European electricity and gas markets, the EC established the ERGEG Electricity Regional Initiatives (ERI) Framework in 2006.

Under this framework, seven regional electricity markets (REMs) for electricity and three for gas were created with the aim of developing integrated regional markets in a coordinated manner as an interim step to single European electricity and gas markets. While the seven REMs have broadly similar aims (integrating fragmented national electricity markets into regional markets), the priorities and focus of their work are determined by their distinct regional characteristics and existing level of integration. The Regional Initiative Group consists of the Regional Co-ordination Committee (comprising only regulators), together with the Implementation and Stakeholder Groups, with a lead regulator appointed for each REM to chair and co-ordinate work within that region.

The seven REMs are:

Baltic – Estonia, Latvia and Lithuania

Central Eastern Europe – Germany, Poland, Czech Republic, Slovakia, Hungary, Austria and Slovenia

Central South – Austria, France, Germany, Greece, Italy and Slovenia

Central West – Belgium, France, Germany, Luxembourg and the Netherlands

Northern – Denmark, Finland, Germany, Norway, Poland and Sweden

South West – France, Portugal and Spain

FUI – France, UK and Ireland

The focus to date of the work in the FUI region has been on transparency; ensuring compliance of the UK/France interconnector with the CMG requirements of UIOLI and intra-day trading; and on access of the GB and French system operators respectively to each other's balancing markets.

²² The third liberalisation package consists of two regulations and three directives relating to gas and electricity and was entered into the EU's Official Journal in July 2009. Most of its provisions will enter into force in early 2011 although technical codes will then be developed by ACER and ENSTO-E.

3.2 Regional Market Integration Europe to date

Since the establishment of the ERI framework, the integration and formation of regional markets has advanced at varying speeds across Europe. While some countries, e.g., those of the Central West REM (Belgium, France, Germany, Luxembourg and the Netherlands), have taken significant steps towards a creating a regional market, others such as Ireland and GB continue to have limited interactions with their neighbouring markets.²³

In addition to the REMs, there is a patchwork of regional markets and regional interactions operating across Europe with notable examples of functioning regional markets including:

- the Nordpool Market comprising Norway, Denmark, Sweden and Finland and which has been operating since 1996;
- the Iberian Energy Market (MIBEL), established on 1 July 2007; and
- the Single Electricity Market (SEM) integrating the Republic of Ireland and Northern Ireland, which began in November 2007.

Coordination of Congestion Management Methods and Emerging Target Models

As stated above, the CMG set out mandatory requirements for regionally coordinated market-based congestion management methods to be put in place on interconnectors linking member states of the European Union. In particular, the CMG require that transmission capacity be allocated either explicitly or implicitly.²⁴

Under explicit auctioning mechanisms, capacity is auctioned to the market separate to and independent from the trading of electricity. Traders buy physical rights to capacity between areas and decide for themselves on the daily use of that capacity. Explicit auctioning is relatively straightforward and widely used in Europe under bilateral arrangements. However, increasing coordination of explicit auctions within regions is expected as member states implement the CMG requirements. In this context, the RAs intend to discuss the development in SEM of congestion management mechanisms as part of a coordinated approach to capacity allocation on SEM interconnectors with those being developed for interconnectors linking GB with continental Europe. In discussions, market participants have highlighted that the ability to coordinate the allocation of capacity across numerous interconnectors within a region is likely to benefit trade and increase the efficient use of IC capacity across countries. Such coordination has been the subject of initial discussions with Ofgem. Steps to coordinate CMG methods with the RAs will require further consideration as appropriate methods for the France England, BritNed and East West ICs are developed.²⁵

²³ Examples of moves towards market coupling are efforts to integrate the Iberian and Central West regions, through day-ahead price coupling and recent progress on efforts to introduce market coupling between Italy and Slovenia.

²⁴ Continuous allocation is permitted for intra-day use of capacity.

²⁵ BritNed is a joint venture between National Grid in Britain and TenneT in the Netherlands to build a 1000MW DC interconnector between England and the Netherlands. Its planned commissioning is late 2010 or early 2011.

Market coupling, on the other hand, is a congestion management method whereby cross border capacity is implicitly allocated according to supply and demand on power exchanges.²⁶ Combining the implicit auctioning of capacity on an interconnector along with the trade of electricity is considered a more efficient use of cross border capacity than explicit auctioning. Market splitting (as practised in Nordpool) is a variant of market coupling and refers to the case where a single power exchange links separate areas within a region, whereas market coupling involves several power exchanges within one region.

Across Europe, the allocation of capacity on an interconnector takes place under a number of different timelines with specific terminology used to describe each. Article 3.2 of the CMG requires a common coordinated congestion management and procedure for the allocation of capacity to the market across these timelines. The following timeframes apply:

Long and Medium Term

This applies to the allocation of interconnector capacity before gate closure, usually on an explicit basis. For example, physical capacity on the Moyle interconnector between Scotland and Northern Ireland is currently allocated in annual and monthly auctions. Capacity on the 2000MW DC interconnector between France and England (the *Interconnexion France-Angleterre* or IFA) is auctioned annually (for annual capacity), monthly (for monthly capacity) and daily (for daily capacity). Periodic auctions are also held for capacity of between one day and one year (medium term capacity). It is likely that long and medium term capacity on both the Moyle and the IFA will continue to be allocated on an explicit basis. The means of allocating capacity on the East West interconnector has yet to be determined.

Some REMs, e.g., the Central East, Central South and Central West regions, have, or will soon have, a single set of regional auction rules which will apply to the explicit allocation of capacity on all ICs in the region.

At this stage of development of regional markets, physical transmission rights (PTRs) are the key concern. As markets mature and liquidity increases, the focus of long and medium term transmission rights may shift from physical to financial – i.e., when sufficient liquidity is created in spot energy markets, long term financial IC transmission rights can be used as a hedge against the volatility of these day ahead prices. Eventually, financial transmission rights (FTRs) could replace physical transmission rights, where FTRs would not represent the right to nominate a physical transfer of power across a border, but rather the right to receive compensation equal to the value of the physical capacity at the day-ahead allocation stage.

Day Ahead

The day-ahead allocation of capacity refers to the auctioning of capacity rights for use of capacity on the IC on the following day (i.e., one day ahead of physical delivery). As day-ahead

²⁶ The efficient integration of national electricity markets is often referred to as 'market coupling.' Market coupling, though often cited as being the optimal approach to efficient allocation, is one of several methods of managing congestion.

prices are the basis for settling most electricity forward contracts, it is this day-ahead allocation that has become the driver for integrating Europe's electricity markets.²⁷ It is at the day-ahead stage that the most progress on regional integration has been made with market coupling (implicit auctioning). Many stakeholders see implicit day-ahead auctions as the target model for regional and eventually European integration.

When markets couple, they can do so by two alternative means – price coupling and volume coupling. Under price coupling, the single price coupling mechanism determines both flows across interconnectors and prices in the coupled markets. Under volume coupling, the coupler determines only the flows between the markets, with prices in each individual market calculated subsequently by the local power exchanges. A further distinction can be made between tight volume coupling and loose volume coupling. Tight volume coupling achieves a closer replication by the volume coupler of the bids and local market rules of the individual market pricing algorithms than loose volume coupling.

The Trilateral Market Coupling Initiative (TLC) between Belgium, France and the Netherlands is an example of price market coupling.²⁸ Here the three power exchanges, respectively Belpex, Powernext and APX, together determine the prices for the region, using available transfer capacity at the day-ahead stage to optimise the clearing of their day-ahead auctions.²⁹ Under this process, one exchange will export to another so long as the marginal supply price in one is lower than the marginal demand price in another, until such a point when price convergence occurs or cross border capacity is no longer available (i.e., the IC(s) becomes congested). Between its establishment on 21 November 2006 and 21 November 2008, the three prices on Powernext, Belpex and APX have converged on average 65 % of the time.

It is generally held that the TLC experience of price market coupling has been a positive one, with reduced price volatility and efficient price signals directing investment to higher priced zones. Plans to extend market coupling of the TLC to all countries in the Central West region under the aegis of the Central West REM and the Pentalateral Energy Forum are currently well advanced.³⁰

Whilst the (albeit limited) experiences of price coupling in Europe have to date been positive, the one instance of volume market coupling - between Germany and Denmark – has proved less successful. Here the Electricity Markets Coupling Company (EMCC) was forced to suspend the coupling mechanism in October 2008 owing to 'unexpected deviations in flow and price calculations between the EMCC and the Nord Pool Spot system,' which were believed to

²⁷ In most European electricity markets trading is conducted on a bilateral basis but is often supplemented with auction trading organised by power exchanges one day ahead of delivery for every hour of the following day. The auctions are used by market participants to fine-tune their portfolios as bilateral negotiations at that point are considered too time consuming. Arbitrage between power exchanges day ahead takes place on an implicit basis across Europe.

²⁸ Another example of price market coupling is Nordpool (Elspot), which has coupled the Scandinavian countries since the mid-1990s.

²⁹ While all day-ahead capacity is implicitly auctioned, only 10% of flows across between the three countries are implicitly auctioned. The rest are still explicitly auctioned.

³⁰ The Pentalateral Energy Forum is an initiative of the governments of Germany, Luxembourg, France, Belgium and the Netherlands to develop a regional electricity market.

have caused 'price differences between Germany and Denmark which did not correspond to the direction of the flows.'³¹

Intra-Day Trading

While much of the focus at European level has to date been on the day ahead coupling of national electricity markets using implicit auctions on power exchanges, the intra-day allocation of capacity is gaining ground as an additional means of facilitating the efficient use of cross border capacity. As shall be addressed in Section 4 of this paper, the CMG require that there are coordinated methods of intra-day congestion management by 1 January 2008. Intra-day markets cover energy trades negotiated between the close of the day-ahead market and the point at which the system operator takes control for real-time security and balancing. In the SEM context, intra-day therefore means the period between gate closure at 10am - or arguably 12 noon, when the indicative market schedule is made available - and some time before 6am the following day when the trading days begins.³²

There are already intra-day allocations in place across Europe. These include Elbas, which covers some of the Nordic countries in Nordpool, and the Spanish market, OMEL. Elbas operates continuous allocations of capacity throughout the day up to one hour before real time delivery, while OMEL facilitates six intra-day auctions of capacity with neighbouring countries (France, Portugal, Morocco and Andorra). Furthermore, two REMs – South West and Central West - have recently consulted on the model of intra-day trading best suited to their markets in the context of compliance with the requirements of the CMG.

As intermittent generation increases its share of installed capacity across Europe, the necessity of intra-day use of cross border capacity increases. This is particularly relevant to the SEM in view of the probability of significant wind capacity coming on line in the coming years. Rather than maintaining expensive conventional thermal generation as backup to wind, access to energy from neighbouring markets with a different plant portfolio and different system peak times would be economic. Access to an export market for wind at times of high production also becomes more important in the future, to avoid the opportunity costs of having to curtail wind.

In discussions with Ofgem, the RAs understand that Ofgem considers the intra-day allocation of capacity as being a priority for the FUI region. In view of the increase of intermittent generation in both Ireland and GB in the coming years, Ofgem are of the view that this could be an important focus of efforts at regional coordination level.

Balancing

This refers to the real time availability of interconnector capacity to system operators (SOs) to balance the transmission and generation systems across regional markets, since the SOs are the single buyers of balancing services. At the European level the balancing of real time markets is being examined with a view to integration with neighbouring systems. An ERGEG

³¹ EMCC is a joint venture between Nord Pool Spot, European Energy Exchange (EEX), Vattenfall Europe Transmission, transpower stromübertragungs gmbh (formerly E.ON Netz) and Energinet.dk

³² In the GB market, there is a period of one hour ahead of real time when the SO takes control of the system and further trading between participants is disallowed.

taskforce working on balancing market integration has been established and non-binding guidelines of good practice (GGP) on the need for, and method of, integrating balancing markets are being drafted.

The GGP are aimed in particular at stakeholders, system operators and market players and are intended to support the EC and national competent authorities in developing and implementing appropriate policies towards the integration of balancing markets in the European Union, within the broader scope of the evolution of the single electricity market. One of the areas that the taskforce is currently examining is the reservation of capacity on DC interconnectors by the SOs for use as reserves. In the SEM currently, balancing is restricted to mutual support (i.e., the provision of reserves) across the Moyle IC by the two system operators (SONI and National Grid).

As markets across Europe move towards a more integrated and coordinated approach for the allocation of cross border capacity over the long term, day-ahead and intra-day time horizons, the interactions of co-ordinated balancing by system operators and these markets will become increasingly important.

3.3 Latest European Union Developments

In view of the disparate and somewhat uncoordinated pace of regional market integration, the EC and ERGEG have begun efforts to recalibrate the integration of European electricity market, including moves to overhaul the regional approach and refocus the attention of policymakers towards the goal of a single European electricity market.

The Electricity Regulatory Forum (the Florence Forum) was set up in 1998 to discuss the creation of a single European electricity market. It is a conference of national regulatory authorities, Member State governments, the European Commission, transmission system operators, electricity traders, consumers, network users, and power exchanges that meets once or twice a year in Florence. It established a Project Coordination Group (PCG) in June 2008. The PCG has the task of developing a practical and achievable model to harmonise interregional and then European Union-wide coordinated congestion management and to propose a roadmap with concrete measures and a detailed timetable. The practical design issues associated with the work of the PG are to be addressed by system operators and power exchanges through the Market Integration Design Project. The PCG is in the process of developing and identifying a target model and have so far indicated the following features as key:

- A target model by 2015 of day-ahead implicit price coupling with:
 - Harmonized gate closure times
 - Compatible bids / products
 - Use of a single pricing algorithm

- Sharing of all bid data between power exchanges
- A target model for the intra-day market of implicit continuous trading or implicit auctions or both.

It should be noted that the findings of the PCG are to be reported to the Florence Forum on an ongoing basis and are not necessarily in line with the views of ERGEG, national regulators or the EC on the way forward for increased market integration. The PCG is due to submit a roadmap on European cross border congestion management to European policymakers (EC, national regulators) in November 2009.

Other current notable developments at the European level include:

- The EC has commissioned a study on the regional initiatives which is to define new milestones and deliverables for the work to be done within the regional initiatives after the adoption of the 3rd Package. The findings of the study will be presented at the regional initiatives conference on 17th November 2009.
- In parallel to the work of the PCG, ERGEG has established an internal group – the Regional Integration Group (RIG) - to look at the role of the regional initiatives in the context of the 3rd Package. Specifically the RIG is intended to:
 - ensure convergence of regional initiatives towards a single European electricity market;
 - facilitate cross-region and cross sectoral sharing of experience;
 - publish a single annual progress report to be presented at the regional initiatives conference;
 - publish a paper to provide clarity on the role of the regional initiatives in the context of the 3rd Package;
 - cooperate with the EC regarding its study on regional initiatives.

3.4 SEM and its neighbours

SEM forms part of the France-UK-Ireland Regional Electricity Market (FUI). The SEM spans two jurisdictions of the FUI and thus qualifies as a form of regional market in itself. However, the SEM is markedly different from the wholesale electricity trading arrangements in both GB and France. The key differences were discussed in the SEM Committee's previous paper on interconnector issues (SEM-09-042). They are here summarised for convenience.

SEM

The SEM is the all-island electricity market for the Republic of Ireland and Northern Ireland with average generation of 38 TWh a year. The SEM is a gross mandatory pool with day ahead gate

closure into which bids are optimised over the whole day with an *ex-post* single market clearing price (SMP). Generators, including interconnector users, submit bids into the SEM by 10 am on the day before trading. The SEM is an *ex-post* market, with a significant time lag between the submission of offers and real time dispatch and the publication of market prices and quantities (though IC users are notified of their firm dispatch quantities two hours after gate closure). It is the scheduling and pricing software, in combination with bids by interconnector users, that determines interconnector flows.

The SEM does not currently have a day-ahead market, one of the consequences of which is that users of interconnectors in the SEM have no indication of the SMP when it comes to settling their position in neighbouring markets. The lack of a day-ahead physical market is considered to be a significant impediment to price coupling the SEM with neighbouring markets. Furthermore the SEM does not currently allow for trading after gate closure. Unless changes are made to market rules, unused interconnector capacity at the day ahead stage (i.e., at gate closure) is lost to the market. The latter is significant in terms of compliance with the CMG.

BETTA

The electricity market in GB is known as the British Electricity Trading and Transmission Arrangements (BETTA). BETTA is a self-dispatch, balancing market with average annual generation (including cross border imports/exports) of 350 TWh. Market participants are encouraged to self-balance before gate closure and are required to submit *ex ante* physical contract notifications on a half-hourly basis, one hour in advance of each trading half hour. Generators and suppliers who do not meet their contractual agreements are exposed to potentially penal system buy prices and system sell prices, both of which aim to reward participants whose imbalance contributes towards system balance and penalise those that move the system away from balance.

Most trading of electricity takes place either internally (since most generators in GB have broadly matching supply businesses), through over the counter (OTC) platforms or through direct 'structured contracting', with power exchanges such as APX, which caters for 5% of electricity traded.³³ These power exchanges operate up to one hour before the physical delivery of power and constitute the GB day-ahead market. After that point, generation and demand are balanced by National Grid who act as the only counterparty to trades for the hour before real time and in real time itself. Transactions under this balancing mechanism account for less than 2% of electricity traded. National Grid is allowed to trade as a participant in BETTA so as to reduce its exposure to the penal prices of the balancing mechanism and has an incentive to do so.

The BETTA market has relatively low levels of interconnection compared with other European markets, with current levels at 3% of consumption³⁴. Liquidity in the British market, while higher than in many continental European markets, is considerably lower than the similarly sized Nordic market. This reflects the high degree of vertical integration in the British market.

³³ Further trading options available to participants include spot trading, prompt trading and forward trading. Generally, physical market participants buy or sell energy forward and use spot and prompt markets to fine tune their positions.

³⁴ This ignores trade with Northern Ireland. Interconnection between Germany and its neighbours is 19%.

In summary, BETTA has a relatively illiquid day-ahead market and rolling one-hour gate closures. These features make it difficult to couple with both continental markets (e.g., the Central West region) and with the SEM. However, Ofgem, CRE, National Grid and RTE (the French system operator) are currently developing rules for intra-day trading and UIOLI on the IFA, to ensure compliance with the CMG. Ofgem are also considering what trading arrangements will apply to the BritNed interconnector as well as any future interconnection between GB and the Continent.

French Wholesale Market

France has the second biggest wholesale electricity market in the European Union with volumes on the wholesale market (including cross border imports) amounting to 450 TWh a year in 2007 (accounting for 127% of French demand), with the majority of power (some 80%) being generated by nuclear power stations. The state-owned utility, *Electricité de France* (EDF), dominates the French market in both generation and supply sectors. Most wholesale activity takes place over the counter through bilateral contracts or through intermediaries, with the Powernext exchange facilitating day ahead (spot), intra-day and futures trading. After gate closure, RTE operates the balancing mechanism.

The French market is highly interconnected market with total cross border flows in 2007 equivalent to 16% of domestic consumption. Nuclear plants typically generate at low marginal cost thus making France a significant exporter of power to its neighbours. In 2007, France exported 65.5 TWh and imported 10.4 TWh. Nonetheless liquidity levels in the French market are considered to be low, doubtless reflecting the vertically integrated nature and dominance of EDF.

France is market price coupled with Belgium and the Netherlands. Powernext began operating intra-day markets in 2007 and in April 2009 Powernext and the German EEX power exchange merged their entire spot trading activities.

Interconnectors in the FUI Region

Interconnectors are either operating, under construction or being contemplated within the FUI region or between the FUI region and other regions are shown in Table 1.

Moyle

The Moyle IC has a transfer capacity of 500 MW with available transfer capacities of 80 MW for exports to Scotland and 450 MW during the winter and 400 MW during the summer for imports from Scotland. While it is not classified as an IC under European Union legislation because it connects regions – Northern Ireland and Scotland - within a Member State, the Moyle IC has implemented some of the EU requirements for ICs such as third party access rights. Under its licence Moyle makes capacity available to the market in accordance with access arrangements that are subject to the approval of NIAUR.

Currently no day-ahead or intra-day capacity products are offered on the Moyle IC. However, Moyle is planning to hold weekly auctions and a request has been submitted to NIAUR for the same IT system as has been procured for use on the IFA, which would allow this to happen. Shorter-term auctions are currently being implemented on other European ICs and in particular on the IFA. Moyle propose aligning Moyle auctions with those of other European interconnectors and possibly the forthcoming East West interconnector. Alignment and eventual coordination of explicit auctions on Moyle and other SEM ICs with those of the other FUI ICs would satisfy Article 3.2 of the CMG, which provides that there must be ‘a common coordinated congestion management and procedure for the allocation of capacity to the market at least annually, monthly and day-ahead in the FUI region.’ The RAs intend to ensure that a common co-ordinated means of allocating capacity up to the day ahead stage on the Moyle and future ICs in the SEM is put in place.

IFA

The *Interconnexion France–Angleterre* (the IFA) is a 2,000MW DC interconnector between the French and British transmission systems, with ownership shared equally between National Grid and *Réseau de Transport d'Electricité* (RTE).³⁵

³⁵ The IFA connects Les Mandarins in France with Sellindge in England.

Table 1: Interconnectors in operation, under construction or under consideration

Interconnector	Connecting	Status	Size	Regulated/ Merchant	Auction Type
Interconnectors in operation					
Moyle	Northern Ireland & Scotland	In operation since 2002	450 MW Scotland⇒NI 80 MW NI⇒Scotland	Regulated	Explicit
IFA	England & France	In operation since 1986	2,000 MW	Regulated	Explicit
Interconnectors under construction					
BritNed	England & the Netherlands	Operational 2011	1,000 MW	Merchant (subject to exemption conditions)	Implicit and explicit
EirGrid EWIC	Ireland & Wales	Operational end 2012	500 MW	Regulated	TBD*
Interconnectors under consideration					
Elia/NG	England & Belgium	Under consideration	700 – 1300 MW	Regulated	TBD
IMERA	Ireland & Wales	Connection offers applied for. TPA exemption granted MW February '09	1. 350 MW 2. 350 MW	Merchant	TBD
IMERA	France & England	TPA exemption and connection offer applied for	800 MW	Merchant	TBD
IMERA	Ireland & France	TPA exemption and connection offer applied for	800 MW	Merchant	TBD

*TBD – To be Determined

Capacity on the IFA is auctioned on both a long term and a short term basis by National Grid, and a form of UIOLI is to be implemented in October 2009. Capacity holders on the IFA are free to trade firm capacity up to the day ahead stage (before 13.00 D-1, GMT/BST). National Grid sets aside 200MW of IC capacity on the IFA for sale at the day-ahead stage. The day-ahead auction takes place at 7am (GMT/BST) and the contract runs from 11pm to 11pm (British time) that day.

There are no implicit auctions on the IFA. While this may change in the future, the lack of an established day-ahead product in BETTA makes it difficult to envisage implicit auctions happening soon on the IFA. The main focus for the IFA at present is ensuring that the access arrangements are compliant with the CMG. National Grid and RTE in 2007 identified three required changes in this respect:

- implementation of UIOLI/UIOSI;
- introduction of allocation mechanisms which facilitate access to intra-day capacity;
- the optimisation process of supporting firm access to capacity.

Moves are also being made to improve the existing secondary trading facility on the IFA.

Accordingly, revised access rules have now been developed for the IFA that allow for UIOLI relating to the day ahead auction process, intra-day use of capacity and a firm nomination stage of long-term capacity as a result of UIOSI at D-1. The first intraday auction will occur at 19.00 D-1, followed by five subsequent gates and a second intraday auction at 08.00 on D. The revised access rules are due to be implemented in October 2009.

In other IFA developments, an interim solution for the SO-SO balancing model was implemented on 3 March 2009, allowing SOs to exchange six prices a day, compared with only one previously. Initial indications are that this has resulted in higher volumes of balancing energy being exchanged. An enduring solution with more prices and greater automation is being developed.

BritNed³⁶

The BritNed DC link between Maasvlakte in the Netherlands and the Isle of Grain in England is due to begin operation in late 2010 or early 2011. The cable has a capacity of 1000 MW with 100% third party access for all market participants via implicit and explicit auctions. Through explicit auctions, parties will be able to buy capacity from BritNed and electricity from traders, while under the implicit auction market participants can buy capacity as well as electricity in one single transaction. The implicit auction (market coupling) will be based on a day-ahead auction and facilitated by the power exchanges of APX Power NL and APX UK.

³⁶ BritNed is a joint venture between National Grid and TenneT.

This implicit price auctioning system is expected to be similar to the market coupling of the Netherlands, Belgium and France (TLC) but is yet to be finalised. The details of the explicit auctioning mechanism have yet to be finalised but are likely to be similar to the auction system used by the IFA interconnector. When BritNed becomes operational, it will be subject to the requirements of the Regulation, except for article 6 (6) of Regulation (EC) No1228/2003 from which it is exempt. The coordination of CMG mechanisms for the allocation of capacity on the SEM ICs may therefore need to be coordinated with those of the IFA and BritNed to ensure compliance with the CMG.

East West

The East West Interconnector, due to be operational in July 2012, is a DC link with a planned capacity of 500 MW. Connection offers have been accepted by EirGrid between Deeside in Wales and Woodland, County Meath in the Republic of Ireland. The CER have approved the project based on EirGrid's 'Approval to Proceed' submission in February 2009. Final investment approval was given by the Irish Government in March 2009.

As an interconnector linking two member states of the EU, the East West IC shall be subject to the CMG. The details of the auctioning of capacity on the East West IC have yet to be determined.

3.5 Conclusions

This section has set out the legislative framework relating to cross border flows of electricity in the European Union and outlined the development of regional market integration in Europe to date. The various methods and time horizons for integrating markets and how these relate to the SEM and its neighbours are outlined. Of relevance are the latest developments at European level and in particular the drive for greater coordination of regional efforts to integrate markets and interconnectors either operating or being developed in the FUI region. The various considerations and their implications for the SEM discussed in this section are addressed in the recommendations and conclusions section at the end of this paper and views on such are welcomed.

4 Interconnector Use Policy Options

The SEM Committee's previous paper on interconnector issues (SEM-09-042) illustrated the degree to which the fundamental characteristics of the SEM design such as the lack of liquidity in GB day ahead markets and network charging at triad periods could affect the use of interconnectors. The SEM Committee is concerned to ensure that interconnector capacity is optimised to the greatest extent possible and certainly by 2012 when the EWIC should be in operation.³⁷

This section examines various options for ensuring that the interconnections with GB are used to the extent warranted by underlying economic and commercial conditions. These options range from the radical – redesigning the SEM – through to the minimum changes required to ensure that the SEM is compliant with the relevant European Union Directive regulations on interconnector use and views are welcomed.

4.1 Market coupling the SEM

The current design of the SEM, with:

- a gross mandatory pool, through which all physical transactions between generators, suppliers and other participants must take place;³⁸
- early day-ahead gate closure, at 10.00 am on day D-1;
- a single market clearing price;
- *ex post* pricing on the basis of an unconstrained schedule optimised over the 30 hours beginning at 6 am on day D;
- centralised dispatch;
- complex bidding; and
- capacity payments and other charges

makes it difficult for the SEM to be price coupled with its neighbouring markets (in GB, France and the Netherlands, once BritNed is in operation) along the lines of the emerging standard used in TLC.

Nonetheless, it is apparent that net economic benefits – in the form of convergence in prices - can potentially be derived from price coupling markets. In developing this paper, the RAs have had initial discussions with APX, who are working with BritNed to develop an implicit auction

³⁷ IMERA also has plans to build two 350MW interconnectors between Ireland and Wales on the same timescale as the EWIC.

³⁸ Subject to appropriate *de minimis* exceptions.

process to price couple the Dutch and BETTA markets.³⁹ While the method used to couple the French, Belgian and Dutch markets is not replicable in the case of the GB and Central West markets, given the existence of certain flow-related charges in BETTA a workable solution may exist.⁴⁰

It is APX's view that the implicit auction method which APX envisage for BritNed would not be feasible for linking the SEM and BETTA (and through BETTA to the Central West region). This is because implicit day-ahead auctions require compatible day-ahead auctions of energy and interconnector capacity, with the same traded products, the same gate closures and similar bidding rules in all the markets that are being coupled.

While the SEM Committee is not persuaded that the benefits of re-designing the SEM to make it compatible with the GB and Central West regional markets would outweigh the considerable costs, it would be particularly interested in the views of interested parties on the issue.

An option for market coupling the SEM in its current form was considered in discussions with APX. APX were of the opinion that a form of loose market coupling might be feasible without necessitating fundamental changes in the SEM design. This could be achieved through the development of a liquid day-ahead market in financial contracts for difference (CfD) in Ireland. Under this option, an Irish day-ahead market could operate as a financial CfD market with *ex post* SMP as the reference (or strike) price. The CfD market would be complementary to the SEM, and not replace it.

A day-ahead CfD auction would need to be run at the same time as other day-ahead auctions in Central West Europe and TLC, which will be run at 12.00 Central European Time. Since the CfD auction would need to be run before SEM gate closure and since an hour or so would be required after the auction for the results to be collated, gate closure in the SEM would have to be put back by at least two hours, from 10.00 to 12.00 D-1 to accommodate a coupled day-ahead auction in Ireland. Cross border flows would be determined in the coupled day ahead markets; would be an input into the SEM ex-post unconstrained schedule; and would act as a hedge on the price and volume exposure. A shipping agent would manage trade across the interconnector and - based on the determinations of the market coupler - would balance its physical position in BETTA with trades in the SEM.

The key to making this option work effectively by avoiding any basis risk is to ensure:

- that the price (e.g., SMP plus a capacity charge/payment) that buyers and sellers (on the interconnector) pay and get paid in the SEM is the same;
- that SEM charges levied on buyers and sellers (on the interconnector) are predictable in advance and cannot be changed after the event, even if they are they are different; and

³⁹ The discussions were held with APX Group, the Anglo-Dutch energy exchange.

⁴⁰ These BETTA flow-related charges include balancing service use of system (BSUoS) and transmission network use of system (TNUoS) charges and the allocation of transmission system losses to generation (as well as demand).

- that IC flows allocated in the SEM to the shipping agent at the day ahead stage and in real time exactly match the coupled volumes (i.e., that the flows must be financially firm to the shipping agent).

An advantage of a loose form of coupling along these lines would be the avoidance of the substantial costs that would be incurred in fundamentally re-designing the SEM. The SEM Committee would be interested in the views of interested parties on whether such an option (or feasible alternatives) for coupling the SEM with BETTA would yield significant net benefits, whether the moving of gate closure by two hours or more is feasible and whether this option should be developed further in consultation with Ofgem, APX and other interested parties.

4.2 Intra-day Trading and Use-It-Or-Lose-It⁴¹

Once the EWIC is in operation in 2012, it will be subject to the relevant EU Directive and the CMG. To comply with EU law, the SEM design will need to facilitate ‘use-it-or-lose-it’ (UIOLI) arrangements and the development of intra-day trading across the interconnections between SEM and GB. The objective of UIOLI is to ensure that as much IC capacity as possible is made available to the market and is used; and to prevent capacity hoarding by those who hold firm rights to capacity at gate closure but have no intention of using it, thus ensuring non-discriminatory and transparent access to the IC.

The TSC as it stands is non-compliant with the CMG. This is because there is no facility within the existing rules for IC capacity that is not going to be used (as in the indicative market schedule) to be offered to other market participants. Doing nothing about UIOLI or intra-day trading once the EWIC is built and operational is not an attractive option because the SEM would at that point be non-compliant with EU law and ICs would not be able respond as flexibly as they might to increasing levels of intermittent generation coming on the system.

This section looks at how the SEM framework could be changed to make the rules that apply to trading across an interconnector between the Republic of Ireland and GB compliant with EU law. The various options considered reflect the challenges of linking a market based on a compulsory pool with single day-ahead gate closure (SEM) with a continuously traded bilateral market (BETTA).

4.2.1 The Congestion Management Guidelines

The EU’s CMG have two high-level requirements in relation to UIOLI and intra-day trading. The first is the need for the nomination by capacity holders of their intention to use the capacity a reasonable time ahead of the relevant operational period. The second is that (re)allocations of available interconnection capacity can take place on days D-1 and D (and after the issuing of an indicative or actual production schedule).

The indicative schedule in the SEM for the period (6 am to 6 pm) is issued to interconnector capacity holders at 12 noon on D-1. Therefore, in relation to the SEM, intra-day is defined as

⁴¹ Pöyry Energy Consulting inputted into the completion of this Section.

being from noon on D-1 to at least 6 am on day D. (Re)allocation of interconnection capacity after noon on D-1 is not possible under the existing SEM rules, because “the time of nomination” is effectively gate closure which occurs at 10 am on D-1. After this time there is no opportunity for other participants (other than the system operators) to submit commercial offers for the use of interconnector capacity.

The requirements of the CMG apply to both the UK and to the Republic of Ireland. It is assumed that capacity and flows in either direction between the SEM and BETTA would be treated equally under any revised interconnector arrangements that are designed to comply with CMG.

The CMG (Annex to 2006/770/EC) contain the following sections in relation to UIOLI provisions for interconnection capacity:

‘the access rights for long-term and medium-term allocations shall be firm transmission capacity rights. They shall be subject to the use-it-or-lose-it or use-it-or-sell-it principles at the time of nomination’ (section 2.5);

‘market participants shall firmly nominate their use of capacity to the TSOs by a defined deadline for each timeframe. The deadline shall be set such that the TSOs are able to reassign unused capacity for reallocation in the next relevant timeframe -including intra-day sessions’ (section 2.11);

‘capacity shall be freely tradable on a secondary basis provided that the TSO is informed sufficiently in advance...’ (section 2.12); and

‘the financial consequences of failure to honour obligations associated with the allocation of capacity shall be attributed to those who are responsible for such a failure.’ (section 2.14).

The guidelines contain the following requirement for the development of intraday congestion management:

‘By no later than 1 January 2008, mechanisms for the intra-day congestion management of interconnector capacity shall be established in a coordinated way and under secure operational conditions, in order to maximise opportunities for trade and to provide for cross-border balancing’. (section 1.9).

‘Successive intra-day allocations of available transmission capacity for day D shall take place on days D-1 and D, after the issuing of the indicated or actual day-ahead production schedules.’ (section 4.3).

As already stated, IMERA is currently planning to build two 350MW interconnectors between Ireland and Wales. The relevant regulators, the CER and Ofgem, have granted an exemption from Third Party Access rules to IMERA for these interconnections. However, this exemption (as amended by the EC) is subject to a number of conditions including:

'CER and Ofgem will assess the effectiveness of secondary trading and UIOLI provisions within six months of the first year that the interconnector is operational; and

IMERA shall make reasonable endeavours, before commencing commercial operation, to implement effective congestion management, in particular by enabling intraday trading by system users'.

4.2.2 Assessment criteria

Reference has already been made to the fundamental differences between the SEM and BETTA market designs and the challenges that this creates for integrating the two markets. Unless the basic SEM design is changed, whatever is done to develop intra-day trading and UIOLI in the SEM must also comply with the following basic design features in the SEM:

- day-ahead gate closure with optimisation over the 30 hours beginning at 6 am on day D;
- a single market-clearing price;
- some explicit allocation of interconnector capacity before the day-ahead stage, which allows interconnector operators to receive a longer-term revenue stream that is consistent with their financing; and
- interconnection units may not be constrained down after they have been provided with a firm despatch instruction at some point during day D-1.

In addition, it is assumed at the outset that interconnection capacity (re)allocation procedures will not be limited to those parties that already hold capacity rights on the interconnector. Increasing the number of parties able to access the interconnectors will deliver a more efficient outcome.

The introduction of UIOLI arrangements and intraday trading across future interconnectors relates to ensuring efficient use of the interconnector across three timeframes already mentioned, long term, and day ahead and intraday in addition to balancing arrangements. No set of market arrangements can achieve optimal results in all three timeframes and therefore tradeoffs are required. The SEM arrangements are currently focused on achieving an efficient long-term capacity allocation through explicit auctions. The issue is whether a more efficient and economic SEM could be delivered through developing mechanisms for efficient interconnection scheduling and pricing day ahead and within-day.

When assessing options for ensuring that the interconnector trading arrangements are compliant with EU law, the following criteria are relevant:

- delivery of an efficient market outcome for the SEM;
- delivery of an efficient allocation of interconnection capacity on a long-term basis;
- efficient scheduling and pricing of interconnector capacity at the day-ahead stage;

- efficient use of interconnection capacity on an intra-day basis;
- performance against other SEM objectives, including ‘transparency’ and ‘no undue discrimination’;
- the impact on Irish electricity consumers;
- the cost of changes to the Trading and Settlement Code and to interconnection arrangements; and
- consistency with longer term move towards market integration of the SEM and BETTA.

4.2.3 Options

There are three time frames to consider in relation to interconnection capacity:

1. *Longer-term*: achieving efficient allocation of interconnection capacity before gate closure on day D through, for example, annual, monthly, weekly and possibly daily explicit auctions of capacity;
2. *Day-ahead*: achieving efficient scheduling and pricing of interconnector units based on information submitted by SEM gate closure (10am on day D-1):⁴² and
3. *Intra-day*: achieving efficient use of the interconnector on a short-term basis allowing parties to respond to post-gate closure market developments.⁴³

The current SEM arrangements for interconnectors are focused on achieving an efficient long-term capacity allocation through explicit auctions, with a secondary emphasis on efficient scheduling and pricing based on day-ahead submissions. This can be compared to the trading arrangements for the proposed BritNed interconnector. Current plans are that BritNed’s capacity will be allocated through a mixture of explicit auctions of long-term capacity products of limited duration and ‘implicit auctions,’ which allow parties in each country to bid for capacity and trade power on the IC in one transaction on a day-ahead basis. No set of market arrangements can achieve optimal results in all three time frames. Appropriate trade-offs between the efficiency achieved in the different time frames have to be made.

Five basic options have been identified. The key innovation in all five options is that SEM participants (either interconnector units or all generation units, depending on the option) may make revised bids and offers in relation to interconnector capacity that they do not currently hold. These bids are contingent on unused capacity being available in the relevant direction (exports to or imports from GB).

The five options have common features. These are that they all:

⁴² It is taken for granted that all bids submitted by gate closure should influence the market schedule and SMP.

⁴³ Intra-day is defined for the purposes of this paper as starting at noon on D-1 with the issuing of the indicative market schedule and ending at some point before 6 am on day D. After this point, it can be said that the balancing market takes effect.

- 1 retain the need for the nomination by existing capacity holders of their intention to use their capacity by submitting a set of bids by 10 am on D-1. These bids are then used to identify unused interconnector capacity.
- 2 meet the minimum requirement of the CMG, which is that available interconnection capacity is re-allocated on days D-1 and D, after the issuing of an indicative or actual production schedule at 12 noon on D-1.
- 3 result in existing holders of interconnection capacity losing all rights to any capacity that is identified as being unused after a fixed nomination deadline.⁴⁴
- 4 allow (some) SEM parties to submit revised bids (at or after gate closure), including bids in relation to interconnection capacity that they hold no rights for. These bids are then used to redistribute unused interconnector capacity.

These revised (or contingent bids) could be made at gate closure and at one or more successive stages after gate closure. To comply with the intra-day trading requirements of the CMG would require (successive) intra-day (re)allocations of unused available interconnection capacity. This could be accomplished by putting in place a series of deadlines after gate closure at 10 am on D-1 for the submission of revised bids. Parties could be required to hold revised bids firm for two hours in line with the current gap between gate-closure (10 am on D-1) and release of the indicative schedule (12 noon on D-1). There is a wide range of sub-options related to the frequency and timing of the revised bids. The greater the number of successive gates and the later in the day they are, the more complicated and costly the option will be. This paper does not explore those options in detail.

Those parties making successful revised bids would be using interconnection capacity without (necessarily) having made any payment to the interconnector operator. Some sort of interconnector tariff will have to be developed to enable interconnector owners to recover their costs. There could be a fixed or variable tariff. The variable tariff could for example be based on a fixed fee or some profit-sharing arrangements. Its precise form is a secondary consideration at this stage.

The five options are:

Option 1: Use of revised bids by interconnector units for constraint management

Under this option, only interconnector units would be allowed to submit contingent bids at or revised bids after gate closure to use interconnector capacity to which they do not hold rights. In the event that there is unused interconnector capacity in either direction when the indicative market schedule is compiled after gate closure - either because existing capacity holders are out of merit in the indicative schedule or because all the available capacity was not allocated in the explicit auctions before gate closure – then the SMP software would be rerun to take these revised bids into account.

⁴⁴ Interconnector capacity is defined as being 'used' if the capacity is subject to a price-making bid from an interconnector capacity holder that is included in the indicative SEM schedule produced at the day-ahead stage. Otherwise it is 'unused.'

Under this option, the second run of the MSP software would not affect market schedule quantities or SMP. Any changes to quantities would be reflected only in the constrained schedule (i.e., in dispatch) and hence in constraint payments. By definition, system management costs for the system operator would be the same or less than in the absence of revised bidding. This is because the system operator will call on the revised interconnector bids only if they are more attractive than the suite of (unchanged) bids from the generation units in the SEM. The revised interconnector bids may present such an arbitrage opportunity for the system operator for one of two reasons: either they reflect within-day movements in fuel prices, such as gas; or they are provided by parties who have no long-term capacity on the interconnectors and are therefore not in the indicative schedule.

The option would ensure a more efficient use of the interconnectors on an intra-day basis. By reducing constraint costs, it would also benefit Irish customers. As the simplest option being considered, it would also be the least cost option in terms of changes to system software.

On the other hand, by limiting the ability to rebid after gate closure to interconnector units, it might be said to breach the SEM's objective of no 'undue discrimination.' The question of undue discrimination arises from the fact that interconnector units would be the only generating units that would be allowed to submit revised bids. So a CCGT based in GB could respond to intra-day changes in the gap between BETTA and SEM prices, but a CCGT in the SEM could not. In assessing the weight of this objection, the key point is whether or not the discrimination is judged to be proportionate in light of the efficiency improvements delivered. There are a number of factors to be taken into account when making that judgement:

- the distinctiveness of interconnector units is already recognised in the SEM as they are the only generation units that can submit price-quantity pairs that differ by settlement period, and they are given dispatch quantities by 12 noon on D-1 as opposed to standard generation units which must hold firm for 20-44 hours;
- any party may sign up to become a user of an interconnector, with the scope of access widened after the implementation of effective UIOLI arrangements;
- under the TSC, the SEM SOs already have the ability to conduct post-gate closure trades or counter-trades with counterparties in GB; and
- the improvements in the economic and efficient operation of SEM (particularly at high levels of high wind penetration) would be expected to be sufficient to justify the introduction of arrangements which might be considered discriminatory.

Option 2: Use of revised bids by interconnector units to change MSQs and SMP

This option builds on Option 1, but goes further by allowing the revised bids by interconnector units to affect market schedule quantities (MSQs) and SMP. This would be achieved by allowing the second (and subsequent) runs of the SMP software to change the ex post unconstrained schedule, rather than just the constrained (i.e., dispatch) schedule.

This would have the effect of changing the market schedule quantities of all units and of SMP. The effect on total SEM costs would be commensurately larger than under Option 1, since it would affect the price paid to all units in the unconstrained schedule rather than just the marginal constrained units. However, the direction of the impact of the revised bids on SMP is uncertain. Lower net export demand or lower fuel costs as a result of revised bids would lead to lower import bids and could reduce SMP. However, if the net export demand or fuel costs were higher, then the SMP could rise as a result of rebidding.

Currently all generator units and interconnector units submit bids by gate closure (by 10 am on D-1). These bids are an input into the *ex-post* market scheduling software. They are also used by the SOs in their calculation of dispatch on the day (effectively a bid into the constraint mechanism). This will place some pressure on the market software to be clear about which bid is prevailing when a generation unit receives a dispatch instruction. This issue does not apply in Option 1 as by definition, the revised bids by interconnector units in relation to unused IC capacity are not submitted into the market schedule.

This option – like Option 1 - would make more efficient use of the interconnector capacity available at gate closure than the current arrangements. But, to the extent that it had the effect of raising prices by increasing net exports, it would be to the detriment of Irish customers (in the short-term). Like Option 1, it might be considered discriminatory, since only interconnector units would be allowed to submit revised bids. System costs are likely to be higher than under Option 1, since it requires a clearer distinction between scheduling and dispatch.

Option 3: Use of revised bids by all price making units to change MSQs and SMP

Option 3 is similar to Option 2, except that all price making participants – not just interconnector units - would be allowed to make revised bids after gate closure.

Introducing the ability for all SEM price maker units to submit revised bids would meet the criteria of the economic and efficient operation of the SEM and the promotion of competition in the wholesale electricity market. However, in common with Option 2, it significantly increases the cost and complexity of the policy option, since it leads to the need to clearly distinguish between scheduling and dispatch.

On the other hand, it would avoid the accusation of discrimination that might be levelled at Options 1 and 2.

Options 4 and 5: Day-ahead redistribution of capacity

The three options considered so far have all restricted the redistribution of interconnector capacity to non-holders to that which is ‘unused’ in the indicative schedule. Options 4 and 5 go further and allow *all* interconnector capacity to be redistributed to non-holders in the indicative schedule. In other words, capacity on the interconnectors is *ab initio* allocated to those interconnector units who are best able to use it (i.e., those that are in merit), rather than those who hold the firm rights to capacity. So under Options 4 and 5, long-term interconnector capacity holders can use their capacity only if it is in merit against *all* bids, including revised

bids. If it is not, it is reallocated at the indicative schedule stage to non-capacity holders who are in merit.

The fact that the system operator may not constrain down an interconnector unit is one of the essential design features of the TSC. Therefore, if all interconnection capacity is to be reallocated, it requires that the revised bids affect the indicative market schedule released at 12 noon on D-1, since this determines the dispatch for the interconnection units. After this time, redistributing any interconnector capacity that has been dispatched to a revised bid is not possible. This means that any reallocation of the interconnection capacity must occur at the day-ahead stage (i.e. by 12 noon on D-1). This means that successive bidding rounds other than between 10 am and 12 noon cannot be accommodated under Options 4 and 5.

Under both Options 4 and 5, only interconnector units are allowed to submit revised bids by 12 noon. And under both options intra-day trading would be accomplished by reallocating residual capacity to revised bids after gate closure. The options differ in how the reallocation of capacity, either at gate closure or subsequently, is reflected in SEM costs. Under Option 4, the reallocation affects only constraint costs (as in Option 1). Under Option 5, it is allowed to affect SMP, as in Options 2 and 3.

As the redistribution of all capacity means that the long-term rights holder is worse off than under current arrangements, compensation arrangements would need to be put into place (including transitional compensation for existing long-term capacity holdings) to ensure that a value is still placed on long-term firm capacity rights. So Options 4 and 5 operate more as a form of use it or sell it (UIOSI), while Options 1, 2 and 3 are pure UIOLI options.

The existence of a transfer payment to existing capacity holders reduces the gains that can be captured by the system operator in rescheduling or re-dispatching the system. However, the extension of redistribution of all interconnector capacity (rather than just unused capacity as in Options 1, 2 and 3) could lead to much larger net gains (or losses) for Irish electricity consumers under Options 4 and 5 than under the first three options. This is because the effect of reallocation and hence the effect on constraints payments (in the case of Option 4) and SMP (in the case of Option 5) will be larger. The efficiency gains from scheduling and pricing at the day-ahead stage will also be greater than under the first three options.

On the other hand, both Options 4 and 5 would be vulnerable to the criticism of undue discrimination. And the system software (implementation) costs of both Options are likely to be greater than under Options 1 and 2.

4.3 Conclusions

This section has set out various options for ensuring that the existing and any new interconnectors between the SEM and its neighbouring markets are used as efficiently as possible and are compliant with EU legislation.

Two potential options on how best to couple the SEM with the GB and Central West region markets at the day-ahead stage were briefly proposed. The most radical would be to re-design

the SEM to make it as compatible as possible with other markets in the region and thereby enable it to be price coupled at the day-ahead stage with those markets. A less ambitious option would be to work with the existing design of the SEM and couple with the GB and Central West markets through a day-ahead CfD auction. The SEM Committee would be interested in the views of interested parties on these mutually exclusive options and of the likely balance of costs and benefits of each.

The section also considered options for ensuring that the treatment of interconnectors in the SEM conforms to the requirements of EU law. Five options on intra-day allocation of cross border flows and the implementation of some form of use-it-or-lose-it provision were identified. It is proposed that the RAs will now develop these (and any other candidate) options further in conjunction with the SOs and SEMO, as well as Ofgem and National Grid UK in the context of regional coordination of intra-day trading. Nonetheless, the RAs would welcome the views of interested parties on the five options put forward here, as well as any alternatives that would achieve the same objective of ensuring compliance of the TSC with the CMG and of meeting the suggested criteria.

5 Conclusions

Analyses of the SEM and neighbouring markets suggest that, with considerably increased levels of wind capacity on the Irish system in the years to come, the benefits of increased interconnection between Ireland and Great Britain will outweigh the costs. By extension, making the best use of the interconnector capacity that exists will be of economic benefit to Ireland.

The SEM Committee wishes to ensure that the rules governing the allocation and use of interconnectors in the SEM across the long term, medium term and day ahead time horizons are conducive to making the best possible use of interconnection capacity. It recognises the difficulties involved in coupling the SEM with neighbouring markets at the day-ahead stage, given the different designs of the SEM and of the electricity market in GB. The SEM Committee welcomes the views of interested parties on how the SEM might be implicitly coupled with BETTA and other markets in the region. Two broad options exist: to amend the design of the SEM to minimise the differences between it and other markets in the region; or to work within the constraints of the existing SEM design and put in place a looser version of market coupling, at lower cost.

The SEM's rules need to be compliant with the requirements of the Directive 2003/54/EC, Regulation (EC) No. 1228/2003 and the associated Congestion Management Guidelines once the East West Interconnector comes into operation in 2012. The CMG require coordinated allocation of capacity at year, month and day-ahead stages. Ofgem have expressed an interest in addressing cross border congestion management mechanisms through a bilateral process with the RAs.

The CMG specifically require the implementation of intra-day trading and use-it-or-lose-it on interconnectors between member states of the European Union. The RAs intend that the SEM rules will be modified to allow for UIOLI and intra-day trading. The expected high levels of intermittent generation in Ireland and in GB mean that efficient access to neighbouring markets is essential if the development of the SEM is not to be restricted by being an isolated high wind system. Not only does the SEM require expanded IC capacity; it also requires robust trading rules to utilise efficiently the cross border capacity. After day ahead price or volume coupling, access by market participants to IC capacity post gate closure is emerging as the most important aspect of cross border capacity management in Europe⁴⁵.

In view of the above, this paper recommends that the medium term goal of the SEM Committee for ICs is to:

5. Engage with all stakeholders and policymakers at the European level to influence the development of policy on integration of electricity markets at a regional and European level, with specific emphasis on coordination of capacity allocation within regions at the annual, monthly and day-ahead stage. The relative benefit of implicit auctioning (market

⁴⁵ Though thinking on intra-day trading is not at an advanced stage as day ahead coupling in most regions.

coupling) and explicit auctioning will be key to the direction of policy and future legislation in this area;

6. Develop a coordinated approach to congestion management with Ofgem, and in particular the explicit auctioning of capacity on ICs.
7. Develop SEM rules on UIOLI and IC trading to comply with the requirements of the CMG, maximise the benefits of interconnection and intermittent generation to customers. The policy options identified in Section 4 of the paper will be developed by the RAs in consultation with Ofgem and the recently established working group of the TSC Modifications Committee chaired by the RAs. In this context the RAs would be particularly interested in the views of interested parties on the options set out in Section 4.
8. Depending on the response of interested parties to this consultation paper and in the light of their likely costs and benefits, further develop options for the market coupling of the SEM with its neighbouring markets.