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Ensuring Compatibility of the All-Island Electricity System with the Target Model: Fitting a Square Peg into a Round Hole?[□]

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Abstract

The all-island wholesale electricity market, SEM, has to comply with the Target Model by 2016. SEM has worked well for consumers through mitigating market power, facilitating entry and ensuring adequate generation capacity, problems that will persist. But the SEM is a mandatory pool with central dispatch, the Target Model is a self dispatch with bilateral contracts. Minimal change to the SEM in complying with the Target Model is preferable to reinvention of SEM. The latter option might be appropriate when the EU internal electricity market is complete and the all-island market has sufficient interconnection to participate fully in that market.

Key Words

Target Model; Single Electricity Market; Third Package.

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1. Introduction

The model for trading electricity at the wholesale level on the island of Ireland – the Single Electricity Market (SEM) – has to comply with the European Union’s (EU) Third Package. While a deadline of 2014 has been set for Member States’ compliance, transitional arrangements, that “do not extend beyond 2016,” for meeting the Capacity Allocation and Congestion Management (CACM) Network Code apply to “island systems with central dispatch” (ACER, 2011, para. 1.12), of which the SEM is the only instance within the EU.¹ These transitional arrangements reflect the fact that most EU wholesale electricity markets are self dispatch bilateral exchange models, in contrast to the mandatory pool central dispatch model of the SEM.

The Network Code will apply to capacity allocation and congestion management “between the zones of the EU electricity market” (*ibid*, para. 1.1). SEM is likely to be a separate zone. The Network Code, which will be legally binding and based on the CACM Framework Guideline, which was finalised in July 2011, deals with “the integration, coordination and harmonisation of the congestion management regimes, insofar as such harmonisation is necessary to facilitate electricity trade within the EU” (*op cit*, para 1.1) in compliance with the Third Directive. In securing such integration the Third Directive states that in setting “fair rules for cross-border exchanges in electricity” that account should be taken of “the particular characteristics of national and regional markets.”²

¹ It should be noted that the Agency for the Cooperation of Energy Regulators (ACER) adopted the CACM Framework Guidelines (FG) in July 2011, while the European Network of Transmission System Operators for Electricity (ENTSO-E) presented their proposals for the CACM NC in September 2012. See ACER (2011), ENTSO-E (2012a) and SEM Committee (2012, pp. 17-18) for a discussion of the relationship between the FG and the NC.

² Article 1 (a) of Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003.

The Framework Guideline is based on the Target Electricity Model (the Target Model) which “is a high level description of the market mechanisms to facilitate” the EU internal market in electricity that emerged from the Florence Forum process (Booz *et al*, 2011, p. 24). While some aspects of the Target Model have to be finalised, the key features of the model, such as a forward, day ahead, intraday and balancing market, have been settled. The issue thus becomes how the SEM should be restructured to ensure compliance with the Target Model and thus the CACM Network Code.

The paper is divided into six sections, including the introduction. Section 2 sets out the framework for analysis. Section 3 sets out the problems and challenges that the SEM was designed to address, together with the extent to which participation in the internal EU electricity market and other recent and expected developments address these problems. Section 4 compares the SEM and the Target Model and briefly outlines proposals that for ensuring compliance of the SEM with the Target Model. These proposals were put forward by the SEM Committee (2012).^{3,4} Section 5 evaluates the proposals, based on the conclusions to Sections 2 and 3. Section 6 concludes.

³ There was also an accompanying paper, EirGrid *et al* (2012) by the Single Electricity Market Operator (SEMO), and the Transmission System Operators (TSOs) in Ireland (EirGrid) and Northern Ireland (System Operator of Northern Ireland or SONI). SEMO is a joint venture between EirGrid and SONI that according to its website, “facilitates the continuous operation and administration of the Single Electricity Market.” <http://www.sem-o.com/AboutSEMO/Pages/default.aspx>. Accessed 25 May 2012. EirGrid *et al* (2012) address the issue of how to adapt or vary the current SEM so as to comply with the Target Model.

⁴ This consultation is part of an ongoing process; it is not expected to result in a definitive answer to the question of the how compliance will be achieved, but rather mark a move towards resolving the issue. For details see: http://www.allislandproject.org/en/TS_Current_Consultations.aspx?article=41f5681a-ef37-41ca-ab7d-7a1bdd7db385. Accessed 6 March 2012. See also SEM Committee (2102, pp. 73-74).

2. Selecting the Most Appropriate Approach: A Framework for Analysis.

One approach would be to evaluate a range of proposed models that comply with the Target Model by considering whether or not the benefits exceed the costs. The proposal with the highest benefit/cost ratio is the preferred choice. However, it could be argued a simpler methodology should be employed: estimate the fixed and ongoing costs of implementing each proposal in terms of investments in new computer and trading systems for the market operator and market participants *etc*⁵ and select the least cost proposal. No attention would be paid, however, to crucial factors that are likely to differ between the proposals and that, in turn, are vital to ensuring that the SEM works well for consumers, the ultimate objective of the electricity wholesale model.

Seen in this broader light, the issue of selecting the most appropriate model to replace the current SEM that is compliant with the Target Model becomes more difficult. The current SEM model was designed to deliver electricity in an efficient and cost reflective manner.⁶ However, in order to do so successfully the SEM had to address particular concerns, including the market power of the incumbent vertically integrated Electricity Supply Board (ESB),^{7,8} facilitating entry⁹ and ensuring

⁵ For example, when the SEM was introduced the implementation costs were estimated at €256.4 million in 2006 prices. The implementation costs were divided into four categories. For details see NERA (2006, p. ii). However, the actual outturn were much less, €110 million (SEM Committee, 2012, p. 48).

⁶ The primary objective of the SEM, developed by the energy regulators in Northern Ireland and Ireland, “in the light of their statutory duties and functions,” is that the “wholesale electricity trading arrangements should deliver an efficient level of sustainable prices to all customers, for a supply that is reliable and secure in both the short and long-run on an all-island basis” (SEM Committee, 2012, p. 28).

⁷ And the corresponding firm in Northern Ireland, Viridian.

⁸ Fitz Gerald *et al*, (2005, Table 6.1, p. 89) found that, for example, that 2003 ESB plant had the ability to set the market price 91 per cent of the time on an Ireland basis and 67 per cent on an all-island basis. The index used to determine whether ESB has the ability to set prices is the Residual Supply Index (RSI) defined as (System capacity(including import capability) – Uncommitted capacity of investigated generator)/Demand. An

adequate capacity. These concerns can also be used to evaluate proposals for complying with the Target Model.

Account needs to be taken as well of the market facts in 2016 and beyond, when the SEM has to comply with the Target Model, which may not be the same as those that obtained on 1 November 2007 when the SEM model was created. If the Third Package is successful in integrating Ireland in the internal EU market for electricity issues such as market power are likely to be of lesser importance.^{10,11} The significance of renewable sources of electricity, especially wind, is much greater to-day and its significance is likely to increase. The wholesale electricity model needs to

RSI above 120 per cent is taken to be a competitive market. For discussion see also CEPA (2010, p.18). Some of this market power may have become dissipated in costs that are too high. This issue is discussed in Fitz Gerald *et al* (2005, pp. 81-2) and Diffney *et al* (2009, pp. 480-482) which finds evidence consistent with this view at least up to 2004, the most recent year used.

⁹ Especially if the incumbents have been protected from competition. Bridgman *et al* (2011) find that the threat of liberalisation (i.e. privatisation and market entry) caused productivity in the Brazilian state-owned oil company, Petrobras, to double in the six years after its legal monopoly was abolished, despite no entry actually occurring or its status changing.

¹⁰ While it is true that since 2002 the Moyle Interconnector (IC) linked the SEM with Scotland, its impact was limited due to its size relative to the SEM market and the high transaction costs involved in trading across the Moyle IC. The issue of interconnection with Great Britain is addressed in Malaguzzi Valeri (2009).

¹¹ Of course, if the European market is dominated by a few firms, integrating Ireland into the European market may simply import market power problems. The European Commission (2007, p. 152) expressed concern over concentration and market power at the Member State level. To the extent cross-border mergers occur in response to the creation of the internal EU market in electricity then the pattern of concentration on Member State markets is likely to be replicated at the EU level.

provide flexible plant that is able to provide electricity at short notice, given the variability and difficulty of forecasting wind accurately.¹²

In the debate over restructuring the SEM to meet the Target Model there is often a concern to preserve the essence of the current market model.¹³ However, there is no generally agreed set of 'essential' or 'critical' characteristics of the SEM. What is essential/critical are those elements of the current SEM model that deliver electricity efficiently while successfully dealing with problems such as market power and ensuring adequate generation capacity. Whether these elements are relevant in the future depends on the degree to which the problems that the current SEM was designed to resolve are still pertinent in 2016 and beyond and, if so, the extent to which they are addressed by the Target Model.

3. Challenges Facing the Wholesale Electricity Market: Past, Present & Future¹⁴

The current SEM model was designed to provide wholesale electricity in an efficient and cost-reflective while at the same time addressing three inter related major problems: neutralising the market power of incumbents; creating conditions to encourage and facilitate entry; and, ensuring

¹² This issue would, of course, have to be addressed irrespective of whether the SEM had to comply with the Target Model.

¹³ In a consultation exercise conducted by the SEM Committee (2012, p. 31) this was one of the questions raised. The SEM Committee is responsible for regulating the SEM. Membership consists of: (1) up three representatives from CER; (2) up to three from NIAUR; and (3) one independent (and deputy independent) member. Each block has one vote. For details, see for example, SEM Committee (2011, pp. 5-6).

¹⁴ Gorecki (2011) provides a review of the Irish electricity market characteristics and the implications of SEM for competition and entry. Hence we provide only a brief summary in this section, together with some updating to take into account recent developments.

adequate generation capacity.¹⁵ We briefly describe each problem, how the current SEM addresses the problem and how future developments in the wholesale electricity market are likely to influence matters. Attention then turns to the challenge of accommodating the large volume of renewable electricity, primarily wind, which is expected to come on stream. While the SEM wholesale electricity market for the island of Ireland, the retail market regulated separately through the local regulator (i.e. the Commission for Energy Regulation (CER) in Ireland and the Northern Ireland Authority for Utility Regulation (NIAUR) in Northern Ireland).

Mitigating Market Power

Market power is addressed in the current SEM model by:

- A *mandatory pool* under which all generation units above 10MW have to bid into the pool;
- A generation unit has to *bid a price* into the mandatory pool that reflects *short run marginal cost* (SRMC), which is essentially the cost of fuel and CO₂ emission permits; and,
- All generation units are stacked from lowest to highest based on SRMC, the *merit order*. Where demand meets supply determines the System Marginal Price (SMP).¹⁶ All generators at or below the SMP are dispatched by the TSO's in Northern Ireland (SONI) and Ireland

¹⁵ This reflects the objectives of the SEM as developed by the regulators in Northern Ireland and Ireland (see footnote 6 above) and the great stress is laid by the State and the UK government on ensuring that the wholesale electricity market is competitive. (See Governments of the UK and Ireland, 2006, p. 6).

¹⁶ The SMP mostly reflects the SRMC. However, there is also an uplift which "is paid if a generator's start-up and no-load costs are not covered by any infra-marginal rent" (CER, 2011a, p. 4). It should be noted that the SMP is set four days after each trading period based on an unconstrained market schedule. Hence, for example, if enough wind was available that could theoretically supply all of the electricity demanded in a particular period then the SMP would be zero, given that wind has a zero marginal cost. In other words, no account is taken of the fact that there is an upper bound – currently 50 per cent – in the proportion of electricity that can be supplied by wind because of system security issues.

(EirGrid) and paid the SMP. Since the SMRC of plants that are dispatched will be below the SMP, these plants earn infra-marginal rents.

Such a set of rules, which are set out in the Bidding Code of Practice, make it difficult for a firm to strategically withdraw a unit from the merit order or to bid a too high a price, both of which can raise SMP through the exercise of market power.¹⁷ The system is transparent, so that entrants as well as regulators can observe/monitor market behaviour. A Market Monitoring Unit (MMU) enforces the SEM rules and determines how well the market is performing.

Two additional mechanisms are also used: Directed Contracts (DCs) and the ring - fencing the generation and supply operations of ESB and Viridian.¹⁸ DCs reduce the incentive for generators with market power – ESB and Viridian - to raise prices above costs on the SEM (i.e. the spot market), since CER & NIAUR, the regulatory authorities, *direct* these generators to offer a certain volume of Contract for Difference (CfD) based on expected SEM prices reflecting appropriate fuel/CO₂ scenarios. If the firm with market power causes the SMP to be above this expected price it will have to pay the difference to the buyer of the DC.¹⁹ The ring fencing of the generation and supply operations of ESB and Viridian is designed to prevent the generation arm of these firms from

¹⁷ These strategies are described in CER & NIAUR (2010a, pp. 9-10). They are not just theoretical. A case was brought by the European Commission against E.ON AG for strategic withdrawal of capacity on the Germany electricity market with a view to raising prices. For details see: http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_39388. Accessed 18 April 2012.

¹⁸ Viridian was ESB's counterpart in Northern Ireland.

¹⁹ For a discussion see CER & NIAUR (2010a, pp. 18-22). A CfD is a mechanism for hedging for fluctuations around the expected SMP. It shares risk between the generator (seller) and the buyer. If the SMP is above the price agreed in the CfD – the strike price - then the difference is paid by the generator to the buyer; if the SMP is below the strike price then the buyer pays the difference to the generator.

offering more favourable deals to their supply arms to the detriment of competitors in the supply business.²⁰

These mechanisms were enhanced by a detailed legally binding agreement between the CER and the ESB, dated 27 April 2007, under which ESB undertook to close and/or divest certain power generation assets by 2010 (the CER-ESB Asset Strategy).²¹ These assets included 208MW of peaking capacity, 1,300MW of other capacity and several sites that could be used for power generation. The purpose of the agreement was to reduce the market share of the ESB to 40 per cent, which is generally considered to be the lower limit, under competition law, of the market share of a dominant firm (Whish, 2009, pp. 176-178).

The issue of market power in the SEM has been carefully considered in a review by the CER & NIAUR (2010a, 2010b, 2011, 2012) together with a commissioned research paper (CEPA, 2010). The review found that there “had been no significant market power exercised in the spot market to date due to the relevant market power mitigation measures in place” (CER & NIAUR, 2012, p. 3). Nevertheless, ESB was still the largest generator, with an all-island market share of 46 per cent in 2011.²² Despite new entry and increased interconnection, concerns were expressed over the exercise of market power in the period up to 2020 (*ibid*, p. 3). Although these concerns are less than when the SEM was created, they are nevertheless of sufficient gravity that the CER and NIAUR decided to retain the various measures outlined above designed to mitigate market power. Thus the evidence suggests that market power issues are likely to remain salient for the foreseeable future. However, this needs to be qualified in three ways.

First, subsequent to the CER & NIAUR (2012) decision on market power, the Government stated that it intends to sell off some of the non-strategic generation capacity of ESB and the energy business of

²⁰ For a discussion see CER & NIAUR (2010a, pp. 23-24).

²¹ For details see CER (2007, 2009) and CER & ESB (2007).

²² CER & NIAUR (2012, p 15).

Bord Gais, but ESB is to remain a vertically integrated utility.²³ *Second*, under the Third Directive there are provisions for the unbundling for distribution system operators (DSOs) where this is part of a vertically integrated firm.²⁴ In 2008 it was announced regulations would be introduced “establishing the independent ESB Subsidiary to undertake the Distribution Operator role of ESB Networks, which will further strengthen the open and transparent use of the networks by all parties” (DCENR, 2008). *Third*, increased interconnection with Great Britain and beyond is likely to mitigate the market power of incumbent generators in the SEM. However, in the simulations conducted by CEPA (2010) that take into account the two existing interconnectors with Great Britain, measures to mitigate market power are still recommended. It is unlikely that such additional interconnection capacity will be in place before 2025-2027, based on historical timelines.^{25,26} However, even if sufficient interconnection capacity was built there are competition concerns with respect to the Great Britain wholesale electricity market, while it is not clear that enough interconnection capacity has been built between Great Britain and continental Europe for price convergence with the rest of the EU to be reached.²⁷

²³ Department of Public Expenditure and Reform (2012a, 2012b).

²⁴ For further discussion see Commission guidance, EC (2010, pp. 23-29).

²⁵ Government could, of course, accelerate the time required to complete an interconnector. For further discussion of the issue see Gorecki (2011, pp. 98-99).

²⁶ In considering whether SEM is part of the EU internal market, the answer is not a simple yes or no, since the answer will depend on the time of day or night. Hence for some time periods the SEM might be part of the EU internal market while for others it is not. Even in these latter time periods the issue of how close the prices are would need to be considered in judging the degree of integration.

²⁷ Great Britain plans to expand substantially interconnection with continental Europe. See SEM Committee (2012, pp. 68-69), Gorecki (2011, pp. 78-81), Ofgem (2011), and ENTSO-E (2012b).

In sum, while the market power of ESB is likely to diminish over time due to asset disposals, and increased interconnection, it nevertheless remains the case that for the foreseeable future mitigating market power is an issue that any all-island wholesale market will have to address.

Facilitating Entry

Entry is addressed in the current SEM model by:

- *Regulatory Credibility.* The SEM is enshrined in legislation in the UK and Ireland and a Memorandum of Understanding between the two governments.²⁸ When changes are made to the SEM – as with the current consultation to ensure compliance with the Target Model – this is done in an open, transparent and predictable manner. This creates regulatory credibility and certainty, which in turn leads to lower capital costs of financing a new plant.²⁹
- *Market Access.* A generator needs access to the transmission system. A vertically integrated incumbent generator may decide to impede the new entrant by various delaying tactics as well as charging high connection fees. This issue is resolved through responsibility for the control and management of the transmission network being assigned to EirGrid, which is separate from the vertically integrated firm, ESB, which still retains ownership of the network. The CER provides regulatory oversight.
- *Finding Customers & Pricing Structure.* Under SEM the new entrant is not required to find customers or to sign long term agreements to match the life of the generator. This reflects the pool nature of the SEM. If a new entrant is efficient – which would be the expectation since it would have access to the latest technology and be able to make investment decisions based on more up to date forecasts of fuel costs than incumbent generators – then it will be dispatched by the market operator and receive the SMP. Since the SMP will tend to

²⁸ For details see: <http://www.dcenr.gov.ie/Energy/North-South+Co-operation+in+the+Energy+Sector/>.

Accessed 20 March 2012.

²⁹ The same argument also applies to an incumbent considering building a new plant.

be set by a less efficient plant, the new entrant will earn an infra-marginal rent which will contribute towards capital costs. It will also receive capacity payments, discussed below.

Hence the SEM has been designed to encourage entry, by lowering the risk of entry, providing a ready market for the output of the entrant and a pricing structure that contributes to capital costs.

The evidence suggests that the SEM has been successful in attracting new entrants (CER & NIAUR, 2010a, Figure 16, p. 35). Endesa, for example, entered in 2009 by buying three generators and two 'generation-ready' sites from ESB as part of the CER-ESB Asset Strategy to reduce ESB's market share.³⁰ Bord Gais built a gas fired 450 MW generation plant at Whitegate Co Cork that came on stream in 2010. SSE has built 500MW of wind generated electricity.³¹ Given that market power is likely to be an issue in the wholesale electricity market in the foreseeable future, then a corollary is that the rules should continue to facilitate entry. There are, nevertheless two developments that bear on the issue of entry.

First, a major thrust of the Third Package is the 'effective unbundling' of the transmission system from upstream generation and downstream supply.³² It seems likely that Ireland will select the

³⁰ Endesa's three plants accounted for 14 per cent of all-island installed capacity in 2009 and 9 per cent in 2010. For details see CER (2009) and CER & NIAUR(2010a, Figure 16, p. 35). In June 2012 Endesa entered into an agreement with Scottish Southern Energy (SSE) to purchase the assets of Endesa in Ireland with plans to replace existing plants at two sites with modern gas-fired electricity generators. Based on various press reports.

³¹ It accounted for 4 per cent of all-island installed capacity in 2010. (CER & NIAUR, 2010a, Figure 16, p.35).

³² As the Directive 2009/72 states, "[W]ithout effective separation of networks from activities of generation and supply (effective unbundling), there is an inherent risk of discrimination not only in the operation of the network but also in the incentives for vertically integrated undertakings to invest adequately in their networks (*ibid*, Recital 9)." There are three options under the Directive, which are discussed extensively in Commission guidance on unbundling EC (2010).

independent system operator (ISO) option,³³ under which the ISO – Eirgrid in Ireland’s case – will be responsible for “granting and managing third-party access, including the collection of access charges, congestion charges and payments under inter-TSO compensation mechanism ... The ISO is also responsible for operating, maintaining and developing the transmission system” (EC, 2010, p. 12). The CER has a large number of responsibilities in relation to the ISO option.³⁴ *Second*, it could be argued that since there is currently excess generation capacity and there is less need to be concerned about encouraging entry. However, as we shall argue in the discussion below on ensuring adequate generation capacity, this is not the case when considering a medium to longer term time horizon.

In sum, the SEM has created conditions that encourage entry via acquisition of existing capacity and the building of new capacity. In the future entry will continue to be an important factor influencing incumbent behaviour, despite the presence of excess capacity in the short term.

Ensuring Adequate Generation Capacity

The Capacity Payment Mechanism (CPM) payments are made to generators for their availability, irrespective of whether or not they are dispatched.³⁵ A fixed pot is set at the beginning of the year. Furthermore the CPM payments are higher the narrower the margin between supply and demand – in other words at the peak when prices are most likely to spike, since a higher cost plant sets the SMP. The CPM is designed to contribute towards the fixed costs of a Best New Entrant, which is usually a peaking plant. Furthermore “at least a significant proportion of the generator’s fixed costs are covered by capacity payments.” (CEPA, 2010, p. 51). Explicit capacity payment mechanisms are

³³ As noted above ESB is to be vertically integrated entity, which suggests retention of ownership of the transmission system.

³⁴ These include: monitoring communications between the ISO and the transmission system owner and acting as a dispute settlement authority between the ISO and the transmission system owner.

³⁵ For a discussion of this issue see Fitz Gerald *et al* (2005, pp. 57-58, pp. 65-69).

unusual in the EU wholesale electricity models (CER & NIAUR, 2010a, p. 30). However, in some instances, such as Great Britain, consideration is being given to the introducing of capacity mechanisms. Although most of the return to generators comes from SMP payments, CPM is substantial – around a sixth in 2007-08 and a fifth in 2009-10.³⁶

In terms of the way forward a couple of things need to be considered. *First*, it could be argued that less attention should be paid to CPM given the substantial level of excess or spare capacity.³⁷ However, to a considerable extent this spare capacity is cyclical. As the economy recovers the spare capacity will be utilised. Furthermore, a substantial amount of capacity will be decommissioned between by 2025 – 2,961.5 MW according to Diffney *et al.* (2012, Table 3, p. 10).³⁸ In contrast, expected new planned capacity is only 438 MW by 2025, but in order to meet anticipated demand by 2025 a further 2,220 MW of capacity will be required, including the anticipated replacement of Moneypoint, which has a capacity of 847MW (*ibid*, Table 4, p. 10).³⁹

³⁶ See Gorecki (2011, p. 72, fn. 176). Proportions expressed in reference to total SMP and CPM payments.

³⁷ Excess capacity is measured as the dispatchable margin divided by dispatchable capacity at peak demand. In 2011 the average monthly excess capacity measured in this way was, 39.7 per cent, with a high of 48.5 per cent in June and a low of 27.9 per cent in January. The data source presents weekly generation system information. For each month the first week is selected to estimate excess capacity. Dispatchable margin is the difference between dispatchable plant and peak demand. The data source, CER, *Generation System Performance Report*, various issues, refers to Ireland rather than the SEM.

³⁸ This, in turn, is consistent with EirGrid's estimates of generation capacity (Diffney *et al.*, 2012, p. 10).

³⁹ The estimates of SONI & EirGrid (2011, Table 3-2, p. 31, Table 3-3, p. 32) of decommissioning and commissioning of thermal generation plant are somewhat lower than those reported in the text because the TSOs only consider confirmed decommissioning and commissioning. In the case of commissioning new plant, for example, the list only includes "generators that have signed agreements and confirmed dates to connect to the island over the next ten years" (*ibid*, p. 31). Hence instances where only an agreement for a new plant has been signed are not included.

Second, interconnection and participation in the EU internal market cannot be relied on to alleviate peaks in demand in Ireland. It is likely to be some time before interconnection with the rest of the EU will bring about price convergence. There is still a risk that supply via the interconnection would be interrupted, thus necessitating sufficient all-island capacity to offset the shortfall. If peak demand is somewhat correlated across Member States, it is less likely that there would be cheap electricity available to be imported at times that are peak in Ireland. Finally, it should be noted that in markets that are implementing the Target Model, such as BETTA in Great Britain, there are concerns over shortfalls in capacity and moves to design a capacity payment mechanism.⁴⁰

In sum, the capacity payment mechanism has been an important mechanism for remuneration of the capital costs of new generators and encouraging capacity to meet peak demand. It provides the correct incentives for existing generators to offer capacity at peak hours and encourages new entry by remunerating the fixed costs of new entrants. The removal or compromising of the CPM would likely lead to a higher SMP that would also be more volatile.

Renewable Electricity: Wind

Ireland like other EU Member States has to meet certain targets for renewable energy by 2020. These translate for the electricity sector for Ireland into having 40 per cent of electricity consumption from renewable sources, virtually all of which will be from wind, mostly onshore.⁴¹ At certain times, such as a summer valley of demand at night, renewable sources may be able to supply 100 per cent of the demand. This is not currently technically possible, due to various technological constraints such as reduced synchronous inertia (EirGrid & SONI, 2010, 2011). The maximum share of electricity supply that can be accounted for from renewable sources is currently 50 per cent, above which it is deemed that there is an unreasonable threat to the security of the system (EirGrid & SONI, 2011, p. 8) but this is expected to increase to 60-75 per cent (*ibid*, p. 8).

⁴⁰ For a discussion see Gorecki (2011) and references cited therein.

⁴¹ For a discussion see Gorecki (2011, pp. 37-49).

The presence of large scale wind generation poses two problems that any model of the wholesale market electricity will have to resolve. *First*, with so much wind there will be a need for incentives to ensure sufficient conventional generation capacity that is flexible in that it can quickly supply electricity to the system (ramping). *Second*, under the pricing rules for SEM, prices are set without regard to the technological and security constraints on the system. If, for example, there was sufficient wind available (although not dispatched for reasons set out above) to account for 100 per cent of demand then the SMP would be zero. However, this is unlikely to be the case for all periods of the day. During periods when the wind does not blow, the SMP will increase and conventional generation is likely to earn infra-marginal rents, which would contribute towards fixed costs. Although the CER&NIAUR (2009, p. iii), in a study on the impact of high levels of wind, found that the “SEM design is potentially robust to significant increases in the amount of wind generation on the system,” they nevertheless cautioned that “the marginal nature of the incentives on new generation to enter the market is a potential concern, which suggests that the design will need to be kept under close review in the years to come.”⁴²

Conclusion

The SEM has been successful in meeting the challenges of mitigating market power, facilitating entry and ensuring adequate generation capacity. The magnitude of these challenges has been reduced subsequent to the creation of the SEM because of increased interconnection, the reduction in the market share of ESB, new entry and the cyclical decline in demand. However, although the magnitude of these challenges has been reduced and future developments suggest a continuation in this trend, it nevertheless remains the case that these challenges are likely to be present for the foreseeable future. It is only when the SEM is an integral part of the internal EU electricity market that market power and facilitating entry are likely to become much less important issues, providing that market is competitive. However, that is not likely to occur for 10 to 15 years at a minimum.

⁴² See also Cox (2010) on the implications of intermittency.

This suggests any wholesale market model for the all-island market will have to continue to address these challenges for the foreseeable future.

4. The Alternative Scenarios

In this section two alternative approaches to meeting the requirements of the Target Model are considered: variations or adaptations of the current SEM model; and, a radical revision, a completely new all-island wholesale market model. The proposals are taken from SEM Committee (2012), which has a couple of advantages: the proposals are likely to comply with the Target Model; and, they are technically feasible.⁴³ Hence the discussion can concentrate on the merits of the proposals, particularly in view of the discussion in the previous section. The discussion of the variants draws heavily on the SEM Committee (2012, pp. 32-47) and the EirGrid *et al* (2012, pp. 21-33; p. 62-118), while the issue of a replacement for the SEM is addressed in SEM Committee (2012, pp. 57-70). The purpose of this section is not to provide a detailed description of these alternatives, but rather to highlight their major characteristics.

We first deal with the variants. Since there are a number of common characteristics across all four variants these are first set out before details of each variant are presented. The common characteristics are contrasted with the current SEM model. A summary comparison of the Target Model and the current SEM model is presented in Table 1. Attention then turns to the replacement of the SEM by a new model. As we shall see, in some aspects of these alternatives, especially the replacement of SEM, have as yet to be fully fleshed out in EirGrid *et al* (2012) and SEM Committee (2012). Nevertheless, they provide a useful starting point to discuss the issue of how the SEM should comply with the Target Model.

⁴³ It should be noted that the variants “have not been legally reviewed against the provisions of the CACM Framework Guidelines and the expected requirements of the Network Codes.” (SEM Committee, 2012, p. 32).

Table 1**A Comparison of the SEM and the Target Model**

Characteristic	SEM Design	Target Model
Market Design	Mandatory Pool	Voluntary Bilateral contracts
Trading Day	06AM for 24 hrs	23PM for 24 hrs
Trading Period	30 minutes	1 hr (for Day Ahead and Intra-day contracts).
Gate Closure	Trading Day – 20.5 hrs (EA1)	Trading Day – 12 hrs (Day – 1)
Offers/Bids	Generally Complex Offers (with Commercial & Technical Components).	Simple Offers & Bids Sophisticated Offers (Block Bids, Linked Bids, Minimum Revenue, Energy Ltd).
Intra-Day	2 Implicit Auctions	Continuous Implicit Trading
Form of Dispatch	Central Dispatch	Self Dispatch
Firm Pricing	Ex-post	Day Ahead & Intra Day
Financial Contracts	Limited contracts market	Forward financial & physical markets
Cross Border Settlement	Interconnector Units settle cross border trades	Shipping agent settles cross border trades
Capacity Payment	Explicit Capacity Payments	Not considered in the FG CACM

FG CACM = Framework Guideline Capacity Allocation and Congestion Management

Source: SEM Committee (2012, Table 2, p. 24).

Four Variants of the SEM Model: Some Common Characteristics

The four variants of the current SEM model share certain common characteristics.⁴⁴ In each case we contrast the situation with the current operation of the SEM.

First, consistent with the Target Model there are four different markets for which rules have to be designed: forward, which clears before the day-ahead stage; day-ahead, which is capable of being coupled through implicit auction with other EU day-ahead markets; intraday, which is also capable of being coupled implicitly with other EU markets; and balancing. These four markets are differentiated in relation to the time when electricity is sold by a generator for delivery on the trading day broken down into half or one hour periods. The furthest away from delivery is the forward market while the balancing market operates close to real time. Under the SEM at present there is limited intraday trading, a financial, rather than physical, CfD forward market,⁴⁵ while the balancing market is integrated with the spot and ancillary market rather than being a separate market where balancing responsible parties are obligated to submit balancing positions or else be exposed to imbalance prices.

Second, under each variant a supplier must participate in at least one of the four markets. This allows a generator to select the most appropriate market to participate in given their technical characteristics. For example, a slow moving base load plant is much more suited to the forward market than the day-ahead or intraday market (SEM Committee, 2012, p. 21). However, the generator retains discretion in deciding the extent of their participation in any particular market. Under the SEM at present all generators must submit offers for the day-ahead market and can rebid for the intraday market.⁴⁶

⁴⁴ This is based on EirGrid *et al* (2102, pp. 21-27).

⁴⁵ This is facilitated by Directed Contracts discussed in Section 3 above. The Target Model allows for financial transmission rights and CfDs. For details see ACER (2011, p. 10).

⁴⁶ A summary of the trading and settlement code for the SEM states, “[P]articipants are required to submit Offers into the pool in respect of each Generator Unit for each Trading Day.” Poyry (2007, p. 10).

Third, each generator is not required to offer all of its available capacity into the market(s) in which it decides to participate.⁴⁷ Indeed, it could submit bids that were infeasible and hence effectively withdraw from the market.⁴⁸ Under the current SEM arrangements generators have a strong incentive to submit bids for all of their capacity for a particular trading day due to the CPM. Hence if an appropriately designed CPM forms part of all four variants then there will continue to be incentives to bid in capacity. However, this issue has, as yet, to be addressed.

Fourth, central dispatch, as opposed to self dispatch, is a feature of all variants.⁴⁹ In this respect there is no difference with the current SEM arrangements. It is partly for this reason that generators are required, as at present, to submit commercial and technical information including forecast availability. As EirGrid *et al* (2012, p. 21) state, “[U]ltimately if the System Operator decides the generator is required a set of relevant data must be available to make this decision with.”

Fifth, prices in all of the markets are on an ex ante basis, except for the balancing market where they are usually but not always on an ex post basis. It is anticipated that there will be a single (but not necessarily the same) market price for each half or hourly period in the forward and day-ahead markets, but several prices in the intraday market.⁵⁰ This contrasts with the current situation in the SEM where there is a single SMP price paid to all generators calculated on an ex post unconstrained basis.

⁴⁷ However, generators are required to provide technical information concerning their availability should the system operator need to dispatch them for system security reasons.

⁴⁸ For example, the bid could be for the delivery of electricity at $t+x$ hours but the generation unit would need $t+y$ hours to be able to supply the required volume, where $y>x$.

⁴⁹ The rationale for the retention of central as opposed to self dispatch is set out in SEM Committee (2012, p. 33).

⁵⁰ However, under Variants #1 and #3 where there are bilateral contracts in the forward market there is unlikely to be a single price for any half or hourly period.

Sixth, the issue of how generators set prices is not discussed. It thus appears that generators are free to set prices based on their own best judgment as to what will maximise profits. This contrasts with the current SEM model under which offers are made based on a generator's short run marginal cost (SRMC), essentially its fuel and CO₂ costs. However, the possibility exists that SRMC could be retained under all the variants.

Seventh, there is no provision for capacity payments in any of the four variants. This contrasts with the current SEM model where there is a CPM, as noted in the previous section. However, the SEM Committee intend to address this problem with a capacity payment mechanism of some kind.

Eighth, a shipping agent is required, under all of the options, in order to ensure correct financial settlement of trades between different geographical markets. In the day-ahead and intraday markets all trades will be coordinated via local market operators such as SEMO and therefore there is a need for a single shipping agent between markets to settle imports and exports.⁵¹ In the case of an export for example the shipping agent will purchase electricity from the SEM and will be settled by the market operator as a payment to a generator and a charge to the shipping agent.

Ninth, under all the variants, interaction between the all-island market and the wider EU market occurs on the day-ahead and intraday markets.⁵²

- The *day-ahead* market sees participants submit bids and offers to the market operator, who will then submit feasible bids⁵³ to the single European price coupler for inclusion in its

⁵¹ The shipping agent in other EU markets is often the TSO.

⁵² There will also be links in the balancing market through the Framework Guidelines on Electricity Balancing (ACER, 2012). However, attention here is confined to the CACM Framework Guideline.

⁵³ This means that the generator must be able to supply the electricity in the timeframe bid. For example, if it bids more than 100 per cent of its capacity, then that is not feasible or if it bids to supply electricity in the next trading hour but needs 12 hours to start up then that would not be feasible.

pricing algorithm.⁵⁴ Firm day-ahead prices and quantities would be issued back to the market operator. For each zone, such as the SEM, the market price would be set and, given this price, the trades that would take place. Such information would then be published, together with all the bids/offers made.

- The *intraday* market participants will make bids and offers to the market operator on a continuous basis. Feasible orders will be collected and submitted by the market operator and submitted to the Shared Order Book Function (SOBF) which is managed at the European level. In conjunction with the Capacity Management Model (CMM) that takes into account capacity constraints between different markets (e.g. limited interconnection relative to demand), the SOBF will make use of a single pan-European algorithm matching energy sales orders (generation bids) to energy purchase orders (supplier offers), possibly on a first-come-first-served basis. The algorithm has the best prices come first – highest buy price and lowest sell price (i.e. maximising consumer and producer surplus).⁵⁵ A shipping agent will be required to ensure appropriate settlement of trades across different markets.

In the day ahead market the pricing algorithm sets a single price per zone (e.g. the all-island market) by simultaneously solving for the equilibrium price and quantity based on supply and demand; the intraday market is more akin to matching a series of bilateral trades at particular points in time.

⁵⁴ The price coupling algorithm is in the process of being finalised. ENTSO-E (2012a) in its proposals for the Network Code in Article 45 state that the algorithm will “maximise Economic Surplus for the price coupled region for the subsequent trading day,” will use “the marginal pricing principle to generate results per Bidding Zone per Market Time Period,” and facilitate “efficient price formation.”

⁵⁵ The day ahead coupling algorithm is an auction whereas the intraday shared order book uses a system of continuous matches rather than an auction. Both systems however share an implicit pricing of capacity with energy.

Tenth, it is anticipated that most electricity supplied on the trading day will have been contracted in the forward and day-ahead markets. Use of the balancing market would be discouraged through penal prices which would incentivise generators to deliver the quantities contracted. Under the SEM all generators are required to bid into the day-ahead market and there is no separate balancing market.

Eleventh, there is a considerable degree of transparency in terms of information concerning bids and offers under all the variants, except where bilateral trading is allowed – in variants # 1 and 3. A high degree of transparency is consistent with the current SEM model.

Attention now turns to the characteristics of the four variants of the SEM that have been advanced that comply with the Target Model. These variants are summarised in Table 2.

Table 2

Four Variants of the SEM Model: Option #1 Bilateral Trades, Couple on EA1

Timeframe	#1: Bilateral Trades, Couple on EA1	#2: Forward Pool, Couple on EA2	#3: Bilateral & Forward Pool, Couple on EA2.	#4: No explicit Forward, Couple on CfD Auction
Forward	Bilateral trades	Firm forward pool	Bilateral trades & forward pool	No explicit forward market
Day-Ahead	Couple on EA1 ^a	Couple on EA2 ^b	Couple on EA2 ^b	Couple on CfD auction
Intraday	Implicit continuous with no implicit auctions	Implicit continuous with implicit auctions/with	Implicit continuous with implicit auctions/with	Implicit continuous with implicit auctions

		no implicit auctions	no implicit auctions	
Balancing	Imperfections, real-time market	Imperfections, ex-post market	Imperfections, real-time market, ex-post market	Imperfections, ex-post market

a. EA1 = 09:00 on D-1.

b. EA2 = 11:00 on D-1.

Source: EirGrid *et al* (2012, p. 28, p. 30, p. 32)

*Variant #1: Bilateral Trades, Couple on EA1*⁵⁶

Variant #1 sees the *forward* market organised through bilateral contracts. This variant allows the explicit use of interconnector (IC) capacity rights in advance of day-ahead implicit auctions. Under Variant #1 there may be limits placed on the extent which the forward market can be used. Indeed, it might be decided that forward trades would be set to zero so that all trade would go through the day-ahead and intraday markets. The *day-ahead* market sees participants submit bids to the market operator who will then submit feasible bids together with offers to the single European price coupler for inclusion in its pricing algorithm. Firm day-ahead prices and quantities would be issued back to the market operator. Such information would then be published.

In terms of the *intraday* market, participants will make bids into the market operator on a continuous basis. Feasible orders will be collected and submitted by the market operator to the SOBF, where in conjunction with the Capacity Management Model (CMM), purchasers and sales will be matched on a first-come-first-served basis. A shipping agent will be required to ensure appropriate settlement of trades across different markets. The *balancing market* considers

⁵⁶ This discussion is based on SEM Committee (2012, pp. 34-39) & EirGrid *et al* (2012, pp. 28-29 and pp. 63-72).

contracted quantities from the three previous markets to be firm. To ensure the quality of information available for the system operators in terms of formulating economic dispatch of the system, generators are required to submit complex commercial offers to the balancing market. If a generator is unable to meet its contracted position these offers will be used to determine prices in the balancing market. The generator will be charged the difference between the contracted quantity and the actual quantity delivered.⁵⁷

Final settlement in the SEM will be based on the result of the four markets, with bilateral contracts settled outside the SEM. Depending on the volume of trade settled in the bilateral market, this could see a marked decline in the collateral requirements of the SEM.⁵⁸

*Variant #2: Forward Pool, Couple on EA2*⁵⁹

Variant #2 envisages a *forward* market that is a voluntary pool. Participants would submit complex commercial and technical offers for their generation as under the existing Trading & Settlement Code. Purchasers would submit single simple price/quantity pairs. The forward voluntary pool would function like the current SEM, with generators ranked in merit order with no modelling of

⁵⁷ If a generator is scheduled to deliver electricity on the Trading Day but due to system constraints is not able to do so, either in part or in whole, then the generator receives constraint payments. These constraint payments are funded by a SEM Imperfections Charge levied on all suppliers. For details see <http://www.eirgrid.com/operations/ancillaryservicesothersystemcharges/dispatchbalancingcosts/>. Accessed 29 May 2012.

⁵⁸ According to the Single Electricity Market Operator, collateral, in the form of cash or Letter of Credit, “is required to ensure the Single Electricity Market (SEM), and its Participants, are protected from the financial risk of a Participant not paying their outstanding debts to the SEM.” (<http://www.sem-o.com/JoiningTheMarket/Pages/CreditRiskManagementFactsheet.aspx>. Access 29 May 2012). If bilateral trades are settled outside the SEM then there will be a corresponding reduction in the need for such collateral.

⁵⁹ This draws on EirGrid *et al* (2012, pp. 30-31 and pp. 73-83) and SEM Committee (2012, 39-43).

system constraints. On completion of the EA1 run, prices and quantities would be firm and published by the market operator. The price would not include an uplift payment, which is necessary for generators to cover their running costs. The price would be calculated ex post for all participants irrespective of the timeframe in which they traded. The *day-ahead* market, which would couple on EA2, since the forward market couples on EA1, is also a voluntary market. Feasible bids would be transferred to the single European price coupler for inclusion in the price coupling algorithm. The results would be published by the market operator. The day-ahead market operates the same as in Variant #1.

In the *intraday* market, trading occurs through the submission of bids to the market operator. Feasible bids are collected and, together with offers, submitted to the SOBF where in conjunction with the CMM, purchases and sales are matched on a first-come-first-served-basis. On the *balancing* market as with the other options, a complex set of commercial and technical offer data is required by a specified gate closure. The TSOs make use of these incremental and decremental prices to balance the power in real time. Generators unable to meet their contracted positions would be required to pay, as under Variant #1, reflecting the difference between their contracted and actual deliveries. An alternative would be to determine the balancing price on an ex post basis, which would be estimated on the basis of perfect hindsight rather than in real time. However, there may not be a large difference between the two methods of pricing in the balancing market.

All markets would be settled ex post as part of the SEM. This would mean that collateral requirements would continue to be on gross quantities of the combined markets that make up the SEM.

*Variant #3: Bilateral & Forward Pool; Couple on EA2.*⁶⁰

⁶⁰ This draws heavily on EirGrid et al (2011, pp. 31-32 and pp. 85-90) and SEM Committee (2012, pp. 43-45).

Under Variant #3 the *forward* market combines elements of Variant #1 and #2 with the result that there are two opportunities to trade in this market, sequentially not simultaneously. First, bilateral trading which would be completed in D-2. Second, a forward pool to which participants would submit complex commercial and technical offer data. Once the gate closed for the bilateral trading had taken place the contracted quantities would be imported into the forward pool. The forward pool assumes that all bilateral contracts are for the least cost quantities. Any supplier offers would be in addition to those already contracted in the bilateral trading. Participation in the two markets would be voluntary.

As soon as the forward pool is cleared and the results published, then submissions to the *day-ahead* market would be examined in terms of feasibility. Bids would be collected by the market operator, and if feasible, passed on the single European price coupler. Firm quantities and prices are returned and published to the participants, including the shipping agent and the system operators. The *intraday* market bids would also be assessed for their feasibility. The ability to integrate within day auctions into this variant is dependent on the liquidity of the earlier forward pool. If trade moves to the bilateral contracts market then there would be little benefit to additional within day auctions. Hence such auctions are not considered appropriate. Finally the *balancing* market incremental and decremental quantities would be calculated as set out in other options.

Final settlement in the SEM would be based on the results of the forward pool, day-ahead, intraday and balancing markets. Bilateral arrangements would be settled between the counterparties to the trade outside the SEM. As in Option #2, because this option retains a number of elements similar to a pool approach, ex post pricing can be used in the balancing market rather than real time pricing.

*Variant #4: No Explicit Forward Market; Couple on CfD Auction.*⁶¹

⁶¹ This draws heavily on EirGrid *et al* (2012, pp. 32-33 and pp. 91-98) and SEM Committee (2012, 45-47).

The final variant of the SEM is #4. The intention here is to retain as much of the SEM as possible and insert an interface between the SEM and the European systems through arrangements that are similar to the current contracts for difference (CfDs). This would apply at both the day-ahead and intraday market.

There is no explicit *forward* market except what exists already – explicit capacity auctions across the interconnectors and trading forward (CfD). As at present generators submit offers into EA1. As in current arrangements this would remain an indicative schedule with the exception of ICs trades that would remain fixed at this stage.

In the *day-ahead* market generators and suppliers would submit offers and bids for the coupled implicit auction. Participation would be voluntary. Bids and offers would be sent to and matched by the European central coupler. The prices and quantities would be returned by the coupler as under other variants. However, the crucial difference with the other variants is that buyers and sellers would enter into CfD. The strike price would be the coupled price; the reference price would be the ex post SEM price (i.e. SMP). Thus if, for example, the SMP exceeded the strike price the seller would pay the buyer the difference between the two prices. Quantities would be firm and positions guaranteed via clearing.

In the *intraday* market, bids and offers would be submitted by generators and suppliers on a continuous basis and these would be submitted by the system operator to the pan-European SOBF. These continuously matched offers and bids and matched trades would be sent back to each zone (e.g. the all-island market) to settle accordingly. These prices and quantities would be the strike prices of CfDs in a similar manner to those traded at the day-ahead stage. Firm cross border flows from continuous trading would need to be included in the ex-post SEM schedules. Finally, in the *balancing* market, ex post pricing would take place as it currently does in the SEM and CfDs would be settled outside the SEM, as is currently the situation.

*Replacing the SEM: a 'Clean Slate.'*⁶²

An alternative to trying to adapt the current SEM to the Target Model is to abstract from the current model and consider de novo what is the most appropriate all-island market for wholesale electricity, including existing models such as the British Electricity Trading and Transmission Arrangements (BETTA), Nordpool, and MIBEL, the Iberian wholesale electricity market. The SEM Committee (2012, pp. 61-62) point out “the basic choice for the day ahead and intraday wholesale electricity market is between a self-scheduled bilateral contracts market on the one hand and a centrally scheduled gross pool on the other.” In comparing a centralised to a bilateral contracts system issues such as market power and entry, which were the subject of Section 3, are repeated by the SEM Committee as to why the current SEM model is the appropriate choice. These arguments need not be rehearsed here. However, reference is made to the fact that the closer intraday continuous trading is to real time then “compliance with the [European] Target Model would therefore argue decisively in favour of a self-commitment bilateral contracts market for the SEM” (*ibid*, p. 64). Consideration is also given to linking more closely in various ways with the British Electricity Trading and Transmission Arrangements (BETTA), through for example becoming incorporated as part of BETTA. However, a number of important difficulties are pointed out with respect to BETTA, such as the fact that BETTA is not entirely consistent with the Target Model, the lack of transparency, liquidity and competition, as well as the lack of a capacity payments mechanism.⁶³ Some estimates of the costs are presented based on the switch from a pool in England and Wales to the New Electricity Trading Arrangements (NETA), the forerunner of BETTA. To a considerable degree the discussion over whether a radical departure from the current SEM model is desirable and/or appropriate is rerun of the debate over the creation of the SEM in 2007.

⁶² This discussion draws heavily on SEM Committee (2012, 57-70).

⁶³ However, the Electricity Market Review envisages the introduction of a capacity mechanism.

5. Complying with the Target Model: A Discussion of the Alternatives

In this section we discuss the alternative models of the wholesale electricity market that were presented in the previous section. We start by addressing the issue of whether compliance with the Target Model is best achieved through replacing SEM or selecting one of the four variants of the current SEM. Attention then turns to a discussion of the merits of the four variants. In this discussion it is assumed that all of the alternatives comply with the Target Model and concentrate on considering their merits.⁶⁴

Incremental or Radical Change?

The first issue to be considered is whether or not the SEM should be redesigned from scratch or whether change should be incremental through adapting the current wholesale market arrangements. There are a number of reasons for arguing that incremental change is the best option. *First*, it is generally agreed that the SEM has performed well in supplying electricity at a competitive cost reflective price, in part through successfully dealing with the problems of mitigating market power, facilitating entry and providing adequate capacity.⁶⁵ Consistent with this Newbery (2011) commented that the CER and NIAUR should “not throw away the good features of the market that you’ve already designed” (McQuade, 2012, p. 56). Furthermore these problems are likely to continue to be important for the all-island wholesale electricity market in at least the near and

⁶⁴ This is not to deny that there might be problems of reconciling continuous implicit intraday trading with centralised dispatch (Gorecki, 2011, pp. 90-92; SEM Committee, 2012, p. 36). However, it is assumed that either the two can be reconciled and/or that trading will be less than continuous, but still more than the current two intraday gate closures. The latter is consistent with the CACM FG which states in Section 5 that intraday trading should enable “market participants to trade energy as close to real time as possible ... “ (ACER, 2011, p. 11).

⁶⁵ See, for example, Gorecki (2011, pp. 75-76) and references cited therein and SEM Committee (2012, p. 10-11).

medium term.⁶⁶ *Second*, there is no clear alternative wholesale electricity market design that deals with these problems. Indeed, alternatives such as BETTA not only have some important shortcomings in relation to market power and encouraging entry, but themselves in a state of flux in part due to the requirement to meet the Target Model and other aspects of the Third Package. *Third*, and to some extent an extension of the second point, EU wholesale electricity markets will need to address a number of issues in the near future. These issues include harmonising support schemes for renewable electricity, introducing capacity payment mechanisms and accommodating high levels of renewable generation. Since these issues are likely to affect wholesale market design it might be premature to undertake a radical redesign of the SEM ahead of resolution of these issues at the EU level.

Fourth, as noted above, there was a debate over the most appropriate all-island wholesale model in designing the current SEM model. It is not at all clear that things have changed sufficiently since 2007 to reopen the question. As noted in Section 3 many of the same issues are important to-day and are not going to go away in the near to medium term. *Fifth*, it is not clear that there is enough time to debate whether or not a new all-island wholesale electricity model should be introduced and implement the outcome of any such exercise. Not only will the new model need to be agreed, a cost benefit analysis undertaken, but also legislation passed as well as, at the EU level, the Agency for the Cooperation of Energy Regulators (ACER) being satisfied that the CACM conditions are met. While compliance with the CACM has to be achieved 2016, the requirement that ACER is satisfied with the proposed new all-island wholesale model would mean that any proposal would be have to agreed

⁶⁶ This is discussed in Section 3 above. In some instances policy measures have not gone as perhaps they could to resolve some of the problems raised.

well in advance of 2016.⁶⁷ *Sixth*, the adoption of a new model implies a learning period for market participants. This adds to the costs of a radical change.

Hence for the reasons set out above it is suggested that the debate over compliance with the Target Model should focus on adapting the current SEM model, rather than reinventing the all-island wholesale market.

Incremental Change: Which Variant?

Before considering the merits of the four variants of the SEM some discussion of the common features of all four is merited. Although the term ‘variant’ is used in describing these models, implying perhaps not a great deal of change, this is not altogether the case. Each of the variants implies, although not to the same extent, considerable departure from the current SEM when measured against some of the key characteristics set out in Section 3 to resolve issues of mitigating market power, facilitating entry and assuring adequate capacity. However, some of the changes should raise the overall efficiency of the market. For example, the increase in the number of sub-markets allows generators to bid in the sub-market which most closely matches their technical characteristics. A unit commitment model such as PLEXOS could be used to examine the impact on price and the distribution of rents of depending on the market structure.⁶⁸

The variants of the current SEM may remove some of the key elements introduced to mitigate market power and facilitate entry. Depending on the nature of the CPM, generators may not have the incentive to bid all of their capacity and, while it has yet to be decided, it is not clear that

⁶⁷ The issue of legislative requirements is set out in SEM Committee (2012, pp. 71-72). It should be noted that even in the case of the variants of the SEM primary legislation may be required if the gross mandatory pool is not retained.

⁶⁸ This would require, for example, the modelling of strategic behaviour, such as bidding, of the generators. See http://www.allislandproject.org/en/market_decision_documents.aspx?article=cb4ee33b-a83a-47ce-956a-6cff30900495 for details of the PLEXOS model. Accessed 8 October 2012.

generator bids will be required to be based on SRMC. There does not appear to be any discussion in either the SEM Committee consultation paper or the options set out by EirGrid for these choices. To some extent, of course, depending on the degree of transparency, the Market Monitoring Unit may be able to detect deviations from SRMC based on fuel cost and/or strategic withdrawal of generation capacity designed to raise prices.⁶⁹ However, this increases the market monitoring burden of the Market Monitoring Unit. It is not clear why this is necessary. It thus suggests to the maximum extent possible that pricing based on SRMC of the current system be retained, combined with the capacity payment mechanism to incentivise capacity availability.⁷⁰ While it is not proposed to dispatch the generators based on the merit order, the pricing algorithm is designed to have a similar outcome.

Turning to the variants themselves it is suggested that the use of the two variants with an element of bilateral contracts - #1 and #3 - should not be adopted. Transparency and liquidity are important aspects of the current SEM. They encourage entry and facilitate market monitoring to ensure that markets are working well for consumers by providing reliable information on prices. In markets such as BETTA even though they are substantially larger than SEM concerns have been expressed over the consequences of bilateral contracts, which are frequently between different parts of a vertically integrated energy firm, that lead to a lack of transparency facilitating the exercise of market power. The lack of liquidity in BETTA makes it difficult for small independent generators to not only find a route to market but also manage risks by, for example, hedging against unexpected outages of

⁶⁹ Arguably this could be a breach of competition law and since the SEM is an all-island market and hence would affect trade between Member States would be brought to the attention of the European Commission. See footnote 17 above for reference to the E.ON AG case in this respect.

⁷⁰ However, as noted in Section 3 above, one of the issues yet to be addressed is incorporating a capacity payment mechanism in the wholesale electricity model that meets the requirements of the Target Model.

generation.⁷¹ EirGrid *et al* (2012), in discussing the use of bilateral contracts, points out these problems and suggest various mechanisms, such as limiting their use, as a way of mitigating their impact. Furthermore, it is not clear with the extensive use of bilateral contracts what price would be used to estimate the Public Service Obligation for renewable support.⁷²

Variant #2 has the advantage of having a forward pool that in many ways reflects the current SEM system. This could be strengthened by making participating in this market mandatory and leaving participation in the other markets voluntary. Variant #4 is an intriguing idea. Essentially it is trying to build an interface between the SEM and the EU day-ahead and intraday markets through the use of CfDs. Under the proposal while the reference price in the CfD remains the same as under current CfDs – the SMP – the strike price is now that determined by the price coupling algorithm. While a number of issues still need to be resolved concerning this variant, such as “whether a CfD daily auction in the SEM can operate using the standard PCR [Price Coupling of Regions] algorithm but as a financial rather than physical product and produce outputs that are respected by and compatible with the SEM pool arrangements” (SEM Committee, 2012, p. 45) it is nevertheless an option worth pursuing further. However, critical to its success will be a liquid well functioning internal EU market as represented by the price coupling algorithm. Even if this is the case such that a stable and predictable price emerges from the application of the algorithm, there will be an initial period of uncertainty. The suggestion by SEM Committee (2012, p. 56) of a pilot CfD project merits serious consideration.

⁷¹ These risks are discussed in DECC (2011), while Ofgem (2012) is moving to create greater liquidity and transparency in the GB wholesale electricity market. The SEM Committee (2012, pp. 68-69) also discusses these issues.

⁷² See CER (2011b) for details.

6. Conclusion: Fitting a Square Peg into a Round Hole

The mandatory pool central dispatch model of the SEM is very much the exception in comparison with other EU Member State wholesale electricity markets and with some elements of the Target Model that assume are bilateral contracts or self dispatch. Nevertheless, the uniqueness of the SEM should not be overstated. Central dispatch systems are common in the US and at least some EU Member States such as Spain and Portugal.⁷³ While Ireland is out of step with much of the EU, the SEM works well for Irish consumers. Indeed, Green (2008, p. 122) argues that Europe would “gain if countries moved towards versions ... of the ... Standard Market Design used in the US.”⁷⁴ Aligning SEM with the Target Model appears very much to be a matter of fitting a square peg into a round hole. One choice would be change the shape of the peg – the radical reshaping of the SEM. However, as the paper argues, that is not a sensible choice at this time. Another choice is put some kind of device that permits the peg to fit into the hole. This is a much better alternative. One of the options that meets this requirement is the proposed contracts for differences which act a mediating device between the SEM and the rest of the EU internal electricity market.

At the present time the debate over complying with the Target Model is centred on the most appropriate choice as though this were a once and for all decision. Hence the debate is seen in part as radical vs. incremental change. To a considerable extent this is a false choice. The discussion of the challenges facing the all-island wholesale electricity market suggests a different way of framing the choice. As interconnection between the island of Ireland and the rest of the EU increases and

⁷³ For details see Green (2008) and SEM Committee (2012, pp. 91-92). SEM’s uniqueness may stem from the size and granularity of the system coupled with the planned penetration of intermittent generation. This means that central dispatch could become more important than for other markets and thus implementation of the Target Model becomes more of a challenge.

⁷⁴ Green (2008, pp. 104-109) discusses the central dispatch Standard Market Design in greater detail and compares it with the typical European wholesale electricity market model.

transaction costs of trading electricity fall, electricity will be fully traded with a single pan-EU price. However, that is not likely to occur for at least 10 to 20 years at the earliest. Hence in the immediate future to comply with the Target Model adapting the current SEM model might be the best choice, when the internal EU market is working well and the Third Package and all the associated Network Codes are completed, then it would be appropriate to consider whether a more radical alternative might be appropriate.

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