

Demand Side Vision for 2020

Synergen's response to SEM-10-052

1 Introduction

This paper is Synergen's response to the consultation paper SEM-10-052 published by on 17th August 2010. Synergen has no objection to this response being published.

For clarity, in this response Synergen uses the following descriptors.

- Demand Side Bidders (DSB) – licensed participants make bids into the energy market via a Demand Side Unit (DSU), and are scheduled and dispatched by the TSO.
- Demand Side Management (DSM) – the out of (energy) market contracting of demand for load reduction or the response of plant to anticipated prices by load shifting/load reduction.
- Demand Side Participants (DSPs) – this is used as a generic term covering both DSM and DSB

Within SEM-10-052 there are a number of explicit questions posed. Synergen has provided some relevant responses to these questions within the main body of this paper and highlighted these with footnotes as appropriate. In addition there is a short explicit response to the 30 questions within SEM-10-052 set out in Appendix A of this paper.

2 Introduction

Incorporating the elasticity of demand in wholesale electricity trading arrangements has proven to be one of the most difficult challenges facing those parties developing such markets. These difficulties exist in both net pool and gross pool arrangements. Whilst most liberalised electricity markets have either superficially or actively sought to set prices on the dynamic intersect of demand and supply curves, none have truly succeeded. There are, of course, many explanations for this, but central to them is the lack of real time wholesale price signal seen by customers. In short, wholesale prices are at spot values (albeit often hedged) whilst customers are generally (but not always) purchasing under longer-term contractual arrangements that dilute or remove this exposure to spot prices¹.

The consultation paper considers the barriers to, and potential remedies to the lack of (or limited extent of) demand side participation in the SEM. The paper also states that there are potential benefits to DSB in the SEM and identifies a number of barriers to its participation (under the present market arrangements). Leading

¹ It should be noted that exposure to the risks inherent in spot prices are often attractive to large users as they see firm prices preferable consistent with their own business objectives

amongst these is the lack of an ex-ante price in the SEM. Synergen has included further observations on the reasons why there is a lack of active demand side in the SEM in Section 4 of this paper.

Consideration of ex-ante pricing is going to be being undertaken as part of the potential development of inter-regional trading / market integration (following on from SEM-10-011):

“The SEM Committee has considered several options for establishing a day-ahead market through which implicit coupling with a power exchange in GB could take place and is of the view that further consideration and development of these options is required. One possibility is to set up a liquid day ahead CfD market to establish a robust day-ahead price in the SEM. This has the advantage of being possible without changing the SEM design or its central market systems. Another option, which the RAs discussed with several respondents, is the use of the existing ex-ante MSP software to set a firm day-ahead price and volumes for interconnector trades. Whilst this has the drawback of entailing likely changes to the SEM rules, this may be offset by the benefits of being able to use an already liquid market (i.e. the pool). These two options are described in the text boxes below. Other options within the SEM design itself may present themselves as work and further investigation into this area progresses.

The SEM Committee has decided that the RAs will investigate the feasibility of and bring forward proposals during the course of 2010 for the development of:

- *A viable means of establishing a day-ahead price in the SEM which would allow SEM participants to trade energy with power exchanges in neighbouring markets at day ahead stage either by volume or price; and propose if appropriate,*
- *TSC modifications which facilitate the above but which do not fundamentally alter the SEM rules.*

Recommendations for changes to market design should bear in mind the potential demand from market participants or new entrants for the above and address liquidity concerns as needed.”

Thus, whilst ex-ante pricing may be pursued, it is not being done to deliver DSB. That is not to say that possible DSB benefits should not be included in the assessment of an ex-ante price, but it would be highly unlikely that DSB by itself would justify the major changes that the creation of an ex-ante market. If an ex-ante market is developed (noting that this would be a high level of demonstrated benefit for such a regime to justify this given the RAs “Decision Making Paradigm” DSB **may** be facilitated, but our assessment of the drivers of DSB is that the creation of an ex-ante pricing mechanism alone would not necessarily give rise to a material volume of DSB.

Synergen understands that the RAs have recently engaged consultants to consider the creation of an ex-ante market in the SEM. This response concentrates on DSM issues – not an ex-ante pricing, but we are concerned that the creation of any form of mandatory ex-ante price would undermine the fundamental design of the SEM. If there was a need / desire for some form of voluntary traded market (potentially a futures market) then our belief is that participants would have already established such a platform. In terms of considering any ex-ante market, it would be a central requirement to explain in detail how such a regime may operate, including:

- Is the ex-ante market voluntary or mandatory?

- What is the nature of the product?
- Are prices and volumes firm, or non-firm?
- What is the relationship between any ex-ante prices and the ex-post unconstrained schedule price? and
- Is the incorporation of an ex-ante price consistent with economic fundamentals of the SEM?

3 Experience of DSB

The consultation paper refers to potential markets for demand side participation in the SEM. The SEM does explicitly allow for demand side bidding by registered Demand Side Units (the present arrangements treat any Demand Side Unit as a Variable Price Maker) – yet such participation is limited. There are a number of potential explanations for this, which are discussed in Section 4 of this response. Clearly, potential markets for the demand side include the energy market, rewards through the CPM and more fully exploiting the demand side potential to provide Ancillary Services. This section considers some of the experiences of overseas markets² in these three areas. It should also be noted that the application of demand side transmission charging arrangements (specifically those that target demand side TUoS at limited periods of peak demand) play a significant role in reducing consumer costs where they provide benefits to the system in terms of deferred network investment.

3.1 SEM

Outside of the SEM (i.e. via an out of market DSM) a DSP can choose not take demand at times when it anticipates SMP will be high. This would, subject to the reduced load displacing the marginal generating unit (i.e. MW in the marginal price band) reduce the shadow price. Intuitively this should reduce SMP – subject to the operation of Uplift in that Trading Period. Within the SEM, ex-ante price signals are solely indicative, and thus any decisions on DSM are based on anticipated prices. Thus, for an out of market response to work effectively, the DSP would need information on the expectation of ex-post SMP on which the DSP can make a decision to reduce demand as there is no firm ex-ante price to respond to. Typically such out of market response would be undertaken in conjunction with a retailer as an element of risk management.

For a DSM entity, there is thus the chance that its actions reduce SMP to a point where it would have taken demand, or more simply the anticipated high price never eventuated regardless of any actions it took. In the first of these circumstances, the unilateral actions reducing SMP, the customer avoids a high price, but all other purchasers free ride on its actions through the reduction in SMP.

² SEM-10-052 QUESTION 4.

For any DSP that engaged in DSB within the existing SEM rules the situation is even more complex, but in principle a DSB³ should be scheduled / despatched off when SMP is less than its DSU bid and receives compensation at SMP.

Under the SEM a DSU would submit a bid ex-ante which should indicate the price at which it would rather not take demand than purchase energy this will consist of PQ pairs as well as a Shut Down price. The DSU would be dispatchable by the TSOs in the circumstances it was deemed to be economic, consistent with the RCUC regime. In such circumstances the Market Schedule Quantity is not determined by the MSP software rather set to be equal to the value of Scheduled Demand Reduction⁴ and thus the DSU paid at SMP for each MWh of demand reduced. In addition the DSU receives CPM payments at all times based on a level of availability calculated as the offered demand reduction i.e. the DSU receives a CPM reward as it is providing its “own” capacity⁵. In addition the DSU may be entitled to a make whole payment in the circumstances where payment at SMP isn’t compensatory given differences in despatch and scheduling outcomes i.e. if ex-post SMP was too low compared to the DSU’s bid.

3.2 England and Wales Pool

3.2.1 Overview

Operating from 1990 to 2003 the E&W Pool had the following characteristics:

- Gross;
- Mandatory;
- Explicit Capacity Payments;
- Ex-ante price setting (Pool Purchase Price (PPP) = Energy Price + Capacity Payment) was firm day ahead; and
- Schedule vs dispatch price outcomes gave rise to “Uplift” and Pool Selling Price (PSP) = PPP + Uplift which was the price paid by suppliers.

The main difference between the SEM and the E&W Pool is the timing of the energy price setting (ex-ante vs ex-post) – and thus the way in which out-turn demand influences SMP. The “Pool” was a dual settlement system – utilising a day ahead price curve, and out-turn prices. In other key respects (notably the explicit payment of capacity) the designs are similar.

It should also be noted that the demand transmission charging arrangements (the Triad) also had a significant impact on demand side usage patterns at times of forecast peaks in demand.

³ NB Synergen was advised by SEMO that at present there are no DSB units within the SEM.

⁴ See T&SC 5.163 onwards.

⁵ SEM-10-052 QUESTION 2.

3.2.2 Energy Market

Initially the Pool lacked any meaningful demand side bidding arrangements. Its ex-ante price setting allowed for DSM to occur (essentially as demand shedding and/or shifting) as the ex-ante price was firm. However, this price response had no impact on the market price – essentially there was no price elasticity in the mechanism. If prices are firm ex-ante, this arrangement works. In real time markets (such as the NEM in Australia) and in ex-post markets the objective of demand side bidding into the central market becomes one of peak price avoidance – essentially stating that the DSB unit would rather be dispatched off than take at a certain price. The experience of the Pool was that:

- (a) demand side elasticity was evident at certain PPP bands – this was essentially an out of market (not bid in) response; and
- (b) DSB units bid in at prices where they were unlikely to be scheduled and dispatched down / off but at prices that allowed them to avail themselves of capacity payments.

3.2.3 Capacity Market

Pressure from large industrial customers led to the development of the DSB scheme by the mid 1990. This allowed DSB units access capacity payment rewards – essentially the DSB unit was allowed to reflect its own VoLL within the Capacity Mechanism (in return for shedding load when price hit that level). DB units received Capacity payments when available but not scheduled. The workings of the mechanism were such that the higher the bid-price, the lower the CPM payment – essentially the demand side bid price was a substitute for the value of VoLL in the CPM calculation, so demand side bidders took a specific disconnect price, rather than the market wide assumed value represented by VoLL.

3.2.4 AS Market

The old E&W trading arrangements also involved the competitive procurement of AS from both generation and demand side providers. Over time, these arrangements became increasingly competitively based (through a tendering and contracting process with the Grid). The demand side played an important part in this, providing frequency response, reserve, reactive power and constraint alleviation contracts. This was based upon clear statements of Grid requirements, and the publication by NGC of both indicative prices and likely utilisation levels – for example the payment for response at specific levels of frequency, and the payments associated with being called at different frequency levels.

3.3 BETTA

Post 2001, the E&W Pool was replaced by the NETA arrangements – now expanded to include Scotland as BETTA. These arrangements are primarily bilateral, and as such the demand side may actively trade ex-ante. The arrangements include a mandatory balancing mechanism. This allows both generators and DEB units to submit bids to vary up or down from their contractual position. Accepted bids, from generators and DSB units are paid on the same basis – specifically DSB units are

paid their bid price for demand not taken. The nature of imbalance pricing within the Balancing Mechanism serve to incentivise with and accepted bids (as any deviation would be subject to imbalance price exposure, whereby the costs of deviation would exceed the payment for demand reduction).

3.4 Other Markets

Most liberalised wholesale energy markets seek to incorporate some form of demand side response. Norway operates within the NordPool market. Whilst there is voluntary ex-ante market, demand side participation within it is limited, although up to 20% of demand is considered to be price responsive⁶. However, it is estimated that up to 70% of reserve contracts are held on demand side response⁷.

In the Spanish pool there is priced bidding on the demand side as well as on the supply side. While most retailers bid in as price takers to cover their contracted positions, hedged with CfDs across the pool, a small amount of demand is price-sensitive and can set the SMP.

The NEM in Australia is, like the SEM, a single settlement market with ex-post pricing (although pricing is significantly closer to real time than the SEM). It has no explicitly capacity mechanism, and prices are thus significantly more volatile than in the SEM. Whilst provision has existed for demand side bidding, the incentivised for load to become involved have not led to meaningful levels of participation. Concern over this, including consideration of the role of Network Service Providers, was subject to a major review⁸ in 2008.

Whilst within energy market demand side participation has not got off the ground, the volatility of price has given rise to out of market solutions. Whilst the details of these are confidential between the parties involved, the general principle is one of bilateral contracting between Retailer and large customer to allow the Retailer to instruct load shedding at times when price is anticipated to be high. This would potentially reduce SMP, and this would impact a retailer's un-hedged purchase cost from the pool. What this does seem to illustrate is that:

- DSM does not need to be within the market;
- DSM does not require a firm ex-ante price;
- it requires price/volume exposure on the retailer/demand side;
- there are customers for which such offerings may be attractive; and
- it requires commercial innovation.

⁶ "Load Response in the Norwegian Balancing Market" (Statnet). Referenced in "Demand Side Bidding in Wholesale Electricity Markets" (The Brattle Group) -

<http://www.brattle.com/documents/UploadLibrary/Upload732.pdf>

⁷ "Demand Side Bidding in Wholesale Electricity Markets" (The Brattle Group) -

<http://www.brattle.com/documents/UploadLibrary/Upload732.pdf>

⁸ SEM-10-052 QUESTION 3 and QUESTION 5: Material relating to the AEMC review can be found at: <http://www.aemc.gov.au/Market-Reviews/Completed/Review-of-Demand-Side-Participation-in-the-National-Electricity-Market.html>.

In the US, demand side mechanisms vary by market. Some, such as PJM involve explicit within market payments for load reduction, whilst others concentrate on formalised load reduction programmes. The Brattle Group paper referenced in this response contains a summary of the operation of various markets within the USA, which the RAs may wish to review.

4 Requirements for successful DSP

4.1 Observations from other markets

Whilst Synergen has not conducted an extensive review of the multitude of DSB arrangements, we observe that:

- DSB within the central market requires an incentive other than price avoidance to make it worthwhile. The arrangements for DSB in BETTA thus appear more successful in this regard compared to the SEM, E&W Pool or the NEM;
- DSB should be able to set price;
- Demand needs to be dispatchable;
- Demand side response (be that DSM or DSM) requires prices at relatively high levels (for example price response in the E&W pool to ex-ante prices occurred at prices in the range 70 to 120 £/MWh range in the mid 1990s). In the NEM, the call off prices for DSM between retailers and customers were in the hundreds of \$/MWh range. Markets where prices are flatter, and lower, will tend to not economically justify DSM;
- The type of customer that suits DSB / DSM is one which has processes that are both (a) energy intensive and (b) operationally flexible i.e. where energy is a significant proportion of production costs and the customer can either reduce load for a period or choose to re-schedule its processes. It is likely that some markets (GB, and the Australia) have more customers that fall into this category than the SEM;
- Reduction has to be real, and measurable. This requires both appropriate metering and commercial incentives to act as dispatched.

4.2 Aspects of the SEM that effect the role of DSB / DSM at the moment

Our assessment of the T&SC payment arrangements for DSUs within the SEM suggests that the payments available are more attractive than in some other markets. Payments are made at SMP when for demand reduced (unlike the old E&W pool), and this allows at least the SRMC of load shedding through the T&SC to be rewarded (and, as with generators the prospect of IMR when $SMP > bid$). Unlike BETTA which is a firm arrangement (i.e. there are direct exposures for deviations which could exceed potential revenues for complying with an instruction). The non-

firm nature of the SEM reduces⁹ these risks i.e. if a DSM does not act on an instruction it would lose revenue. In short, a DSU can capture SMP payments, and CPM payments where available. Comparatively the SEM is a generous arrangement.

The area where revenue streams to a DSU appear to be less developed are with respect to Ancillary Service provision – and DSU involvement in this would appear to be contingent on the prices for Ancillary Services being both at economic provision levels, and subject to either explicit market arrangements, or an enhanced and open service tendering regime.

Based on the observations above, we believe that demand side response in the SEM is limited (and in terms of DSB non – existent) for a range of reasons, **but not the T&SC arrangements**, which include:

- very limited number of energy intensive customers that have flexible demand;
- existing TSO schemes are more attractive;
- the level and lack of volatility of pool prices, resulting from:
 - Restrictive bidding regime – SRMC limits energy prices;
 - Uplift mechanism smooths out SMP spikes; and
 - Low energy price cap.
- lack of explicit payment for energy reduction bid in merit (other than the CPM rewards which may not be sufficient and subject to significant regulatory risk);
- ex-post pricing means that the avoided price is uncertain but make whole payments would seem to offer some protection; and
- demand has low levels of exposure to pool price as Retailers seek to be highly contracted.

Synergen believes that the creation of an ex-ante price would only address the uncertainty of price barrier and it may be that education regarding the SEM regime would also address this concern. Whilst we remain open to discussion on the merits of seeking to introduce mechanisms to better reflect in a dynamic manner the elasticity of demand, we are of the view that the barriers to DSB are such that an ex-ante price would not encourage significant levels of DSB given other aspects of market structure and design including the regulatory risks. Given the RAs Decision Making Paradigm we believe that there would need to be substantive evidence produced to demonstrate the scale and likely benefits of DSB to customers should an ex-ante market be developed for this purpose.

⁹ The extent to which this risk is reduced depends on the way that any short notice re-declaration penalties would apply to a DSU.

4.3 Pre-conditions for DSB participants

Within any ex-ante market that may be developed, or under the existing single settlement ex-post regime Synergen believes that a level playing field between generator participants and any DSB is required and the following T&SC requirements should continue to apply:

- Demand reduction is measurable (although metering standards may not necessarily be exactly the same as for gensets);
- DSB units would be declared available in a manner comparable to generating units; and
- DSB units would be capable of dispatch by the TSOs.

Furthermore, Synergen believes that DSB units should be subject to the BCoP consistent with generator i.e. bidding at avoidable cost.

Whilst we have previously commented on DSB within the energy market, we believe that there is a lack of consideration of out of market issues. Thus, if the economic drivers for DSB exist in the SEM it is not the T&SC arrangements themselves that prevent demand side response – out of market solutions would develop.

5 Specific issues raised in the consultation paper

Synergen's response concentrates on the role of the demand side in the wholesale market arrangements. Consequently, we have not sought to address many of the questions specifically posed in the consultation paper. In some areas we have made reference to specific questions in the consultation within the body of our response. There are, however, some questions that fall within the scope of this response and these are commented on in Appendix A.

6 Summary

In summary:

- 1 Synergen is not convinced that ex-ante prices are going to actively promote the growth in DSP - the E&W pool was ex-ante (but no response to actual elasticity) but SEM is price effecting but uncertain (as are all single settlement regimes);
- 2 Further, the reward streams for DSB in the (SEM?) appear to be more attractive than in some of the other markets that we are aware of and have referenced in this paper;
- 3 Synergen believes that there are not is a strong desire for DSB participation from energy intensive customers that have flexible demand either because:
 - there are not such customers in the SEM; and / or

- SEM market prices are not high enough to elicit a demand side response as a result of the SEMs mechanistic nature, structure of generation and its costs, and the explicit CPM mechanism; and
- 4 Synergen considers that there would be merit in exploring further AS opportunities for DSB participants.

Appendix A Explicit Consultation Response

This appendix contains short summary answers to some of the explicit questions set out in SEM-10-052.

Section	Question	Answer
2	1: Do you agree with our characterisation of the four types of benefits that demand side management can provide?	Yes, although there should be reference to its contribution to plant margin requirements.
2	2: Are there other cost savings which you believe demand side management can deliver?	Effective peak demand reduction defers capacity build.
2	3: Are there additional studies and reports (to those listed in Annex B) which you are aware of and believe we should review?	<p>The old E&W Pool arrangements should be investigated and understood. As the arrangements ceased several years ago we do not have links to the historic papers.</p> <p>The RAs should also review the NEM review of Demand Side Involvement of 2008 – there is a link in the paper. This included the Brattle Report referred to in this response, which itself has a number of referenced papers that the RAs should refer to – notably the (limited) involvement of DES in the Norwegian ex-ante market.</p>
2	4: What other insights do you have from your experience of demand side management adopted internationally?	This is included in our response. We have not sought to be exhaustive in our reference markets – some are markets where our personnel have had direct experience, and have been included in our response on that basis.
2	5: Are you aware of other quantitative findings from international experience which you believe are important for us to capture and consider?	There is some reference to this in the body of the response. However, the evidence of the price points at which demand was elastic in E&W are based on historic recollections of NGCs view at the time – and not referenced in documentation that we have available.
2	6: Do you agree with our identified drivers of future value for demand side response/management? Are there any additional drivers we should consider?	The drivers are reasonable as set out, although we are unconvinced about the ability of significant levels of demand side response to act in a flexible manner – notably short term response to dispatch instructions. Whilst constraint costs will increase (and we note that this is the RAS belief) relieving them through demand side response appears unrealistic based on our observations to date.

Section	Question	Answer
3	8: Do you agree with our high level assessment of the potential for demand side management in Ireland by 2020?	We cannot comment definitively on the figures, but it is important to distinguish between what could be flexible, and whether it would act in this manner – and at what price it is flexible. Our feeling is that there is not 2.3 - 4.6GW of flexible industrial and commercial load, so we would suggest the RAs reference these figures and support them. Estimates of SEM load in 2020 are in the range of 10.4 GW at peak demand. If 20% of demand in Norway is deemed to be flexible, this would suggest that estimates may be at the lower bound of the range quoted, unless demand flexibility in the SEM is for some reason higher – and this assumption is not supported in the paper.
4	13: Do you agree with our identified market issues for each specific demand side measure and our proposed remedies to address these?	Do not concur with 4.2.6.3 , as (a) we do not believe that an ex-ante price will necessarily encourage DSB (b) we do not believe regulation is overly restrictive in this regard. 4.2.7.2 – do not concur that an ex-ante price is required for this purpose. We also note that the emphasis elsewhere is on flexibility, and this proposal is targeted at the inflexible. Is this seeking to reward inflexibility? (If so this is contrary to the RAs approach in other areas)
4	14: What are your views on the likelihood and effectiveness of the identified policy options addressing the specified market issue and delivering the desired change?	As set out in the paper, we believe the lack of DSB is more down to factors outside of the operation of the T&SC
4	15: Are there any unintended undesirable consequences that any of the options might create elsewhere?	Creation of a firm ex-ante price will require a fundamental re-evaluation of the entire reward structure of the SEM. It is not considered to be consistent with the SEM high level design, and we do not at this time believe that it could be incorporated within it.
5	18: Have we identified all of the relevant criteria for assessing the individual and comparative merits of the demand side measures?	It is critical that they are all assessed for consistency with the SEM design – which is a fine balance of linked payment streams to generators
5	19: What are your views about our approach to high level assessment of different demand side options?	Do not concur with Table 8 (row 10) – there is no established case for a firm ex-ante pricing being required to deliver DSB.
6	23: Do you agree with our assessment of the relative priorities of different demand side options in developing a 2020 Demand Side Vision?	No – we do not concur regarding the high value classification of demand side response. The reasons are set out in our response, but in short, the incentives already exist and are not taken up. Further, we stress that for this to be realised any arrangements to reward the demand side must be based on equitable and value reflective principles.

Section	Question	Answer
6	25: Do you agree with our proposed high level 2020 Demand Side Vision as described above?	No. Our assumption is that by 2020 the SEM will have changed significantly from its present design as changes required to deliver regional integration will require a re-evaluation of, and changes to, key elements of the existing arrangements.