Market Power Implications of the Planned Balancing and Load Following Ancillary Service Market Arrangements

30 September 2011

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1. Executive Summary

Market Reform has been engaged by the Independent Market Operator (IMO) to assess the risk that market power could be abused under proposed new balancing and load following ancillary service market arrangements due to be implemented by April 2012. The assessment has been conducted by Dr. Brendan Ring, who advised both the Electricity Reform Implementation Unit (ERIU) and the IMO during the establishment of the current market. The assessment was based on draft design documents and rule amendments. No procedures were provided or reviewed in this assessment.

Overall Assessment

While no absolute statement can be made as to whether individual participants will exercise market power, it seems unlikely that a market participant could freely exercise market power to the extent of significantly harming competition. Given diligent market compliance and surveillance monitoring it seems likely that such behaviour would be detected. The very potential for detection and potential public identification and/or imposition of financial penalties should mitigate the risk of market power being exercised. The market power mitigation features of the new balancing and load following arrangements are appropriate to allow the detection of material market power abuses. Lesser or very infrequent market power abuses may occur and may not be detected but are less likely to have a material impact on the market.

Market Power and Its Mitigation

Generators can exercise market power by withholding capacity from the market, either by declaring it unavailable or by altering offer prices, so as to cause higher cost generating units to set the price. Provided that the profit forgone on the withheld capacity is less than the profit increase on the generator's remaining capacity then the generator can increase its total profit. Similar strategies can be used to decrease prices in the market to discourage new entry, though this is not considered a viable strategy in the context of the WEM given that most generator revenue is secured via the reserve capacity mechanism and the day-ahead scheduling processes.[1]

Short of breaking dominant generators into smaller companies, the four main strategies for mitigating market power are:

- Minimising the barriers to entry and facilitating competition so as to maximise competitive pressure on dominant generators. Greater contestability and greater transparency of information are examples of this.
- Imposing contracts on dominant generators which fix their earnings on contracted capacity, reducing the potential profit gains from withholding capacity.
- Set provisions in the rules specifying acceptable behaviour and to conduct compliance monitoring relative to those provisions.
- Imposing alternate settlement arrangements on dominant generators such that the revenue they earn in specific situations is capped independent of the market price.

The first three of these methods exist in the new balancing and load following arrangements. The balancing arrangements that operate today use a form of the final method, with Verve being settled for balancing based on a settlement formula specified in the rules rather than at a market price.

[1] A robust planned outage approval process is also important to limit the potential for generators to use such a process to deliberately withhold capacity from the market for the purpose of increasing price.

Assessment of the Potential for Market Power Abuse

A generating company has substantial market power when the competitive constraints imposed on it by its competitors are ineffective in constraining its behaviour. The risk of the exercise of substantial market power depends in the first instance on the extent to which the market is workably competitive. The new arrangements enhance competition by allowing IPPs to compete in balancing and load following. The ability of IPP's to update their balancing submissions after the window has closed for Verve Energy (Verve) to update the Verve Energy Portfolio Balancing Submission will further curb Verve's dominance. To the extent that a market is not workably competitive, then more direct market power mitigation techniques must be used to discourage abuses of market power.

Given the dominance of Verve in the Wholesale Electricity Market (WEM) it may be natural to assume that it has a significant capability to exert market power in the new balancing and load following arrangements. Simple modelling performed in this analysis indicates that the contractual and STEM positions of Verve (and other IPPs) combined with the small and uncertain volumes traded in balancing will substantially limit the potential for market power abuse in the balancing market. This modelling ignored a number of real-world world constraints. As the model was formed from STEM data it assumes as much active trading in balancing by IPP's as is the case currently in the STEM. The balancing market will provide a financial incentive for active IPP participation and participation levels may eventually exceed those in the STEM, though active participation levels may be muted at the commencement of the new arrangements while IPP's gain experience and confidence in the new market.

At the commencement of the new arrangements there might be no more than one competitor for Verve in the provision of load following. Entry by IPP's to this market may not be that difficult, however, placing pressure on Verve to not make the price paid for load following too attractive for IPPs.

If situations arise where competition is inadequate to prevent the profitable exercising of market power in balancing then the SRMC clauses in the rules will apply and should discourage generators from bidding above short-run marginal cost. It is understood that no breaches of the SRMC clause that applies to the STEM have been identified in the market to date. While the SRMC clause may not be the only factor moderating price, and while there can be difficulties in measuring SRMC, the clause still provides a strong disincentive for the abuse of market power. Related limitations on offer price to be applied in balancing and load following can be expected to provide similar disincentives for the abuse of market power. The SRMC clause applied in balancing and the related 'incremental cost' clause applied to the load following ancillary service appear to be appropriate mitigation measures in situations where competition is inadequate. The market may need some guidance, though, as to what constitutes appropriate behaviour, particularly with respect to offers for the load following ancillary service.

Good faith provisions in the rules place additional constraint on participant behaviour. These clauses are generally not direct devices to prevent the exercise of market power, though they do prohibit the abuse of constrained-on and constrained-off payments. They are, however, useful clauses to have when making a case that market power has been exercised.

In the longer term, if Verve's generation remains in a portfolio managed by System Management then the ability to evolve the market and to create more competitive pressures will be limited. Such limitations make the market less transparent and raise the potential for inefficient outcomes that may be perceived as being due to market power, even if actually just a by-product of these limitations. The introduction of the Verve Stand-Alone Facility (VSAF) creates a mechanism by which the market can begin to transition to a more normal relationship between system operator and generator. There is however no requirement for Verve to make use of this feature.

Recommendations

It is recommended that the IMO and ERA review the interactions between: the balancing SRMC requirement (clause 7A.2.16); the requirement that balancing submissions accurately reflect the capability of facilities to be dispatched in the balancing market for a given trading interval (clauses 7A.2.8(b) and 7.A2.9(a)(ii)); and the Balancing Facility Requirements (to be defined in procedures); so as to ensure that a common and consistent interpretation is applied with respect to how facilities that are not committed and which cannot be committed in time to be available for a specific trading interval are to be priced in balancing submissions. The interpretation put forward in this review is that these clauses would allow such off-line facilities to be offered at the maximum price cap provided this was recognised in the interpretation of the SRMC clause and in the Balancing Facility Requirements.

The use of a single ramp rate per trading interval, particularly for the Verve Energy Balancing Portfolio may be restrictive. The materiality of this is unclear – the level of trade and uncertainty in balancing may not be so great as to conflict with half-hour ramp limits – but it would be worth monitoring the effectiveness of this approach during the early operation of the new arrangements.

It is recommended that the information made available to the market be increased so as to further increase the transparency, at least to the extent that the release of such information is not detrimental to competition or to the commercial interests of participants. If meter/SCADA data for individual generating units were published then participants would have a clearer basis for understanding the market outcomes. Improved information on outages information on the system's reserve margin by fuel type (e.g. assuming maximum availability of non-liquid fuels and separately assuming the maximum use of liquid fuels) would aid participants in predicting future behaviour of the balancing market. The level of Verve Energy Backup Load Following could also usefully be published. The required data is provided by System Management to the IMO.

Compliance monitoring should consider the impact that participant unit commitment decisions have on balancing prices. In particular, it is recommended that if Verve makes use of VSAF's that market surveillance monitoring assess the performance of Verve based on its entire generating portfolio without distinguishing between VSAFs and the Verve Energy Balancing Portfolio. This will increase the likelihood of detecting price manipulation achieved through the commitment timing of VSAFs.

If Verve does not seek to use the VSAF feature under the new arrangements then there may be merit in requiring the use of VSAFs. This would force Verve to begin to operate more like other participants in the market and would remove one barrier to evolving the market to a point where Verve is treated like any other participant. Any review of this matter might be conducted after the market has operated for a year and once the future of any restrictions on Verve and Synergy to apply beyond 1 April 2013 are known.

2. Introduction

Market Reform has been engaged by the Independent Market Operator (IMO) to assess the risk that market power could be abused under proposed new balancing and load following ancillary service market arrangements due to take effect in April 2012.

This review has been conducted by Dr. Brendan Ring of Market Reform. Dr. Ring advised the Electricity Reform Implementation Unit (ERIU) during 2003 and 2004 on the design of the market and was a contributor to the market rules. He advised the IMO during 2005 and 2006 with respect to implementing the market.

3. Scope

The IMO has sought advice on:

- The likelihood, under the new arrangements, of the exercise of market power resulting in inefficient market outcomes.
- The potential outcomes and the worst case scenarios in the event that market power is exercised under the new arrangements.
- The appropriateness of the proposed methods of dealing with such risks under the proposed new arrangements.
- Any amendments or changes to the proposed design and/or proposed rules to deal with the identified risks.

The IMO has advised that 'market power' for this exercise should be considered as the ability to control prices or hinder competition in a market. The IMO's aim is to have cost effective arrangements in place that mitigate the likelihood and consequences of exercise of any market power issues in the most efficient overall manner for the Wholesale Electricity Market (WEM).

4. Approach to this Review

The final document versions reviewed were:

- 'Extract of Proposed Amendments to the Wholesale Electricity Market Rules ', 23 September 2011.
- 'New Balancing Market Proposal – Design Details', 23 September 2011.

A number of earlier versions of the market design documentation and the draft amending rules were reviewed in the course of this work. A number of recommendations made in drafts of this report have been reflected in the final documents reviewed.

No procedures have been provided or reviewed as part of this work.

Industry representatives, largely drawn from the Market Advisory Committee, were interviewed in the course of this review. The purpose of these interviews was to get an idea of perceptions and concerns within industry that may be relevant to this review. Relevant points have been incorporated into the discussion and conclusions.

5. Market Power and Market Power Mitigation

5.1. When is Market Power a Problem?

The scope of this work has defined market power in terms of a participant's ability to control price or hinder competition.

While a participant may have some ability to exercise market power, this of itself may not justify intervention in the design, structure, or operation of the market so as to curb that ability. Regulatory interest in market power tends to be limited to 'substantial market power'. A firm has substantial market power when the competitive constraints imposed on it by other firms are ineffective in constraining its behaviour. The duration of these conditions is an important consideration. If new entry to the market is relatively easy then this will curb the degree to which a dominant firm possesses substantial market power. The dominant firm cannot exercise its market power in the short term without risking a reduction in its market share over the long term.

There is no such thing as a perfectly competitive electricity market. The complexity of power systems, uncertainty about the future, the diverse range of technologies involved, and the long lead-times for investment all place limitations on competition. A common compromise is that the market should be 'workably competitive'. The goal of regulators and market designers should be to make competition workable, rather than perfect.

The risk of the exercise of substantial market power depends in the first instance on the extent to which the market is workably competitive. To the extent that a market is not workably competitive then more direct market power mitigation techniques are required to provide an additional disincentive for the exercise of market power. Care must be taken in implementing such direct mitigation techniques so as not to have unintended outcomes on market efficiency. It is important to drive an appropriate balance between market-based arrangements designed to achieve efficient pricing and investment levels versus arrangements aimed at mitigating market power.

5.2. The Exercise of Market Power

The primary methods by which a generator can exercise market power are: [2]

- Withholding capacity – either by not making it available or by pricing it out of the market – so as to drive prices upwards, usually with the aim of increasing the generator's profits. This approach can also be used to increase constrained-on payments for a generator forced to run by a transmission constraint; or
- Under-valuing generation so as to drive down prices while increasing the generator's market share. While this can create a loss for the generator, the aim in this case is usually to discourage investment by competitors.[3] This is a short-term strategy that would tend to be employed to delay new investment. The losses created by the strategy make it difficult to sustain in the longer term. This approach can also be used to increase constrained-off payments for a generator forced to not run by a transmission constraint.

The mechanics for achieving these outcomes need not be complicated. Energy can be withheld from the market through declaring an outage or by simply increasing the offer price beyond the price at which the market would normally clear. Energy can be under-valued simply by offering it at a price less than it is worth to the generator. [4]

[2] Participation in balancing and load following is limited to generators, hence demand side market power is ignored in this discussion.

[3] Such behaviour may constitute predatory pricing and as such would be unlawful under the Competition and Consumer Act 2010. The reserve capacity mechanism operating in the WEM combined with the small size of the balancing market would make it difficult in practice to discourage new entrants.

[4] The situation is more complicated if multiple participants are simultaneously abusing market power. The optimum strategy of each participant becomes dependent upon the strategy employed by each other participant.

It is incorrect to think that only the largest participants can exercise market power. At certain times or in certain locations[5] situations may arise that allow even a small generator to exercise market power. Under the right conditions and by withdrawing just a few megawatts of energy from the market, a small generator might cause an additional generator to be scheduled, raising the price received by all generators. The small generator will increase its overall profit if the increased profit on its reduced output exceeds the profit forgone on the energy withdrawn from the market. Of course, the frequency or predictability of the conditions that facilitate market power, and the level of gains achievable at such times, may significantly limit the ability of a small generator to take advantage of these conditions.

5.3. The Mitigation of Market Power

The ideal mitigation for market power is to lower the barriers to new entrants and to encourage competition. It is not in the interest of a dominant firm to hold prices above competitive levels if this results in new entry into the market and a decrease in its own market share. The WEM has already reduced barriers to new entry by placing restrictions on investment by the dominant generator, Verve Energy (Verve) and by making participation in the capacity market and the day-ahead energy market contestable. The new balancing and load following arrangements further increase competitive pressures.

Increased competition alone does not make a market workably competitive. It may take many years for new entry and competition to sufficiently impact the ability of a very dominant generating company to profitably exercise market power.[6] Competition can be increased faster by requiring a dominant generator to divest generation assets or by imposing contracts on the dominant generator.

To understand the impact of contracts, consider a market with demand for 1000 MW of energy where all energy is traded through the spot market rather than under contract. A dominant generator can profitably supply 800 MW of the demand, with a number of smaller generators collectively providing the remaining 200 MW. Suppose now that the dominant generator withdraws 200 MW from the market, only offering 600 MW of energy. The smaller generators will need to provide 400 MW of energy and the market price will be higher than it would have been otherwise. If the increase in profit that the dominant generator earns on the 600 MWs it supplies is greater than the profit it forgoes on the 200 MW it does not offer, then it would be better off than if it offered 800 MW of energy to the market. In such a situation the dominant generator has the ability and an incentive to abuse its market power.

Now, suppose this dominant generator were contracted to supply 90% of its capacity, or 720 MW, under a contract which returned it a fixed energy price irrespective of the market price. The generator will want to get at least 720 MW of energy scheduled in the market to cover its contract position. It therefore has only 80 MW of uncontracted energy with which it can profitably manipulate the market price. Suppose it withdraws 30 MW of this from the market. It is scheduled to provide 770 MW, with 720 MW funded under the contract and 50 MW funded by the market. The smaller generators only need to provide 230 MW or 30 MW more than they would if no energy had been withdrawn from the market. While the price may rise, it will not rise by as much as it did in the case without the contract. It is therefore a lot less likely that the increased market profit on the 50 MW of energy that the dominant generator sells through the market will offset the profits forgone on the 30 MW not made available.

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[5] Locational factors are important in markets where prices vary by location. This is not the case in the WEM, with a single price applying at all locations. The exercise of market power due to locational effects is limited to the manipulation of constrained-on and constrained-off payments. While the current 'unconstrained grid' concept is under review any changes to the design stemming from that would be a number of years away.

[6] At the commencement of the WEM Verve controlled over 80% of the generation capacity. This figure is forecast to drop to around 55% during the 2012/13 financial year. The ERA has suggested that without significant load growth Verve's market share is unlikely to drop below 40% before 2020 (see 'Prohibitions and restrictions on Synergy and Verve Energy under the Electricity Corporations Act 2005', ERA Issues Paper, 25 January 2011).

The imposition of a contract on the dominant generator increases the competitive pressure imposed by the other smaller generators in the market. This is the concept behind the vesting contract originally imposed on Verve Energy (Verve) and, presumably, on the more conventional energy contract that has replaced it.

The potential impact of market power can be reduced by placing limits on price levels. Such limits can be applied to the entire market or can be targeted to apply to specific participants in specific circumstances. Care must be taken in imposing such limits as they have the potential to restrict competitive prices at peak times, discouraging new entry and hence competition. Some markets have pre-set price caps triggered under prescribed conditions, with the subject generators paid the lesser of the market price and these caps. This type of approach can be used to address so called 'local market power' issues, such as where a transmission constraint gives generators dominance in one part of the power network. In some respects the method by which Verve is settled under the existing balancing arrangements has this form – it receives a payment based on a formula defined in the market rules rather than being settled based on price it can directly influence.

Mitigation can also be achieved by defining acceptable behaviour within the market rules with the potential for penalties being imposed if unacceptable behaviour is observed. The threat of this alone can be a very powerful disincentive to abuse market power. The limitation of such forms of monitoring is that they must be conducted on an on-going basis, are resource intensive and a substantial amount of evidence can be required to prove that market power was being abused.

The market power mitigation measures used in a market need to be applied appropriately in the context of the market. Market power mitigation measures can undermine the efficiency of the market if poorly designed or targeted.

6. The Context of the WEM

6.1. Introduction

The following subsection presents a brief history of the WEM. This serves to give some context to the types of market power mitigation measures used in the WEM. This is followed by a brief summary of the market as it exists today and then a summary of the new arrangements.

6.2. The Evolution of the WEM

The earliest concepts of the WEM were developed by the Electricity Reform Task Force, established in August 2001. The formal rule development process began in mid-2003. Rule development progressed on the basis that Western Power would be separated into a generating company, a retail company, and a transmission company with a ring fenced system management function. A near final version of the market design developed at that time explicitly contemplated all market participants operating in a day ahead Short Term Energy Market (STEM), all of them submitting resource plans, all of them submitting balancing data, all of them being dispatch on the same basis by System Management (with resource plans being revised during the day), and all participants having revenue quality metering.[7] System Management was to maintain the capability to dispatch the market based on balancing submissions.[8] Ancillary services were to have been provided under contract and, where possible, on a contestable basis. Instead of a reserve capacity mechanism run by the IMO, System Management was to have run a tender for 'available capacity'. A market rules panel was to have been an independent body reporting to the Industry Minister. The only special treatment of what is now known as Verve would be that it would be subject to a vesting contract developed independent of the market rules.

[7] Draft Detailed Market Design, Version 2.0, Electricity Reform Implementation Unit, 11 February 2004.

[8] An early version of the detailed design called the tool to do this the 'Balancing Engine'.

In early 2004 an initial attempt to divide up Western Power failed. Consequently, an alternative 'interim' market design was put in place. It was considered inappropriate to have what is now Verve participating like any other participants when it was part of the same company as System Management. The following changes were made:

- IPP's would operate as per the original design but System Management would schedule Verve directly and would use Verve facilities to balance the market.
- The IMO took over the management of capacity (renamed as Reserve Capacity) and the market rules panel.
- Many of the metering requirements were watered down – consequently Verve facility meter data is actually based on SCADA data aggregated to a portfolio level.

At a very late stage of rule development, and at the instigation of an independent power producer (IPP), a clause was added to the rules requiring prices in STEM submissions to be based on short run marginal cost where market power was an issue.

The interim design was intended to provide a low cost path under which a market could commence and allow new entrants into the market. This left the option open for more substantive changes to be made after market start if Western Power were to be separated as originally planned.

As it happens, by the time the market commenced in November 2006, Western Power had been separated. While some minor market design changes were made as result, the market has been operating for 5 years on what is essentially an interim design that assumed that Western Power still exists.

In the context of this history, the current 'evolution' in the market design to make balancing and load following more contestable can be seen as step towards what the market was originally planned to be.[9]

The interim design avoided many of the costs that would have been incurred in a full market implementation. Keeping costs low may be desirable for those trading bilaterally with minimal involvement in the market. But the avoidance of these costs limits the ability for the market to gain further benefits. If Verve's generation remains in a portfolio managed by System Management and if the market continues to have limited scheduling tools that do not allow more sophisticated pricing of services then the ability to evolve the market and to create more competitive pressures will be limited. These limitations make the market less transparent and raise the potential for inefficient outcomes that may be perceived as being due to market power.

Stated another way, if the WEM moved to a more standard separation of market roles then many of the market power mitigation features of the WEM could be restated in less restrictive forms.

6.3. The WEM as it operates today

The WEM operates based on a trading day of 48 half-hour periods with the trading day commencing at 8 AM.

Participation in the WEM is voluntary. However, a Reserve Capacity mechanism operated by the IMO provides revenue to generators and demand side energy providers in return for accepting obligations to participate in the market. The failure of participants to meet their Reserve Capacity obligations exposes them to financial penalties.

[9] Though significantly, the new balancing arrangements determine the least cost mix of generation to serve the entire trading interval demand. The original balancing arrangements only determined the least cost mix of generation to serve the change in demand relative to the energy scheduled bilaterally or via the STEM. The newer approach is more flexible and efficient, as it allows lower cost energy not previously scheduled to displace more expensive energy scheduled a day ahead. The participant with displaced energy actually profits from this as it can purchase energy for less than it costs to produce itself.

Most energy is traded bilaterally. Ahead of the trading day, generators register their level of bilateral trade with the IMO. A day-ahead Short Term Energy Market (STEM) operates for each trading interval of the trading day to facilitate incremental trade around the established bilateral positions. This market establishes a STEM Price for energy in each trading interval with these prices used to settle trade in the STEM. As most energy is traded bilaterally only a small volume of energy is settled through the STEM.

Participants that supply power can broadly be categorised as Verve and the independent power producers (IPPs). IPP's must formulate resource plans which describe how much energy they will provide from each of their facilities so as to deliver their scheduled energy. Their resource plans indicate when they will turn on facilities, when they will turn them off, and how much they will generate.

Actual demand in each trading interval of the trading day will differ from that assumed in the STEM. Balancing processes exist to maintain the balance between supply and demand over each trading interval in the trading day. Load following serves to keep supply and demand in balance second-by-second within each trading interval.

A true market for balancing and load following does not currently exist in the WEM. Balancing and load following, and other Ancillary Services, are delivered through System Management calling on the capacity of Verve.[10] System Management dispatches Verve's facilities based on a confidential procedure developed between System Management and Verve though subject to IMO approval. This is why Verve does not submit a resource plan – it is effectively treated as a single resource which supplies all demand in the market not otherwise served by IPPs.

Verve is funded for its balancing service under a rules based formula. Participant's that deviate from their day-ahead position face a balancing price. The balancing price is based on what the STEM price would have been given the actual demand, this price being called the Marginal Cost Administered Price (MCAP). Participants who cause Verve to provide more energy are charged a Downward Deviation Price (DDAP) greater than MCAP while participants who cause Verve to supply less energy are paid an Upward Deviation Price (UDAP) less than MCAP. There is no direct relationship between the net amounts that participants pay for these deviations and the revenue that Verve receives for balancing and load following. Consequently a settlement imbalance is created which is socialised amongst purchasers.

The current balancing and load following arrangement came about because:

- It kept the market design simple and relatively inexpensive to implement.
- It minimised the change required in the physical operation of the power system relative to the situation prior to the Western Power separation.
- Verve facilities are not generally metered making it more natural to treat it as a portfolio. SCADA data is aggregated to portfolio level and used in place of meter data.
- It countered Verve's dominance in the market. Verve's offers into the STEM must be based on short-run marginal cost, while System Management controls the scheduling of Verve's facilities.

[10] The rules do allow for System Management to issue dispatch instructions to other participants where necessary, and to contract other participants to compliment Verve in the provision of Ancillary Services. It is understood that tenders for load following ancillary services have been unsuccessful in securing supply, this principally being due to the IPPs considering the technical requirements too onerous, particularly a requirement that their load following capabilities be symmetric with respect to increase and decrease load following. The new balancing arrangements address this concern by allowing increase and decrease load following to be offered independently.

6.4. The Revised Balancing and Load Following Ancillary Service Market Arrangements

The draft design of the market due to operate from April 2012 includes modifications to many features of the market. However, the key changes, and the ones focused upon here, are to balancing and load following.

The STEM will operate more-or-less unchanged. IPP's will continue to submit resource plans with System Management continuing to schedule generators within Verve's portfolio. Verve now has the option to break generators out of this portfolio and to operate them as Verve Stand-alone Facilities (VSAF's). System Management will not schedule VSAF's. Instead, Verve must submit a resource plan for them. Nothing in the new market design requires Verve to use VSAF's but if it wishes to use this feature then it can only do so with the IMO's permission, only if System Management does not believe it will interfere with System Management's functions, and only after a trial period. A facility accepted as a VSAF cannot be returned to Verve's portfolio subsequently.

Balancing will be contestable. Balancing will not just schedule an increment of generation to cover increased or decreased demand; rather it will reschedule all generators in order of cost. Thus even if demand is unchanged in balancing, a more expensive generator could be displaced by a cheaper generator. All generators, including Verve, will be required to make balancing submissions. These submissions will specify offers for increased or decreased generation relative to resource plans or Verve's portfolio schedule. The prices specified by generators in balancing submission will be allowed to be over the same range as prices in the STEM. The price limits are reviewed annually but are currently between -$336/MWh (the minimum STEM price) and +$336/MWh (the maximum STEM price), or +$522/MWh (the alternative maximum STEM price) for liquid fuelled facilities.

Load following ancillary service (LFAS) will also be contestable. While balancing provides for the matching of supply and demand over the trading interval, LFAS serves to keep supply and demand in balance moment by moment. Upwards LFAS capability is understood to be a range of capacity above a generator's nominal schedule in which it can be moved up or down automatically. Downwards LFAS capability is understood to be a range below a generator's nominal schedule in which it can be moved up or down automatically. A generator can offer to provide Upwards LFAS, Downwards LFAS or both. The offer price for each type of service is also called an enablement price. The IMO determines a merit order for load following and determines clearing quantities based on required quantities specified by System Management. A clearing price for each of upward load following and downward load following is determine by the IMO. The IMO provides details of the LFAS providers to System Management.

LFAS is scheduled over a six-hour time horizon but different LFAS providers may be scheduled in different trading intervals.

Verve is the load following provider of last resort. Verve will be paid for this service.

The new arrangements allow for updates of balancing submissions. Table 1 illustrates the interplay between load following, balancing, the gate closures, and the horizons during which services are required to be delivered.

Table 1: Gate Closure Times

LFAS Gate Closure	Balancing Gate Closure (Verve Portfolio)	Balancing Gate Closure (IPP, VSAF)	Balancing Interval	LFAS Selection Horizon
	6 PM	6 PM	10 PM – 8 AM (34 hours)	
9 PM	10 PM	12 AM	2 AM – 8 AM (30 hours)	2 AM – 8 AM (6 hours)
3 AM	4 AM	6 AM	8 AM – 8 AM (24 hours)	8 AM – 2 PM (6 hours)
9 AM	10 AM	12 PM	2 PM – 8 AM (20 hours)	2 PM – 8 PM (6 hours)
3 PM	4 PM	6 PM	8 PM – 8 AM (12 hours)	8 PM – 2 AM (6 hours)

At 6 PM each day all participants must provide a balancing submission covering the 36 hour period from 8 PM on the current trading day to 8 AM at the end of the following trading day. This is understood to provide a base set of data for initial forecasting for the next trading day.

A number of cycles of re-submission of data follow. Consider the events for scheduling balancing and load following over the 2 AM to 8 AM horizon.

- By 9 PM, participants registered as LFAS providers and wishing to provide the service for the period 2 AM to 8 AM must have submitted LFAS submissions.
- Based on this data the IMO determines the load following merit order and determines how much LFAS is provided by each participant. Prices are loss factor adjusted in forming this merit order.
- By 10 PM Verve may issue a revised balancing submission for the period 2 AM of the current trading day until 8 AM at the end of the next trading day. Energy required to be scheduled to allow ancillary services to be provided will be priced at the minimum STEM price while energy required to not be scheduled will be priced at alternative maximum STEM price.
- IPPs and VSAF can submit revised balancing data for a further two hours until midnight. This feature exists to allow IPPs an ability to react to forecast price changes caused by changes in the balancing submission of the Verve portfolio. Verve can also update its portfolio balancing submission up to this deadline in the event of a forced outage.
- The IMO develops a new balancing merit order factoring in the revised Verve balancing submission while also adjusting IPP and VSAF balancing submissions to account for any load following they must provide. Prices are loss factor adjusted. Load following that requires generation to be kept in the schedule are priced at the minimum STEM price while load following that requires generation to not be scheduled are priced at the Alternative Maximum STEM price.
- After gate closure System Management uses the balancing merit order to modify the dispatch for the six hours from 2 AM. If System Management runs short of scheduled load following capacity then Verve is the default supplier.
- Provisions exist for Verve to further update its balancing submission if a forced outage would force it to run on more expensive liquid fuels.

Balancing prices are determined after the event based on the actual balancing quantities served.

During the course of the day the IMO publishes System Management's forecast of the balancing required and the IMO's forecast balancing price and provides forecast outcomes and anonymous aggregate supply curves[11] to individual participants. It is understood that the IMO intends to provide a rolling update of this data every half-hour. This information is to aid participants in making balancing submissions.

7. The Potential Outcomes of Market Power

7.1. Introduction

This section explores, in a general sense, the question posed in the scope of what the potential outcomes and the worst case scenarios are in the event of market power being exercised. The section begins with an exploration of the extent to which market power can be exercised within a simple model of the balancing market. The potential for market power abuse in load following is discussed qualitatively. The load following ancillary service will be a much smaller market than the balancing market. Subsequent sections explore the implications of features overlooked in this analysis.

7.2. The Potential for Abuse of Market Power in an Ideal Market

A simple analysis has been conducted of how profits and balancing prices could be moved by generators in the WEM exercising their market power.

For a given trading interval, the model employs a single market supply curve derived from actual STEM portfolio supply curves. Loss factors and demand-side bidding are ignored.[12] This single market supply curve is used in the model as both the STEM portfolio supply curve and as the balancing merit order. The use of STEM data means that this model assumes that the level of active trading in balancing is the same as that in the STEM.

Two points were identified on the market supply curve based on actual market data – the point on the curve at which the STEM clears and the point at which the balancing market clears. The latter point defines the balancing price. For each generator, any offers scheduled between these two points represent the volume it trades in balancing. If demand has increased relative to the STEM solution then these volumes are positive and the generator will be paid the balancing price for any energy it supplies in this range. If demand has fallen relative to the STEM solution then these volumes are negative and the generator must pay the balancing price for reducing its supply of energy in this range.

The model simulates the degree to which each generator can exercise its market power in the balancing market in the absence of any market power mitigation measures. Selecting each generator in return, it incrementally reduces the energy that generator makes available for balancing, recording the impact this has on the balancing price and on the generator's profit. When the market requires increased generation then this can be made unavailable by increasing its offer price. When the market requires decreased generation then this can be made unavailable by decreasing its price. The model identifies the optimum quantity of capacity to withhold from the balancing market so as to maximise the generator's balancing market profit.[13]

The model ignores complications such as unit commitment constraints, transmission constraints, ramp rates, and the provision of load following and other ancillary services.

[11] The anonymous aggregate supply curve is allowed to be published under the rules but is not explicitly described in the rules. It is understood that this will provide information to participants about their position in the balancing merit order without identifying their competitors.

[12] Demand bids are not used in the new balancing arrangements.

[13] Potentially a generator might try to minimise price without regard for its profits so as to discourage new entrants into the market. This is ignored as being a quite limited strategy given that new entrants can benefit from capacity payments and by participation in the STEM.

This model was solved based on data for six actual days from November 2010 to June 2011. The data for these days were provided by the IMO and no particular logic was applied in their selection other than ensuring that they included a few interesting days. For each day the model was applied to four different trading intervals spread across the day. The market power maximising solution was determined for each generator in the WEM for each trading interval studied. A summary of the results is presented in the Appendix.

The major finding of this analysis was that the potential to exercise market power in balancing is limited. The volumes traded in balancing for any trading interval ranged between a decrease of 418 MW and an increase of 280 MW.[14] A generator's ability to influence price it is limited by the amount of capacity it has in that range and shape of the offer curve around that range. Of the 24 different trading intervals explored it was observed that:

- There were three trading intervals in which no generator could influence the balancing price.
- There were nine trading intervals in which only Verve could influence the balancing price. In each of six of these trading intervals its profit increase was less than $1000. In each of the other three trading intervals its profit increase was between $4,400 and $6,200. The largest profit gain required the withdrawal of 285 MW of capacity from the balancing market, though in all other cases less than 100 MW of capacity was withdrawn.
- There were three trading intervals in which only Alinta could influence the balancing price. In each of two of these trading intervals it's profit increased by less than $20, while in the third it gained $535 by withdrawing 11 MW of capacity.
- There were two trading intervals where an IPP other than Alinta was the only generator that could influence the balancing price. However, the maximum profit increase in either of these trading intervals was only $112.
- There were seven trading intervals where both Verve and Alinta, and occasionally at least one other IPP, could influence the balancing price. In all but one of these trading intervals the maximum profit gain by any generator was less than $250. The one exception was a trading interval where the competitive balancing price was $101/MWh. Verve could push the balancing price up to $335.50/MWh by withdrawing just 34 MW of capacity while Alinta could push it to $180.33/MWh by withdrawing just 2.8 MW of capacity. Verve's profit increase was $16,380 while Alinta's was only $248.

Of the 24 trading intervals, there were only four for which a profit gain of more than $1000 could be achieved with the greatest increase being $16,380. All these cases involved Verve withdrawing capacity from the market.

It seems unlikely that any generator would attempt to manipulate the market for such small gains, at least the ones giving a return of less than $1000 per trading interval. That said, in the most extreme case each MW of capacity withdrawn by Verve yields a gain of $481. At that level such strategies could become tempting in the absence of any market power mitigation. The ability of Verve to exercise market power in balancing is limited because most of its energy is scheduled via bilateral trade and the STEM and so is not available for manipulating the balancing market. Verve could potentially withdraw a lot more capacity from the market and drive the balancing price up by more, but would not profit by doing this.

[14] More extreme variations are certainly possible and may present more opportunity to increase profit. Note that a significant band of energy is offered at the maximum STEM price and once the competitive balancing solution is within this range there is no further ability for profits to be increased through the exercise of market power.

The load following ancillary service market has not been modelled. The level of competition in this market depends on the level of new entry. This is not easily modelled. The maximum forecast range of load following in 2012 is only ±90 MW[15] and it is conceivable that IPP's could, over-time, develop the capability to provide a significant proportion of this. The freedom with which IPP's can enter this market will place competitive pressure on incumbent providers of load following.

The conclusions of this section are based on some simplistic assumptions and overlook the following issues:

- The impact of uncertainty.
- The levels of active participation by IPPs.
- The level of transparency in the market.
- The impact of constraints.
- The likelihood that market power would be exercised.

The impact of these matters is explored in the following subsections.

7.3. Implications of Uncertainty

Uncertainty about balancing and load following volumes may limit the potential abuse of market power. The results reported in section 7.2 for the balancing market assume perfect foresight of the balancing quantities. The opportunity to maximise profits would be much reduced if the quantity to withhold from the market had to be determined without knowing the exact balancing quantity.

Forecast information on balancing and load following requirements do reduce uncertainty but they do not eliminate it. For example, Verve locks in its offers four hours before the first trading interval in which balancing occurs and up to ten hours before the last. There could be significant shifts in balancing forecasts over those periods of time. Such shifts will encourage Verve to be conservative and offer energy at cost.

The ability of Verve to exercise its dominance will be further reduced in practice because IPPs have the right to revise their balancing submissions for two hours beyond the standard deadline for the Verve portfolio.

7.4. Implications of Active Participation Levels

The level of competition in balancing and load following will depend on the level of active participation. Balancing is compulsory but the market rules only place restrictions on the prices in balancing submissions if market power is a consideration. A participant not subject to the market power provisions can (largely) avoid participating in balancing by offering energy it intends to produce at a very low price and by offering generation it does not want to run at a very high price. There are reasons why an IPP may choose not actively participate. In particular:

- An IPP reliant on gas needs to have flexibility in its gas supply arrangements if it is to move its facility output during the day – whether for load following or balancing. If it is not confident of securing gas to do this, or will be exposed to significant penalties under its gas contract, it may not actively participate.
- Uncertainty around how the balancing and load following markets will perform may discourage IPP participation until some history of market performance is available. The level of forecast information made available to participants will help in this regard, particularly once participants have had an opportunity to validate the forecasts by comparing forecast results with actual outcomes.

[15] 'Ancillary Services Report 2011, prepared under clause 3.11.11 of the Market Rules by System Management – 27 June 2011.' Western Power.

- It has been suggested, though not confirmed, that some operators of high cost generators may choose to price their energy out of the market with the aim of avoiding being scheduled. The logic of this would be to earn capacity payments while minimising the risk of exposure to capacity refunds that could arise if the generator was scheduled to run but failed to.[16]
- An IPP may view that the price at which it is prepared to respond to market signals to be outside the minimum and maximum price range of the market. The maximum energy price in the WEM is relatively low because generators recover a high proportion of their capital costs from payments made to them under the reserve capacity mechanism.

There is no fundamental barrier to participation in balancing or load following. Based on feedback from a number of IPP's it is possible that IPP participation in load following and active participation in balancing could be less than its full potential at the commencement of the new arrangements. In particularly, participation in load following cannot occur until a generator has the capability to provide the service and the lead times for this will limit the rate at which IPPs can enter this market. Once participants get to see the prices in these markets and can better understand the opportunities then levels of active participation can be expected to rise. The potential for greater IPP participation in these markets puts competitive pressure on Verve.

7.5. Implications of Transparency

Increased transparency is contemplated in the rules in the form of publication of the forecast balancing demand and prices and the publishing of the load following merit order. While not explicitly stated in the rules, the IMO also intends to provide participants with anonymous aggregate balancing supply curves. This information gives participants a greater ability to understand what is happening in the market and to react to the market. This will increase the competitive pressure in the market.

Transparency of data available for market compliance monitoring is aided by the introduction of clause 7A2.9(c)(ii). This clause requires that Verve submit to the IMO information about which facilities Verve intends to provide ancillary services from. Verve must alter its balancing merit order to ensure that energy required to be scheduled for the purpose of ancillary services is at the bottom of its balancing merit order, while energy required to not be scheduled is at the top. Without clause 7A2.9(c)(ii) it would be difficult to assess whether the remaining capacity is offered at SRMC.

Discussions with participants indicated that even greater transparency of market outcomes would be seen as beneficial. Some IPP generators have suggested that if they had full transparency of the unit by unit outputs of all generators then they would be less concerned about the potential for the exercise of market power in balancing. If market power were exercised then, they believe, they would be able to identify the behaviour themselves. Specific information identified by participants as aiding transparency was:

- Timely access to meter data or corresponding SCADA data for all individual generating units.
- The volume of non-contestable ancillary services scheduled from Verve facilities,
- Improved outage information. Comments were received that participants see significant price changes when outages occur and in some instance they only become aware of the outage from the price changes. This may in part reflect a lack of transparency of the fuel mix of capacity not on outage.

It is understood that that amendments to Chapter 10 of the rules create scope for the IMO to increase the level of information made public. It is recommended that the IMO assess the information described above with the objective of making more or improved information available to the market except to the extent that the release of such information is found to be detrimental to competition or the commercial interests of participants.

[16] It is understood that there is a proposal before the market to vary the level of capacity refunds based on the level of overall capacity available to the market. Peaking generators could be encourage to actively participate in balancing if the potential for balancing market revenues outweighs the potential exposure to capacity refunds. This would create increased competition and a downward pressure on balancing prices.

7.6. Implications of Constraints

The simple model presented in section 7.2 represents a single period market with no constraints on the provision of the energy. Real generators can be constrained in their operation and the performance of the balancing market will depend on the degree to which the design provides mechanisms for participants to effectively manage these constraints.

Ramp Limits

Balancing submissions allow the specification of linear ramp limits to apply for each trading interval. These ramp limits restrict the amount by which the output of a facility or the Verve Energy Balancing Portfolio can change between the start and end of a trading interval. A single ramp limit per trading interval may not perfectly reflect a balancing facilities capability in a given trading interval. This is particularly an issue for Verve, which has a portfolio of several thousand megawatts. Limitations in ramp modelling have the potential to have the market ramp a participant by a greater amount than it can actually provide. In the case of Verve's portfolio, this would require Verve to run more expensive facilities than it intended to make up the shortfall. A participant with a single facility may simply fail to conform to its dispatch schedules. In each case the balancing price will be lower than it would be if the market were using the true ramp limits. Equally, if the ramp rates are too restrictive, the market may determine balancing prices which are more extreme than they need be.[17]

Ramp rates could be used by a participant as a means of exercising market power. A participant could actually offer at SRMC but use its ramp rate to prevent that energy fully being available to the market. If a participant has a facility which has diversely changing ramp capabilities over its output range then it may be able to construct an argument that this was prudent behaviour given the restriction of the market design. The rule requirements that participant balancing submissions reflect their capabilities and that participants offer in good faith provide a basis for interpreting such actions as a rule breach. It would be worth conducting market surveillance of situations where ramp constraints restrict the scheduling of participants where this has a significant impact on prices and on the profit of that participant.

It may well be that balancing schedules do not vary so much from expectation that participants cannot manage ramp limitations with a single ramp limit, while exercising market power via ramp rates may be unattractive if effective monitoring exists. To the extent that ramp rate related issues arise in the market then these could be addressed by making ramp rate data standing data, and by including more information in that data as to how ramp rates vary with balancing facility/Verve portfolio output.

[17] Odd outcomes have resulted from limitations in ramp modelling in other markets. The Ontario electricity market once required generators to specify a five-minute ramp rate to apply to each facility for a five-minute real-time dispatch interval. During the morning ramp up period it was operationally necessary to stagger the order in which hydro and thermal units ramped up so as to maximise the ramp capability of the system. To achieve this required that generator offers differed from strict marginal cost. The (very) dominant generator, Ontario Power Generation, chose to avoid any concerns about market power abuse by offering all its generation at marginal cost, leaving the markets dispatch algorithm to manage the ramping process. The dispatch algorithm only looked five minutes ahead and so could not manage the complexities of ramping over longer time intervals. The result was that low cost but fast ramping hydro units were ramped at their maximum rates before higher cost units even began ramping. Once the hydro ramp capability was exhausted the system lacked the ability to keep up with the morning load growth and price spikes resulted. While the specifics of this issue are different from the situation in the WEM, and the dispatch time intervals were shorter in Ontario, there are similarities with the WEM context. In particular, Verve's portfolio is dispatched based on a single ramp rate and to the extent that the ramp rate is understated (even if not deliberately) then balancing prices will rise.

Constrained-On and Constrained-Off Payments

The balancing market is not settled solely based on a balancing price. System Management may have to schedule generators for power system operation reasons in ways which do not exactly match the balancing merit order. Transmission constraints can cause this. Some low cost generators may be constrained-off because there is not enough transmission capacity to get their energy to market, while other higher cost generators may be constrained-on to replace the low cost generation. To ensure that generators do not operate at a loss because of this, the new balancing arrangements allow for constrained-on and constrained-off payments to be paid to generators. These payments are not paid to the extent that the constraint is imposed by the participant. For example, if a participant set its own ramp limit to a low level to constraint itself on it does not get constrained-on payments on that quantity.

Transmission constraints can create so called 'local market power' issues. Consider a generator which costs $50/MWh to run and a trading interval with a balancing price of $60/MWh. If this generator is constrained-off by a transmission constraint then it will not run, but will earn $10/MWh to compensate it for the profit foregone due to the constraint. If this generator can predict that it will be constrained-off then it could change its offer price in its balancing submission to -$366/MWh and would receive $426/MWh in constrained-off compensation. Similarly, if the generator were to be constrained-on when the price were only $40/MWh it would normally get $10/MWh in constrained-on payments to compensate it for the costs not recovered by the balancing price, but could offer at $366/MWh and receive $326/MWh in constrained-on payments.

The SRMC provisions in the rules would apply in the latter case – the generator has exercised market power by bidding above SRMC. However, the SRMC provisions around balancing allow a generator to bid below SRMC, so do not of themselves prevent gaming of constrained-off payments. Clause 7A.2.13(c) addresses this latter issue by prohibiting the setting of prices in balancing submissions for the purpose of influencing constrained-on and constrained-off payments. The market rules therefore include appropriate measures to mitigate the exercise of market power with respect to constrained-on and constrained-off payments.

Some attention may need to be given to wind farms in the context of compliance monitoring and clause 7A.2.13(c). It is normal for wind farms to be offered at a negative price to reflect the fact that they receive income from renewable energy certificates (RECs) beyond income received in the energy market. However, if they are routinely constrained-off then the constrained-off payments may give them an incentive to offer at even more negative prices which are beyond the value they receive from RECs.

Unit Commitment

The WEM balancing arrangements schedule generators based on offer prices applicable for a single trading interval with only ramp limits constraining the solution relative to the prior interval. Subject to some oversight by System Management, the market design leaves it to the participants to manage the unit commitment of their generators, i.e. the timing of when each generating units start-up and when it shut-downs.

The approach assumed in balancing is the so called 'self commitment' model. The responsibility of managing the unit commitment of facilities is left to the participants. Similar approaches are employed in the National Electricity Market (NEM) and in the New Zealand Electricity Market (NZEM). The logic is that participants can make an assessment of the supply and demand conditions, the expected pries and their contract positions and form a view as to how to commit their facilities. They then submit offers which are constructed to have them scheduled to match this unit commitment.

There are some matters of timing and cost recovery that must be managed.

Consider the case of an IPP generator that makes a balancing submission at midnight. Based on the balancing forecast it sees that it is required to provide more energy at 10 AM then it currently has committed. If it were to take 6 hours to start up an additional generating unit then this IPP will have to start the unit up at 4 AM to be ready to synchronise at 10 AM. But the balancing price and schedule for 10 AM is determined based on the balancing merit order as at 6 AM. The IPP could bid at 6 AM exactly as it did at midnight, but faces the risk that:

- The balancing merit order has changed, with the result that it the newly committed generator is not scheduled.
- The balancing merit order is unchanged, but demand has changed enough to require balancing in the opposite direction. The market needs less energy, not more, so again it would not be scheduled.

In each case the generator would have incurred the start up cost without any compensation.

In principle the generator could lower its offer price in its 6 AM balancing submission to increase the likelihood that it would be scheduled at 10 AM. A generator may not have much scope to do this before it simply becomes unattractive to actively participate in balancing. Of course, this scenario is only going to be an issue if cheaper supply becomes available at 6 AM. Exactly this could happen, though, in the scenario where the direction of balancing reverses. As demand falls below expectation then multiple generators may be lowering their bid prices.

Even if an IPP generator can start units instantly, but subject to a start up cost, there is still the issue of how the IPP should bid so as to recover that start up cost. Based on forecasts of balancing prices the IPP could estimate how long it is likely to be committed for and average its start up cost over that period.[18] The risk that the IPP faces is that the balancing merit order changes or the degree of balancing required changes, such that it runs for a shorter time than expected and fails to recover its start-up cost. Further, if the start-up cost were to be significant enough then the participant may not be able to recover its start-up cost within the $366/MWh price cap if it only runs for a short period.

A generator can use unit commitment management as an excuse to hold capacity out of the market. For instance, a 100 MW generator with a $50/MWh running cost and a $20,000 start up cost could withhold capacity from the market by bidding $150/MWh on the claimed basis that it will run for only two hours when a more efficient schedule might have it bidding at $100/MWh and running for four hours. If the balancing price is $130/MWh then the 100 MW generating unit will not be scheduled but the participant may increase the over-all profit it receives from its lower cost generators that are running.

Verve might potentially employ a related strategy with respect to Verve Stand-Alone Facilities (VSAFs). The earlier balancing submission closure time for the Verve Energy Balancing Portfolio is intended to provide IPP's with some protection from Verve's dominant position. This restriction does not apply to VSAFs. Updated balancing submission can be made by VSAFs for two hours beyond the deadline for the Verve Energy Balancing Portfolio. The balancing submissions of VSAF will still be subject to the requirement that prices do not exceed SRMC and the value of SRMC will be more easily assessed for VSAF's than for the Verve Energy Balancing Portfolio. However, Verve could still influence the balancing price by managing the commitment times of VSAFs so as to increase (or decrease) the energy scheduled from the portfolio.

From a compliance monitoring view point it may be necessary to form a view as to whether a participant's expectations of commitment patterns are reasonable in situations where the participant profits from not committing a unit. It is recommended that if Verve makes use of VSAF's that market surveillance monitoring assess the performance of Verve based on its entire generating portfolio without distinguishing between VSAFs and the Verve Energy Balancing Portfolio.

[18] At least to the extent that forecast revenues are not sufficient to recover its start-up cost.

Finally, there is the issue of minimum generation limits. Consider a generating unit that can only run with an output between 20 MW and 40 MW. If the participant offers 40 MW in balancing and is scheduled to provide 15 MW then it cannot comply with this schedule. It is normal in self commitment markets for participants to manage this risk, but for IPP's with small generation portfolios there may not be much option for the generator but to choose not to participate by pricing its generation at the maximum price.[19]

The availability of forecast prices, balancing volumes, and anonymous aggregate supply curves on a half-hour basis will allow participants to make an informed view about the likelihood of being dispatched. The risks associates with unit commitment may still create some disincentive for generators to actively participate in balancing, lessening competitive pressure. However, it seems likely that the majority of the participants in the market will get use to these arrangements reasonably quickly and will develop approaches to managing the associated risks.

7.7. The Likelihood of the Exercise of Market Power

The scope posed the question of the likelihood of the exercise of market power. It is not possible for this reviewer to draw any conclusions about the intent of any participant in the WEM to exercise market power. Only general observations can be made.

International experience suggests that if a generating company is operating in an environment where it believes there will be no severe consequence from exercising market power then it will be more inclined to exercise such power. There is strong evidence of this from the experiences of the original electricity pool of England and Wales and from the original Californian Electricity market.

Where penalties exist for the abuse of market power then generators will tend not to attempt extreme strategies which would be easy to detect. Generators that seek to exercise market power may instead focus on short-term strategies that are hard to detect, e.g. capitalising on an outage, or longer term strategies that have small less noticeable impacts, e.g. increasing prices by 0.5% instead of 10%. A strategy available for a dominant generator is to simply not exert market power at all through the balancing market and instead do it all through the (less visible) contract market.

The combination of market power monitoring processes in the WEM and the corporate embarrassment that could result from being caught abusing market power should discourage significant abuse of market power.

7.8. Conclusion

Verve's market power in the balancing market is significantly mitigated because its bilateral contract and STEM positions limit the extent to which it can profit from the exercise of market power. IPP's also have market power but are very limited in their ability to exercise it. Uncertainty as to the actual balancing volumes further limit the ability of Verve and IPP's to take advantage of any market power they may have.

If active participation in the new balancing arrangements is high and constraints are not a major issue then the potential for market power abuse is not likely to be great.

It is possible that at the commencement of the market Verve may temporarily have increased scope to abuse its market power in balancing load following if IPP's are slow to actively commence participating. Any abuse of market power by Verve at such times will not serve its own self interest as increased prices will attract increased IPP participation. The barriers for existing IPPs to participate in balancing and load following are not great.

Compliance monitoring should consider the impact that participant unit commitment decisions have on balancing prices. In particular, it is recommended that if Verve makes use of VSAF's that market surveillance monitoring assess the performance of Verve based on its entire generating portfolio without distinguishing between VSAFs and the Verve Energy Balancing Portfolio. This will increase the likelihood of detecting price manipulation achieved through the commitment timing of VSAFs.

[19] The same issue can arise in the STEM currently. A participant can have the STEM clear at a point which is below the minimum generation that it can produce.

Increased transparency in the balancing market will help to mitigate IPP concerns and to discourage the exercise of market power. It is recommended that the IMO assess the potential for the release of increased or improved metering, ancillary service and outage data so as to further improve the transparency of the market. The IMO may need to limit such releases, however, to the extent that the release of such information is found to be detrimental to competition or to the commercial interests of participants.

8. Appropriateness of Measures for Countering Market Power Risk

8.1. Introduction

This section assesses the appropriateness of features to mitigate the risk of market power in the new balancing arrangements. This assessment recognises that the IMO and the Economic Regulation Authority (ERA) are small organisations which cannot devote unlimited effort to market compliance and market power monitoring. This assessment also takes as given the organisational, institutional and financial structures in place in the WEM.

8.2. SRMC Clauses

The market rules include the following clauses relating to SRMC.

- Clause 2.16.9 requires that the ERA, assisted by the IMO, monitor behaviour related to market power. A non-exclusive list of items to be monitored in this regard is specified and includes 'prices offered by a Market Generator in its Portfolio Supply Curve that do not reflect the Market Generator's reasonable expectation of the short run marginal cost of generating the relevant electricity'.
- Clause 6.6.3 requires that a Market Generator must not, for any Trading Interval, offer prices in its Portfolio Supply Curve that do not reflect the Market Generator's reasonable expectation of the short run marginal cost of generating the relevant electricity when such behaviour relates to market power'. This clause relates to the STEM, but is significant with respect to balancing as the Portfolio Supply Curve may provide a reference point for testing prices in Balancing Submissions against similar balancing SRMC clauses.
- Clause 7A.2.16 states that a Market Participant 'must not, for any Trading Interval, offer prices within its Balancing Submission in excess of the Market Participant's reasonable expectation of the short run marginal cost of the Balancing Facility, when such behaviour relates to market power', though recognises that clause 7A.2.3 requires that facilities other than the Verve Energy Balancing Portfolio must bid energy scheduled under a test or as a result of an Operating Instruction[20] at the Minimum STEM Price while clause 7A.2.9(c) requires Verve to offer some capacity at either the applicable high or low price cap so as to ensure it can deliver ancillary services. A 'Balancing Facility' is defined with respect to the individual generators of Market Generator's other than Verve and for each stand-alone facility. However, clause 7A.1.12 states that for the purposes of 'Chapter 7A only, unless otherwise indicated, the Verve Energy Balancing Portfolio is to be treated as a single Balancing Facility and references in this Chapter 7A to a Balancing Facility are to be read as including a reference to the Verve Energy Balancing Portfolio.'

These clauses relate to all participants, not just Verve.

It is understood that no participant has to date been found in breach of the SRMC clauses as they apply to the STEM. This would suggest that to the extent that competition in the STEM may be limited, the SRMC clauses are effective in deterring the abuse of market power. The ERA discussion paper 'Short Run Marginal Cost', 11 January 2008, provides a good discussion of SRMC and one which this reviewer broadly agrees with. Conceptually it is quite simple for a participant to assess its own SRMC – it is the incremental change in cost experienced by the participant as a result of an incremental change in output. Some sensible approximation may of course be required to define a supply curve with prices that increase monotonically with output as required by the market.

[20] These relate to calling Network Control Services and related ancillary features of the market.

An interesting issue concerns the interaction between the SRMC clause and obligations to offer capacity for generating units that are off-line. How should a unit that is not committed to run be treated in this context? This has not been an issue in the STEM because there is sufficient time between the running of the STEM and the trading day to commit most generating units that are off-line. In the new balancing market there may only be a short time between a balancing submission being made and a unit being required to run – this could be a shorter time than it takes for the generator to start up. In other self commitment markets, like the NEM, generators that are off-line with no intention of running simply do not submit offers. Depending on how the obligations to participate in balancing are finally specified[21] an off-line generator's capacity may need to be included in a balancing submission. Clauses 7A.2.8(b) and 7.A2.9(a)(ii) may be relevant, the former relating to IPPs and VSAFs the latter to the Verve Energy Balancing Portfolio. These clauses require that balancing submissions accurately reflect the capability of facilities to be dispatched in the balancing market for a given trading interval. This would appear to imply that if a facility cannot be committed in time to be available for a given trading interval then the participant may price that out of the market.[22] This interpretation requires that the SRMC clause for balancing be interpreted such that a unit that cannot be committed within the time available before the start of a trading interval can be priced at the maximum price cap. Further, the Balancing Facility Requirements, to be defined in procedures, would need to recognise this possibility if capacity refunds are to be avoided.

The intent of the SRMC provisions seems reasonable in context. A number of issues have been identified which should be addressed in the course of finalising the implementation of the new balancing and load following arrangements.

8.3. LFAS Price Limit Clauses

Clause 7B.2.14 requires that a 'Market Participant must not, for any Trading Interval, offer prices within its LFAS Submission in excess of the Market Participant's reasonable expectation of the incremental cost incurred of the LFAS Facility providing LFAS when such behaviour relates to market power.'

A price for load following is not like a price for energy. A load following price must recover the opportunity cost expected to be incurred by the generator for holding capacity available to load follow rather than constantly generate. It would be reasonable to expect that a small component of the offer price would recover the cost of supporting technology required for load following, such as Automated Generation Control (AGC).[23]

A common view expressed by those interviewed is that there will be at most two providers of AGC based on current generator configurations. However, IPPs without AGC did indicate that they would certainly be interested in exploring that capability if they could earn revenue from it.

Monitoring of LFAS offers will be important until enough alternative supply sources develop to offset Verve's dominance in this market. Monitoring of LFAS offers should be focused on assessing how closely the load following offers for the scheduled units match the profit foregone. Some allowance must be made for the uncertainty under which LFAS submissions are formed and for the impact that load following has on the balancing price.

The LFAS incremental cost clause is an appropriate method for curbing the ability of generators to profit from the abuse of market power to the extent that there is limited competition for the provision of the service.

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21 The full details of the obligations may only be apparent once the procedures are complete.

22 If the balancing price actually reaches the price cap then the facility could theoretically be called. However, System Management would know that it is not committed and hence would not issue it a dispatch instruction. The facility could be viewed as being constrained-off by the settlement system. However, since the offer price associated with the facility matches the balancing price there would be no constrained off payment made.

23 The specific requirements and obligations on load following generators are not stated in the current rules. However, it is reasonable to assume that AGC capability will be a prerequisite.

8.4. Good Faith Clauses

The market rules include the following good faith provisions with respect to submissions:

- Clause 7A.2.13 requires that Balancing Submissions must be made in good faith and that participants should not misled or deceive other participants with respect to material facts relating to the balancing market. Clause 7A.2.13(c) prohibits the setting of prices in Balancing Submissions for the purpose of influencing constrained-on and constrained-off payments. Clause 7A.2.14 defines a Balancing Submission as being made in good if 'at the time it is made the Market Participant had a genuine intention to honour that Balancing Submission if the material conditions and circumstances upon which the Balancing Submission was based remained unchanged until the relevant Trading Interval.' Clause 7A.2.15 allows the determination of good faith to be based on the conduct of the Market Participant or another person or the relevant circumstances.
- Clause 7B.2.11 requires that LFAS Submissions must be made in good faith and that participants should not misled or deceive other participants with respect to material facts relating to the load following market. Clause 7B.2.12 defines a LFAS Submission as being made in good if 'at the time it is made the Market Participant had a genuine intention to honour that LFAS Submission if the material conditions and circumstances upon which the LFAS Submission was based remained unchanged until the relevant Trading Interval.' Clause 7B.2.13 allows the determination of good faith to be based on the conduct of the Market Participant or another person or the relevant circumstances.

Although these clauses relate only to the material conditions and circumstances upon which the submissions are made, other clauses require that new submissions be made if circumstances change.

The interpretation of 'good faith' is difficult and one which can ultimately only be decided by the courts. These clauses include a variety of other specific requirements relating to misleading or deceiving others which are more measurable concepts and which may prove useful in proving the exercise of market power.

Clause 7A.2.13(c) addresses a weakness of the SRMC clauses with respect to constrained-on and constrained-off payments. By allowing generators to offer at less than SRMC the opportunity exists under the balancing SRMC clause for a generator that expects to be constrained-off to artificially inflate its constrained-off payments. This was discussed in section 7.6.

8.5. Information Release

The versions of the rules reviewed allow for the following information to be published by the IMO with respect to the new balancing and load following arrangements.

- Balancing forecasts – comprising expected balancing quantity for the market and the balancing price. While not explicitly identified in the rules, the rules allow and the IMO intends to release anonymous aggregate supply curves as part of this information.
- Provisional balancing prices
- Final balancing prices
- The LFAS Forecast Merit Order
- The LFAS Merit Order
- LFAS Prices

The balancing forecast and LFAS merit order data would aid participants in understanding the market.

The IMO already releases some information pertaining to outages and (cumulative) generator output. It was recommended in section 7.8 that transparency would be improved with increase information release concerning outages, ancillary service schedules and (specific) generator output data.

It is recommended that the IMO considering the publication of the level of Verve Energy Backup Load Following provided. System Management provides this information to the IMO under clause 7B.4.2

8.6. Restrictions on the Verve Energy Balancing Portfolio

The SRMC and good faith clauses apply to all participants. Verve's Energy Balancing Portfolio has some additional restrictions placed on it. These are:

- Verve does not directly determine the schedule for its resources. Instead, System Management forms the day-ahead schedule (the equivalent of a resource plan) based on a confidential scheduling procedure. It is understood that this process involves scheduling Verve generators so as to cover the balance of energy not supplied by IPPs. This limits the ability of Verve to manipulate its unit commitment in a manner that could allow it to distort its balancing merit order.
- Clause 7A.2.9 specifies bid submission cut-off times for the Verve Energy Balancing Portfolio to be two hours before the deadlines applicable for IPP's and VSAF's. The full detail of gate closures is not specified in the rules but is described in Table 1 above. The different gate closure times mean that if Verve attempts to increase or lower prices in its balancing submission for the purpose of abusing market power then the IPP's have time to respond to this behaviour before their own gate closure times. While there is a theoretical potential for VSAF's to create some problems in this regard being under the control of Verve[24], their behaviour will at least be more transparent for the purpose of compliance monitoring.

These features appear to be appropriate in the current context of Verve's large size and its role as the sole provider of most ancillary services.

9. Conclusions

9.1. The likelihood of the exercise of market power

A generating company has substantial market power when the competitive constraints imposed on it by its competitors are ineffective in constraining its behaviour. The risk of the exercise of substantial market power depends in the first instance on the extent to which the market is workably competitive. To the extent that a market is not workably competitive, then market power mitigation techniques provide an additional disincentive for the exercise of market power.

This review suggests that IPP participation in the balancing and load following ancillary service markets is the key to managing the exercising of market power. Each market has the potential to impose enough competitive pressure on Verve and other IPPs to significantly restrict the situations in which market power can be exercised in the balancing market. There are likely to be periods, however, during which competition is limited by constraints in the market or by low levels of active participation of IPP's in balancing. The level of participation by IPPs in the load following market may also be low at market commencement.

As discussed below, the market compliance related market power mitigation features of the new balancing arrangements should discourage significant abuses of market power in situations where competition is limited.

[24] VSAFs could offer to provide LFAS and then fail to do so, with the Verve Energy Balancing Portfolio being called on to provide back up LFAS at a premium rate; or a VSAF could issue a balancing submission with prices that hold some of its capacity out of the market, causing the Verve Energy Balancing Portfolio to not set the market price when it otherwise would have – market power has been exercised through a VSAF rather than the portfolio.

9.2. The potential outcomes if market power is exercised

Simple modelling of an idealised balancing market has shown that the potential gains from the exercise of market power are typically not great. A selection of 24 real trading intervals was studied. Balancing market trades ranged between a decrease in load of 418 MW and an increase in load of 280 MW. The balancing offer curves used were based on actual STEM data. There were only four trading intervals for which a generating company could use market power to increase its profit by more than $1000. The generating company involved was Verve. The maximum profit increase for Verve in any trading interval was $16,380. The ability of Verve to exercise market power in balancing is so limited because most of its energy is scheduled in bilateral trade and the STEM and so is not available for manipulating the balancing market. Verve could potentially withdraw a lot more capacity from the market and drive the balancing price up by more, but would suffer a loss.

These results assume perfect foresight as to what the level of trade through balancing would be. Real world uncertainty would make it more difficult to profit from the abuse of market power. .

The results also ignore factors such as ramp limits, transmission constraints and unit commitment constraints which may limit the level of competition in specific circumstances.

The potential to benefit from market power could also be increased if IPP's failed to actively compete with Verve in balancing. Factors such as gas contract limitations and uncertainty as to how the balancing market will perform may place some limits on IPP participation initially, but the financial benefits of participation should encourage increased participation over time. While more difficult to quantify, a similar situation exists with respect to the load following ancillary service. At the commencement of the new market there may only be one or two providers of the service. Verve would be very dominant in this market and is likely to have significant market power. However, Verve's dominance should be tempered by the relative ease with which existing IPP's can enter the market for the provision of load following.

9.3. The appropriateness of the proposed methods of dealing with market power risk

The primary mechanism for mitigating market dominance has been to enhance the potential for competition. High transparency of balancing market data will place participants in a good position to make informed updates of their balancing submission data. In particular, allowing IPP's a longer window in which to submit revised balancing data than is available to Verve will substantially limit the potential of Verve to take advantage of its dominant position.

To date, the SRMC clauses in the rules have provided a guide as to appropriate generator behaviour when market power is an issue. The imposition of an SRMC clause in balancing will continue to provide a very strong disincentive for the abuse of market power. The SRMC clause appears to be an appropriate mitigation against market power in situations where competition is inadequate. As discussed in the next section there may be some issues to be worked through with respect to the interpretation of the clause and in regard to constrained-on payments.

A related clause which limits load following submission prices will restrain the exercise of market power at the commencement of the new arrangements when competition may be limited. As the clause is new and the wording around limiting prices to a 'reasonable expectation of the incremental cost incurred' is open to interpretation, it is likely that additional guidance on this clause will need to be provided to industry. It is understood that the intent of the wording is allow LFAS providers to recover a reasonable allowance for energy market revenues forgone as well as some contribution to the cost of their LFAS equipment.

Good faith provisions in the rules place additional constraint on participant behaviour. The effectiveness of these in practice depends upon how the courts interpret them.

In the longer term, if Verve's generation remains in a portfolio managed by System Management then the ability to evolve the market and to create more competitive pressures will be limited. Such limitations make the market less transparent and raise the potential for inefficient outcomes that may be perceived as being due to market power, even if actually just a by-product of these limitations. The introduction of the Verve Stand-Alone Facility creates a mechanism by which the market can begin to transition to a more normal relationship between system operator and generator. There is however no requirement for Verve to make use of this feature.

9.4. Recommendations

It is recommended that the IMO and ERA review the interactions between: the balancing SRMC requirement (clause 7A.2.16); the requirement that balancing submissions accurately reflect the capability of facilities to be dispatched in the balancing market for a given trading interval (clauses 7A.2.8(b) and 7.A2.9(a)(ii)); and the Balancing Facility Requirements (to be defined in procedures); so as to ensure that a common and consistent interpretation is applied with respect to how facilities that are not committed and which cannot be committed in time to be available for a specific trading interval are to be priced in balancing submissions. The interpretation put forward in this review is that these clauses would allow such off-line facilities to be offered at the maximum price cap provided this was recognised in the interpretation of the SRMC clause and in the Balancing Facility Requirements.

The use of a single ramp rate per trading interval, particularly for the Verve Energy Balancing Portfolio may be restrictive. The materiality of this is unclear – the level of trade and uncertainty in balancing may not be so great as to conflict with half-hour ramp limits – but it would be worth monitoring the effectiveness of this approach during the early operation of the new arrangements.

It is recommended that the information made available to the market be increased so as to further increase the transparency, at least to the extent that the release of such information is not detrimental to competition or to the commercial interests of participants. If meter/SCADA data for individual generating units were published then participants would have a clearer basis for understanding the market outcomes. Improved information on outages information on the system's reserve margin by fuel type (e.g. assuming maximum availability of non-liquid fuels and separately assuming the maximum use of liquid fuels) would aid participants in predicting future behaviour of the balancing market. The level of Verve Energy Backup Load Following could also usefully be published. The required data is provided by System Management to the IMO.

Compliance monitoring should consider the impact that participant unit commitment decisions have on balancing prices. In particular, it is recommended that if Verve makes use of VSAF's that market surveillance monitoring assess the performance of Verve based on its entire generating portfolio without distinguishing between VSAFs and the Verve Energy Balancing Portfolio. This will increase the likelihood of detecting price manipulation achieved through the commitment timing of VSAFs.

If Verve does not seek to use the VSAF feature under the new arrangements then there may be merit in requiring the use of VSAFs. This would force Verve to begin to operate more like other participants in the market and would remove one barrier to evolving the market to a point where Verve is treated like any other participant. Any review of this matter might be conducted after the market has operated for a year and once the future of any restrictions on Verve and Synergy to apply beyond 1 April 2013 are known.

9.5. Overall Assessment

While no absolute statement can be made as to whether individual participants will exercise market power, it seems unlikely that a market participant could freely exercise market power to the extent of significantly harming competition. Given diligent market compliance and surveillance monitoring it seems likely that such behaviour would be detected. The very potential for detection should mitigate the risk of market power being exercised. The market power mitigation features of the new balancing and load following arrangements are appropriate to mitigate the risk and allow the detection of material market power abuses. Lesser or very infrequent market power abuses may occur and may not be detected but are less likely to have a material impact on the market.

Appendix: Modelling Results

The trading days and selections of trading intervals used in the model are identified in Table 2.

Table 2: Trading Intervals Used in Modelling

Trading Day	Features	Trading Intervals
13 November 2010	Typical	8 AM, 4:30 PM, 9:30 PM, 4 AM (14th)
23 June 2011	High outages	10 AM,5:30 PM, 11 PM, 6:30 AM (24th)
16 February 2011	High prices	8 AM, 4:30 PM, 9:30 PM, 4 AM (17th)
28 February 2011	Typical	8 AM, 4:30 PM, 9:30 PM, 4 AM (1st)
10 March 2011	High balancing trade	10 AM,5:30 PM, 11 PM, 6:30 AM (11th)
24 March 2011	Typical	10 AM,5:30 PM, 11 PM, 6:30 AM (25th)

For each trading interval studied:

- 'STEM Demand' is the scheduled system load and corresponds to the volume of energy scheduled through day-ahead processes.
- 'Balancing Demand' is the relevant quantity currently used to set the Marginal Cost Administered Price.
- 'Demand Change' is the Balancing Demand less the STEM Demand. This is the volume settled in balancing.
- 'Competitive Price' is the competitive balancing price.
- 'Profit Gain' is the increase in profit achieved by the generator relative to the profit it would earn (without withholding capacity) at the competitive balancing price.
- 'Capacity Withheld' is the MW quantity withheld by the generator. If Demand Change is greater than zero then this is the amount of economic generation not available to be scheduled on. If Demand Change is less than zero then this is the amount of economic generation that is running but is not available to have its output reduced.
- 'Gamed Price' is the balancing price which would result given the amount of capacity withheld.
- 'Best of Rest' indicates the IPP generator, other than Alinta, which has the highest profit gain value.

13-November-2010

10:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	851	807	-44	$29.95
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$27.27	1.1	$26.00
	Alinta	$61.10	10.0	$21.77
	Best of Rest	$7.18	1.0	$26.00
5:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	901	836	-65	$30.00
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	$11.70	30.4	$26.00
	Best of Rest	-	-	-
11:00 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	859	823	-37	$30.00
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	$1.40	28.8	$28.41
	Best of Rest	-	-	-
6:30 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	624	714	90	$30.00
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$233.10	29.5	$40.00
	Alinta	$7.19	3.9	$31.50
	Best of Rest	-	-	-

23-June-2011

8:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1226	1124	-102	$43.98
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$296.40	90.9	$33.92
	Alinta	-	-	-
	Best of Rest	-	-	-
4:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1218	1386	168	$101.14
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$16,380.42	34.0	$335.50
	Alinta	$248.49	2.8	$180.33
	Best of Rest	-	-	-
9:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	856	869	13	$50.48
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$14.90	3.7	$55.21
	Alinta	-	-	-
	Best of Rest	-	-	-
4:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	950	1015	65	$55.21
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	-	-	-
	Best of Rest	$3.83	16.8	$57.29

16-February-2011

8:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1235	1423	188	$231.90
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	-	-	-
	Best of Rest	$112.58	24.0	$249.30
4:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1583	1863	280	$336.00
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	-	-	-
	Best of Rest	-	-	-
9:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1312	1401	90	$56.75
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$5,099.17	76.7	$231.90
	Alinta	-	-	-
	Best of Rest	-	-	-
4:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	885	927	42	$29.31
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	-	-	-
	Best of Rest	-	-	-

28-February-2011

8:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1410	1364	-46	$116.00
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	$535.68	10.8	$80.91
	Best of Rest	-	-	-
4:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1768	1668	-100	$84.08
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$21.49	3.5	$74.76
	Alinta	$167.17	10.8	$60.25
	Best of Rest	$38.75	3.4	$74.76
9:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1474	1334	-139	$45.61
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$142.69	12.1	$39.39
	Alinta	-	-	-
	Best of Rest	-	-	-
4:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	974	893	-81	$30.48
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$70.43	2.4	$27.70
	Alinta	$1.60	2.1	$27.70
	Best of Rest	$4.37	2.0	$27.70

10-March-2011

10:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1426	1281	-145	$40.15
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$96.02	103.9	$23.00
	Alinta	-	-	-
	Best of Rest	-	-	-
5:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1700	1282	-418	$42.10
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$1,485.22	4.2	$33.68
	Alinta	$138.30	0.3	$33.68
	Best of Rest	$25.22	0.2	$33.68
11:00 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1219	887	-332	$18.95
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$6,111.51	284.7	-$58.79
	Alinta	-	-	-
	Best of Rest	-	-	-
6:30 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1088	952	-136	$20.00
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$92.62	78.2	$6.00
	Alinta	$7.80	7.3	$16.20
	Best of Rest	$18.69	7.4	$16.20

24-March-2011

10:00 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1462	1264	-198	$26.50
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	-	-	-
	Alinta	-	-	-
	Best of Rest	-	-	-
5:30 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	1538	1494	-43	$77.24
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$21.42	36.0	$76.22
	Alinta	-	-	-
	Best of Rest	-	-	-
11:00 PM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	933	1028	95	$40.63
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$425.96	28.8	$51.14
	Alinta	-	-	-
	Best of Rest	-	-	-
6:30 AM	STEM Demand	Balancing Demand	Demand Change	Competive Price
	861	1007	145	$52.48
	Company	Profit Gain	Capacity Withheld	Gamed Price
	Verve	$4,484.62	92.4	$128.76
	Alinta	-	-	-
	Best of Rest	-	-	-