Oakley Greenwood

Verve Energy Review

Market rules implementation discussion and information paper

Melbourne +613 9486 0897 **Sydney** +612 8006 8107 **Adelaide** +618 8331 1358 **Brisbane** +617 3263 7612

Table of CONTENTS

1. Background

The Minister for Energy has commissioned Mr Peter Oates to lead a team to implement the recommendations of the Review of Verve Energy (the Review). The work will cover arrangements around vesting between Verve and Synergy, market rules for the Wholesale Electricity Market (WEM) and also is to develop a Generation Outlook. This paper is being issued by the implementation team in order to present the framework within which the team intends to approach the development of the market rules component of the work.

While the reason for involvement is on implementation of recommendations of the Review, the impact will be market wide, particularly in relation to the market rules. Accordingly we will work closely with the Independent Market Operator (IMO) and as far as practically possible to utilise opportunities for stakeholder interactions through the IMO's established mechanisms, including the Market Advisory Committee (MAC).

The end result of the work on market rules will be a formal submission to the IMO for amendment to the market rules. Under the rules any amendments must be in the interests of the market as defined by the market objectives.

1.1. Approach

This initial paper provides a deliberately broad view of the fundamental principles of each phase of the electricity industry as the basis for discussion of the key issues around amendments arising from the Review.

We consider this is important in order to establish the context in which each element of the market design functions and how it currently does, or should in the future, contribute to efficient and effective outcomes. An overall description also highlights the key interactions between prices and the rules for different parts of the market and assists in avoiding ad hoc changes that inadvertently address one problem and create others. The analysis has a number of parallels with work published by the Energy Regulatory Authority (ERA) in its annual reviews of the WEM and by the IMO and our work has been informed by those previous studies.

Although all of the matters raised in the Review, including operation of the capacity mechanism through to dispatch and ancillary services, are covered in the paper, a practical program of work requires a focus on the different aspects in turn. For this reason we propose to focus initially on the shorter term operation covered by STEM and balancing. This is consistent with the current emphasis of the IMO under its market evolution plan.

We also note that while the paper looks at the operation of the market overall, as a matter of policy the basic structure of the market comprising the capacity market, STEM and dispatch/balancing is not under review. However, amendments to the design of each component are anticipated.

2. Industry phases in the WEM

The broad objectives for most power systems include a reliable and cost effective electricity supply to customers. To meet these objectives operation of the industry across the supply chain from fuel supply to customer meters covering investment, operational planning and short term preparation for dispatch must operate as an efficient and reliable whole.

In principle there are many ways the industry can be organised to achieve these outcomes, ranging from full central control to disaggregated markets that rely entirely on decisions by market participants.

In practice electricity systems that use market mechanisms use a combination of competitive, regulated mechanisms and prescriptive technical standards. The role of the market and competitive mechanisms is to create commercial incentives for future behaviours that together with the regulated and prescriptive elements lead to efficient and reliable outcomes.

Figure 1 provides a functional map of the WEM highlighting the features that comprise each element. This is followed by a critique of the efficiency and effectiveness of the WEM design features in meeting the objectives.

In the context of this work the key features are:[1]

- The WEM is a bilateral contract based net pool. Participants are responsible for arranging their own bilateral contracts "off market";
- A minimum level of investment in capacity that must be presented is set in accordance with a centrally determined reserve margin (by the IMO);
- Accredited generating plants and demand side resources are assigned capacity credits that entitle them to a capacity payment;[2]
- Caps, floors and values for a number of prices used in market settlement are set, for example maximum reserve capacity price, STEM MCAP and alternative MCAP, *margin_peak* and *margin_off peak*;
- The arrangements for capacity credits are based purely on technical performance and are indifferent to the capital or operating cost of the plant. The capacity credit arrangements therefore play no role in delivering a cost-efficient mix of plant across the SWIS as a whole, or for individual participants;
- A number of conditions are attached to the nature of capacity that can be accredited to receive capacity credits including operating profile (important for limited use demand side resources), back up fuel capability and in the case of intermittent generators a process to assess the amount of credits;[3]
- All accredited capacity must coordinate maintenance through System Management;
- A day ahead short term trading market, STEM, is operated by the IMO;
- Scheduled generation and relevant demand side resources must present resource plans relating to individual units;
- Dispatch is schedule based subject to adjustment by System Management in order to maintain security of operation; and
- In the event generators do not meet obligations under the rules for presenting capacity to market the WEM includes commercial penalties that "clawback" part of the capacity payment.

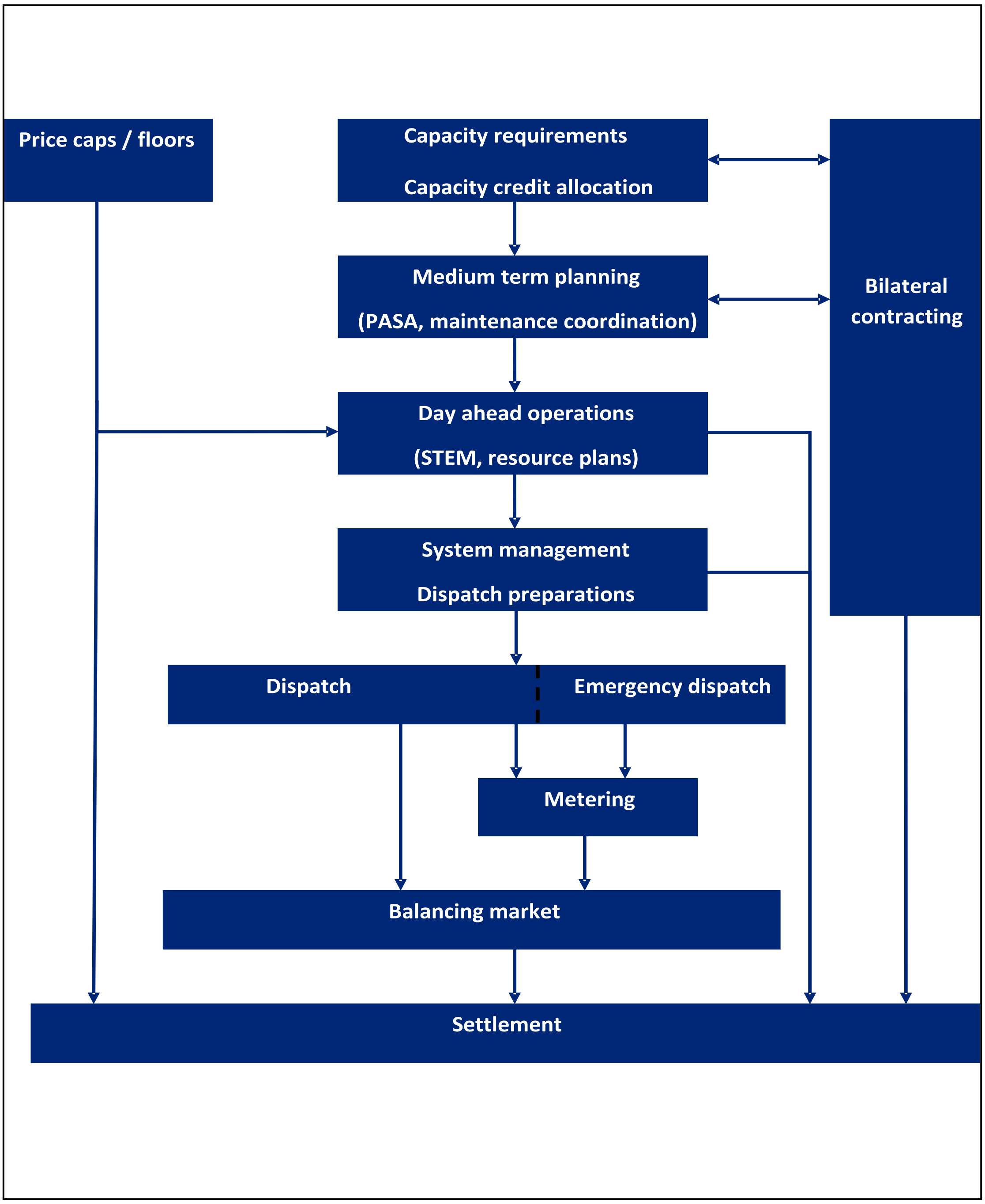
---

1 See www.imowa.com.au for comprehensive descriptions

2 The payments can be directly from the IMO or indirectly through bilateral contracts whereby customers' obligations to pay capacity payment to the IMO are offset

3 The level of credits awarded to intermittent generation is currently under review by the IMO including that intermittent generation plant may be presently favoured in the Capacity Credit allocation process and in doing so overestimates the available capacity at times of peak and that this will be exacerbated by the expected increase in level of wind generation over time

Figure 1 Overall functional map of the WEM



3. Investment phase

This section analyses the functioning of the investment processes of the WEM.

3.1. Industry context

The electric power industry is highly capital intensive, involves long lead times between a decision to invest and real time operation. Many assets have long economic lives. As a result a significant fraction of the costs of the industry is determined at the time of investment decisions.

Impacts of over- and under-investment

Under-investment in total will have an obvious adverse impact on reliability of supply. Over-investment in the first instance will increase reliability but at the expense of increased costs. Over- or under-investment in technologies with different cost structures will mean there will be a sub optimal mix of cost structures and this will also increase costs.

In a market environment, over-investment in total, or in a particular technology, will distort prices and revenues and reduce the attractiveness of the market as a credible place for future investment and thus be to the long term detriment of customers.

Nameplate v effective capacity

Reliability of supply is affected by both the nameplate capacity and the effective capacity after accounting for breakdowns and fuel availability and in the case of wind intermittency. Performance of generating units is affected by the design of the constituent components and how it is maintained.[4] Therefore the specification of the components at the time of an investment decision can have a major impact on overall reliability of supply, or can increase the number of generation plants needed to provide a given level of reliability to customers. All else being equal, the cost of construction and maintenance will generally be higher for more reliable plant.

Accordingly there is a trade-off between the cost of production over the lifetime of a generation plant and the reliability of performance. Getting the balance between cost and performance right is one of the key challenges for all power systems and for designers of market mechanisms where they are used to create incentives for performance.

3.2. WEM arrangements

The WEM provides for relatively strong central control of the total nameplate capacity available for dispatch through the capacity credit arrangements and capacity payment. It also sets a number of requirements for reliability of fuel supply and operating performance of accredited resources and includes a mechanism for clawback of part of the capacity payment in the event capacity is not made available.

A rational generating company operating within the WEM would be expected to account for costs and benefits related to:

- Capital expenditure;
- Maintenance expenditure;

4 For example the level of instrumentation to monitor emerging failures and redundancy of pumps, fans and valves and the quality of material used in manufacture.

- Operating expenditure (including for fuel);
- Ancillary Service related expenditure (capital and operating);
- Capacity credit revenue;
- Capacity credit penalties;
- Net revenue from off market bilateral contract trading;
- Bilateral contract payments;
- STEM trades;
- Net DDAP/ UDAP revenue in balancing;
- Ancillary service revenue; and
- Network charges and market fees; and
- Ancillary Service charges

While the current arrangements focus on the total capacity and hence the quantum of reliability, they leave the technology and cost mix to market incentives under the rules and contracts.

Accordingly the cost effective delivery of reliability is heavily impacted by market arrangements under the rules and by off-market bilateral contracting. If these arrangements lead to over-or under-investment, either in total or between technologies (and cost structures), the cost of operating the SWIS will increase and there may also be “winners and losers” amongst generators.

The Review highlighted an emerging over-capacity in total and also a poor mix of technologies with over-investment in base relative to total customer demand. While the Review identified this as one factor contributing the position of Verve, the issue of concern for amendment of the rules is that it is inefficient.

Provisions of the rules that became effective in October 2008[5] now effectively distribute a fixed capacity fund amongst accredited generation and demand side resources based on the IMO’s capacity requirements. Customers are therefore not faced with payment for capacity in excess of the requirement. However, capacity can still be accredited in excess of the IMO’s reserve requirements and receive a (diluted) payment. The effect of over-capacity is to increase reliability in the short term but introduce uncertainty into revenue for generator investments.

Market based mechanisms often show uncertainty of this form and it is a difficult area of market design. Markets also generally see depressed prices if over-capacity occurs, however, it is notable that in the WEM payments are made as a result of the operation of market rules, not only due the actions of competing suppliers. Other capacity market designs make payments only for the amount of capacity needed to meet the reserve requirement.

In the WEM the potential for clawback of part of the capacity payment and (as noted later in this paper) the absence of opportunity or incentive to voluntarily increase capacity in response to events within hours of dispatch should be expected to influence decision making by participants.

5 See WEM Rules cl 4.29.1

3.2.1. Prescriptive technical requirements affecting investment decisions

The detailed design process of any electricity market involves decisions about which technical characteristics will be prescribed in rules or other regulatory instruments and which will be left to individual participants to respond to commercial incentives.

Within each approach the specification of the technical characteristics and level of commercial incentive are crucial. For example, the access arrangements in the WEM have been criticised by proponents of small embedded generation units for being overly prescriptive about technical requirements for connection of these plants. We note the IMO has plans to review technical standards in its current work program. We would expect the requirements for small and asynchronous generating technologies found in wind generating resources and photo-voltaic solar cells (which have been contentious issues in many power systems) to be part of that work. Although different regulatory bodies manage market rules and network regulations in the WEM highlighting the importance of coordinated evolution of the overall arrangements.

We are not aware of any market based arrangements that do not include some prescriptive requirements. However, as technical standards for plant and equipment within a generating unit impact on cost of construction and ultimately on the price passed through to customers it is important that the standards are in themselves reflective of the value they deliver. However, it is often quite difficult to set such a value and thus difficult to define cost-effective standards.

Prescriptive standards are simpler to define and implement but the costs to meet them can readily move out of alignment with the value they bring, and hence commercial incentives are to be preferred where practicable.

3.2.2. Commercial incentives impacting plant design

Decisions about plant design and operation that are not subject to prescribed technical characteristics are by default matters for the generation businesses to decide in the WEM - for example, the timing of requests for maintenance, length of outage and flexibility to adjust maintenance arrangements on the basis of market conditions. Clawback of the capacity payment in the event capacity that is not made available is one of the commercial incentives in the WEM.

We would expect that the effective capacity of plant would also be a factor in bilateral contract negotiations with customers.

A recent development that highlights the interaction between technical requirements and commercial incentives is the decision to construct additional back up fuel facilities near Kwinana. This will undoubtedly increase the security of fuel supply and reduce the risk of affected generators being unable to supply into the SWIS. Depending on whether access to the storage is integrated into the capacity credit arrangements under the market rules it may also affect the commercial risks of the different generators to provide their own back up.

In addition the IMO is currently reviewing arrangements around fuel supply relating to capacity certification, in particular in relation to dual fuel issues.

As noted earlier market authorities must strike a balance between prescriptive technical requirements and commercial incentives in designing detailed arrangements.

3.2.3. The role of trading of bilateral contracts

In general the economically optimum portfolio of generating plants across a power system overall will comprise a mix of different technologies with different combinations of capital and operating cost in order that the dispatch can most efficiently meet the profile of customer demand.

This will usually mean that a single generating unit or technology will not be the optimum choice to supply a given customer demand profile. Accordingly it will be in most participants' interests to trade with other participants to optimise their portfolios and manage the commercial consequences of maintenance outages. This is a common feature of most electricity markets. More fundamentally, efficient system wide operation of a bilateral contract market such as the WEM relies on both generators and (wholesale) customers being able to enter the dispatch phase of the market with an optimised set of contract entitlements.

3.2.4. The role of STEM in facilitating new entry

Interactions between the different elements of the WEM are highlighted by the design and operation of the STEM. The STEM is primarily a short term trading mechanism, however all accredited capacity is required to be presented to the STEM and participants also have the option of presenting capacity that has not been accredited.

Where its price is attractive the plant will be accepted and thus enter dispatch as contracted plant. This mechanism provides a means for parts (or all) of any generation facilities that have not entered into a bilateral contract to obtain a revenue stream to progressively enter the market without the need for full contracting from the start and build a contract portfolio over time, although entry via STEM cannot be confirmed until the day before dispatch.

Clearly the price such plant receives within the STEM will impact the usefulness of the STEM in this role. Uncontracted capacity may be of most value at times of low reserve and hence the maximum prices that can be achieved will be important. On the other hand inefficiently high prices may lead to a surplus and distort operation of the bilateral contracting market.

3.2.5. Consequences of inefficient contract trading

If net contract positions are not efficient, over-building and an inefficient mix of investment is a predictable outcome. Both outcomes may lead to increased prices to consumers and create barriers to entry for new players.

We are aware the general question of liquidity of contract trading has been raised in comments to the IMO and is noted in its market evolution plan as a matter for future consideration.

A prima facie case for concern would exist if smaller participants, especially prospective and new entrants with limited opportunity to build a physical portfolio, were unable to access trades when needed – that is if bilateral trading was illiquid.[6] In this respect we note that there is relatively little trade in the STEM suggesting that one or more of the other mechanisms for participants to develop efficient books are adequate, or alternatively, that the final result is not efficient.

6 Illiquid trading in this sense refers to lack of opportunity to find counterparties to trade at efficient prices; it does not require high volumes of trading per se.

As off-market trading is confidential we are faced with the same lack of information about liquidity of contract trading noted earlier in relation to investment, and are thus reliant on input from participants in the market to raise any concerns in this regard.

3.3. Investment issues summary

A rational investor will be influenced by forecasts of the consequences of all actions and market outcomes that follow. If there are avoidable uncertainties about costs and revenues, barriers to efficient trading or future settlement outcomes that do not accurately reflect efficient costs then it is likely investment decisions will be inefficient in part because of unnecessarily high risk premiums.

The WEM design involves relatively strong central control of the amount of installed capacity. However, it also relies on commercial incentives created by the balancing market and capacity deficiency penalties for capacity to be constructed to be reliable and to present for dispatch. These incentives also influence decisions about technology mix.

The IMO is currently reviewing the assessment of the level of capacity credits for different technologies and is also examining operation of the balancing market. The Review noted that operation of the market in both these areas was impacting outcomes for Verve and also for the operation of the market overall, and is therefore of interest. As noted in the introduction to this paper, our initial focus will be on the shorter tem aspects of the market and its interactions with the decisions taken at the time of investment, especially those that affect technology mix and operational reliability. The work will be progressed jointly with the IMO.

4. Medium Term Operational Planning

4.1. Industry context

Following decisions to invest, the next important stage involves medium term operational planning in the weeks and months ahead of dispatch. In this stage participants arrange fuel supplies, determine maintenance plans and undertake off market bilateral trading.

4.2. The WEM arrangements

The mechanisms within the WEM are intended to allow greater sharing of resources than was previously practicable under the pre-reform wheeling arrangements that applied in the SWIS where IPPs were required to be self-sufficient, including holding standby capacity, but it is important to note that it remains a matter for the parties to pursue the level of sharing.

The design of the WEM allows participants to choose the level of trading of contracts to suit their needs. This can be important for parties whose operation or fuel supply is closely linked to external industrial processes.

STEM offers a last minute opportunity for trading but operates only one day ahead of dispatch and is therefore effectively a voluntary spot trading mechanism. Off-market bilateral trading between participants in the preceding days and months before dispatch is therefore crucial for efficient contracting and this is common to most competitive market designs for electricity.

4.2.1. Maintenance planning

One condition attached to the entitlement to receive capacity payments under the WEM rules is that periods of planned unavailability for dispatch due to maintenance be coordinated through System Management. By design, assignment of capacity credits and central coordination of maintenance periods is based purely on the volume of capacity available at a given time and takes no account of commercial consequences of the timing or nature of the plant. The WEM design therefore presumes that market participants will have sufficient commercial incentive and opportunity to seek commercially viable timing for maintenance and to arrange cost effective cover for maintenance outages.

This is a very common characteristic of oversight of maintenance in many market designs as it shifts the responsibility (and risks) for managing cost to participants and minimises the role of central authorities consistent with a market philosophy.

Generators and customers will benefit from an ability to adjust contract positions to accommodate timing of maintenance outages in the same way as they will to establish an efficient investment book of contracts. Very similar considerations about barriers to entry and the benefits of portfolio-generators that can arise if trading is not liquid noted earlier in relation to the investment phase apply here as well.

4.3. Summary

Most of the activity between investment and short term operation occurs off-market and as noted the design presumes it will lead to efficient portfolios presented for dispatch. The role of the market is therefore to avoid creating barriers to off-market bilateral activity and to facilitate it as appropriate.

5. Short Term Operational Market Operation and Technical Planning

The next phase of operation of the industry concerns short term planning for the next day covering physical operations and short term forward market operation.

5.1. Industry Context

The technical characteristics of electricity require close coordination of operation and short term planning arrangements include:

- Pre-dispatch – the detailed planning and forecasting of likely operations for each generating unit;
- Unit commitment – decisions about which generating units will be on line or shut down throughout the day;
- Recruitment of ancillary service; and
- Security assessments – detailed assessment by System Management about the physical security of operation and levels of reserve in the event of disturbances.

In a market context short term market operations are designed to finalise ex ante commercial prices and volumes.

The relevant arrangements within the WEM for these steps are contained within STEM, dispatch and balancing and ancillary services and are discussed below, although as foreshadowed earlier we conclude that unit commitment is not adequately accounted for.

5.2. WEM arrangements

While the STEM operates as a centralised mechanism for adjusting financial contract positions it takes no account of technical operating conditions beyond those implied in the STEM submissions. Submissions to STEM are at a participant level, which is appropriate for STEM as a contract trading mechanism, but is inadequate for analysis of impact on the power system of operation of individual generating units that underpin the portfolio submission. Accordingly participants are also obliged to submit resource plans at a unit level which identify the location in the network and the intended production of each unit.

The resource plans become the basis for assessment by System Management of the physical viability of planned operation. Under the current arrangements System Management effectively develops a resource plan for Verve plant, including unit commitment arrangements. It also calls for changes to the unit commitment of non-Verve plant to manage security constraints on operations. Ancillary Service requirements are also firmed up at this point, but may be amended by System Management at any time up to the minute of dispatch.

5.2.1. The market design does not facilitate efficient unit commitment

Our preliminary conclusion is that there is a gap in the design of the WEM at this point as there is no mechanism for any of the participant generators other than Verve to assess the merits of unit commitment and only limited opportunity for ancillary service requirements to be reflected in STEM outcomes. As result there is no opportunity for participants to see that ancillary service costs will be high or that Verve will be called to shut down units where it may have been possible for others to do so more economically.

Currently STEM is unable to signal these opportunities as it is a single pass process using one set of prices for incremental increases and decreases in production, although it does allow a second set of prices for different fuels for a given unit commitment profile but does not account for options involving shutdown and restart. Shutdowns can be instructed by System Management but these are handled separately through shutdown prices that apply in the event it instructs a shutdown for security reasons. Other markets tackle this issue by one or more of:

- Multiple operation of the equivalent of a security constrained STEM;
- Multiple operation and publication of security constrained pre dispatch with rebidding;
- Active bilateral trading and associated price discovery; or
- A centralised security constrained unit commitment.

STEM and balancing prices are determined in the light of the variable volumes and the prices submitted but does not (and cannot in its current form) account for the impact of unit commitment or operating constraints. To assess whether a change to unit commitment would be efficient it is necessary to account for discrete increments of production (between zero and minimum loading) and cannot be reflected in the current pricing arrangements.

Further the current STEM does not account for system wide security constraints – such as run back capability (often called minimum load reserve) and other ancillary services and can also mean STEM may develop a schedule that cannot be implemented and thus requires review, if needed, adjustment by System Management. Alternatively it may lead to a schedule that results in inefficiently high costs for ancillary services.

It is likely that this gap was less material while Verve held adequate flexibility to manage fluctuations in demand and to reduce output overnight without incurring significant costs. However, this is no longer the case and is expected to get worse as additional intermittent resources and generation facilities submitting inflexible base load resource plans become a greater percentage of the generation mix. It will also be exacerbated if climate change and renewable energy policy initiatives lead to a larger number of smaller generation blocks and increased risk network constraints.

Accordingly, the WEM does not provide either an administered process or market based mechanism for efficient decisions about unit commitment, ancillary service provision or management of network loading other than the technical vetting by System Management late on the day before dispatch after submissions by market participants have closed.

We also conclude that a number of the perceived problems with balancing arrangements are exacerbated by this gap in STEM. That is, the perceived problems with balancing are in part created by this gap in the design of STEM.

6. Dispatch and Balancing

6.1. Industry context

The final phase of physical operation of the industry is real time, second by second dispatch. The balancing market is a settlement of transactions imputed under the rules to have occurred as a result of the difference between the metered level of generation from dispatch and resource plans (adjusted for amendments by System Management instruction on the day). By this we mean it was a matter of choice in designing the WEM to base balancing transactions on deviation from schedules established the day before.

6.2. WEM arrangements

On-the-day dispatch in the WEM follows resource plans prepared the day before unless amended on the basis of security considerations by System Management. In the event demand varies from forecast or generation capability varies from resource plans, dispatch is varied in accordance with the rules on the basis of prices to increase or decrease production (or consumption in the case of schedulable demand). Different arrangements and payments apply to Verve and non-Verve plant submitted at the time of STEM.

Accordingly the efficiency of dispatch is primarily determined by which plants are run and in the WEM this is heavily linked to the resource plans. The relativity of prices submitted the day before for increasing or decreasing output affects the order in which those resources are dispatched. These prices together with priorities for avoiding uneconomic use of liquid fuels and the incremental costs submitted by Verve (developed in accordance with the rules) are used to form the merit order System Management uses if necessary to track system load.

In the same way that the gap relating to unit commitment noted in the preceding section was probably less of an issue while Verve was more dominant, the lack of other plants involved in dispatch/balancing was probably less of an issue for system wide efficiency, although we have not quantified this point. However, as the number and size of non Verve plants grows this effect can only increase in importance. It is also likely that the commercial impact may have been proportionally more significant for individual non-Verve generators who may have "left money on the table" by maintaining high load when they could purchase from other generators at a price less than their own operating cost – that is they fail to take advantage of the opportunity for economic pooling of energy production that the market offers. At present that opportunity is only available through STEM because Verve is the sole balancer.

The commercial transactions in the Balancing Market will be a factor in participants' decisions about prices and volumes offered in both STEM and for dispatch and will also affect forecasts of revenues at the time of investment and therefore have an indirect effect far earlier in the functioning of the industry. For this reason the commercial transactions in the Balancing Market may be more important to overall economic efficiency than the efficiency of the dispatch process in isolation.

6.2.1. Increasing participation in balancing

We are aware there has been wide discussion of the potential to open participation in balancing to more/all generators. This is also a call to give System Management the right (or obligation) to call more readily on all participating generators to track the overall supply demand balance on the SWIS. As a result there may be many more balancing transactions than now.

However, the overall cost of supplying electricity to the SWIS will only reduce if the plant presented to dispatch is closer to the optimum mix and also if the relativity of prices at which System Management can select plant are efficient.

Accordingly, while Verve's financial position could be improved by simply compensating them for costs incurred under current practices, and other parties may also be willing to participate on the same basis, this does not mean there would be any material gain in efficiency. It might simply change the allocation of cost between participants, tariffs and possibly the government to the extent any losses are covered by a Community Service Obligation (CSO).

Changes to ensure cost reflective unit commitment and relativity of dispatch and ancillary services should therefore be a key concern.

Further, if the current opportunities for trading in STEM are not being used extensively now, it is not clear whether participants will be more involved in balancing if the opportunity was available. We are aware that stakeholders and the IMO are examining the impact of concerns raised by some participants about their ability to manage fuel supplies within the timetable for market operation (see section 7.1 for further discussion) in this regard. Further work will be required to examine if this is a significant barrier to participation in both STEM and balancing.

6.2.2. Balancing Support Contracts

We also note that the market already has a mechanism for greater participation in balancing through Balancing Support Contracts. The ERA and advice to the IMO have also drawn attention to this mechanism. However, we understand these are effectively never used but appear to offer the opportunity to change which plants are used to track system demand in dispatch and thus improve economic efficiency.[7] In conjunction with changes to determination of balancing prices they may offer an early path to improvement.

However, it is important to note that Balancing Support Contracts may open up dispatch (and balancing) to more participants but will not of itself address the limitations relating to unit commitment or the forecasts of revenue used by investors. Therefore it would need to be demonstrated that improved participation in dispatch without changes in these areas would yield sufficient net gain to warrant the effort.

6.2.3. Impact of capacity credit penalties and balancing prices

A condition of participation and entitlement to receive capacity payments is that all available capacity is made available to the market and part of the payment is subject to clawback in the event it is not, unless excused as part of an approved maintenance outage. System Management has authority to direct capacity back into service to protect reliability but not for economic reasons.

A participant may choose to recall plant of its own volition and present to STEM if it can see an emerging high price. However, under the current rules there is no capacity based reward for a generator with a unit on approved maintenance to incur the additional costs involved and recall its plant early and earn revenue other than for producing energy in the event of a sudden loss of other generators after resource plans have been submitted. Plants returning to service in this way therefore earn energy based revenue but the market design places no value on an increase in capacity (in these circumstances) yet it penalises parties for reductions in capacity.

Further there is no means for System Management to instruct or accept an increase based on the cost of production. However, if a participant independently increases production relative to its resource plan in this way its energy will be paid at UDAP and Verve will be required to reduce to compensate, but ironically the participant may then be in breach of dispatch compliance provisions of the market.

In a power system with very volatile demand such as the SWIS the economic value of additional capacity (and energy) can change rapidly following generator breakdown. The current arrangements require Verve, as the sole balancer, to respond to such events and it will generally need to hold reserve in order to be prepared – this is a form of mandatory ancillary service. The market rules include a mechanism to recompense Verve for the associated cost and it is currently being reviewed in accordance with the rules.[8] We understand the compensation may increase significantly from its current level; however, this will have no impact on efficiency of operation and is an example of changes that shift the allocation of costs.

---

7 In discussion System Management has noted that one barrier to their use of Balancing Support Contracts is that the contracts would need to be funded from their budget and it is difficult to make provision in advance and hence their lack of use may be due to an incomplete administrative process

8 WEM Market Rules cl 9.92, Margin_Peak and Margin_Offpeak parameters

7. A Supply Chain View

To this point this paper has looked at the industry on the basis of the activities across time and highlighted the importance of consistency between commercial incentives at one time affecting key decisions at another time. An analysis of the industry as a supply chain is also useful and highlights a number of potential barriers relating to fuel and highlights the linkage between transmission access and market operation.

The industry supply chain comprises:

- Fuel (the primary energy source);
- Generation (conversion of chemical or potential energy in the fuel to electricity);
- Transmission and Distribution (transport of electrical energy); and
- Customer (conversion of electrical energy to end use forms such as heat, motion, light etc).

7.1. Management of fuel within the WEM

The primary fuels for generators in the WEM are coal, natural gas, liquid fuels and, increasingly, wind. Smaller amounts of other fuels such as land fill gas are also used. The WEM includes some features that recognise the operation of fuel in the supply chain, for example the two part STEM price cap that varies depending on whether liquid fuel is expected to be in use.

However, the overall design is premised on participants being able independently to arrange to purchase and transport fuel as needed for their generation portfolio. In particular, that participants can purchase supply and transport at efficient prices acting independently and can also arrange day to day operations within the timetable of the electricity market. Our understanding at this point is that except for natural gas these are reasonable assumptions.

In the case of gas there are potentially significant economies of scale in both the supply and transport. In the same way that bilateral electricity contracts will be efficient providing there is good opportunity for trading between participants, the same applies in the gas sector, although larger users with multiple facilities may be less dependent on trading to find efficient arrangements.

Gas contracts often include take or pay provisions and allow some (although generally limited) flexibility within a year and from day to day. We understand trading between participants occurs regularly, however, some smaller gas users report that their electricity market operations are constrained by the details of arrangements for gas.[9]

Defined procedures within the electricity market, including timing of gate closures and the timing of release of information are needed to ensure operation is practicable. However, uncoordinated procedures between gas and electricity may create avoidable inefficiencies. Participants in the WEM are required to make submissions to STEM before they have final details of the previous day's use.

We understand this can lead to conservative participation in the WEM that limits the ability of the WEM to reach an economically optimum outcome. This limitation may restrict the commercial viability of broader participation in balancing.

9 Submissions and discussions with IMO and the Review implementation team

What is not clear at this stage is whether the resultant loss of efficiency is material, and the relative contribution to the problem from incompatibility between gas and electricity practices and design of the WEM. Accordingly key questions for further work include whether the presumption that all parties can make adequate and efficient long and short term arrangements for fuel independently is valid and, if not, how material is the resultant loss of efficiency.

7.2. Transmission Access and Ancillary Service Costs

In broad terms the WEM is premised on network access arrangements providing for unconstrained access by generators who are required to bear the associated costs for network development. However, at times of low demand, total system costs can be impacted severely by whether that access is fully utilised by generators submitting resource plans to run at high loading levels at all times.

In a disaggregated market structure costs for balancing or ancillary services arising from low demand are generally not considered network costs and thus not reflected in transmission costs but included in energy and ancillary service requirements – and this is also the case in the WEM. Incentives for participants to act to optimise the total cost of energy and ancillary services thus depend critically on cost reflective prices and allocation of costs between participants in the energy and ancillary service elements of design.

At present the WEM requires that Verve carry much of the costs for the reserve and also provides little commercial incentive for total costs to be optimised. As noted earlier, the WEM also includes a mechanism to compensate Verve for the costs it incurs (and the quantum of compensation is under review at present). However, the WEM also allocates the cost on the basis of forecast annual quantities recovered on the basis of monthly contribution to demand of customers. This is a relatively weak signal to participants to act to reduce total costs at low demand. But, it should be one of the strongest incentives to a participants choosing between generating from their own plant, buying from the market or increasing ancillary service costs and will therefore be of interest as amendments are developed.

8. Next Steps

The objective of this paper is to present the approach to analysis and highlight how we will interact with the existing governance framework of the WEM. It has not set out to present solutions.

The paper also notes that while the Review was prompted by the position of Verve, amendments to the rules will be based on market principles for efficiency and reliability as defined by the market objectives.

While we have looked at each phase of the operation of the industry and how the elements of the WEM function within each, the initial focus will be on amendments to the shorter term issues within STEM and balancing. This fits well with the current work of the IMO. Our initial attention, in conjunction with the IMO and stakeholders, will be on:

- Facilitating efficient resource plans that:
  - better account for unit commitment and operating constraints including for network limits and system wide reserves);
  - consider the management of fuel supply and transport; and
  - thus improve the starting point for dispatch and operation of the balancing market and reduce the incidence of avoidable last minute cycling of generation plant;

- Assessing the costs and benefits of wider participation in balancing and real time dispatch including infrastructure costs for System Management and the likely level of participation noting that some participants will be driven by external factors related to industrial processes and fuel; and
- Cost reflective prices and charges within balancing and ancillary service to create efficient feedback to:
  - STEM submissions;
  - Resource plans;
  - Participation in balancing (to the extent allowed for under the rules);
  - Off-market trading of contracts;
  - On the day flexibility to amend (increase) capacity available; and
  - Investment decisions (in particular decisions affecting back up fuels and operating performance)

We anticipate terms of reference for a work package to address these matters will be released by the IMO shortly.

We expect to return to provisions affecting investment and medium term planning, with particular reference to factors driving inefficient over-investment and plant mix and issues around management of fuel (in particular gas) that are not addressed in the short term arrangements. A more detailed work program will be developed and be informed by the IMO's current work on capacity credits for intermittent generation.

9. Submissions

Comments on the discussion in this paper are welcome, especially for matters of concern or debate about our understanding of participants' positions. However, the primary purpose is to inform stakeholders of the approach we are taking to developing amendments to the market rules arising from the Review. We will be working with the IMO to develop concept positions and subsequently proposals for rule amendments. These will be subject to wide consultation with stakeholders primarily through the IMO's established mechanisms. Where appropriate, submissions on this paper would be appreciated by 4 February 2010.