Independent Market Operator

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1 INTRODUCTION

The IMO's Market Rules Evolution Plan (MREP) and recommendations of the Verve Energy Review (Verve Review) both identified the need for review of the Wholesale Electricity Market (WEM) Rules (Market Rules) for a number of aspects of the WEM. As a consequence of these two foundational pieces of work the Oates Review Market Rules Implementation Group was established to undertake a review of the current WEM design. In particular, changes to Capacity Credit arrangements (especially for intermittent resources) and the Market Rules relating to day ahead planning and real time dispatch reflected in the operation of the Short Term Energy Market (STEM), balancing market and ancillary services are being considered.

The aim of the review is to improve the arrangements within the Market Rules relating to:

- Participant's ability to prepare economically efficient and commercially viable resource plans accounting for management of fuel supply and unit commitment;
- Trading and pricing within the STEM;
- Economic efficiency of dispatch and provision of ancillary services;
- Pricing within the balancing market;
- Incentives and arrangements for efficient responses to changing market conditions, for example following generator breakdown; and
- The impact of the operation of, and prices developed within, the STEM and balancing on decisions taken by participants, including for example:
    - The role of STEM in facilitating entry of uncontracted generation capacity;
    - Assessments of the cost of different plant specifications against benefits of improved reliability; and
    - Participation in balancing and ancillary services to the extent feasible under the Market Rules.

2 BACKGROUND

2.1 Why we have the market that we have

The original market design process was aimed at minimising the risks often associated with the reform process by undertaking an evolutionary rather than revolutionary approach. In developing the market design, the goal was to facilitate greater competition and private investment by allowing wholesale purchasers of electricity, such as retailers, greater flexibility

as to how, and from whom, they procure electricity. The WEM was also designed to include a mechanism for ensuring that adequate generation and demand-side management capacity was available to satisfy the growing demand for electricity.

In more detail, the main drivers for the market design that was adopted were:

- The South West Interconnected System (SWIS) is a small, geographically isolated system which is not interconnected with any other electricity jurisdiction;
- There was a desire to reduce risk and encourage private investment;
- The initial industry structure was characterised by a small number of market participants, with limited diversity and number of generating plants;
- A number of existing participants were small in size and were expected to be financially vulnerable;
- The significance of the reliability objective to Government;
- As a result of a recognition of current limited competitive tensions; and
- To allow for fairness for all technology and energy options.

A further and key objective during the development and implementation of the market model was to minimise the implementation costs of the wholesale market while maintaining its efficiency and effectiveness.

The resultant, and current, market model involved a combination of:

- a bilateral contract market;
- a binding day ahead Short Term Energy Market;
- balancing and ancillary services mechanisms; and
- a Reserve Capacity Mechanism.

Other circumstances taken into account were:

- Perceptions about market power proved to be very important for private investors. The generation arm of Western Power was retained as a single entity (Verve Energy) rather than being split into a number of generators as in other states. The retail arm was also be retained as a single entity rather than being disaggregated;

- A substantial vesting contract was put in place to ensure an orderly opening of the market to competition. The vesting contract was designed as the key market power mitigation tool in the absence of fully developed competition in the market; and

- The Government had commitments in place to maintain uniform tariffs across Western Australia and to ensure price protection for customers.

2.2 Verve Energy Review

During 2009 the Minister for Energy for Western Australia initiated the Verve Energy Review to report on the causes of Verve Energy's financial position and performance, and present options which might improved Verve Energy's financial outlook and enable it to continue as a viable long term Market Participant making an appropriate contribution to the reliability of the South West Interconnected System.

The key findings from the Verve Review were:

- Verve Energy has suffered significant financial loss over the last three years;

- Verve Energy's forecasts suggest that the future will be better;

- Competition has increased since disaggregation;

- New private sector generation has been secured;

- Significant further investment is required over the next 10 years;

- Climate change and gas prices are a major and imminent challenge;

- The approach to wind generation in the SWIS needs careful consideration;

- There are no easy funding options for investment in the short to medium term;

- As a Market Participant the State is exposed to competitive risk;

- The Market Rules have significant shortcomings;

- The vesting contract has many issues which impact on Verve Energy and the sector;

- The system is now 10% over capacity;

- Increasing concerns about oversupply of base load plant overnight;

- Low tariffs have contributed to losses and represent a barrier to competition; and

- To date reliability measures have worked, and there are no threats going forward.

Following this, the Minister for Energy commissioned a team to implement the recommendations of the Verve Review. This work will cover arrangements around vesting between Verve Energy and Synergy, the Market Rules for the WEM and will also develop a generation outlook.

Changes to the Market Rules are expected in relation to the broader participation in the balancing mechanism, the provision of ancillary services and the provisions relating to pricing in the STEM and balancing mechanism, the acquisition of new capacity and the capacity deficiency penalties. This paper focuses on the first phase of improvements required in the Market Rules.

2.3 Market Rules Evolution Plan

The MREP Issues Paper was presented at the 10 June 2009 Market Advisory Committee (MAC) meeting. This paper identified the areas of the Market Rules that were acknowledged as requiring further work, as raised by various stakeholders during the first few years of operation in the WEM and consolidated during a specific consultation process.

Following this meeting MAC members were invited to indicate the relative priority of each of the issues on the list with the intention that the prioritisation exercise would assist the IMO to set the work priorities for the next phase of Market Rules development.

As a result of the prioritisation process five key issues were identified. These were to:

- Improve the balancing mechanism, with a view to allowing Independent Power Producers (IPPs) to contribute towards balancing where this makes sense economically and improving the mechanism to handle unexpected events between the clearing of the STEM and real time;
- Review certain aspects of the Reserve Capacity Mechanism;
- Review the STEM and identify areas for improvement that assist in increasing trade volume, price relevance and STEM predictability. This could include, but is not limited to moving closer to real time or multiple gate closures, increasing transparency of STEM offers, and undertaking a preliminary (i.e. forecast) calculation of Marginal Cost Administered Price (MCAP) (closer to real time);
- Review a closer alignment of gas and electricity nominations; and
- Review the procurement of ancillary services process and assess whether the provision of Ancillary Services should be opened up to competition for spinning reserve, frequency control and black start.

The IMO considered that the review of the balancing mechanism, STEM, alignment of gas and electricity nominations and ancillary services markets are interrelated and would largely

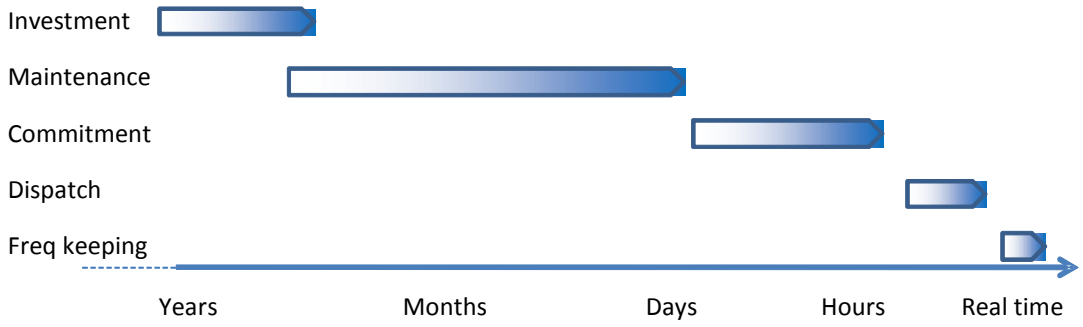
be addressed together, while the review of the Reserve Capacity Mechanism would be a standalone review. In relation to ancillary services, load following (frequency control) in particular is closely aligned with balancing.

3 TERMINOLOGY/ CONCEPTS

3.1 Coordination concepts

A fundamental requirement of any electricity market is that supply must be physically matched to demand in real time. Achieving this depends on decisions that are made over different timeframes along the lines depicted in Figure 1[1].

Figure 1: Illustrative decision timeframes



Working back in time from second to second (real time) operation, supply and demand will be balanced if:

- power system frequency is maintained within the prescribed limits around 50Hz (this has been labelled as frequency keeping in Figure 1);
- generation tracks minute to minute and hour by hour trends during dispatch;
- there is a viable combination of generating units on-line and capable of producing electricity with adequate upward and downward operating range as determined through the unit commitment process in use. e.g. unit commitment decisions can be made by System Management (central commitment) or by the operators of individual generating units (self commitment); and

[1] For simplicity, decisions regarding fuel and other resources are implied within these timeframes and other ancillary services for contingency and/ or voltage management purposes have been ignored.

- there is a viable combination of generating units available for unit commitment at any time as a result of decisions about how much capacity is constructed through the prevailing investment process and the maintenance process.

The focus of this review is on the final few days of operation and in particular:

- the day ahead arrangements (declaration of bilateral positions, operation of STEM, formation of net contract positions, initial unit commitment decisions and resource plans);
- on the day arrangements (commitment/ de-commitment of units, dispatch, balancing and the role of ancillary services); and
- how participants are compensated (pricing) for these services and the costs recovered.

3.2 Summary of current SWIS arrangements

Within the above timeframes, key features of the WEM can be summarised as follows:

- Day ahead arrangements:
    - Participants establish net contract positions (NCP) for the following day. i.e. through bilateral contracts and the day ahead STEM process.
    - Subject to potential amendment by System Management for security purposes, IPPs submit resource plans specifying how they will schedule their generation to match their NCPs, including when generating units will be committed/ de-committed.
    - System Management prepares a dispatch plan for Verve Energy facilities to meet forecast demand (net of IPP plans, intermittent supply etc). The dispatch plans are based on guidelines supplied by Verve Energy (i.e. its internal merit order). System Management decides when to commit/de-commit Verve Energy units.
- On the day arrangements:
    - IPPs commit/ de-commit and dispatch their plant in accordance with their resource plans, subject to System Management security requirements being met[2] (if System Management has to dispatch IPPs off resource plans it uses a 'dispatch merit order' prepared by the IMO from IPP balancing data).
    - System Management commits/ de-commits and dispatches Verve Energy facilities up and down as required to physically balance the market (in conjunction with load following or frequency keeping ancillary services).

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[2] Called dispatch criteria in the Market Rules.

- Pricing/ allocation of costs:
    - Verve Energy receives a half hourly administered price (MCAP) for deviations from its NCP (i.e. for balancing support).
    - IPPs dispatched off their resource plan (NCP) by System Management receive their pay as bid balancing price for the quantity involved.
    - IPPs which deviated from the NCPs, beyond tolerance limits, and were not dispatched off resource plan by System Management, pay/ receive penalty payments for the quantity involved. i.e. MCAP times peak or off-peak increase penalty factors (UDAP/DDAP).
    - Residual costs (differences between balancing payments to Verve Energy, and any IPPs dispatched off their resource plan, less UDAP/DDAP payments) are recovered from/ allocated to market customers.

3.3 Conceptual framework

In the WEM, decisions about commitment and to some extent dispatch could be made either by central bodies such as the IMO and System Management or by individual participants. Although it is generally accepted that System Management should have a right to intervene in the event there is a risk to security or reliability of operation.

Information about physical capability, operating costs, and potential system wide operating conditions and, where relevant, prices are needed by whichever party is responsible for making unit commitment decisions. Similarly shorter term and "real time" information about operating capability is needed by whichever party(ies) are responsible for making dispatch decisions.

The current arrangements in the WEM are a hybrid because:

- subject to possible amendment by System Management for security purposes, IPPs make unit commitment decisions about their plant, submit resource plans that specify their planned dispatch and dispatch their facilities accordingly;
- the WEM is thus organised with self commitment and self dispatch for IPPs; and
- Verve Energy plant is centrally committed and centrally dispatched.

Although there is a range of options, market settlement regimes can generally be classified as net or gross. Net settlement refers to payments, through a body like the IMO for energy produced or consumed for the volume of transactions that are not settled on a bilateral basis directly between participants. Under gross settlement regimes, the entire (gross) volume of energy produced or consumed is settled through a body like the IMO. Under both net and

gross settlement arrangements market participants can overlay other settlement mechanisms over any of the IMO settled amounts.

The options for unit commitment, dispatch and settlement can be summarised as depicted in Table 1 below. The row labelled "current" represents the current hybrid configuration and potential enhancements (discussed later). Note that gross settlement options[3] are not practicable in the WEM context given its bilateral focus, and have therefore been shaded in the table.

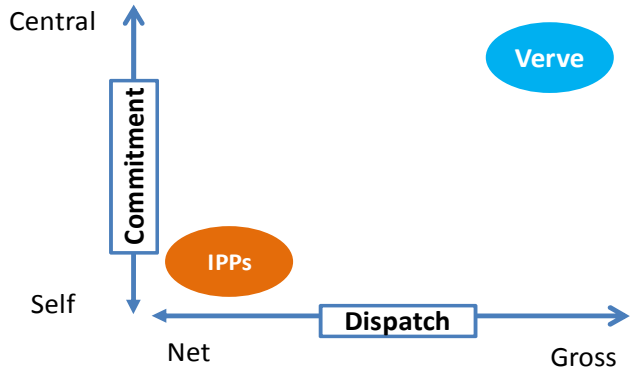
Table 1: Options for commitment, dispatch and settlement

	Commitment		Dispatch		Settlement	
	Central	Self	Gross	Net	Gross	Net
Current	**VE**	**IPPs**	**VE**	**IPPs**		**VE/IPPs**
Theoretical Alternatives	VE/IPPs		VE/IPPs		VE/IPPs	
	VE/IPPs		**VE/IPPs**			**VE/IPPs**
	VE/IPPs			VE/IPPs	VE/IPPs	
	VE/IPPs			**VE/IPPs**		**VE/IPPs**
		VE/IPPs	VE/IPPs		VE/IPPs	
		VE/IPPs	**VE/IPPs**			**VE/IPPs**
		VE/IPPs		VE/IPPs	VE/IPPs	
		VE/IPPs		**VE/IPPs**		**VE/IPPs**

These concepts provide a useful way of thinking about the different approaches markets adopt for coordinating physical operation within pre-dispatch and dispatch timeframes. For example, the current SWIS arrangements can be characterised as shown in Figure 2.

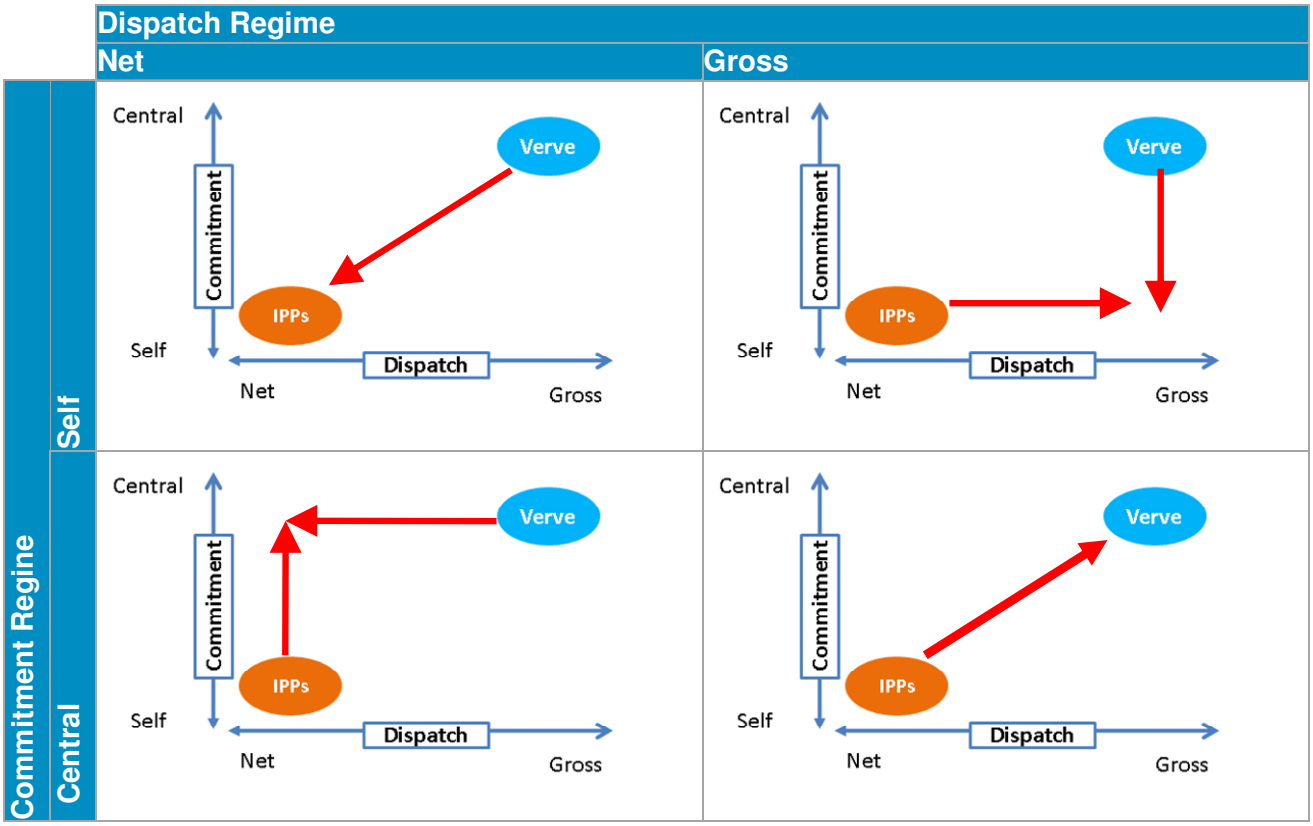
[3] Although this may apply in some circumstances (e.g. for uncontracted generation or for intermittent generation).

Figure 2: Existing SWIS arrangements



Changes to the Market Rules in relation to unit commitment and dispatch for participation in balancing would, of necessity, involve changes to the split of responsibilities and attendant risks as shown in Figure 3[4].

Figure 3: Coordination options



4 Note that the purpose of highlighting this at this stage is simply to explain the concepts involved; not to suggest any particular option. Potential development options are developed and considered later in section 5.

The arrows in each diagram in the above figure show directionally how the current arrangements would alter. The following sections describe the type of arrangements that would apply **if** arrangements for commitment or dispatch were to be amended.

3.4 Central and Self Commitment Concepts

In order that plant is ready to be dispatched (whether by System Management instructing generators or by generators operating to their resource plans), some decisions must be made in pre-dispatch timeframes. For example, deciding when to bring slower starting thermal generation into service.

Under the central commitment concept, the market would make these commitment/ de-commitment decisions on behalf of participants (as for Verve Energy now). This would involve generators including start-up and shut-down parameters in their offers (costs, times, minimum load etc). The market would then schedule generation to meet expected demand, based on offers, and generators would be instructed when to start-up and shut-down their units in anticipation of dispatch requirements.

Under the self commitment concept, generators would decide when to commit/de-commit units (as IPPs do now) and reflect this in their offers. For example, if a generator considered it profitable to bring a unit into service at a particular time, it would submit a zero (or low) priced offer to ensure it would be dispatched accordingly. Similarly, if it wished to de-commit a unit, it would offer the unit at a price sufficiently high to ensure it is not dispatched. In order to make these decisions efficiently, a generator needs to have a view of expected market prices (in turn depending on the pricing methodology employed) and some flexibility to alter its offers as market conditions alter. On the other hand, System Management and the market in general would want some assurance that plant will not be withdrawn leaving insufficient time for alternatives: this is normally addressed through the concept of a ‘gate closure’ time for changing an offer prior to dispatch /real time.

A key difference between self and central commitment is the allocation of risk. Under the self commitment concept, generators evaluate the commercial implications of starting or stopping slower starting units given expectations of market revenues, fuel requirements and unit start-up/ shut down costs and times. In this instance, generator offers comprise quantity, price and ramp rate information and market schedules are established on a half hour by half hour basis (accepting that forecast dispatch at the end of one half hour determines the starting point for the next half hour).

Under central commitment, participants submit start up and shut down costs and times, and any constraints/ costs on in service duration (e.g. fuel related), and the market decides whether to commit the unit. In this instance, the market process is more complex having to evaluate requirements over the full scheduling period. i.e. accounting for inter-temporal effects. Generally, market participants would be remunerated for all costs incurred regardless of market outcomes.

3.5 Net dispatch concept

Under this concept:

- All participants (Verve Energy and IPPs) would submit resources plans consistent with their NCPs.
- Participants would submit half hourly increment and decrement offers. i.e. an increment (decrement) offer indicating the amount of generation which it is happy for System Management to dispatch above (below) the resource plan level at a price specified in the offer.
- System Management would dispatch participants above or below resource plan levels, as required to balance the system, using increment and decrement merit orders based on participant increment and decrement offers.

By specifying the price(s) at which they are prepared to be dispatched above or below their resource plans, and by how much, generators could take advantage of profitable buy or sell opportunities. i.e. in effect an on-the-day opportunity to adjust their NCP.

3.6 Gross dispatch concept

Under this concept:

- All participants (Verve Energy and IPPs) would submit half hourly offers – an offer indicating an amount of generation which the participant is happy for System Management to dispatch (or not) at a specified price.
- System Management would dispatch all participants to meet demand using half hourly merit orders prepared from participant offers.

Note that under this concept, there would be no need for participants to submit resource plans. Instead, the market would prepare schedules indicating the amount of generation each participant is expected to produce (like IPP resource plans or Verve Energy dispatch plans).

A participant wishing to operate strictly at its NCP level would offer capacity equivalent to its NCP at zero (or even negative) price and any additional capacity at a very high price. i.e. similar to the way IPPs submit balancing prices now. Alternatively, a participant could offer portions of its capacity at prices it would be happy to reduce and or increase generation.

3.7 Pricing and settlements concepts

Over and above changes to commitment and dispatch pricing could also be altered. Although it is important that pricing be internally consistent with the arrangements for commitment and dispatch decisions about pricing are to some degree separable from the design of the physical arrangement. The following briefly summarises the options – noting that, as with commitment and dispatch the current SWIS design is a hybrid of the two broad approaches. Pricing is

clearly important commercially but also for creating incentives for efficient responses to market conditions that nether under or over reward or penalise participants.

Under the net dispatch concept, the basis for payments to generators dispatched off their resource plans by System Management would need to be determined but two general approaches could be considered:

- A single balancing price for each half hour could be set by the highest (lowest) priced increment (decrement) offer dispatched by System Management. All participants dispatched off resource plan by System Management would receive (pay) the single balancing price.

- Alternatively, participants dispatched off resource plan by System Management could be paid at their offered increment or decrement price. i.e. a *pay as offer* approach.

Under the gross dispatch concept, as for net dispatch, payments could either be based on a single balancing price or individual pay as offer approach.

4 EVALUATION CRITERIA

The purpose of the above discussion was to explain conceptually the ways in which markets can allocate decision making responsibilities within pre-dispatch and dispatch timeframes. Clearly any consideration of potential options needs to take account of the Market Objectives, as in the Market Rules and set out below for reference.

- To promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system;

- To encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors;

- To avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions;

- To minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and

- To encourage the taking of measures to manage the amount of electricity used and when it is used.

The WEM context and stakeholder perspectives will also be important considerations. It is therefore proposed that, subject to stakeholder feedback, the following assessment criteria be

adopted. Note that the overall Market Objectives are embodied in the concept of economic efficiency.

Table 2: Proposed evaluation criteria

Market wide perspective	Individual Participant perspective	System Management perspective[5]
Economic efficiency	Commercial risk management • Participants have sufficient information and ability to manage commercial risks.	Information for dispatch • Timely advice of planned operations and availability for commitment and dispatch (eg. merit order)
Competition	Fuel interactions • Sufficient information and market mechanisms to allow alignment with other energy segments, particularly gas contracting, nomination, timeframes etc.	Security Assessment • Sufficient and timely information for security assessment
Transparency	Physical dispatch • Confidence and certainty in the dispatch mechanism and its outcomes	Security Intervention • Appropriate authority for security intervention
Reliability	Commercially profitability, profit maximisation • Provide the mechanism for individual participants to participate profitably in the market	

[5] Subject to further review.

5 OPTIONS/ALTERNATIVES

5.1 Approach

Broadly speaking, development efforts to improve the coordination of resources within day-ahead timeframes could focus on:

- Options to improve the effectiveness/ efficiency of the current arrangements. i.e. with Verve Energy retaining the primary physical balancer role.
- Options to open up the physical balancing role to all participants. i.e. symmetrical treatment of all participants through net or gross dispatch arrangements.

The following conceptual design options have therefore been selected for evaluation purposes. Note that with respect to options B and C, self commitment has been adopted as a working assumption. The options have been deliberately designed to canvas a wide range. Discussion of any of the options should not be taken as indication that it is favoured over one that is not discussed. While the options have been chosen to be achievable, no evaluation has been undertaken - indeed the evaluation criteria have not been settled. Presenting a wide spectrum of options is expected to allow debate about the relative advantages and disadvantages and this is the purpose of this paper.

Table 3: Option A1: Enhanced Hybrid

Design concept	Key features

Retain Verve Energy as default/ primary balancer; opportunity for wider participation through balancing support contracts (BSC) supported by appropriate incentives (including pricing and cost allocation).	• Retains current hybrid commitment/ dispatch regime (Verve with central commitment/ gross dispatch; IPPs with self commitment/ net dispatch)
	• Consider realignment of electricity nomination vs gas nomination timing (later STEM in effect) to increase participant flexibility
	  ○ May increase incentives for BSCs and/or reduce on the day balancing requirements)
	• Either System Management, or System Management and Verve Energy, enter BSCs with IPPs
	• BSCs included in dispatch order available to System Management
	  ○ If System Management is sole BSC counterparty, need to investigate how to include BSCs in Verve Energy dispatch order
	• All balancing activity appropriately compensated and charged (BSCs and Verve Energy)
	  ○ Address any dis-incentives to enter contracts (e.g. UDAP/DDAP, pay as bid balancing, capacity obligations etc)
	  ○ Ensure that parties deemed to be creating the need for balancing/BSC face the costs

Note that interactions between net contract positions, half hourly resource plans, real time (within half hour) dispatch and pricing and settlement arrangements warrants investigation.

Table 4: Option A2: Enhanced Hybrid + re-nomination

Design concept	Key features
As above plus ability to re-declare contract position and adjust resource plan accordingly	• As for option A1 above plus ability for participants to re-submit contract quantities/ resource plans • Increased participant flexibility may reduce physical balancing requirements and/or incentivise/ remove barriers to BSCs ○ Need to consider timing, gate closure issues

Table 5: Option B: Net dispatch

Design concept	Key features

Net dispatch for IPPs and Verve Energy with both eligible to provide balancing support through increment/ decrement offers (or possibly BSCs)	• Net contract positions formed a day ahead as now
	  ○ Maybe with initial nominations realigned relative to gas nomination timing as in Options A1 and A2
	• But shift market from hybrid to net dispatch. i.e. retain IPP net dispatch and shift Verve Energy from gross to net dispatch.
	• Once net contract positions established, as now, IPPs and Verve Energy would submit resource plans, including initial unit commitment decisions, (as IPPs do now)
	  ○ Need to consider what information participants need to make initial self-commitment decisions
	• In addition to resource plans, Verve Energy and IPPs would submit half hourly increment/ decrement offers (or possibly via BSC based alternative[6]) covering the period to the end of the relevant dispatch day
	• The market would establish half hourly increment/ decrement dispatch merit orders from participant offers and provide dispatch forecasts to participants (or BSC alternative as noted above)
	  ○ Need to consider what information participants would receive
	• Verve and IPPs would self commit, de-commit units to meet resource plans and review/ revise inc/dec offers based on own and market conditions (including commitment decisions),
	• Need to consider offer revision protocols (e.g. how often/ when offers could be updated) and gate closure etc
	• System Management dispatches plant off resource plans (net dispatch) in accordance with increment/ decrement dispatch order (or BSCs), potentially including out of merit for security purposes
	• All participants dispatched for balancing appropriately compensated
	  ○ Need to evaluate pay as offer or single balancing price options
	• Ensure balancing costs are allocated to those causing the need

6 For example, Verve Energy could be obliged (and other participants able) to submit BSC tenders. e.g. BSCs could be used to ensure unit commitment to manage minimum load in pre-dispatch.

Table 6: Option C: Gross dispatch

Design concept	Key features

IPPs and Verve Energy compete to provide balancing support (on same terms) through offers for gross dispatch	• Net contract positions formed a day ahead as now
	  ○ Maybe with initial nominations realigned relative to gas nomination timing as in Options A1 and A2
	• But shift market from hybrid to gross dispatch model for IPPs and retain gross dispatch for Verve Energy.
	• IPPs and Verve Energy would submit half hourly offers for its gross capacity (reflecting NCPs and self-commitment decisions) covering the period to the end of the relevant dispatch day
	• Need to consider what information participants need to make self-commitment decisions
	• Offers may include zero or –ve prices (or fixed output if demonstrable physical reasons?)
	• Resource plans not required (manage NCPs through offers)
	• Market establishes half hourly dispatch orders for all capacity offered by participants and provides a dispatch forecast to each generator
	  ○ Need to consider what information participants would receive in dispatch forecasts
	• Verve Energy and IPPs would self commit, de-commit units to meet resource plans and review/ revise offers based on own and market conditions (including commitment decisions)
	  ○ Need to consider offer revision protocols (e.g. how often/ when offers could be updated) and gate closure etc
	• System Management dispatches all plant in accordance with merit order derived from (gross) offers, potentially including out of merit for security purposes
	• Market prices appropriately compensate participants with incentives for flexibility to increase or decrease in line with prevailing conditions.
	• All participants dispatched by System Management for balancing appropriately compensated
	  ○ Need to evaluate pay as offer or single balancing price options

Table 6: Option C: Gross dispatch

Design concept	Key features
	• Ensure balancing costs are allocated to those causing need